

Nigeria

Primary Maths

Grade 4

Teacher's guide

Pearson Education Limited

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and Associated Companies throughout the world

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How to use this course

The *New General Mathematics* Primary 4 Pupil's Book (PB) consists of 33 units. Each unit starts with a list of objectives, or commonly known as performance objectives (as listed in NERDC, 2013), that will be covered in each unit.

In addition, the exercises in the PB have been carefully developed to ensure integration of the performance objectives from the curriculum, and a steady progression of skills throughout the year.

It is important that you follow the order of the units, especially for related sub-topics, as units build on the knowledge and skills acquired in preceding units.

The units follow a 'teach and practise' approach:

- New concepts are explained and given context in their meaning.
- Worked-through examples show pupils how to approach problem solving.
- Exercises allow pupils to practise on their own.
- Revision exercises round off each unit as a mixed exercise covering all the problems addressed in the unit.

Summative assessment activities are provided at the end of every term in the form of Term assessments, along with a Term project. These assessments test pupils on all the knowledge and skills they have gained in each term, and the projects enable the pupils to apply the work they have learnt in practice.

Additional features include:

- **Key words:** Key terminology is highlighted for the pupils. Definitions are given in the PB and in the Teacher's Guide (TG).
- **Puzzles:** Additional problems, usually in a real-life context to help grow an appreciation of mathematics in everyday life.
- **Challenges:** extension problems for stronger pupils to attempt. These exercises generally

extend the scope of content covered in each unit.

- **Teaching notes:** advice and ideas for teachers in dealing with the content on each page.

Features of the Teacher's Guide

This *New General Mathematics* Primary 4 Teacher's Guide is lesson-based. The units of the PB are organised into a series of lessons. Units include most of the following features:

- The performance objectives from the curriculum that are covered in the unit
- A list of suggested resources you will need
- Definitions for the key words in the PB, as well as some additional key words and their descriptions
- Frequently asked questions relating to teaching the unit's content (not always applicable)
- Common errors pupils make (not always applicable)
- An evaluation guide showing the key learning milestones.

Each lesson includes the following:

- **Preparation** for the lesson (all the suggested resources) – remember, these can be tailor-made to suit the requirements of your classroom situation
- A **starter activity**, which helps you focus on the topic, or revise previous required knowledge
- **Lesson focus**, which suggests how you should teach the lesson and the main strategies you can incorporate
- **Answers** to all exercises, puzzles and challenges in the PB and Workbook (WB)
- **Assessment** guidance on how to effectively assess pupils in each lesson
- **Extension activities** (not always applicable)
- Suggestions for **homework activities**, where necessary.

Note: The lesson-based guidelines are *suggestions* only. You, as the teacher, will need to assess how much your pupils are able to cover in each lesson.

Features of the Workbook

The *New General Mathematics* Primary 4 Workbook provides a worksheet for every unit in the PB. Pupils use these worksheets to practise the specific mathematical skills and concepts covered in each unit. It forms as a consolidation of the pupils' understanding and is a useful resource for homework assignments.

Pupils can record their answers and calculations in the spaces provided on each of the worksheets.

The answers to these worksheets are all provided in the TG.

Methodology

Mathematics teaching and learning goes beyond reaching the correct answer. Many mathematical problems have a range of possible answers. Pupils need to understand that Mathematics is a *tool* for solving problems in the real world; not just about giving the correct answers.

The Mathematics classroom must therefore provide an environment in which problem-solving is seen as integral to the teaching programme, and where learning activities are designed to provide pupils with opportunities to think.

Working mathematically involves:

- questioning
- applying strategies
- communicating
- reasoning
- reflecting.

Pupils will require some, or all, of the above processes to make sense of any mathematical concept.

Problem-solving strategies include:

- trial and improvement
- acting it out
- making a model
- drawing a diagram or picture
- looking for patterns
- working backwards (inverse operations)
- using tables and data
- making a list.

Primary level 4 focuses primarily on building and strengthening the first five strategies listed above, and then in the later primary levels, builds on the other strategies.

Alongside developing these problem-solving strategies, it is important for pupils to gain specific mathematical knowledge as tools for problem-solving. At Primary level 4, these tools include:

- counting in thousands up to one million
- counting in groups of 5s, 7s (weeks and days), 60s (minutes and seconds)
- working with place value in 4-digit numbers
- counting in Roman numerals from 1 to 100
- ordering numbers up to 1 000 using < and > symbols
- finding the LCM of numbers up to 9
- finding the HCF of 2-digit numbers
- working with fractions (common and improper); changing improper fractions to mixed numbers and vice versa; obtaining equivalent fractions of a given fraction; applying fractions in sharing commodities; ordering pairs of fractions
- adding and subtracting whole numbers in Th, H, T, U with or without remainders
- adding and subtracting three 4-digit numbers, taking two at a time
- adding and subtracting two proper fractions, and improper and mixed fractions
- adding and subtracting decimals up to three places
- working with multiplication (whole numbers by 2-digit numbers not exceeding 50; multiplying decimal numbers by 2-digit numbers; calculating the squares of 1- and 2-digit numbers; identifying perfect faces in shapes)
- dividing 2- or 3-digit numbers by numbers up to 9, with or without a remainder; multiples of 10 up to 50
- estimating sums and products of numbers
- working with open sentences and word problems
- working with money (adding and subtracting; multiplying and dividing money by a whole number; calculating profit and loss)

- working with length (estimating distances in kilometres and estimating length in metres or centimetres; comparing length and adding and subtracting length)
- working with weight (computing addition and subtraction of weights using g and kg; multiplying and dividing weight by whole numbers)
- working with time (giving the time on clocks and reading dates on a calendar; using the notation a.m. and p.m. for the time of the day)
- working with area (finding the area of rectangles using the formula; calculating areas of shapes in the environment)
- working with capacity (adding and subtracting in litres; multiplying and dividing in litres with whole numbers)
- working with plane shapes (identifying plane shapes and lines of symmetry; distinguishing between horizontal and vertical lines; indicating the four cardinal points and relating these to the setting and rising of the sun)
- working with 3-D shapes (distinguishing between open and closed shapes; identifying the use of 3-D shapes in the home and environment)
- reading and drawing bar graphs (finding the mode).

Curriculum Matching Chart

NERDC Topic	Performance Objective	Pupil's Book Unit	PB Pages	WB Pages
Theme 1: Number and numeration		Sub-theme: Whole numbers		
1. Whole numbers	1. Count in thousands up to one million	Unit 1 Counting up to one million	8	5, 6, 7
	2. Solve problems on quantitative reasoning	Unit 2 Writing up to one million	14	
	3. Apply knowledge of counting to local counting in groups of: Fives Market days Sevens 60s	Unit 3 Counting in fives, sevens and sixties	20	8 9
	4. Solve problems on quantitative reasoning involving whole numbers			
	5. State the place value of a digit in four-digit numbers	Unit 5 Ordering of whole numbers up to 1 000	28	
	6. Count Roman numerals up to 100 (I to C)	Unit 4 Roman numerals	24	10
	7. Solve problems on quantitative reasoning involving use of Roman numerals			
	8. Order whole numbers up to 1 000 using the symbol < and >	Unit 5 Ordering of whole numbers up to 1 000	28	11 12
	9. Solve problems on quantitative reasoning involving ordering or whole numbers			
2. LCM	1. Find the LCM of numbers up to 9	Unit 7 Lowest common multiple	38	15, 16
3. HCF	1. Find the HCF of 2-digit numbers	Unit 6 Highest common factor	33	13, 14
Theme 1: Number and numeration		Sub-theme: Fraction numbers		
1. Fractions	1. Differentiate between proper and improper fractions	Unit 8 Proper and improper fractions	43	17
	2. Change improper fractions to mixed numbers			
	3. Apply fractions in sharing commodities in home, market, school, etc			
	4. Solve problems on quantitative reasoning involving fractions			
	5. Use decimal fractions up to hundredth			
	6. Solve problems on quantitative reasoning involving decimal fractions	Unit 9 Decimal fractions and equivalent fractions	50	18 19
	7. Obtain equivalent fractions of a given fraction			
	8. Ordering pairs of fractions			
	9. Solve problems on quantitative reasoning on equivalent fractions			
Theme 2: Basic operations		Sub-theme: Basic operations		
1. Addition and subtraction	1. Add and subtract whole numbers in Th. H. T. U with or without renaming	Unit 10 Adding and subtracting whole numbers	58	20
	2. Carryout correct addition and subtraction in everyday life activities			
	3. Add and subtract three 4-digit numbers, taking two at a time			
	4. Solve problems on quantitative aptitude problems involving addition and subtraction of whole numbers of four digits			
	5. Add and subtract: Two proper fractions Improper fractions and mixed numbers	Unit 11 Adding and subtracting fractions	64	16 21 22
	6. Correctly add and subtract proper and improper fractions in everyday life activities			
	7. Solve problems on quantitative aptitude problems involving addition and subtraction of fractions			
	8. Add and subtract decimals up to 3 places	Unit 12 Adding and subtracting decimals	70	23
	9. Correctly add and subtract decimals			
	10. Solve problems on quantitative reasoning involving addition and subtraction of decimals			
2. Multiplication	1. Multiply whole numbers by 2-digit numbers not exceeding 50	Unit 13 Multiplying whole numbers	80	24, 25
	2. Solve quantitative aptitude problems involving multiplication of whole numbers by 2-digit numbers			
	3. Multiply decimal numbers by 2-digit numbers	Unit 14 Multiplying decimals	86	26
	4. Solve quantitative aptitude problems involving multiplication of decimal number by 2-digit numbers			
	5. Calculate the squares of 1- and 2-digit numbers	Unit 15 Squares and square roots	90	27
	6. Identify objects with perfect faces, like cube and square shapes			
	7. Solve quantitative aptitude problems involving squares			
	8. Find square roots of perfect squares up to 400			
	9. Solve quantitative aptitude problems of square roots of perfect squares not greater than 400			
3. Division	1. Divide 2- or 3-digit numbers by: Numbers up to 9, with or without remainder Multiples of 10, up to 50	Unit 16 Dividing whole numbers	97	28
	2. Solve quantitative aptitude problems involving division			

NERDC Topic	Performance Objective	Pupil's Book Unit	PB Pages	WB Pages
Theme 2: Basic operations		Sub-theme: Derived function		
1. Estimate	1. Give meaningful estimate of sums and products of numbers	Unit 17 Estimating	103	29, 30
Theme 3: Algebraic processes		Sub-theme: Algebraic operations		
1. Open sentences	1. Define open sentences	Unit 18 Open sentences	109	31
	2. Find missing number in an open sentence			
	3. Solve related, quantitative aptitude problems on open sentences involving multiplication and division			
Theme 4: Mensuration and geometry		Sub-theme: Primary measures		
1. Money	1. Solve problems on addition of money	Unit 19 Adding and subtracting money	115	32 33 34
	2. Solve quantitative aptitude problems on additions of money			
	3. Solve problems on subtraction of money			
	4. Solve quantitative aptitude problems involving subtraction of money			
	5. Multiply money by a whole number	Unit 20 Multiplying and dividing money	122	
	6. Solve quantitative reasoning problems on multiplications of money			
	7. Divide money by a whole number			
	8. Solve quantitative reasoning problems in real-life situations			
	9. Calculate profit and loss			
	10. Solve quantitative aptitude problems on profit and loss			
2. Length	1. Estimate distances in kilometres and lengths in meters or centimetres and compare with measurements	Unit 21 Estimating and measuring length	132	34, 35, 36, 37, 38
	2. Add and subtract length	Unit 22 Adding and subtracting length	136	
3. Weight	1. Compute addition and subtraction of weights using Kg and g	Unit 23 Adding and subtracting weight	145	39, 40, 41, 42
	2. Multiply and divide weight by whole numbers	Unit 24 Multiplying and dividing weight	149	
4. Time	1. Give time on the clock, read calendar and write dates	Unit 25 Time	153	43, 44, 45, 46
	2. Solve problems on quantitative aptitude related to time			
	3. Use the notation am and pm for time of day			
Theme 4: Mensuration and geometry		Sub-theme: Secondary measures		
1. Area	1. Find area of rectangles using the formula	Unit 26 Introducing area	157	47, 48 49, 50 51
	2. Calculate areas of shapes, farmland, etc in the environment	Unit 27 Area of farmlands, towns and cities	161	
	3. Solve problems on quantitative aptitude related to areas			
2. Capacity	1. Add and subtract in litres	Unit 28 Adding and subtracting litres	165	52 53 54
	2. Multiply and divide in litres with whole numbers	Unit 29 Multiplying and dividing litres	169	
	3. Solve problems on quantitative aptitude related to addition, subtraction, multiplication and division involving litres	Unit 28 Adding and subtracting litres Unit 29 Multiplying and dividing litres	165 169	
Theme 4: Mensuration and geometry		Sub-theme: Shapes		
1. Plane shapes	1. Identify symmetrical plane shapes	Unit 31 Symmetry	181	58 59
	2. Locate line(s) of symmetry of objects in the school and home	Unit 32 Horizontal and vertical lines	186	
	3. Distinguish between horizontal and vertical lines			
	4. Indicate the four cardinal points and relate the setting and rising of the sun on the cardinal points of East and West			
2. Three dimensional shapes	1. Distinguish between open and closed shapes	Unit 30 Three dimensional shapes	173	55 56 57
	2. Identify the uses of three dimensional shapes in homes and their environment			
Theme 5: Everyday statistics		Sub-theme: Data collection and presentation		
1. Bar graph	1. Draw bar graphs	Unit 33 Bar graphs	194	63 64
	2. Read bar graphs			
	3. Identify bar graph mode			
	4. Identify the most common events/data in daily life activities			

Objectives

By the end of this unit, each pupil should be able to:

- Count in thousands up to one million
- Solve problems in quantitative reasoning.

**Suggested resources**

Charts for counting forwards and backwards in ones and hundreds; Abacus (for the **Challenge**).

**Key word definitions**

interval: gap or space between

count forwards: count up, numbers get bigger

count backwards: count down, numbers get smaller

**Frequently asked questions**

Q *What prior knowledge do the pupils need?*

A Pupils should be able to:

- count forwards and backwards up to at least 1 000, in a variety of whole-number intervals, including using starting numbers other than zero
- write 3-digit whole numbers in their expanded form
- order whole numbers up to 1 000.

**Common errors pupils make**

Pupils sometimes have difficulty in crossing the place value bridges, for example, from 9 000 to 10 000 or from 99 000 to 100 000. While counting, use a number line to demonstrate how the numbers progress.

**Evaluation guide**

Pupils to:

- Count up to 999 999 and one million using intervals of ones, tens, hundreds and thousands.
- Solve problems on counting numbers up to one million.
- Solve problems in quantitative reasoning involving whole numbers.

Lesson 1

Pupil's Book pages 8 and 9

**Preparation**

Prepare two charts similar to the diagrams on pages 8 and 9 of the PB.

**Starter activity**

Let pupils count in:

- ones from 1 to 10; 56 to 70; and 295 to 311.

**Lesson focus**

Put the prepared chart up on the board and explain to the pupils that when they count in ones they need to think about the gaps, or intervals, that they use. Explain that when we count in ones we use one interval, or gap, to get to the next number if counting forwards or previous number if counting backwards. The pupils should complete Exercise 1 before you move on to counting in tens. Assess pupils whilst completing the exercises to evaluate whether all the pupils are able to manage the counting. Assist pupils who struggle with the exercises.

Once the pupils have completed the exercises continue the lesson with counting in tens. Use the prepared chart to demonstrate to the pupils that when they count in tens the gap, or interval, is now 10. Emphasise that we use counting in tens to count a greater number of objects or numbers quickly. Complete Exercise 2 on page 9. The exercises focus on counting forwards. Allow the pupils to count backwards as extra practice.

The **Challenge** activities on pages 8 and 9 of the PB are suitable for all pupils to attempt. While more advanced pupils may be able to work unaided, others

might need a little help. These pupils may benefit from using an abacus or number line.



Answers

Exercise 1

- 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67
 - 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329
 - 2 493, 2 494, 2 495, 2 496, 2 497, 2 498, 2 499, 2 500, 2 501, 2 502, 2 5 03, 2 504, 2 505, 2 506, 2 507, 2 508, 2 509, 2 510, 2 511, 2 512, 2 513, 2 514, 2 515, 2 516, 2 517, 2 518, 2 519, 2 520, 2 521, 2 522, 2 523, 2 524, 2 525, 2 526, 2 527, 2 528, 2 529
 - 10 000, 10 001, 10 002, 10 003, 10 004, 10 005, 10 006, 10 007, 10 008, 10 009, 10 010, 10 011, 10 012, 10 013, 10 014, 10 015, 10 016, 10 017, 10 018, 10 019, 10 020, 10 021, 10 022
 - 987 654, 987 655, 987 656, 987 657, 987 658, 987 659, 987 660, 987 661, 987 662, 987 663, 987 664, 987 665, 987 666
 - 999 989, 999 990, 999 991, 999 992, 999 993, 999 994, 999 995, 999 995, 999 996, 999 997, 999 998, 999 999, 1 000 000
- 3, 4, 5, 6, 7, 8, 9, 11
 - 88, 89, 90, 91, 92, 93, 94, 95
 - 380, 382, 384, 385, 386, 387, 388
 - 2 713, 2 714, 2 715, 2 717, 2 718, 2 719, 2 720, 2 722
 - 869 242, 869 243, 869 244, 869 245, 869 246, 869 247, 869 249, 869 250, 869 251
 - 999 991, 999 992, 999 993, 999 994, 999 995, 999 996, 999 997, 999 998, 999 999

Exercise 2

- 27, 37, 47, 57, 67, 87, 97, 107
 - 985, 995, 1 005, 1 015, 1 025, 1 035, 1 045, 1 055, 1 065, 1 075, 1 085, 1 095
 - 9 890, 9 900, 9 910, 9 920, 9 930, 9 940, 9 950, 9 960, 9 970, 9 980, 9 990, 10 000
 - 327 726, 327 736, 327 746, 327 756, 327 766, 327 776, 327 786, 327 796, 327 806, 327 816, 327 826, 327 836, 327 846

- 989 690, 989 700, 989 710, 989 720, 989 730, 989 740, 989 750, 989 760, 989 770, 989 780, 989 790, 989 800, 989 810
 - 999 920, 999 930, 999 940, 999 950, 999 960, 999 970, 999 980, 999 990, 1 000 000
- 42, 52, 62, 72, 82, 92, 102
 - 4 759, 4 769, 4 779, 4 799, 4 809, 4 819, 4 829
 - 10 002, 10 012, 10 022, 10 032, 10 042, 10 052, 10 062, 10 072
 - 10 984, 10 994, 11 004, 11 014, 11 024, 11 034, 11 044, 11 054
 - 889 940, 889 950, 889 960, 889 970, 889 980, 889 990, 890 010
 - 999 920, 999 930, 999 940, 999 950, 999 960, 999 970, 999 980, 999 990

Challenge

(Page 8)

1. 100 2. 1 000 3. 10 000 4. 100 000

(Page 9)

250, 400, 550

Assessment

Assess pupils by ensuring that they are counting correctly in ones and tens, particularly in the larger number ranges.

At the end of the lesson you can assess the pupils orally by asking individual pupils to count in ones and tens starting at any number.

Extension activity

Pupils count forwards and backwards in larger number ranges.

Homework activity

If the pupils have not completed any of the exercises they could complete the written exercise at home. You could also ask them to complete the following at home:

- Count backwards in ones:
 - 98, 97, ..., ..., ..., ..., 92
 - 2 005, 2 004, ..., ..., ..., ..., 1 998
- Count backwards in tens:
 - 674, 664, ..., ..., ..., ...
 - 895 630, 895 620, ..., ..., ..., ...

Lesson 2 *Pupil's Book pages 10 and 11;
Workbook page 5*



Preparation

You will need:

- Prepared number lines which are marked but not numbered
- 2 sets of flash cards with the following numbers on them:
 - Set 1: 100, 200, 300, 400, 500
 - Set 2: 1 000, 900, 800, 700, 600
- Putty to stick numbers to the number line.



Starter activity

Ask a pupil to count in hundreds starting at zero. You can ask another pupil to take over once the pupil has counted a few numbers.

Put up the number lines and ask the pupils to put the numbers on the number line. Remind the pupils where zero would be. Ask pupils to count backwards from 1 000 in hundreds.

Ask pupils to place the second set of numbers correctly on the number line. Pupils can practice counting forwards and backwards using the flash cards and the number lines.



Lesson focus

Explain to the pupils that when they count in hundreds they are using an interval or a gap of 100 to get to the next number. Work through the example on page 10 together with the pupils. Encourage the pupils to ask questions should they not follow the explanation. The pupils should complete Exercise 3 before you move on to counting in thousands.

As an introduction to counting in thousands work through the example on page 11 of the PB. Emphasise that the interval is now 1 000. Demonstrate the interval on the number line in order to consolidate the concept. The exercises in the PB focused on counting forwards. Allow the pupils to count backwards as extra practice.

The **Challenge** activities on pages 10 and 11 of the PB are suitable for all pupils to attempt.

While more advanced pupils may be able to work unaided, other pupils might need a little help. These pupils may benefit from using an abacus or number line.



Answers

Exercise 3

- 100, 200, 300, 400, 500, 600, 700, 800, 900, 1 000, 1 100, 1 200, 1 300, 1 400
 - 350, 450, 550, 650, 750, 850, 950, 1 050, 1 150, 1 250, 1 350, 1 450, 1 550, 1 650, 1 750, 1 850, 1 950, 2 050, 2 150
 - 7 520, 7 620, 7 720, 7 820, 7 920, 8 020, 8 120, 8 220, 8 320, 8 420, 8 520, 8 620, 8 720, 8 820, 8 920, 9 020
 - 257 121, 257 021, 256 921, 256 821, 256 721, 256 621, 256 521, 256 421, 256 321, 256 221, 256 121, 256 021, 255 921, 255 821, 255 721, 255 621, 255 521, 255 421, 255 321, 255 221, 255 121, 255 021, 254 921, 254 821, 254 721, 254 621, 254 521, 254 421, 254 321, 254 221, 254 121, 254 021, 253 921, 253 821, 253 721, 253 621, 253 521, 253 421, 253 321, 253 221, 253 121, 253 021, 252 921, 252 821, 252 721, 252 621, 252 521, 252 421, 252 321, 252 221, 252 121, 252 021, 251 921, 251 821, 251 721, 251 621, 251 521, 251 421, 251 321, 251 221, 251 121, 251 021, 250 921, 250 821, 250 721, 250 621, 250 521, 250 421, 250 321, 250 221, 250 121, 250 021, 249 921, 249 821, 249 721, 249 621, 249 521, 249 421, 249 321, 249 221, 249 121, 249 021, 248 921, 248 821, 248 721, 248 621, 248 521
 - 777 549, 777 649, 777 749, 777 849, 777 949, 778 049, 778 149, 778 249, 778 349, 778 449, 778 549, 778 649, 778 749, 778 849, 778 949, 779 049, 779 149
 - 999 100, 999 200, 999 300, 999 400, 999 500, 999 600, 999 700, 999 800, 999 900, 1 000 000
- 139, 239, 539, 639, 739, 839, 939
 - 5 732, 5 832, 5 932, 6 032, 6 132, 6 232, 6 332

- c) 49 150, 49 250, 49 350, 49 450, 49 550, 49 650, 49 750
 d) 210 521, 210 621, 210 821, 211 021, 211 121, 211 221
 e) 782 740, 782 840, 782 940, 783 040, 783 140, 783 240, 783 340
 f) 999 200, 999 300, 999 400, 999 500, 999 600, 999 700, 999 800, 999 900
4. a) 687 500, 686 500, 685 500; b) 987 500, 988 500, 990 500, 991 500; c) 339 010, 338 010, 337 010; d) 1 599, 559; e) 510 000, 509 000, 508 000, 507 000

Exercise 4

1. a) 1 011, 2 011, 3 011, 4 011, 5 011, 6 011, 7 011, 8 011, 9 011, 10 011, 11 011
 b) 1 345, 2 345, 4 345, 5 345, 6 345
 c) 1 234, 2 234, 3 234, 4 234, 5 234, 6 234, 7 234, 8 234, 9 234, 10 234, 11 234
 d) 36 140, 37 140, 38 140, 39 140, 40 140, 41 140, 42 140, 43 140, 44 140, 45 140
 e) 899 353, 900 353, 901 353, 902 353, 903 353, 904 353, 905 353, 906 353, 907 353, 908 353, 909 353
 f) 988 000, 989 000, 990 000, 991 000, 992 000, 993 000, 994 000, 995 000, 996 000, 997 000, 998 000, 999 000, 1 000 000
2. a) 3 003, 4 003, 5 003, 6 003, 7 003, 8 003, 9 003
 b) 1 099, 2 099, 3 099, 6 099, 7 099, 8 099, 9 099
 c) 2 835, 3 835, 4 835, 5 835, 7 835, 8 835, 9 835
 d) 3 567, 4 567, 6 567, 7 567, 8 567, 9 567, 10 567, 11 567
 e) 13 350, 14 350, 15 350, 16 350, 17 350, 18 350, 20 350, 21 350
 f) 992 000, 993 000, 994 000, 995 000, 996 000, 997 000, 998 000, 999 000

Workbook

1. a) 17, 19, 21; b) 67, 66, 64, 62, 61; c) 508, 510, 511, 513, 514; d) 1997, 1998, 2000, 2001, 2003; e) 96 009, 96 008, 96 007, 96 005, 96 004
2. a) 40, 60, 80; b) 517, 537, 547, 567, 577; c) 3 045, 3 025, 3 015; d) 846 012, 846 002, 845 982; e) 29, 39, 49, 59, 69, 79, 89
3. a) 689 700, 689 800, 690 000; b) 625, 825, 925, 1 025; c) 600, 500, 400, 300, 100, 0; d) 7 888, 7 988, 8 188, 8 288; e) 425 629, 425 729, 425 829, 426 029

Assessment

Mark Exercise 4 and evaluate if the pupils have mastered the concept of counting in thousands. You may also ask the pupils to count in hundreds and thousands starting at different starting points and assess if they are able to count.

Extension activity

Ask pupils to complete the following:

Write the missing numbers:

- 840, 940, ..., ...
- 975, 985, 995, ..., ...
- 8 500; 9 500; ..., ...

Homework activity

Pupils can complete questions 1–4 on page 5 of the WB.

Lesson 3

Pupil's Book pages 12 and 13;

Workbook page 6



Preparation

You will need to have:

- A similar activity to the example on page 12, for example, 85, 185, ..., 385
- Flash cards with possible answers, for example, 175, 245 and 285.



Starter activity

Write the activity that you prepared on the board. Stick the possible answers to the board. Ask the pupils to select the correct number to put in the gap. Discuss with the pupils how they knew that was the correct number. Show them how the interval of 100 forms a number pattern. This number pattern assists us to know which number to put in the gap in the sequence of numbers. You may wish to repeat the exercise with other numbers.

Objectives

By the end of this unit, each pupil should be able to:

- State the place value of a digit in a four digit number
- Solve problems on quantitative reasoning involving whole numbers.

**Suggested resources**

Abacus; Flashcards for key words; Overlay cards for forming numbers.

**Key word definitions**

digit: one figure in a number

place value: the value of a digit based on its position within a number

**Frequently asked questions**

Q *What prior knowledge do the pupils need?*

A Pupils should be able to:

- write 3-digit whole numbers in their expanded form
- identify the place value of digits in 3-digit numbers
- order whole numbers up to 1 000.

**Common errors pupils make**

Some pupils forget to write the zeros in the place value table, if zeros are required. As a result, their final answer is incorrect. In the case of question 1.b) of Exercise 1, for example, some pupils will write the answer as 98 247, because they have forgotten to write the zero as a place holder for the hundreds. Encourage these pupils to check their answer each time by reading it back to themselves. If they read 98 247, they should realise that this is not the same number as 982 047.

**Evaluation guide**

Pupils to:

1. Write the place value of each digit in a given 4-digit number using spike abacus, pocket abacus, thread abacus; thread beads.

2. Write the place value of each digit in a given 4-digit number without using an abacus. Solve problems of place value and writing numbers in words and figures using quantitative reasoning.

Lesson 1

Pupil's Book pages 14 and 15

**Preparation**

You will need to have:

- An abacus for demonstration purposes and if at all possible abaci for pupils to work on
- Prepared overlay cards for pupils to see how numbers are formed.

**Starter activity**

Revise with pupils how to use an abacus, explaining the different columns and how they represent place value. Show the pupils a 3-digit number on the abacus. Ask them to tell you what number you have shown on the abacus. They should then show the same number on their abaci.

Form the same number using overlay cards. Ask a pupil to write the number on the board. Repeat this with another 3-digit number to ensure that all the pupils are comfortable with showing how 3-digit numbers are formed.

**Lesson focus**

Explain to the pupils the meaning of the words “digit” and “place value”.

Use a similar process to the starter activity: show the pupils a number on the abacus, for example,

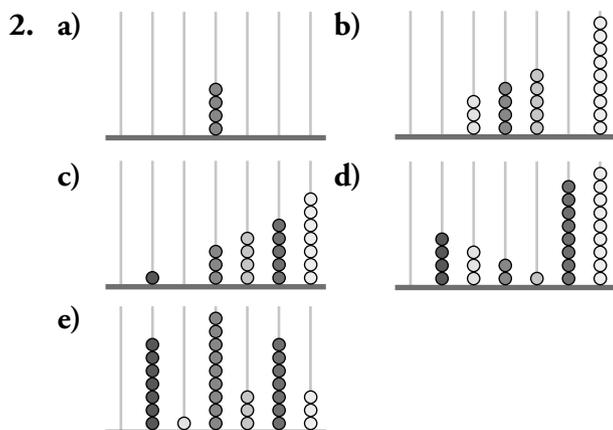
4 173. Show how the number is formed using overlay cards and then have a pupil write the number on the board. Ask other pupils in the class if they agree with how the number was written on the board. Now ask the pupils to identify the place value of each of the digits in the number: 3 = 3 units; 7 = 7 tens or 70; 1 = 100 or 1 hundred; 4 = 4 000 or 4 thousands. Repeat this, using different four-digit numbers until you feel the pupils have a good grasp of the concept.

Work through the example on page 14 of the PB. Ask pupils to complete Exercise 1.

Answers

Exercise 1

1. a) 458 369 b) 982 047
 c) 269 348 d) 999 999
 e) 782 656



Challenge

1. 24 3-digit numbers: 135, 138, 153, 158, 183, 185, 315, 318, 351, 358, 381, 385, 513, 518, 531, 538, 581, 583, 813, 815, 831, 835, 851, 853
2. 24 4-digit numbers: 1 358, 1 385, 1 538, 1 583, 1 835, 1 853, 3 158, 3 185, 3 518, 3 581, 3 815, 3 851, 5 138, 5 183, 5 318, 5 381, 5 813, 5 831, 8 135, 8 153, 8 315, 8 351, 8 513, 8 531

Assessment

Assess whether pupils can represent numbers correctly on an abacus and identify numbers represented on an abacus. Assess their answers to Exercise 1 in order to determine if they have mastered the concept.

Extension activity

Give the pupils any five digits. Ask them to find the biggest number they can make with the given digits and then to find the smallest number they can make.

Lesson 2 *Pupil's Book pages 15 and 16; Workbook page 7*

Preparation

- Overlay cards.

Starter activity

Write a number on the board, for example, 5 864. Ask the pupils how they would represent the numbers with overlay cards. Once the pupils have the correct way of representing the number with overlay cards ask them to write the numbers in a place value table like this:

Thousands	Hundreds	Tens	Units
5	8	6	4

Now replace the digits with words

Thousands	Hundreds	Tens	Units
five	eight	six	four

Explain that we can now write the number in words like this:

Five thousand, eight hundred and sixty-four.

Repeat with another number.

Lesson focus

This lesson focuses on teaching pupils to write numbers in words. Once you have completed the starter activity read the method for writing numbers in words as explained on pages 15 and 16 of the PB.

Work through the examples with the pupils. Explain to the pupils that it is important that we use the correct words to read and write numbers as mistakes are often made if a number like 5 864 is read as “five eight six four” instead of “five thousand eight hundred and sixty-four”.

Ask the pupils to complete Exercise 2 on page 16. Ensure that pupils are able to spell the number names.

Encourage pupils to attempt the **Challenge** on page 16. This challenge is suitable for all pupils. They could swap cards and complete the **Challenge** a few times.



Answers

Exercise 2

- a)** Nine hundred and ninety-nine; **b)** Five thousand and two; **c)** Eight thousand and fifty-four; **d)** Seventy-four thousand, one hundred and fifty-eight; **e)** Eight hundred and eighty-eight thousand, five hundred and sixty; **f)** Nine hundred and forty-one thousand, two hundred and sixty-three
- a)** Four hundred and seventy-one; **b)** One thousand, four hundred and three; **c)** Eighty thousand and one; **d)** Four hundred and twelve thousand and seventy-nine; **e)** Eight hundred and eighty-eight thousand, eight hundred and eighty-eight; **f)** Nine hundred and nine thousand and nine

Workbook

- Zebras: Five hundred and eight thousand and forty-two; Gorillas: Fifteen thousand two hundred and twenty-three; Rhinoceros: One hundred and sixty-two thousand eight hundred and two; Wildebeest: Nine hundred and forty-three

Assessment

Pupils should be able to write six digit numbers in words and demonstrate an understanding of place value.

Extension activity

Challenge the pupils to write numbers in different languages.

Homework activity

Pupils could complete question 1 on page 7 of the WB.

Lesson 3 *Pupil's Book page 17; Workbook page 7*



Preparation

Ensure that you have read through the explanation in the PB on page 17.



Starter activity

Revise how to write numbers in expanded form. For example, $1\ 847 = 1\ 000 + 800 + 40 + 7$

Ask pupils to complete some examples on the board, such as, $2\ 183 = \dots$



Lesson focus

In this lesson pupils will learn to write numbers, which are written in words, in figures. Explain to the pupils that when numbers are written in words we indicate place value in the words, for example five hundred and eighty three is $500 + 80 + 3$. Work through the example on page 17 with the pupils. As you read each of the steps you could demonstrate the step on the board. Pupils complete Exercise 3.



Answers

Exercise 3

- 167; 2. 611; 3. 9 002; 4. 900 600; 5. 900 833; 6. 1 000 000; 7. 2 546; 8. 9 166; 9. 400 254; 10. 700 707; 11. 789 089; 12. 900 909

Workbook

- Elephants: 1 022; Lions: 252 911; Monkeys: 806 499; Giraffe: 2 474.

Assessment

Pupils are able to write numbers in expanded notation.

They can also write numbers which are written in words in figures.

Extension activity

Ask pupils to page through an old newspaper or old magazine and look for numbers which are written in words. They should then write these numbers in figures.

Homework activity

Pupils can complete question 2 on page 7 of the WB.

Lesson 4 *Pupil's Book page 18*

Preparation

Work through the exercises in order to be able to easily explain how to complete them to the pupils.

Starter activity

Revise the work of the previous two lessons. Ensure that pupils know the steps for writing numbers in words and writing numbers in figures.

Ensure that the pupils know how to draw the geometrical shapes that are used as symbols in questions 2 to 4.

Lesson focus

It is important to that pupils see the patterns involving shapes and symbols.

Guide the pupils through each of the exercises as questions 1 and 5 demand different approaches to questions 2 to 4.

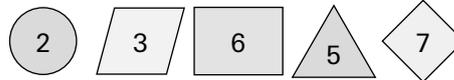
Answers

Exercise 4

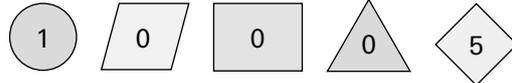
1.

Units	→	3
Ten thousands	→	1
Tens	→	5
Hundreds	→	6
Thousands	→	8
Hundred thousands	→	2

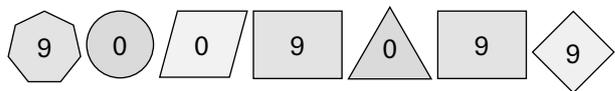
2.



3.



4.



5.

Nine thousand, one hundred and sixty-six	→	4 215
Ten thousand and one	→	111 111
Eight hundred thousand, five hundred and ten	→	9 166
Four thousand, two hundred and fifteen	→	10 001
Nine hundred thousand and nine	→	800 510
One hundred and eleven thousand, one hundred and eleven	→	900 009

Assessment

Pupils should be able to identify place value up to one million.

Ensure pupils can read and interpret numbers written as words.

Pupils' quantitative reasoning skills should allow them to match the appropriate symbols with the correct place value.

Lesson 5 *Pupil's Book page 19*

Preparation

Read through the summary and examine all the questions in the Revision exercise.

Decide if you would like the pupils to complete all the questions or if you would want them to complete only a selection of the questions.

Decide on the length of time you will give the pupils to do the questions you set them.



Starter activity

Ask pupils to read the summary on page 19. Ensure that they understand what they have read.



Lesson focus

The pupils should be clear on which questions they should complete and how long they have to complete them. Assist them if they are not clear on the instructions.

This is an opportunity for you to informally assess what the pupils have learnt and if there are any gaps in their knowledge.



Answers

Revision exercise

- a)** 5 000; **b)** 50 000; **c)** 500 000; **d)** 50; **e)** 500; **f)** 5
- a)** $2\ 000 + 300 + 40 + 5$; **b)** $20\ 000 + 3\ 000 + 400 + 50 + 6$; **c)** $200\ 000 + 30\ 000 + 4\ 000 + 500 + 60 + 7$; **d)** $100\ 000 + 9$; **e)** $900\ 000 + 9\ 000 + 900 + 9$; **f)** $900\ 000 + 90\ 000 + 9\ 000 + 900 + 90 + 9$
- a)** 2 345; **b)** 65 432; **c)** 460 715; **d)** 805 302; **e)** 900 009
- a)** 1 092; **b)** 4 446; **c)** 100 864; **d)** 618 502; **e)** 909 909
- a)** Two thousand and sixty-seven; **b)** Three thousand six hundred and four; **c)** Thirteen thousand and six; **d)** One hundred and twenty-five thousand, four hundred and twenty-six; **e)** Six hundred and forty-two thousand, one hundred and twenty-three; **f)** Nine hundred and eighty-seven thousand, four hundred and fifty-six

Assessment

This Revision exercise allows you to assess if the pupils have mastered the work in this unit.

Pupils should be able to write the place value of each digit in a given 4-digit number:

- using spike abacus, pocket abacus, thread abacus; thread beads
- without using an abacus.

They should be comfortable with solving problems of place value and writing numbers in words and figures using quantitative reasoning.

Objectives

By the end of this unit, each pupil should be able to:

- Apply knowledge of counting in groups of fives, sevens and sixties
- Solve problems on quantitative reasoning.

**Suggested resources**

Calendar pages for counting in sevens; Clock for counting in sixties.

**Key word definitions**

quantities: certain amounts or numbers

**Frequently asked questions:**

- Q *Why should pupils be able to count easily in fives, sevens and sixties?*
- A Besides being a useful skill to have to be able to count easily in different quantities this skill also develops a pupil's number concept and their ability at addition and subtraction.
- Q *What prior knowledge do the pupils need?*
- A Pupils should be able to:
- count forwards and backwards up to at least 1 000, in a variety of whole-number intervals, including using starting numbers other than zero
 - write 3-digit whole numbers in their expanded form
 - order whole numbers up to 1 000.

**Common errors pupils make**

Pupils struggle with counting over 1 000. Give these pupils practice in counting forwards and back in ones involving numbers over 1 000. Include counting sequences spanning multiples of 1 000 (for example, 5 998, 5 999, 6 000, 6 001, 6 002...) multiples of 10 (for example, 6 786, 6 787, 6 789, 6 790, 6 791...) and 100 (for example, 4 198, 4 199, 4 200, 4 201, 4 202...). When pupils are confident in counting in ones over 1 000, gradually introduce them to counting in 2s and then in 10s.

**Evaluation guide**

Pupils to:

1. Solve problems in groups of five, seven and sixty.

Lesson 1

Pupil's Book page 20; Workbook page 8

**Preparation**

You will need to have:

- Read page 20 of the PB carefully
- Worked through the example and examined the exercise in order to understand what will be required of the pupils
- Made a drawing of five hands on the board or on a large sheet of paper.

**Starter activity**

Draw the pupils' attention to your drawing of the hands and ask them to count the fingers on each hand: 5, 10, 15, 20, 25.

Ask them to think of other objects or items that come in fives. They may indicate that there are 5 toes on each foot or that there are 5 school days in a week. You can ask them to count the number of toes on 7 feet and so on.

**Lesson focus**

Work through the example on page 20 with the pupils. Continue counting in fives by asking pupils to start at any number and count in fives, for example start from 115 or 267. When you assess that the pupils are able to count in fives easily ask them to complete Exercise 1. Pupils may require some individual assistance with counting in fives in the bigger number ranges.

Question 3 is quite challenging and pupils may need assistance in calculating the number of chairs. Encourage all pupils to attempt the **Challenge**. The challenge encourages creative thinking and problem solving skills. Invite them to compare different strategies for arriving at the answer, for example, some may have counted in fives; some may have counted in 10s; and others may have multiplied the number of pupils by 10.



Answers

Exercise 1

1. a) 0, 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60
 b) 321, 326, 331, 336, 341, 346, 351, 356, 361, 366, 371, 376, 381, 386, 391, 396, 401, 406, 411, 416, 421, 426
 c) 3 272, 3 277, 3 282, 3 287, 3 292, 3 297, 3 302, 3 307, 3 312, 3 317, 3 322, 3 327, 3 332, 3 337, 3 342, 3 347
 d) 10 404, 10 409, 10 414, 10 419, 10 424, 10 429, 10 434, 10 439, 10 444, 10 449, 10 454, 10 459, 10 464, 10 469, 10 474, 10 479
 e) 914 060, 914 065, 914 070, 914 075, 914 080, 914 085, 914 090, 914 095, 914 100, 914 105, 914 110, 914 115, 914 0120, 914 125, 914 130, 914 135
 f) 999 910, 999 915, 999 920, 999 925, 999 930, 999 935, 999 940, 999 945, 999 950, 999 955, 999 960, 999 965, 999 970, 999 975, 999 980, 999 985, 999 990, 999 995, 1 000 000
2. a) 580, 585, 590, 595, 600, 605, 610
 b) 1 297, 1 302, 1 307, 1 312, 1 317, 1 322, 1 327, 1 332
 c) 828 159, 828 154, 828 149, 828 144, 828 139, 828 134, 828 129
 d) 999 960, 999 965, 999 970, 999 975, 999 980, 999 985, 999 990, 999 995
3. a) 45; b) 75; c) 225; d) 1 475; e) 6 750; f) 52 775

Workbook

1. He has 40 yams. 2. 45 3. 80

Assessment

Pupils should be able to: count in fives in a fluent way; count in fives in bigger number ranges; and problem solve counting in fives.

Extension activity

Ask pupils to count down in fives from any given number, for example, 999 995 to 999 960 and from 999 997 to 999 967.

Homework activity

Pupils to complete questions 1–3 from page 8 in the WB.

Lesson 2

Pupil's Book page 21;

Workbook pages 8 and 9



Preparation

You will need to have:

- Prepared a hundred square and photocopy it for pupils to use
- Read through all the activities on page 21 of the PB.



Starter activity

Use the hundred square and ask the pupils to start at zero and colour all the numbers that they would count if they were counting in sevens. Ask pupils to use the hundred square to help them practice counting in sevens starting at zero. You may want to make the activity a little more challenging by asking them to start counting at any other number.



Lesson focus

Ask pupils where we would usually use counting in sevens. Explain to them that because there are seven days in a week, if we wanted to calculate the number of days in a certain number of weeks we could count in sevens. Use the information at the beginning of this section to explain to the pupils how they can count in sevens and calculate the number of days in a certain amount of weeks.

Pupils complete Exercise 2. Encourage all pupils to attempt the puzzle on page 21.



Answers

Exercise 2

1. a) 0, 7, 14, 21, 28, 35
 b) 108, 115, 122, 129, 136, 143, 150, 157, 164, 171, 178, 205
 c) 941, 948, 955, 962, 969, 976, 983, 990, 997, 1 004, 1 011, 1 018, 1 025, 1 032, 1 039



Preparation

Work through the example and ensure that you are familiar with the questions.



Starter activity

Work through each of the examples on page 23 carefully with the pupils. The pupils should understand the reasoning of connecting the geometric shape with a particular operation that has to be performed. The rectangles indicate that they need to count in fives. The circles indicate that they need to count in sevens and the parallelograms indicate that they need to convert units of time appropriately. This conversion means that the pupils need to count in sixties.



Lesson focus

This lesson demands that the pupils are able to interpret symbols and problem solve. It also provides an opportunity for pupils to revise the work of the unit. It is important that you take sufficient time with the starter activity in order for pupils to understand how to go about calculating the answers. In question 9 the pupils need to read the instructions and information in the table carefully in order to complete the question. Ensure that they interpret the question correctly and that they understand that they need to connect information from both tables so that a true statement is made.

Once pupils have completed Exercise 4 revise this unit by reading the summary with them on page 24 and ask them to complete the Revision exercise on page 24. This Revision exercise may be used as an informal test. It will allow you to see if there are pupils who need addition support and tuition in order to fully master the work.



Answers

Exercise 4

- 2 847, 2 852, 2 857
- 782, 789, 796
- 27 000, 7 hrs 30 mins, 450

- 4 320, 1 hr 12 mins, 72
- 488, 493, 498
- 18 000, 18 007, 18 014
- 32 242, 32 247, 32 252
- 36 000, 10 hrs, 600
- 9.

5 hours	→	30 minutes
72 hours	→	45 fingers
four hands	→	18 000 seconds
nine hands	→	20 fingers
six weeks	→	3 days
1 800 seconds	→	42 days

Challenge

18 hours

Revision exercise

- 7, 14, 21, 28, 35, 42, 49
- 56, 63, 70, 77, 84, 91
- 60, 120, 180, 240, 300
 - 300, 240, 180, 120, 60
 - 697 200, 697 260, 697 320, 697 380, 697 440, 697 500, 697 560, 697 620, 697 680, 697 740
 - 1 000 000, 999 940, 999 880, 999 820, 999 760, 999 700, 999 640, 999 580, 999 520, 999 460
- 300 mins
 - 420 mins
 - 480 mins
- 28 days
 - 35 days
 - 70 days

Assessment

Ensure pupils can count in fives, sevens and sixties.

They should be competent in problem solving using counting in fives, sevens and sixties.

Pupils can solve problems in quantitative reasoning involving counting in fives, sevens and sixties (whole numbers).

Homework activity

Pupils complete questions which they have not finished from page 9 in the WB.

Objectives

By the end of this unit, each pupil should be able to:

- Count in Roman numbers up to 100
- Solve problems on quantitative reasoning involving use of Roman numerals.

**Suggested resources**

Clock with Roman numerals; Pictures of ancient Romans.

**Key word definitions**

combine: put together

numeral: a symbol that stands for a number

convert: change

**Frequently asked questions:**

Q *What prior knowledge should pupils have?*

A Pupils should know that different civilizations or cultures may have used different ways of representing numbers. They should be aware that Roman numerals are still used today in different contexts, for example, on clock faces or sometimes in books.

Q *Why do pupils have to know and be able to use Roman numerals as they are from an ancient civilization?*

A It is important to recognize and interpret Roman numerals as they are still in use today. These numerals are used on clock and watch faces; they are used to number book pages and sometimes to number exercises and questions in textbooks.

**Common errors pupils make**

Pupils may not write the different symbols in the correct order. It is important that they understand the rules of writing Roman numerals as explained through the unit.

Pupils may not know how to convert Roman numerals to numbers and vice versa. Working through this unit will equip the pupils with the necessary knowledge and information.

**Evaluation guide**

Pupils to:

- Read given Roman numerals and state the corresponding values in the Hindu/Arabic form.
- Write the value of the Roman numeral I to C in the Hindu/Arabic form.
- Write 1 to 100 in Roman numerals.
- Solve problems using quantitative reasoning.

Lesson 1

Pupil's Book pages 25 and 26;
Workbook page 10

**Preparation**

You will need to have:

- A clock with Roman Numerals in order to show the pupils and that they may use the clock face as reference for introductory questions
- Read through pages 25 and 26 of the PB carefully in order to understand what work will be required of the pupils
- If possible collected illustrations or pictures of ancient Romans and their civilization to show pupils.

**Starter activity**

Have a short discussion on how the ancient Roman civilization wrote their numbers. If you have any pictures or illustrations of ancient Romans show these to the pupils.

Show them the clock face and ask them what they notice about the numbers on the face of the clock. Write each of the Roman numbers on the board. Ask the pupils if they could guess which Roman number represents 1, 2 and so on. Write the Roman numeral on the board with the corresponding number next to it.

Lesson focus

In this lesson pupils will learn about Roman numerals. They will learn how to write numbers in Roman form. Refer to the numerals which were written from the clock face in the starter activity. Explain to the pupils that Roman numerals are made up of symbols. Allow them to study the illustration of the Roman numerals on page 25 of the PB. Pupils should understand that by using the five symbols on their own or in combination with other symbols all the numbers from 1 to 100 can be written as Roman numerals. You could encourage the pupils to imitate the illustrations in order to demonstrate the Roman numeral.

Work through the example on page 25 with the pupils. Pupils should understand the general principles of writing a Roman numeral, such as: we use the same symbol up to three times in a row when making up a number; if a numeral is written after a larger one, it is added to the larger number; and if the numeral is written before a bigger numeral it is subtracted from the bigger one. Work through the example on page 26 of the PB.

Encourage the pupils to write out a Roman numeral chart from 0 to 100 in lines of tens. This way all the I's, II's, III's and so on will fall under each other in one column. Let pupils use this chart to assist them in this unit.

Pupils to complete Exercise 1.



Answers

Exercise 1

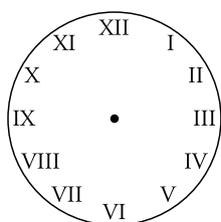
1. a) I b) VI c) XV
 d) XXXIV e) LII f) XL
 g) LXIV h) LXXXIX

Puzzle

4 = IV; 14 = XIV; 24 = XXIV; 34 = XXXIV;
44 = XLIV; 54 = LIV; 64 = LXIV; 74 = LXXIV;
84 = LXXXIV; 94 = XCIV

Workbook

1.



2. VIII: 8, XC: 90,
XIV: 14, LXXV: 75,
XXI: 21, CCI: 201,
XLIV: 44, XXXVIII: 38

Assessment

Pupils should be able to write Arabic numbers in Roman numerals.

Pupils use the symbols correctly to write the Roman numerals.

Support activity

If pupils struggle to write numbers in Roman numerals concentrate only on writing numbers 1 to 5 as a start. Once pupils have mastered these then continue with numbers 6 to 10. By breaking the numbers up into manageable sections the work will be more easily mastered.

Extension activity

Pupils write the ages of all the members of their family. They then write these ages in Roman numerals.

Homework activity

Pupils complete questions 1 and 2 on page 10 of the WB.

Lesson 2 *Pupil's Book pages 26, 27 and 28; Workbook page 10*



Preparation

You will need to have:

- Prepared flash cards with the numbers: 3, 7, 15, 21, 34, 56
- Prepared corresponding flash cards with the numbers written in Roman numerals: III, VII, XV, XXI, XXXIV, LVI
- Carefully read through the information on pages 26, 27 and Exercise 3 on page 28 of the PB.



Starter activity

Stick the flash cards with the Roman numbers on the board. Hold up a number and ask the pupils to match the number to the correct Roman number. Revise how to convert numbers to Roman numerals. You may wish to use the Teaching note on page 26 of the PB to extend the starter activity. It may be interesting to mention to the pupils

that there was no symbol to show 0 in the Roman numeral system. The Latin word “nulla” was used. Sometimes people used just an “n” to indicate zero.

Lesson focus

The focus of this lesson is to write Roman numerals and to convert numbers to Roman numerals and vice versa. Explain to the pupils that in order to write a number in Roman numerals it is best to start with writing the number in expanded form, for example, $67 = 60 + 7$ and when we write Roman numerals we use grouping of numbers: 1; 5; 10; 50 and 100. When we want to write 60 in Roman numerals we need to see which groupings we can use: $60 = 50 + 10$ so, we will write LX. Then, $7 = 5 + 2$ so we write VII. This makes $67 = LXVII$. Work through the example on page 27. Ensure that pupils understand the principles of writing numbers as Roman numerals as explained on page 25 and at the top of page 26. You may need to revise these from the previous lesson. If necessary work through the explanations again with the pupils.

Once you judge that pupils have mastered the concepts they complete Exercise 2.

The next part of the lesson will focus on converting Roman numerals to numbers. Work through the example on page 27. Pupils should write the Roman numerals as a sum and then convert the symbols to numbers. They then add the numbers. Pupils then complete Exercise 3. Encourage all pupils to attempt the puzzle. When completing the puzzle it may be a good idea to allow pupils to work in pairs in order to assist one another.

Answers

Puzzle

$4 = IV$; $14 = XIV$; $24 = XXIV$; $34 = XXXIV$;
 $44 = XLIV$; $54 = LIV$; $64 = LXIV$; $74 = LXXIV$;
 $84 = LXXXIV$; $94 = XCIV$

Exercise 2

1. a) VI; b) XXIII; c) LI; d) C; e) LIV; f) LXIX;
 g) LXXVI; h) XCIX

Exercise 3

1. a) II; b) V; c) X; d) XX; e) L; f) C; g) XXVI;
 h) LXXVII; i) LXXXIII; j) XXXVIII

2. a) 7; b) 9; c) 4; d) 38; e) 29; f) 44; g) 67;
 h) 94; i) 99; j) 19

Workbook

3. 12: XII, 4: IV, 66: LXVI, 99: XCIX, 58: LVIII,
 39: XXXIX, 87: LXXXVII, 50: L, 71: LXXI
 15: XV, 49: XLIX, 48: XLVIII
4. b) 55, LIV, 53, LII, 51, L, 49, XLVIII
 c) 7, XIV, 21, XXVIII, 35, XLII, 49, LVI
 d) LX, 55, L, 45, XL, 35, XXX, XXV

Assessment

Ensure pupils can convert numbers from 1 to 100 to Roman numerals.

They should also be able to convert Roman numerals I–C to numbers.

Support activity

Allow the pupils to use the Roman number chart they made to convert the following numbers to Roman numerals:

3, 4, 5, 6, 8, 9, 10

Allow the pupils to use the chart to convert these Roman numerals to numbers:

XV, XX, XXVI, XCIII, CVI

Extension activity

Introduce pupils to the fact that the civilization of ancient Egypt was a very important civilization in history. The Egyptians also developed a way of writing numbers.

1 was represented as: 

10 was represented as: 

100 was represented as: 

631 could be written as:



Write these numbers using Egyptian numerals:
 56, 172, 392.

Homework activity

Pupils to complete questions 3 and 4 on page 10 of the WB.

Lesson 3 *Pupil's Book pages 28 and 29*

Preparation

You will need to have:

- Prepared flash cards for the starter activity
- Separate flash cards with the following operations written on: $3 + 2$, $10 + 7$, $50 - 25$
- On three other flash cards, write the answers in Roman numerals: V, XVII, XXV
- Worked through Exercise 4 on page 28 of the PB in order to be prepared for questions pupils may ask
- Read through page 29 and decided which of the questions you will ask pupils to complete from the Revision exercise.

Starter activity

Put the flashcards with the operations written on them up on the board. Ask pupils to match the correct flashcard, with the answer written on it, with the operation.

Lesson focus

Discuss with the class how to complete Exercise 4 on page 28. Pupils then complete the exercise. Pupils may need some assistance while completing the exercise. Once they have completed the exercise read through the summary of the unit on page 29. If necessary give the pupils some examples of what is meant by, for example, “break numbers into sums to convert them”. As an example you could show them that in order to write 54 they can say: $50 + 4$ that then means they need to write the Roman numeral as LIV.

Pupils then complete the questions from the revision exercises which you have selected. Use the Revision exercise as an informal assessment to see if pupils have understood the concepts.

Answers

Exercise 4

1. IX = $11 - 2$
2. XIII = $6 + 7$
3. LXXXIX = $69 + 20$
4. XXXVI = $48 - 12$
5. LXVI = $24 + 42$
6. XXXVII = $56 - 19$
7. LXVI = $24 + 42$
8. L = $0 + 50$
9. XCIX = $98 + 1$
10. XX = $16 + 4$

Revision exercise

1. a) XVII; b) LVI; c) XXXII; d) LXXXIV; e) LX; f) LXXXI
2. a) 30; b) 91; c) 52; d) 17; e) 24; f) 93
3. a) LXXIII; b) XIX; c) XLVIII; d) XXXVIII; e) XXXVIII; f) XIX
4. a) 30; b) 36; c) 55; d) 55; e) 46; f) -31

Assessment

Can pupils solve problems with Roman numerals using quantitative reasoning?

Homework activity

Pupils complete any unfinished questions from the Revision exercise.

Objectives

By the end of this unit, each pupil should be able to:

- Order whole numbers up to 1 000 using the symbols: < and >
- Solve problems on quantitative reasoning involving ordering whole numbers.

**Suggested resources**

Numbers on flash cards or for flannel board;
Flannel board; < and > signs on flash cards or for flannel board.

**Key word definitions**

compare: look at the difference between
different: not the same

**Frequently asked questions:**

Q *What prior knowledge should pupils have?*

A Pupils should have a sound knowledge of place value and be able to recognize that one number is bigger or smaller than another because of the position of the digits in the number.

**Common errors pupils make**

Pupils are confused by the symbols < and > and therefore cannot use them correctly.

Pupils do not understand the concept of place value and thus cannot read the number correctly.

**Evaluation guide**

Pupils to:

1. Order whole numbers up to 1 000 using the symbols < and >.
2. Solve problems using quantitative reasoning involving the ordering of whole numbers.

Lesson 1

Pupil's Book page 30

**Preparation**

You will need to prepare the following on flash cards or for the flannel board:

- Three numbers which have digits in the hundreds column, for example, 198, 351, 867
- Three numbers which only have tens and units, for example, 45, 21, 79
- Numbers that read 1 000 and one that reads 786.

Read through page 30 of the PB carefully.

Decide which questions from Exercise 1 you would want the pupils to complete on their own and which ones you will assist them with.

**Starter activity**

Explain to the pupils that any number that has more digits than another one will be bigger. Demonstrate on the board: 309 is bigger than 34. Use the numbers you have prepared on the flash cards/flannel board and ask the pupils to identify which is bigger: 198 or 45, 351 or 21, 867 or 79. Ask them which number they think would be the bigger: 1 000 or 786?

Explain that when we are deciding if a number is bigger than another number then we are comparing the numbers. If numbers are bigger or smaller than each other this means that the numbers are different. Allow them to read the key word section on page 30 in the PB.

Lesson focus

Revise the notion of place value with the pupils. Ensure that they are familiar with the concept of thousands, hundreds, tens and units. Explain that if there is a number with digits in the thousands column, in the hundreds, tens and units columns and they have to compare it to a number which has digits only in the hundreds, tens and units columns then the number with the thousands digit will be the bigger number.

Read through the information on page 30 with them and go through the example carefully. Explain to pupils that the word greater means bigger than.

Ask them to complete Exercise 1 on page 30.

Answers

Exercise 1

1. a) 872; b) 111; c) 200; d) 1 000; e) 874; f) 137; g) 97; h) 670; i) 3 011; j) 874

Assessment

Pupils should be able to identify the value of digits in a number.

Are the pupils able to correctly identify the bigger number out of two different numbers?

Support activity

If pupils are not able to compare and identify the bigger of two numbers it will be necessary to revise the concept of place value with the pupils. Revise the work of Unit 2 and emphasise place value. You may give the pupils some numbers and ask them to identify which digit represents the thousands, which digit represents the hundreds, which digit represents the tens and which digit represents the units. For example, 7 529.

Repeat this until the pupils are comfortable with the place value concept. Revise the work on page 30 of the PB and ask them to complete the exercise.

Extension activity

Pupils who have mastered Exercise 1 quickly may be requested to compare bigger numbers. Which number is bigger?

1. 12 978 or 2 987
2. 159 682 or 178 502
3. 2 000 000 or 234 987
4. 15 500 000 or 15 600 000
5. 23 476 or 32 476

Homework activity

Pupils can complete the following exercise. Which number is the bigger number?

1. 164 or 98
2. 34 or 765
3. 145 or 89
4. 862 or 682
5. 708 or 807

Lesson 2 *Pupil's Book page 31*

Preparation

You will need to have:

- Worked through the information on page 31 of the PB.

If pupils showed that they had difficulty with concepts in the previous lesson make a note of the problems so that you can revise the content at the start of this lesson in order to address the difficulties.

Starter activity

Revise the concept of place value and demonstrate how the same digits in different positions mean that the value of the number changes, for example, 637 and 736. Point out to the pupils that although the same digits have been used the value of 736 is more than the value of 637. Draw place value columns on the board:

Hundreds	Tens	Units
6	3	7
7	3	6

Ask them how they know that 736 is bigger than 637. They should indicate that the seven hundred is more than six hundred. This determines that 736 is bigger than 637. If necessary repeat with the numbers: 341 and 431; 504 and 450.

Lesson focus

Pupils will be taught a strategy for determining which number is bigger if the number has the same amount of digits. Work through the information on page 31 with the pupils. Work through the examples carefully referring back to the work which you covered in the starter activity.

Pupils then complete Exercise 2.

Answers

Exercise 2

1. a) 411; b) 312; c) 883; d) 342; e) 987; f) 157;
g) 586; h) 774; i) 281

Assessment

Are pupils able to work easily with the place value of digits in any given number up to 1 000?

Are pupils able to compare two numbers with the same number of digits and determine the greater of the two?

Support activity

If pupils struggle to complete the exercise, it will be necessary to repeat the work from page 30 and go over the information on page 31. If they are still unable to complete the questions it will be essential to revise the concept of place value. Go back to working with smaller numbers. If necessary use an abacus for pupils to actually count out the numbers. It may also be useful to illustrate the numbers on a number line.

Homework activity

Pupils can complete the following for homework: Which number is bigger?

1. 389 or 893 2. 112 or 121
3. 214 or 412 4. 983 or 389
5. 655 or 651

Lesson 3 *Pupil's Book pages 31 and 32; Workbook page 11*

Preparation

You will need to have:

- A poster which shows the $<$ (smaller than) and $>$ (greater than) signs. Label each of the signs correctly. If possible copy the diagrams of the crocodile at the bottom of page 31 and at the top of page 32 of the PB
- Flash cards of 3-digit numbers, for example, 456 and 546, 129 and 219, 481 and 148.

Starter activity

Put up the diagrams that you copied of the crocodiles. Explain to the pupils that the hungry crocodile will always eat the biggest number. Discuss the crocodile illustration with the pupils. Place the crocodile illustration which shows the greater than sign on the board and ask the pupils to place the numbers correctly on either side of the sign, for example, $546 > 456$ and so on. Do the same with the $<$ sign.

Lesson focus

The lesson focus is about introducing the pupils to the $<$ and $>$ sign. By the end of this lesson they should be able to identify the signs and use the signs correctly to compare numbers. Draw the pupils' attention to the fact that the sign has a smaller side and a greater side. Draw a large sign on the board. Ask the pupils to identify the smaller side and then ask the pupils to identify the greater side. Work through the examples on page 32 of the PB with the pupils.

Pupils complete Exercise 3. Encourage pupils to complete the **Challenge**, on page 31 of the PBs, and the puzzle which is on page 32 of the PB.

Answers

Exercise 3

1. a) $123 < 132$ b) $297 > 279$
c) $698 < 896$ d) $789 < 798$
e) $879 < 897$ f) $969 < 999$
2. a) $25 < 64 < 72$

- b) $120 < 180 < 360$
- c) $72 < 121 < 264 < 367$
- d) $114 < 305 < 421 < 724$
- e) $110 < 724 < 898 < 937$
- f) $121 < 274 < 417 < 573 < 999$

Challenge

Pupils' own numbers, teacher to check.

Puzzle

4	3	5	1	8
9	2	4	9	1
1	6	9	0	2
3	5	7	2	5
8	4	5	3	4

Workbook

1. a, c, d, f, g, i
2. a) $12 < 17$ b) $256 < 625$
 c) $31 > 19$ d) $520 < 998$
 e) $67 < 76$ f) $312 = 312$
 g) $213 > 44$ h) $87 < 294$
 i) $59 < 682$ j) $234 < 987$
 k) $815 < 960$ l) $792 > 658$
3. a) $23 < 34$ b) $256 < 287$
 c) $9 < 13$ d) $4 < 5$
 e) $014 < 1\ 960$ f) $55 < 66$
 g) $174 < 358$ h) $255 < 491$
 i) $045 < 68$ j) $255 < 699$

Assessment

Pupils should be able to use the $<$ and $>$ signs correctly to compare numbers.

Support activity

Pupils may become confused with the symbols $<$ and $>$. Revise the concept of the hungry crocodile with them. They may need to write out the words instead of the signs and then replace the words with the symbols, for example:

$325 * 532$
 325 is smaller than 532
 $325 < 532$

And: $467 * 234$
 467 is greater than 234
 $467 > 234$

Extension activity

Pupils are asked to look through old newspapers and cut out or tear out any numbers that they can find. They put the numbers in pairs. They write the numbers in their books and place the signs correctly, for example:

$214\ 452 \dots 154\ 219$
 $214\ 452 > 154\ 219$

Homework activity

Pupils complete questions 1–3 on page 11 of the WB.

Lesson 4 *Pupil's Book page 33; Workbook page 12*

Preparation

Prepare the starter activity and ensure you have read what is required of the pupils in Exercise 4.

Starter activity

Revise the meaning of the symbols: $<$ and $>$ with the pupils. Write the following on the board $439 < 371$. Ask the pupils if they agree with the statement. Ask the pupils to correct the statement. Now write the next statement on the board $400 > 450$. Ask the pupils if they agree with the statement. Ask the pupils how to correct the statement.

Lesson focus

In this lesson pupils will be required to read mathematical statements and decide if the statement is true or not. Revise the content of Unit 5 with the pupils by reading the summary on page 33. In Exercise 4 on page 33 pupils have to correct the incorrect statements by using the signs for greater than and smaller than correctly. Once you have completed the starter activity ask the pupils to complete Exercise 4 on page 33.

Once the pupils have completed the exercise read through the summary again and ask them to complete the Revision exercise. This is the ideal opportunity to identify pupils who have not yet mastered the content of this unit.

Answers

Exercise 4

1. a) $682 > 628$ b) $104 > 14 < 140$
c) $62 < 206 > 63$ d) $876 > 767 < 788$
e) $964 > 92 < 648$

Revision exercise

1. a) 98; b) 243; c) 950; d) 359; e) 794; f) 901
2. a) $214 > 162$; b) $946 < 981$; c) $26 < 406 > 62 > 7$;
d) $841 > 92 < 614 > 100$; e) $88 < 768 > 476 > 68 < 601$; f) $417 < 671 < 71 < 140 > 76$

Workbook

4. Water 5. James
6. 987; 887; 754; 752; 750; 572; 548; 375
7. 375, 548, 572, 750, 752, 754, 887, 987

Assessment

Pupils should be able to compare numbers up to 1 000.

Ensure pupils can order and compare numbers using the $<$ and $>$ symbols.

Can pupils solve problems involving comparison of numbers using quantitative reasoning?

Support activity

Sometimes pupils may be overwhelmed by too much information as represented in question 2 of the Revision exercise. If pupils are unable to complete Exercise 2. c) to f) assist them by helping them break the questions up into manageable steps, for example, $26, 406 \rightarrow 26 < 406$ and then they continue with the next numbers $406, 62 \rightarrow 406 > 62$ and lastly $62, 7 \rightarrow 62 > 7$. Allow the pupils to complete the exercise in this manner. Ask them to then try to do the exercise as is.

Homework activity

Pupils complete questions 4–7 on page 12 of the WB.

Objectives

By the end of this unit, each pupil should be able to:

- Find the highest common factor of 2-digit numbers.

**Suggested resources**

Counters; Bar of chocolate (if appropriate); 100 number chart; Flash cards.

**Key word definitions**

remainder: left over

prime number: a number which has only two factors, 1 and itself. 1 is not a prime number

factor: numbers you can multiply together to get another number

common: found in two or more things

inspection: look at closely

product: the result of numbers multiplied together

**Frequently asked questions**

Q *What prior knowledge should the pupil have?*

A Pupils should know the multiplication tables well. They should also understand the concept of a prime number.

**Common errors pupils make**

Pupils may often make errors due to the fact that they do not know the multiplication tables and the division tables.

**Evaluation guide**

Pupils to:

1. Find the common factors of given numbers and then determine the highest common factor.

Lesson 1 *Pupil's Book page 34***Preparation**

You will need to have:

- A 100 number chart for each pupil to work on for the starter activity

- A slab of chocolate that can be divided evenly and easily into two equal parts. Please be sensitive to poor pupils who do not regularly have chocolate as a treat. If chocolate is not appropriate for your class then you may consider using teaching aids like unifix cubes
- Read through all the information on page 34 of the PB.

**Starter activity**

Show the pupils a piece of chocolate that has six smaller blocks. Show them that the block of chocolate can be divided equally by 2. Explain to them that 2 is a factor of 6 as once 6 is divided by 2 there is no remainder. Write the word “factor” on the board. Ask them if 2 is a factor of 8. If necessary demonstrate with unifix cubes that 8 can also be divided by two without leaving a remainder.

**Lesson focus**

Read the sentence at the top of page 34 which explains what a factor is. Work through the examples on page 34 of the PB. Ask the pupils to look at all the factors of 8: 1, 2, 4 and 8. Ask them how they know that these are factors of 8. They should answer that these numbers are factors of 8 because there are no remainders when 8 is divided by them. Ask if 3 is a factor of 8. They should say that 3 is not a factor of 8 as there will be a remainder of 2 if you divide 8 by 3.

Continue the lesson by explaining to the class what a prime number is. Ask them to take the 100 number chart and to shade in all the prime numbers that they can. It is a good idea to go through this as a class as you can emphasise the meaning of the term “prime number” a few times

by demonstrating that each prime number is only divisible by 1 and itself. Explain what a prime factor is to the pupil. Demonstrate to the pupils that 8 has only 1 prime factor which is 2 and 15 has two prime factors which are 3 and 5.

Pupils complete Exercise 1.

Answers

Exercise 1

1. **a)** 1, 5, 25; **b)** 1, 2, 3, 4, 6, 9, 12, 18, 36; **c)** 1, 7, 49; **d)** 1, 2, 3, 6, 11, 22, 33, 66; **e)** 1, 2, 37, 74; **f)** 1, 2, 3, 4, 6, 7, 12, 14, 21, 28, 42, 84; **g)** 1, 5, 11, 55; **h)** 1, 2, 3, 6, 7, 14, 21, 42; **i)** 1, 2, 4, 8, 16, 32
2. **a)** 5; **b)** 2, 3; **c)** 7; **d)** 2, 3, 11; **e)** 2, 3, 7; **f)** 2, 3, 7; **g)** 5, 11; **h)** 2, 3, 7; **i)** 2

Assessment

Pupils should understand what a factor is and be able to list the factors of a number.

Pupils must know what a prime factor is and be able to find the prime factor or factors of a number.

Extension activity

Ask the pupils to explain the difference between an odd number and a prime number. They should write their explanation.

Homework activity

Ask the pupils to complete the following

- Find the factors of:
a) 10; **b)** 18; **c)** 21; **d)** 24
- Write down the prime numbers of the numbers in question 1.

Lesson 2 *Pupil's Book page 35*

Preparation

You will need to have:

- Read through the information on page 35 of the PB

- Worked through the extra examples given in the lesson focus.

Starter activity

To start this lesson, drill the pupils on some multiplications like 2×3 , 5×8 and so on. Ask them to simplify or express 6 as a product of prime numbers. Repeat with some other numbers up to 50. Remind the pupils that every number except 1 has at least two factors. Some other numbers have only two factors, 1 and itself, and that such numbers are called prime numbers. Ask the pupils to write on the board the factors of 4, 6 and 8. Correct them where they make mistakes.

Lesson focus

Ask your pupils to list the factors of 6. Remind them that any number that divides another without a remainder is a factor of it. Factors of 6 are 1, 2, 3 and 6 since all these numbers will divide into 6 without a remainder. Ask the pupils to find the factors of 8 in a similar way. They will have 1, 2, 4 and 8. Lead them to identify the common factors between the factors of 6 and those of 8. The common factors are the 2s, since this is the only common factor then it is the highest common factor. Repeat this activity with 12 and 36 and guide them to find the highest common factor as 12.

Work through the example on page 35 of the PB. Pupils complete Exercise 2. Encourage all pupils to attempt the puzzle on this page. Ask pupils to share their strategies for finding the answers.

Answers

Puzzle

There could be 30, 60, 90, etc. sweets in the bag.

Exercise 2

1. **a)** 1, 2, 4; **b)** 1, 2, 3, 6; **c)** 1, 2; **d)** 1, 5
e) 1, 3, 5, 15; **f)** 1, 2, 3, 6, 9, 18
2. **a)** 1, 2, 4, 8 HCF = 8; **b)** 1, 2, 3, 6 HCF = 6;
c) 1, 2, 3, 6 HCF = 6; **d)** 1, 2, 3, 4, 6, 12 HCF = 12; **e)** 1, 2, 4, 8, 16 HCF = 16; **f)** 1, 2, 7, 14 HCF = 14

Assessment

Pupils should be able to find the factors of 2-digit numbers.

From the factors of two numbers, pupils should be able to identify the highest common factor of the numbers.

Extension activity

Pupils work out the following:
Is 6 the highest common factor of 36 and 18?

Homework activity

Ask pupils to find the highest common factors of the following pairs of numbers:

1. 6 and 12 2. 16 and 20 3. 100 and 150

Lesson 3 *Pupil's Book pages 36 and 37; Workbook pages 13 and 14*



Preparation

You will need to have:

- Sufficient flash cards for the starter activity.



Starter activity

Refer to the activity in the Teaching note on page 36 of the PB and allow the pupils to do the activity. Revise the concept of prime numbers and prime factors.



Lesson focus

In this lesson pupils will learn how to use prime factors to find the HCF of two numbers. Explain to the pupils that when numbers have many factors it may be easier to use the prime factors to calculate the HCF of the two numbers. Work through the example on page 36 with the pupils. If necessary choose two other numbers and demonstrate the method again, for example, 24 and 36:

$$24 = 2 \times 2 \times 2 \times 3 \quad 36 = 2 \times 2 \times 3 \times 3$$

Common prime factors: 2 and 3

$$\text{HCF} = 2 \times 3 = 6$$

Once pupils have understood how to use prime factors to find the HCF ask them to complete Exercise 3 on page 37 in the PB.

When they have completed Exercise 3 revise the content of the unit by reading through the summary on page 37. Pupils may then complete the Revision exercise. Use the exercise in order to assess if pupils need any further assistance.



Answers

Exercise 3

- 10, 20, 40, 45
- a) $18: 2 \times 3 \times 3$; $20: 2 \times 2 \times 5$; HCF = 2
b) $12: 2 \times 2 \times 3$; $32: 2 \times 2 \times 2 \times 2 \times 2$; HCF = 4
c) $24: 2 \times 2 \times 2 \times 3$; $40: 2 \times 2 \times 2 \times 5$; HCF = 8
d) $25: 5 \times 5$; $45: 3 \times 3 \times 5$; HCF = 5
e) $60: 2 \times 2 \times 3 \times 5$; $75: 3 \times 5 \times 5$; HCF = 15
f) $84: 2 \times 2 \times 3 \times 7$; $90: 2 \times 3 \times 3 \times 5$; HCF = 6

Puzzle

$$2 \times 2 \times 2 \times 2 \times 3$$

Revision exercise

1. a) 27; b) 15; c) 2; d) 8; e) 4; f) 7

Workbook

- a) 5; b) 6; c) 7; d) 10; e) 8; f) 8; g) 11
- $12 \text{ m} \times 12 \text{ m} = 144 \text{ m}^2$
- a) 5; b) 6; c) 4; d) 24; e) 35
- 5
- 16

Assessment

Pupils should be able to find the HCF of two 2-digit numbers.

They should also be able to find the HCF using prime factors.

Homework activity

Pupils complete questions 1–5 on pages 13 and 14 of the WB.

Objectives

By the end of this unit, each pupil should be able to:

- Find the lowest common multiple of numbers up to 9.

**Suggested resources**

Card; Number chart; Flannel board and numbers to stick on the flannel board.

**Key word definitions**

multiple: a number that can be divided by a number without leaving a remainder
frequent: occurring many times

**Frequently asked questions**

Q *What prior knowledge do the pupils need?*

A Pupils need to know their multiplication table very well.

**Common errors that pupils make**

Pupils may become confused between the terms “factor” and “multiple”.

**Evaluation guide**

Pupils to:

1. Obtain the LCM by identifying the lowest of the common multiples.
2. Find the LCM by factor method.

Lesson 1

Pupil's Book page 38; Workbook page 15

**Preparation**

You will need to have:

- Sufficient number charts for pupils to be able to use charts to find multiples of different numbers
- Perused the contents of page 38 in order to know what is required of the pupils for this lesson.

**Starter activity**

Explain to the pupils what a multiple is. Ask them to take their number charts and to shade all the

multiples of 2 and 4. Ask them what they notice about the multiples. They should notice that all multiples of 2 are also multiples of 4. Repeat for other numbers. For example, find all the multiples of 5 and 8. This exercise gives the pupils plenty of opportunity to practice the skill of finding multiples of numbers.

**Lesson focus**

The lesson develops the pupils' concept of multiples and how to find multiples of any given numbers. The pupils are then required to extend their knowledge by finding common multiples for sets of numbers. Remind the pupils what a multiple is. Use the activity in the Teaching note to further consolidate their knowledge of multiples. Work through the example on page 38. Ensure that pupils know how to find common multiples.

Pupils then complete Exercise 1. Pupils who finish the questions in Exercise 1 quickly should be encouraged to attempt the puzzle.

**Answers****Exercise 1**

1. **a)** 5, 10, 15, 20, 25; **b)** 2, 4, 6, 8, 10; **c)** 8, 16, 24, 32, 40; **d)** 9, 18, 27, 36, 45; **e)** 3, 6, 9, 12, 15; **f)** 7, 14, 21, 28, 35
2. **a)** 15, 30, 45; **b)** 24, 48, 72; **c)** 72, 144, 216; **d)** 20, 40, 60; **e)** 18, 36, 54; **f)** 42, 84, 126

Challenge

- a)** 24, 48, 72; **b)** 36, 72, 108; **c)** 30, 60, 90

Workbook

2. **a)** 5; **b)** 4; **c)** 40

Assessment

Pupils should be able to find multiples of numbers from 1 to 9.

Are pupils able to find common multiples of pairs or sets of numbers?

Support activity

If pupils confuse factors with multiples it is important to compare factors of a number with the multiples of a number. Ask the pupils to try and verbalise what the difference between the two terms is. Correct any misconceptions.

Give them an easy exercise to consolidate their understanding. For example,

Write the factors of 9: 1, 3, 9

Write the multiples of 9: 9, 18, 27, 36.

Now ask the pupils again to compare the two sets of numbers and to explain what the differences are between multiples and factors.

Homework activity

Pupils can complete question 2 on page 15 of the WB.

Lesson 2 *Pupil's Book page 39; Workbook page 15*



Preparation

You will need to have:

- Sufficient number charts for the pupils
- Flash cards with times tables questions on them. Make cards that have the answers to the multiplication questions
- A flannel board and numbers which are multiples of 3 and of 4
- A circle which can be put on the flannel board to hold the common multiples.



Starter activity

Revise the times tables with the pupils. Use the flash cards that you made, for example, $3 \times 4 =$; $5 \times 3 =$; $6 \times 4 =$; $7 \times 3 =$; make at least 10 of these cards. Pupils choose the correct card to put next to the calculations.



Lesson focus

Place the numbers 3 and 4 on the flannel board. Ask the pupils to identify the first 8 multiples of 3.

Tell pupils that they will find the first multiples by multiplying 3 by 1, then by 2, 3, 4, 5, 6, 7, 8. They then put the multiples on the flannel board next to the 3. Repeat the same process with the multiples of 4.

Put the circle on the flannel board. Now ask the pupils to place the numbers that appear in the list of multiples of 3 and the list of multiples of 4 in the circle.

Point out to the pupils that these numbers are multiples of both 3 and 4. They are therefore common multiples. Ask pupils what multiple is the lowest one. They should be able to identify that 12 is the lowest common multiple. Ensure that pupils understand the language and the words.

Hand out the number charts and ask the pupils to shade in the multiples of 2, 5 and 8. Now ask them to list the numbers that are shared as multiples by these three numbers: 40 and 80. Ask pupils how they would describe these numbers. Pupils may respond that the numbers are both multiples of 10; they are even numbers; 80 is double 40 and so on. Point out to them that 40 is the lowest common multiple. Work through the worked example on page 40 of the PB.

Pupils complete Exercise 2. Encourage pupils to complete the puzzle on page 39.



Answers

Puzzle

1. 10, 12, 14, 16, 18, 20: E
2. 3, 6, 9, 12, 15, 18: N
3. 20: T; The mystery number is TEN.

Exercise 2

1. a) 8; b) 12; c) 15; d) 18

Workbook

1. a) 60; b) 84; c) 84; d) 30; e) 36; f) 72; g) 84

Assessment

Pupils should be able to find multiples of single digit numbers.

Are the pupils able to find the lowest common multiple of at least two numbers ranging between 1 and 9?

Support activity

Pupils may be confused between multiples and factors. If this is the case ensure that pupils understand the meaning of the words. Ask them to work through the following exercise:

Fill in the correct words from those in brackets:
Factors are all numbers that can be divided _____ into another number, without leaving a _____. [exactly; remainder]

Multiples are _____ which are the result of two numbers being _____. [numbers; multiplied]

Choose the correct word:

4 is a [factor; multiple] of 16

5 is a [factor; multiple] of 25

18 is a [factor; multiple] of 3

25 is a [factor; multiple] of 5

Extension activity

Ask pupils to complete the following:
What is the lowest common multiple of:

1. 4, 7 and 2; 2. 2, 5 and 9; 3. 4, 6 and 8;

4. 7, 9 and 3

Homework activity

Pupils should complete question 1 on page 15 of the WB.

Lesson 3 *Pupil's Book pages 40 to 42; Workbook page 16*



Preparation

You will need to have:

- Prepared a flannel board for the activity in the Teaching note on page 40
- Read the information in this section of the unit carefully in order to know what will be expected of the pupils.



Starter activity

Use the activity in the Teaching note on page 40 as a starter activity for this lesson.



Lesson focus

Ensure that the pupils understand the meaning of the word “frequent”. The focus of the lesson is

to enable the pupils to use prime factors to find the LCM of bigger numbers. Work through the worked example on page 41 with the pupils. It may be easier to work through the example on the board with the pupils. You could invite them to write the prime factors for each number. Then demonstrate how to multiply the prime factors to get the LCM.

Encourage the pupils to complete Exercise 3 on page 41. All pupils should attempt the puzzle on page 40. Support and assist those pupils who struggle with the puzzle. Use the Revision exercise to assess if pupils have mastered all the main concepts of the unit.



Answers

Puzzle

1. 51; 57 or 69 2. 88 or 92

Challenge

a) 6, 12, 18, 24, 30, 36, 42, 48, 54, 60, 66, 72, 78, 84, 90, 96; b) 12, 24, 36, 48, 60, 72, 84, 96; c) 60; d) 60

Exercise 3

1. 42
2. a) 24; b) 36; c) 90; d) 150; e) 120; f) 180

Revision exercises

1. a) $2 \times 3 \times 5$; b) $2 \times 2 \times 3 \times 3$; c) $2 \times 2 \times 2 \times 2 \times 3$;
d) $2 \times 2 \times 3 \times 5$; e) $3 \times 5 \times 5$; f) $2 \times 2 \times 5 \times 5$;
g) $2 \times 3 \times 7$; h) $3 \times 3 \times 11$; i) $2 \times 3 \times 11$;
j) $2 \times 3 \times 3 \times 3$
2. a) 10; b) 24; c) 20; d) 18; e) 56; f) 12; g) 72; h) 40

Workbook

3. a) 30 min; b) Mary 2 circuits and Jane 5 circuits
4. a) 120; b) 105; c) 400; d) 715; e) 72

Assessment

Are pupils able to find the LCM by using prime factors?

Extension activity

Pupils should attempt the **Challenge** on page 40.

Homework activity

Pupils complete questions 3 and 4 on page 16 of the WB.

Objectives

By the end of this unit, each pupil should be able to:

- Differentiate between proper and improper fractions
- Change improper fractions to mixed numbers and vice versa
- Apply fractions in sharing commodities at home, market, school, and the likes
- Solve quantitative reasoning problems involving fractions.

**Suggested resources**

Paper cuttings of different shapes; Fraction charts; Cardboard.

**Key word definitions**

numerator: the number above the fraction line

denominator: the number below the fraction line

whole number: a positive number used to count with

**Frequently asked questions**

Q *What prior knowledge do pupils need?*

A Pupils need to:

- know how to divide numbers
- understand the concept of sharing
- understand the term “part of a whole”
- understand that fractions are numbers that were designed to meet the needs of people over time
- have a good grasp of the work covered in previous grades
- be able to recognise the fractions that were introduced in previous grades
- be able to recognise simple equivalence.

Q *Is using concrete teaching aids important?*

A The use of concrete teaching aids to teach fractions is very important. It is critical to try and move from the concrete to the semi-abstract to the abstract with the teaching of fractions. Pupils should be given ample time to put their learning into their own language as part of the abstraction process.

**Common errors pupils make**

Pupils easily confuse the numerator and the denominator.

Pupils do not often connect fractions with dividing a whole into a number of equal parts.

**Evaluation guide**

Pupils to:

1. Classify a given set of fractions into proper and improper fractions.
2. Convert an improper fraction to a mixed number and vice versa.
3. Solve conversion problems using fractions.
4. Solve problems using quantitative reasoning.

Lesson 1

Pupil's Book pages 43 and 44

**Preparation**

You will need to have:

- Oranges
- Flashcards with fractions represented in drawings on them: some written out in words and others written in numbers.

**Starter activity**

Prepare drawings of shapes with fractions shaded, for example, a rectangle with 6 out of 12 parts shaded. Prepare flashcards with the fractions written on them, some written out in words and others written in numbers. The pupils match the flashcard fractions with the drawings. You could include these fractions: halves, quarters, fifths, sixths and eighths on the drawings and flashcards.

**Lesson focus**

In this lesson you will be introducing proper fractions to the pupils. Use the activity described

in the Teaching note to introduce the content of this section of the lesson. Write $\frac{1}{2}$ on the board when you demonstrate the orange cut in half. Write $\frac{1}{4}$ when you have cut the halves into half again. Emphasise the language of fractions as you go through the activity: The orange is divided into two halves. Demonstrate how the fraction is written. Emphasise which number is the numerator and which is the denominator. When you divide the halves into halves again emphasise that to get quarters one divides a half by two. Again emphasise the language and the words that pupils need to know. Emphasise the fact that the denominator shows how many parts there are in the whole and the numerator shows how many parts of the whole there are in the fraction. Put the four pieces of the orange together again and show the pupils that four quarters equal the whole, or one, orange.

Work through the content of page 43 of the PB with the pupils. Work through the example on page 43 very carefully and if you assess that the pupils are still struggling to understand the concepts use a sheet of card or paper to demonstrate the example in a more concrete way.

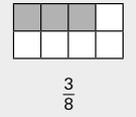
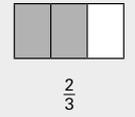
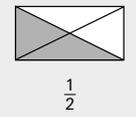
Pupils then complete Exercise 1 on page 44. Encourage those pupils that finish quickly to attempt the **Challenge** on page 44.



Answers

Exercise 1

1. $\frac{9}{8}, \frac{5}{6}, \frac{1}{3}, \frac{5}{4}, \frac{3}{4}, \frac{7}{16}, \frac{1}{2}$, 2. a) $\frac{1}{4}$, b) $\frac{1}{2}$, c) $\frac{3}{6} = \frac{1}{2}$, d) $\frac{2}{5}$

3. a)  $\frac{3}{8}$ b)  $\frac{2}{3}$ c)  $\frac{1}{2}$

Challenge

$\frac{1}{1}, \frac{1}{2}, \frac{2}{2}, \frac{1}{2}, \frac{1}{3}, \frac{2}{3}, \frac{2}{3}, \frac{3}{3}, \frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{2}{3}, \frac{2}{4}, \frac{3}{4}, \frac{1}{1}, \frac{2}{2}, \frac{3}{3}, \frac{4}{4},$
 $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{5}, \frac{2}{3}, \frac{2}{4}, \frac{2}{5}, \frac{3}{4}, \frac{3}{5}, \frac{4}{1}, \frac{2}{2}, \frac{3}{3}, \frac{4}{4}, \frac{5}{5}$

Assessment

Pupils should be able to identify and write common fractions. They should be able to identify fractions from shaded parts of a whole. Ensure pupils can shade parts of a whole to represent fractions.

Support activity

Should pupils have difficulty identifying fractions it would be important to work with concrete objects to explain division of a whole into a number of equal parts for example: use an A4 sheet of paper and fold into halves. Pupils write $\frac{1}{2}$ on each half of the paper, they then tear the paper along the fold line. Hold up one half and ask the pupil to identify the fraction. Repeat this with quarters and eighths. They should then write the fractions that they can identify.

Extension activity

Ask pupils to demonstrate how to add $\frac{1}{2}$ plus a quarter using A4 sheets folded into the fractions.

One sheet is divided into halves and one sheet is divided into quarters. They tear the paper along the fold lines and then put their fractions together to get the answer.

Homework activity

Pupils complete the following for homework: What fraction of the shape is shaded?

1. Rectangle divided into quarters and three quarters shaded.
2. Circle divided into sixths with three sixths shaded.
3. A regular pentagon divided into fifths and three fifths shaded.

Lesson 2 *Pupil's Book pages 44 and 45*



Preparation

Read through the contents of pages 44 and 45 of the PB in order to familiarize yourself with the content that the pupils will have to master in this lesson.



Starter activity

Use the activity in the Teaching notes on page 44 to introduce this lesson.



Lesson focus

The pupils will be introduced to the notion of a proper fraction in this lesson. Write a proper fraction on the board, for example, $\frac{3}{4}$, draw a

corresponding shape to represent the fraction. Ask the pupils how many equal parts does the whole have? They should recognize that the whole has four equal parts. Ask them how many parts should be shaded to represent the three quarters. Now write the numerator. Ask them to point out which of the two is the smaller number. They should easily recognize that the numerator is the smaller number. Explain to them that whenever the numerator is smaller than the denominator then the fraction is called a proper fraction. Repeat this example using other fractions.

Once you see that the pupils have a good grasp on what a proper fraction is you can proceed to work through the worked example on page 44.

Pupils can complete Exercise 2 on page 45. Pupils may need assistance with numbers 3 and 4 of the exercise. Pupils should be encouraged to complete the puzzle. Encourage them to make use of drawings to assist them.



Answers

Exercise 2

- $\frac{1}{3}, \frac{9}{10}, \frac{2}{27}, \frac{19}{21}$
- $\frac{1}{9}, \frac{2}{9}, \frac{3}{9}, \frac{4}{9}, \frac{5}{9}, \frac{6}{9}, \frac{7}{9}, \frac{8}{9}$ (any five)
- a) 5 biscuits b) 2 biscuits
c) $\frac{2}{5}$ d) $\frac{3}{5}$
- In two weeks he reads 4 books out of 6. $\frac{4}{6} = \frac{2}{3}$

Puzzle

$$\text{Length} = \text{head} + \text{body} + \text{tail} = \frac{2}{3} \times \text{tail} + 18 + \frac{1}{2} \times \text{body} \\ = \frac{2}{3} \times \text{tail} + 18 + 9 = 6 + 18 + 9 = 33 \text{ cm}$$

Assessment

Pupils need to be able to identify a proper fraction.

Pupils can solve problems using fractions.

Support activity

If pupils struggle to identify a proper fraction repeat the introductory activity to this lesson.

Lesson 3

Pupil's Book pages 45 and 46;

Workbook page 17



Preparation

You will need to have:

- Sheets of A4 paper to demonstrate halves, quarters and eighths
- Extra sheets in order to show improper fractions.



Starter activity

Show the pupils an A4 piece of paper which has been divided into halves. Place one half on the board and underneath it write $\frac{1}{2}$. Point out to the pupils that this means that the whole piece of paper was divided into two equal parts and you have represented one of the parts on the board. Place two pieces of paper on the board and write $\frac{2}{2}$ underneath the two halves. Show the pupils that there are now two parts represented on the board and that these are the same as one piece of paper. You can place a whole piece of paper over the two halves to show the pupils.

Now place three halves of paper on the board and ask the pupils how many parts there are now. Write $\frac{3}{2}$ on the board and show that there are now three halves on the board and that this is more than one whole. Explain to them that $\frac{3}{2}$ is an improper fraction as the numerator is now bigger than the denominator. This means that the fraction is larger than one. Repeat the same process with quarters and with eighths. If necessary use drawings of 2D shapes to demonstrate improper fractions for sixths, thirds and so on.



Lesson focus

The pupils are shown how to identify an improper fraction. Repeat the principle that with an improper fraction the numerator will always be more than the denominator. Explain too that this means that it is greater than one. Work through the example on page 45.

The pupils should then complete Exercise 3 on page 46. Encourage pupils to attempt the puzzle on page 45.

Answers

Puzzle

$$\begin{aligned}\text{Length} &= \text{head} + \text{body} + \text{tail} = \frac{2}{3} \times \text{tail} + 18 + \frac{1}{2} \times \\ \text{body} &= \frac{2}{3} \times \text{tail} + 18 + 9 = 6 + 18 + 9 = 33 \text{ cm}\end{aligned}$$

Exercise 3

- $\frac{4}{3}, \frac{9}{2}, \frac{10}{9}, \frac{11}{9}, \frac{6}{5}$
- Pupils write five improper fractions.
- Proper fractions:** $\frac{4}{9}, \frac{3}{4}, \frac{1}{2}, \frac{8}{15}, \frac{2}{13}, \frac{5}{6}$
Improper fractions: $\frac{10}{3}, \frac{9}{7}, \frac{4}{2}, \frac{15}{9}, \frac{7}{8}$
- a) $\frac{5}{9}$; b) $\frac{4}{9}$

Workbook

- $\frac{9}{7}, \frac{11}{3}, \frac{5}{2}, \frac{25}{6}, \frac{13}{4}, \frac{17}{5}$

Assessment

Pupils should be able to identify improper fractions.

Pupils should know that in an improper fraction the numerator is larger than the denominator.

They should understand that an improper fraction is greater than 1.

Support activity

If the pupil is unable to identify an improper fraction it may be necessary to repeat the starter activity. Continue with concrete examples like those in the starter activity until the pupil is able to identify an improper fraction. Ensure that they attempt Exercise 3 numbers 1–3 again.

Homework activity

Pupils complete question 1 on page 17 of the WB.

Lesson 4 *Pupil's Book pages 46 and 47;* *Workbook page 17*

Preparation

You will need to have:

- Sheets of A4 paper to demonstrate halves, quarters and eighths
- Extra sheets in order to show mixed fractions.

Starter activity

Repeat the starter activity from the previous lesson to get your three halves of paper, or $\frac{3}{2}$. Ask the pupils how many whole pieces of paper they can make from the $\frac{3}{2}$. They should be able to recognize that they can make one whole piece of paper and that there is then one half left over. Show the pupils how they can write this $1\frac{1}{2}$. Explain that this is called a mixed number.

Repeat with the other fractions, for example, quarters, eighths.

Lesson focus

Once the pupils have mastered the concept of improper fractions they should be shown how to write improper fractions as mixed numbers. Work through the examples on pages 46 and 47 with the pupils. Work through the examples step by step ensuring that the pupils understand the steps.

Once pupils have understood the examples they can complete questions 2 and 3 on page 17 in the WB.

Answers

Workbook

- $19\frac{1}{2}, 1\frac{2}{3}, 1\frac{1}{5}, 2\frac{2}{3}, 2\frac{3}{7}, 3\frac{5}{6}, 19\frac{1}{2}, 1\frac{1}{8}, 2\frac{3}{13}, 2\frac{1}{25}, 2\frac{1}{2}$
- $\frac{4}{3}, \frac{5}{2}, \frac{13}{4}, \frac{7}{5}, \frac{23}{5}, \frac{23}{8}, \frac{19}{4}, \frac{17}{3}, \frac{17}{9}, \frac{25}{11}$

Assessment

Pupils should be able to write an improper fraction as a mixed number.

They should also be able to write a mixed number as an improper fraction.

Support activity

If the pupils cannot write an improper fraction as a mixed number it would be important to repeat the example on page 47 of the PB. If necessary go back to the starter activity and repeat.

Homework activity

Ask pupils to complete the following:

Write each of the improper fractions as mixed numbers:

1. $\frac{4}{3} =$ 2. $\frac{6}{2} =$ 3. $\frac{5}{4} =$ 4. $\frac{11}{8} =$

Lesson 5 *Pupil's Book pages 48 and 49;*

Workbook page 17



Preparation

Write the following questions on the board:

- What is the bottom number of a fraction called?
- In a proper fraction which number is the smaller? The numerator or the denominator?
- What kind of fraction has a numerator which is smaller than the denominator?
- A mixed number is made up of a _____ number and a fraction.
- Can a mixed number be changed into a proper fraction?

Write the following answers on flash cards:

- numerator, denominator, improper fraction, proper fraction, whole, yes, no.



Starter activity

Ask the pupils to complete the prepared quiz on the board. This serves as a revision exercise for the unit.



Lesson focus

The lesson focuses on quantitative reasoning and on the Revision exercise for the unit. Work through the first question of each of the exercises as an example for the pupils.

Pupils complete Exercise 4. Read through the summary on page 48 with the pupils. Allow pupils to complete the Revision exercise. Use the exercise to assess the pupils' knowledge of this unit.



Answers

Exercise 4

1. The fractions which can be changed to mixed numbers are:

$$\frac{14}{10} = 1\frac{4}{10} \quad \frac{41}{11} = 3\frac{8}{11} \quad \frac{62}{40} = 1\frac{22}{40}$$
$$\frac{28}{18} = 1\frac{10}{18} \quad \frac{9}{3} = 3$$

2. a) $\frac{21}{40}, \frac{8}{10}, \frac{2}{3}, \frac{12}{18}, \frac{7}{16}$
b) $\frac{14}{10}, \frac{41}{11}, \frac{62}{40}, \frac{28}{18}, \frac{9}{3}$
c) $\frac{14}{10} = 1\frac{4}{10}, \frac{41}{11} = 3\frac{8}{11}, \frac{62}{40} = 1\frac{22}{40}, \frac{28}{18} = 1\frac{10}{18}, \frac{9}{3} = 3$
d) $4\frac{6}{8}, 4\frac{6}{10}, 1\frac{19}{20}, 6\frac{3}{4}, 2\frac{1}{2}$
e) $4\frac{6}{8} = \frac{38}{8}, 4\frac{6}{10} = \frac{46}{10}, 1\frac{19}{20} = \frac{39}{20}, 6\frac{3}{4} = \frac{27}{4}, 2\frac{1}{2} = \frac{5}{2}$

Revision exercise

1. a) $2\frac{1}{2}$; b) $2\frac{1}{3}$; c) $2\frac{1}{4}$; d) $1\frac{7}{11}$; e) $5\frac{1}{5}$; f) $7\frac{4}{7}$
2. a) $\frac{13}{8}$; b) $\frac{9}{4}$; c) $\frac{15}{4}$; d) $\frac{33}{8}$; e) $\frac{43}{8}$; f) $\frac{55}{8}$
3. $\frac{7}{4}$
4. $\frac{230}{50} = 4\frac{30}{50} = 4\frac{3}{5}$

Workbook

4. a) $1\frac{13}{30}$; b) $\frac{5}{9}$; c) $1\frac{3}{20}$; d) $1\frac{1}{60}$; e) $\frac{7}{24}$; f) $4\frac{1}{15}$
g) $\frac{9}{10}$; h) $\frac{1}{3}$; i) $3\frac{3}{16}$; j) $\frac{3}{5}$; k) $\frac{1}{20}$; l) $\frac{37}{60}$
5. a) $\frac{7}{5}$; b) $\frac{3}{8}$; c) $\frac{5}{2}$; d) $\frac{1}{2}$; e) $\frac{7}{5}$; f) $\frac{4}{3}$; g) $\frac{23}{14}$; h) $\frac{11}{6}$; i) +;
j) $\frac{3}{4}$

Assessment

Are the pupils able to solve problems using quantitative reasoning with improper fractions and mixed numbers?

Are pupils able to solve word sums using improper fractions and mixed numbers?

Support activity

If pupils struggle with the word problems, ask them to first write number sentences before calculating the answers.

Homework activity

Pupils can complete questions 4 and 5 of page 17 in the WB.

Objectives

By the end of this unit, each pupil should be able to:

- Use decimal fractions up to hundredths
- Solve quantitative reasoning problems in decimal fractions
- Obtain equivalent fractions of a given fraction
- Order pairs of fractions
- Solve quantitative reasoning in equivalent fractions.

**Suggested resources**

Flash cards; Flow chart of quantitative reasoning.

**Key word definitions**

decimal: one tenth

unit: one whole

equivalent: equal in value or amount

**Frequently asked questions**

Q *What prior knowledge do pupils need?*

A Pupils need:

- to understand place value very well
- have knowledge of proper fractions.

Q *Is it necessary to work with concrete and semi-abstract representations of fractions when covering the work in this unit?*

A It is very important to use concrete and semi-abstract representations of fractions when you cover this topic.

Q *Should I approach decimal fractions from a fractional perspective or a place value perspective?*

A At this age, it is better to approach decimal fractions from a place value perspective. The pupils do not yet have enough background knowledge of fractions to ensure that they will understand decimals well enough from a fractional perspective.

**Common errors pupils make**

Pupils may make errors with place value. It is important that you work with an abacus as much

as possible when dealing with decimal fractions. Allow the pupils to draw their observations of the fractions represented on the abacus.

Pupils may not understand how to find equivalent fractions. Allow them to use representations such as is illustrated on page 52.

**Evaluation guide**

Pupils to:

1. Write decimal fractions with denominators of tens and hundreds.
2. Solve problems in quantitative reasoning.
3. Find the equivalence of given fractions.
4. Order given pairs of fractions using $<$ or $>$.
5. Solve problems on quantitative aptitude reasoning involving equivalent fractions.

Lesson 1

*Pupil's Book pages 50 and 51;
Workbook page 18*

**Preparation**

You will need to have:

- At least one abacus and if possible abaci for the pupils to work with
- Marked the first two columns (to the right) on the abacus as tenths and hundredths
- Stuck a paper point between the Units column and the tenths column
- Cut out some prices of food and clothing from newspaper advertisements.

Starter activity

Make sure that your pupils understand why we need to extend our number system to include decimal numbers. Talk about the everyday use of decimal numbers, also simply called decimals, for example, decimal-based money systems, containers marked 1.5 ℓ or 2.5 kg as well as distances. Ensure that they understand the link between decimals and common fractions with denominators of 10 and 100.

Lesson focus

Show the pupils an advert that shows a price of an item. Point out that an item costing ₦7.89 means that the item costs 7 whole Naira and the 89 means that it is $\frac{89}{100}$ of a Naira. The 89 is a decimal fraction. Demonstrate this number on the abacus. Explain that the 8 is in the tenths column and the 9 is in the hundredths column. Show the pupils that the $\frac{89}{100}$ is separated from the whole units by a decimal point. Repeat the demonstration with other amounts. Write the numbers and decimal fractions which you represent on the abacus on the board. Explain that for every decimal fraction there is a proper fraction that can be written.

Give the pupils the example of 0.5 being the same as $\frac{1}{2}$. Read through the explanation on page 50 of the PB with the pupils. Ensure that they understand the convention of writing decimal fractions. You could use another example to help consolidate the concept. Go through the example on page 51. If possible show the numbers represented on the table in the example on an abacus.

Pupils should then complete Exercise 1. Those pupils who finish their work quickly and correctly and who have grasped the concept should be encouraged to attempt the **Challenge** on page 51.

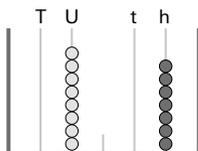
Answers

Exercise 1

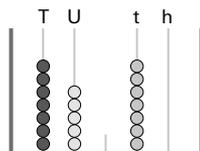
1. a) 3.8

b) 12.35

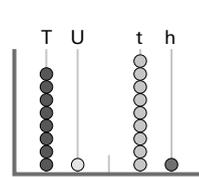
2. a)



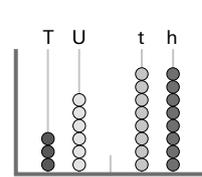
b)



c)



d)



3. a) zero point zero four; zero point zero three; zero point two five; zero point five one; zero point eight nine

b) $\frac{4}{100} = \frac{1}{25}$; $\frac{3}{100}$; $\frac{25}{100} = \frac{1}{4}$; $\frac{51}{100}$; $\frac{89}{100}$

4. a) 7.08 b) 32.95 c) 104.6

Challenge

$0.67 + 0.33$; $0.25 + 0.75$; $0.4 + 0.6$; $0.72 + 0.28$; $0.3 + 0.7$

Workbook

1. B: 204,62 – Two hundred and four point six

C: 43,21 – Forty-three point two one

D: 125 – One hundred and twenty-five

E: 38,05 – Thirty-eight point zero five

Assessment

Pupils should be able to write decimal fractions in figures and in words.

They should be able to represent decimal fractions on an abacus.

Support activity

Write decimal numbers of tenths and hundreds on the board. Explain to pupils that they can write the numbers as proper fractions, for example, nine tenths can be written as $\frac{9}{10}$ and twenty three hundredths can be written as $\frac{23}{100}$. Give the pupils other decimal numbers to write as common fractions.

Extension activity

Give the pupils the following question:

In the 100 m race three pupils ran the following times:

- Thomas ran the race in 13.89 seconds.
- Ama ran the race in 13.85 seconds.
- Adela ran the race in 13.88 seconds.

Who came first, second and third?

Homework activity

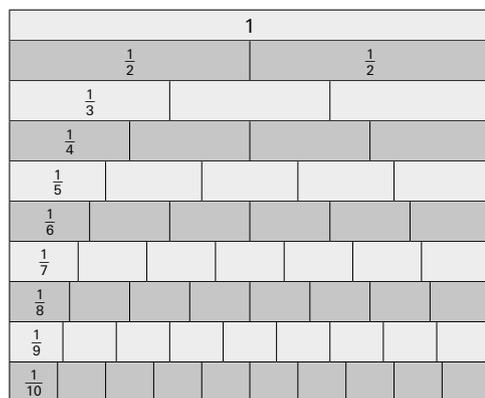
Pupils complete question 1 on page 18 of the WB.

Lesson 2 *Pupil's Book pages 52 and 53*



Preparation

Prepare a fraction wall on a chart as follows:



Starter activity

Put the fraction wall chart up on the board. Ask the pupils to look at the chart and say how many quarters make $\frac{1}{2}$. Write the answer to the question $\frac{1}{2} = \frac{2}{4}$. Continue with other fractions, for example, how many sixths make $\frac{1}{3}$? How many sixths make $\frac{2}{3}$? And so on.

Point out to the pupils that fractions can be written as other fractions, for example, $\frac{1}{2}$ s can be written as quarters, sixths, eighths and so on.



Lesson focus

In this lesson pupils will focus on writing equivalent fractions. Emphasise that all fractions can be written in a number of different ways but still equal the same amount. These fractions are called equivalent fractions. Work through the example on page 52.

Pupils complete Exercise 2.



Answers

Exercise 2

- a) 2; b) 2; c) 4; d) 2; e) 4; f) 8; g) 6
- a) 2; b) 4; c) 2; d) 3; e) 4; f) 3

- a) 3, 8, 5; b) 4, 6; c) 6
- a) 1; b) 1; c) 1; d) 2; e) 1; f) 5

Assessment

Are pupils able to convert fractions to equivalent fractions?

Extension activity

Pupils can attempt the **Challenge** on page 53.

Lesson 3 *Pupil's Book pages 53 and 54; Workbook page 19*



Preparation

- Draw the diagrams on pages 53 and 54 of the PB on the board or prepare a chart of the drawings
- Read the information on pages 53 and 54 in order to prepare your explanation of how to find equivalent fractions.



Starter activity

Use the activity from the Teaching note on page 53 of the PB as a starter activity.



Lesson focus

In this lesson pupils learn the algorithm for finding equivalent fractions. Work through the example on page 54 carefully using the diagram to assist your explanation. Work through the example that changes $\frac{3}{4}$ to the equal fraction $\frac{6}{8}$. If you think it necessary, work through another example using a similar diagram. For example, changing $\frac{1}{4}$ to $\frac{2}{8}$. Once pupils understand that the numerator and denominator can be multiplied by the same number, move to the next example of changing $\frac{5}{10}$ to the equal fraction $\frac{1}{2}$.

Pupils then should complete Exercise 3. Encourage pupils to attempt the **Challenge** on page 53.



Answers

Exercise 3

- a) $\frac{1 \times 2}{4 \times 2} = \frac{2}{8}$; b) $\frac{1 \times 5}{2 \times 5} = \frac{5}{10}$; c) $\frac{1 \times 2}{3 \times 2} = \frac{2}{6}$; d) $\frac{1 \times 3}{3 \times 3} = \frac{3}{9}$
- a) $\frac{4 \div 4}{8 \div 4} = \frac{1}{2}$; b) $\frac{6 \div 3}{9 \div 3} = \frac{2}{3}$; c) $\frac{4 \div 2}{6 \div 2} = \frac{2}{3}$; d) $\frac{5 \div 5}{10 \div 5} = \frac{1}{2}$

Workbook

4. a) $\frac{6}{8}, \frac{9}{12}, \frac{15}{20}, \dots$; b) $\frac{4}{12}, \frac{6}{18}, \frac{8}{24}, \dots$; c) $\frac{14}{16}, \frac{21}{24}, \frac{28}{32}, \dots$;
d) $\frac{18}{8}, \frac{27}{12}, \frac{36}{16}, \dots$; e) $\frac{24}{10}, \frac{36}{15}, \frac{48}{20}, \dots$; f) $\frac{20}{18}, \frac{30}{27}, \frac{40}{36}, \dots$

Assessment

Are pupils able to convert fractions to equivalent fractions using the conventional algorithm?

Support activity

Pupils who have not quite grasped the concept of multiplication or division of the numerator and denominator may need more practice. Design more exercises similar to those in Exercise 3 for them to complete.

Extension activity

Ask pupils to complete the following exercise: Which of the listed fractions is the equivalent of:

1. $\frac{1}{3}$; $\frac{2}{5}$; $\frac{3}{6}$; $\frac{2}{6}$ ($\frac{3}{6}$); 2. $\frac{3}{4}$; $\frac{3}{8}$; $\frac{6}{8}$; $\frac{5}{8}$ ($\frac{6}{8}$);
3. $\frac{2}{5}$; $\frac{3}{10}$; $\frac{4}{10}$; $\frac{6}{10}$ ($\frac{4}{10}$); 4. $\frac{2}{3}$; $\frac{5}{6}$; $\frac{8}{12}$; $\frac{3}{9}$ ($\frac{8}{12}$);
5. $\frac{4}{6}$; $\frac{6}{9}$; $\frac{4}{5}$; $\frac{6}{8}$ ($\frac{6}{9}$)

Homework activity

Pupils complete question 4 on page 19 of the WB.

Lesson 4 *Pupil's Book page 55; Workbook page 19*



Preparation

You will need to have:

- Flashcards or a flannel board.



Starter activity

Revise the concept of less than, <, and greater than, >.

Have $\frac{1}{4}$ of an A4 sheet of paper and $\frac{1}{2}$ of an A4 sheet of paper. Ask pupils to say what fraction each is. Now ask pupils to look at which fraction is bigger and which fraction is smaller. Paste the $\frac{1}{2}$ onto the board and then stick the $\frac{1}{4}$ onto the board. Ask the pupils if you should write a smaller than sign or a bigger than sign in between the two fractions. Explain to the pupils that just as we compare whole numbers so we can compare fractions.



Lesson focus

The lesson focuses on the ordering of fractions. Pupils should be able to tell which fractions are smaller or which are bigger. Work through the examples on page 55 explaining each of the steps very carefully to the pupils. Ensure the pupils understand how to write the fractions as equivalent fractions and are able to compare them in order to find the bigger or smaller fractions.

Pupils to complete Exercise 4 on page 55.



Answers

Exercise 4

1. a) $\frac{1}{3}$; b) $\frac{7}{9}$; c) $\frac{3}{4}$; d) $\frac{4}{10}$; e) $\frac{5}{8}$; f) $\frac{1}{3}$
2. a) $\frac{2}{4} < \frac{6}{8}$; b) $\frac{1}{3} > \frac{1}{9}$; c) $\frac{2}{5} < \frac{6}{10}$; d) $\frac{4}{100} < \frac{9}{10}$;
e) $\frac{4}{8} < \frac{3}{4}$; f) $\frac{1}{9} < \frac{5}{27}$
3. a) Adela; b) 4 crayons; c) 2 crayons

Workbook

5. a) <; b) <; c) <; d) <; e) >; f) <; g) >; h) >; i) >; j) >

Assessment

Pupils need to be able to order fractions.

Pupils should use the < and > signs correctly.

Homework activity

Pupils complete question 5 on page 19 of the WB.

Lesson 5

*Pupil's Book pages 56 and 57;
Workbook pages 18 and 19*



Preparation

You will need to have:

- Read through pages 56 and 57 carefully.



Starter activity

Use the summary on page 57 in order to revise the content of the unit.



Lesson focus

The pupils need to complete Exercise 5 which focuses on equivalent fractions and the Revision exercise on page 57.



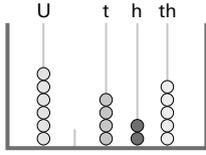
Answers

Exercise 5

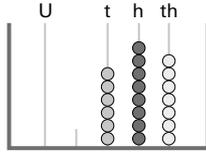
1. $0.25 = \frac{2}{8}$; 2. $\frac{4}{25} = 0.16$; 3. $0.05 = \frac{1}{20}$; 4. $0.85 = \frac{85}{100}$
 5. $\frac{6}{10} = 0.6$; 6. $\frac{20}{50} = 0.4$

Revision exercise

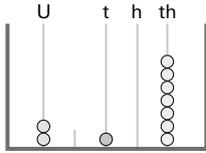
1. a)



b)



c)



2. a) $\frac{6}{8}, \frac{9}{12}$; b) $\frac{3}{20}, \frac{6}{40}$; c) $0.9, \frac{18}{20}$

3. a) $<, <$; b) $<, >$; c) $<, >$

Workbook

2. a) $<$; b) $>$; c) $=$; d) $>$; e) $<$; f) $<$; g) $<$; h) $>$;
 i) $=$; j) $<$; k) $>$; l) $>$; m) $<$; n) $<$; o) $<$
 3. a) 0.6; b) 1.667; c) 0.75; d) 0.625; e) 1.167;
 f) 1.25; g) 1.8; h) 2.4; i) 1.111

Assessment

Are the pupils able to solve problems using equivalent fractions and quantitative reasoning?

Support activity

Should pupils not manage to complete the Revision exercise you should assess which questions they struggle with and revise that section of work from the unit.

Homework activity

Pupils complete questions 2 and 3 on pages 18 and 19 of the WB.

Objectives

By the end of this unit, each pupil should be able to:

- Add and subtract whole numbers in Th. H. T. U. with or without renaming
- Carry out correct addition and subtraction in everyday life activities
- Add and subtract three 4-digit numbers taking a row at a time
- Solve quantitative reasoning problems involving addition and subtraction of 4-digit whole numbers.

**Suggested resources**

Abacus; Charts.

**Frequently asked questions**

Q *What prior knowledge should pupils have?*

A Pupils should

- understand the concept of place value very well
- have mastered addition of 3-digit numbers
- have mastered subtraction of 3-digit numbers
- know number combinations very well.

**Common errors pupils make**

Pupils often become confused when they have to add numbers which add to more than 10 of the place value digits.

Pupils often struggle with subtracting a bigger digit from a smaller digit, for example, $2\ 651 - 1\ 349$.

**Evaluation guide**

Pupils to:

1. Add and subtract three 4-digit numbers with or without renaming.
2. Add and subtract three 4-digit numbers taking two at a time.
3. Solve quantitative aptitude problems involving addition and subtraction of three 4-digit numbers taking two at a time.

Lesson 1 *Pupil's Book page 58***Preparation**

You will need to have:

- An abacus and a flannel board with the necessary numbers and letters to demonstrate addition.

**Starter activity**

Revise adding and subtracting easy 2-digit numbers using the flannel board and column method on the flannel board. Emphasise the placement of the numbers in their place value columns. Ensure you work through the examples on page 58 before the lesson using an abacus and beads.

**Lesson focus**

This lesson focuses on introducing pupils to adding 4-digit numbers. Revise addition of 3-digit numbers using a similar method to the method in the starter activity. Use an abacus to demonstrate the example on page 58. First put beads on the abacus to represent 2 145. Ask the pupils to read the number on the abacus. Now ask the pupils how you would add 4 312? Add the beads to represent 4 312. Start by adding the beads in the units column, then in the tens column, then in the hundreds and lastly in the thousands column. As you add the beads ask the pupils to tell you the value represented by the beads, for example, you are adding one bead in the tens column and this represents 10, you are adding three beads in the hundreds column and this represents 300 and so on.

Repeat this with the subtraction example. Pupils should complete Exercise 1. While pupils are completing the exercise it is important to observe their work in order to assist them where necessary.



Answers

Exercise 1

1. a) 5 398; b) 4 469; c) 5 736; d) 7 588;
e) 3 887; f) 4 468
2. a) 3 241; b) 4 112; c) 4 124; d) 2 221

Assessment

Pupils should be able to add and subtract 4-digit numbers without renaming.

Support activity

If pupils struggle to add and subtract 4-digit numbers without renaming then it is important to go back to basics. Assess whether they know their basic number combinations. If they know these combinations of single digit additions and subtractions move on to adding and subtracting double digits without renaming. Work incrementally like this until you can see where they are not managing and then using the abacus method explain addition and subtraction again. Give the pupils a practice exercise like this one if they are only starting to master addition and subtraction of 3-digit numbers:

1. $124 + 231 =$; 2. $347 + 112 =$; 3. $452 + 236 =$;
4. $689 - 126 =$; 5. $899 - 455 =$; 6. $754 - 213 =$

Homework activity

Pupils can complete the following exercise:

1. $2\ 146 + 231 =$; 2. $3\ 213 + 4\ 426 =$;
3. $5\ 689 - 1\ 327 =$; 4. $6\ 848 - 6\ 422 =$

Lesson 2 *Pupil's Book page 59*



Preparation

You will need to have:

- An abacus.



Starter activity

Revise the examples from the previous lesson.



Lesson focus

The focus of this lesson is to enable the pupils to add more than two numbers. Use the abacus to

demonstrate the following example:

$$2\ 120 + 1\ 232 + 4\ 413 =$$

	Th	H	T	U
	2	1	2	0
+	1	2	3	2
	3	3	5	2
+	4	4	1	3
	7	7	6	5

Explain to the pupils that they should always write the numbers correctly in the place value columns and then start adding from the Units side. Once they have added the first two numbers and calculated the answer they can then write the third number in the correct place value column under the answer. They should then add those two numbers starting at the Units side.

Work through the example on page 59 of the PB. Pupils then complete Exercise 2.



Answers

Exercise 2

1. a) 3 564, 4 686; b) 2 243, 4 475; c) 6 244, 8 258; d) 3 477, 7 222; e) 5 324, 7 785; f) 4 861, 11 404

Assessment

Pupils must be able to add three 4-digit numbers taking two at a time.

Pupils should be using the place value columns correctly when adding.

Do pupils know that they should start adding from the Units side of the columns?

Support activity

If pupils find adding three numbers too difficult it would be important to revise the work of the previous lesson to build their confidence. You may also ask them to complete the following exercise:

1. $454 + 325 =$; 2. $732 + 125 =$;
3. $1\ 000 + 2\ 000 =$; 4. $4\ 500 + 2\ 400 =$

Homework activity

Pupils should finish any of the questions in Exercise 2 which they have not completed in class.

Lesson 3 *Pupil's Book page 60*

Preparation

You will need to have:

- An abacus
- Worked through the examples on page 60 carefully
- Experimented with an abacus in order to plan how best to explain this concept to your class.

Starter activity

Work with an abacus and beads. Have 25 beads on the abacus: five in the Units column and two in the Tens column. Ask the pupils how they would explain to you how to add 36 to the number on the abacus. They should say that you need to add the six beads to the five units. Put the six beads with the five units. Ask them what they notice. Pupils should mention that there are eleven units. Eleven units makes one ten and one unit. You should now take one bead that would represent the ten and one bead to represent the unit. Remove the eleven beads from the Unit column and replace with the one unit bead. Now ask the pupils what you should do with the one ten bead that you still have in your hand. They should say that you now need to add it to the Tens column. Add the two tens and the three tens and then add the one ten bead from the ten units. There should now be one bead in the Units column and six beads in the Tens column.

Repeat this with other numbers. Once the pupils understand how to add with tens and units then ask them to add hundreds, tens and units.

Lesson focus

In this lesson pupils are introduced to renaming in order to add and subtract 4-digit numbers. After taking time on the starter activity lead the pupils through the worked examples on page 60.

Pupils should then be given an opportunity to complete Exercise 3. Assist those pupils who may find the addition a little difficult while they are working through the questions.

Answers

Exercise 3

1. a) 7 761; b) 5 627; c) 7 848; d) 6 102;
e) 6 834; f) 6 312

Assessment

Pupils must be able to add 4-digit numbers using renaming.

Support activity

If pupils are not able to add the numbers with renaming, repeat the starter activity but start with single digit numbers, for example, $7 + 9 =$, then progress to 2-digit numbers and so on.

Extension activity

Pupils choose any four digits, for example 3, 2, 6, 8, they make the smallest number they can with the digits (2 368) and then they make the biggest number they can with the digits (8 632). They should add the numbers.

Homework activity

Pupils can complete the following for homework:

Calculate using a place value table:

1. $2\ 367 + 1\ 462 =$; 2. $1\ 056 + 3\ 985 =$;
3. $7\ 428 + 3\ 539 =$



Preparation

You will need to have:

- Read through the example on page 61
- Draw the columns on the board in order to demonstrate the principle of renaming.



Starter activity

Pupils revise subtraction with 2- and 3-digit numbers. Start with easier examples: $34 - 12$, $87 - 35$ and $378 - 124$. Move on to more difficult examples where pupils have to rename the digits, for example, $84 - 37$ and $512 - 238$. Ensure that the pupils have recalled what to do when subtracting using renaming with 2- and 3-digit numbers before moving on to subtraction of 4-digit numbers.



Lesson focus

In the lesson pupils will use their prior knowledge to help them subtract 4-digit numbers using renaming of digits. Work through the example on page 61 of the PB carefully ensuring that pupils follow the steps.

You can use the following as another example to work through with the learners. It is important that they follow the steps and understand the concept of renaming before attempting Exercise 4.

	Th	H	T	U
-	4	11	12	1
	2	5	4	5
	2	6	8	6

Comments

1. Rewrite the 3 tens and 1 unit in the top number as 2 tens and 11 units. Subtract the units $11 - 5 = 6$
2. Rewrite the 2 hundreds and 2 tens as 1 hundred and 12 tens and then subtract the tens: $12 - 4 = 8$
3. Rewrite the 5 thousands and one hundred as 4 thousands and 11 hundreds and subtract the hundreds $11 - 5 = 6$
4. Subtract the thousands: $4 - 2 = 2$

If necessary work through more examples with the pupils. Once you are satisfied that the pupils understand what is required they may complete Exercise 4 on page 61 of the PB.



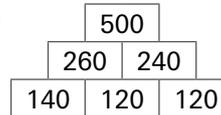
Answers

Exercise 4

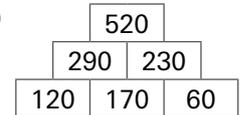
1. a) 2 177; b) 2 889; c) 4 867; d) 4 450
2. a) 1 858; b) 4 749; c) 2 768; d) 3 371; e) 1 518

Workbook

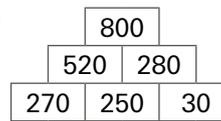
3. b)



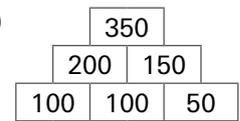
c)



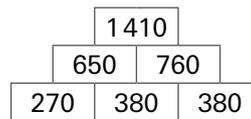
d)



e)



f)



Assessment

Pupils should be able to subtract 4-digit numbers using the technique of renaming.

Pupils can work confidently with place value.

Support activity

If pupils have not mastered subtraction with 4-digit numbers it is important to revise subtraction using renaming within a smaller number range. Repeat the starter activity.

Extension activity

Pupils take any four digits and write them down. They arrange the digits to make the biggest number and then arrange the digits to make the smallest number possible. They then subtract the smaller number from the bigger number. They do as many of these as they can. They can take this activity further by adding the digits of the answer and looking for any interesting patterns.

Homework activity

Pupils complete question 3 of page 20 of the WB for homework.

Lesson 5 *Pupil's Book page 62; Workbook page 20*



Preparation

Read through the word problems on page 62 of the PB and identify the words that the pupils may find difficult to read or to understand.



Starter activity

Ask pupils to choose any 2 digits, for example, 5 and 3. They make the biggest number they can and the smallest number they can. They then subtract the smaller number from the bigger number: $53 - 35 = 18$. They should repeat this with different combinations of digits. They compare the answers and see if they can see a pattern. They should see that all the answers are divisible by 9.



Lesson focus

This lesson focuses on solving word problems which are contextualized in everyday life. Start the lesson by working through an example with the pupils. You could use the following as an example:

A town has 1 034 men and 1 148 women.
What is the total population of men and women in the town?

Ask the pupils how they would solve the problem. They should be able to say that the two numbers should be added to find the total number of men and women in the town. Ask them how they know that the numbers should be added. They should be able to point out that the words “find the total” is interpreted to mean that the two numbers must be added. Show them how to write the number sentence:

Total population of men and women
 $= 1\ 034 + 1\ 148$

	Th	H	T	U
	1	0	3	4
+	1	1	4	8
	2	1	8	2

Revise how to add with renaming the digits.

It may be best to read the first problem and then allow some discussion on how to solve the problem. Assist the pupils to write the number sentence and to calculate the answer. Work through the next question in a similar way.

When ready, ask pupils to complete Exercise 5 on page 62.



Answers

Exercise 5

- 4 529 people; 2. 6 037 pupils; 3. ~~£~~4 669 profit;
- 8 125 km
- a) 67 passengers; b) 59 passengers;
c) 177 passengers

Workbook

- a) 78; b) 32; c) 21; d) 73; e) 762; f) 54
g) 1 005; h) 483
- a) 61; b) 119; c) 11; d) 43; e) 617; f) 746;
g) 1 012; h) 115

Assessment

Pupils should be able to solve word problems which are contextualized in everyday life.

Can pupils add and subtract by renaming the digit in order to solve word problems?

Support activity

If some pupils are struggling with understanding word problems, go over each step of the problem with them before they begin to solve the problem. Ensure that they understand the key words such as “total”, “altogether” and “how many more”.

Homework activity

Pupils complete questions 1 and 2 on page 20 of the WB for homework.



Preparation

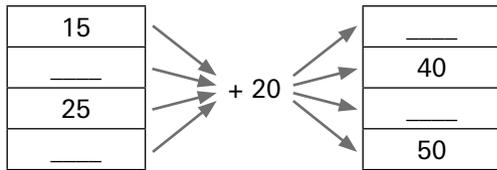
You will need to have:

- Worked through the worked example on page 63 in order to understand the pattern
- Copy the numbers and shapes to use on a flannel board.



Starter activity

Draw a simple flow diagram on the board, for example:



Ask pupils to fill in the missing numbers. If necessary, work through more examples.



Lesson focus

The focus of the lesson is on quantitative reasoning using addition and subtraction of whole numbers. Work through the worked example on page 63. Point out to the pupils that the colouring should also be taken into consideration when looking for the pattern to be used to calculate the answer. In the blue shaded shapes the numbers on the outside add up to give the number in the centre. In the set of numbers which appear in the green shaded shapes the top three numbers add up to give the number at the bottom of the set. Once the pupils understand the process in order to find the missing numbers they should be encouraged to complete Exercise 6 on page 63. Assist those pupils who seem to be struggling with the exercise.

Once the pupils have completed Exercise 6 revise the content of Unit 10 with them and allow them to complete the Revision exercise on page 64.



Answers

Exercise 6

1. 2 796; 2. 3 515; 3. 4 700; 4. 3 887; 5. 1 058;
6. 9 170

Revision exercise

1. a) 6 791; b) 9 705; c) 7 821; d) 9 945
e) 9 253; f) 6 094; g) 7 277; h) 7 303
2. a) 5 318; b) 3 604; c) 495; d) 4 234; e) 2 406;
f) 2 511; g) 0; h) 2 824

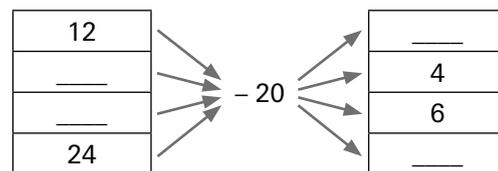
Assessment

Pupils should be able to solve problems using quantitative reasoning and addition and subtraction.

Are pupils able to add and subtract by renaming the digits where necessary?

Support activity

If pupils cannot solve the problems using quantitative reasoning give them easier examples like the one in the starter activity, for example:



Pupils should explain to you how they calculated the answers.

Objectives

By the end of this unit, each pupil should be able to:

- Add and subtract two proper fractions
- Add and subtract improper fractions and mixed fractions
- Correctly add and subtract proper and improper fractions in everyday life activities
- Solve quantitative aptitude problems involving addition and subtraction of fractions.

**Suggested resources**

Fraction charts; Quantitative aptitude charts.

**Frequently asked questions**

Q *What prior knowledge should pupils have?*

A Pupils should have a sound knowledge of:

- proper and improper fractions
- mixed fractions
- finding equivalent fractions
- the terms denominator and numerator
- addition and subtraction.

**Common errors pupils make**

Pupils may confuse the terms of denominator and numerator.

Pupils may want to add or subtract the denominators.

Pupils may not add the numerators but merely put them together, for example, $\frac{2}{6} + \frac{3}{6} = \frac{23}{66}$.

**Evaluation guide**

Pupils to:

1. Add and subtract proper fractions and mixed fractions.
2. Give three or more examples of everyday life activities that require addition and subtraction of fractions.
3. Solve quantitative aptitude problems involving addition and subtraction of fractions.

Lesson 1

Pupil's Book pages 65 and 66;

Workbook page 16

**Preparation**

You will need to have:

- Flash cards with the following fractions written on them: $\frac{1}{2}$; $\frac{1}{4}$; $\frac{3}{4}$; $\frac{1}{5}$; $\frac{2}{5}$; $\frac{3}{5}$; $\frac{4}{5}$; $\frac{1}{8}$; $\frac{3}{8}$; $\frac{5}{8}$; $\frac{7}{8}$
- Prepare same size paper sheets (for example A4) divided into quarters and eighths.

**Starter activity**

Place the flash cards in random order on the board. Ask pupils to select the fractions which have the same denominators. Ask them to place them in groups on the board. Revise the terms numerator and denominator with the pupils.

**Lesson focus**

In this lesson pupils learn to add fractions with the same denominators. Hold up the paper sheet that has been divided into quarters. Tear the paper into quarters. Hold up one quarter and then hold up another quarter. Stick the first quarter to the board with a + sign and then place another quarter behind the addition sign.

$$\frac{1}{4} + \frac{1}{4}$$

Write on the board: $\frac{1}{4} + \frac{1}{4} = \frac{2}{4}$

Point out to the pupils that the denominator stays the same but that the numerators are added. Ask them to try and explain why the numerators are added but that the denominator stays the same. They should be able to identify that the denominator describes the number of parts into which a whole has been divided but the numerator describes how many parts were taken. Repeat the exercise using $\frac{1}{4} + \frac{2}{4} = \frac{3}{4}$; then repeat with eighths. Show as many calculations using the paper quarters and paper eighths as possible. Once you have shown the calculations in a concrete way work through the worked examples on page 65 of the PB. Refer to the diagrams as this takes the pupils to a more semi-abstract level of reasoning.

Once the pupils have worked through the examples you may ask them to complete Exercise 1.

Answers

Exercise 1

1. a) $\frac{5}{6}$; b) $\frac{6}{7}$; c) $\frac{4}{9}$; d) $\frac{5}{8}$; e) $\frac{2}{4} = \frac{1}{2}$; f) $\frac{7}{10}$
 2. a) $\frac{4}{7}$; b) $\frac{2}{5}$; c) $\frac{1}{9}$; d) 0; e) $\frac{7}{8}$; f) $\frac{1}{5}$

Workbook

5. a) $\frac{1}{3} = \frac{5}{15}$; b) $\frac{3}{5} = \frac{9}{15}$; c) $\frac{14}{15}$
 6. a) $\frac{5}{6}$; b) $\frac{5}{12}$; c) $\frac{19}{35}$; d) $\frac{5}{8}$

Assessment

Pupils should be able to identify the numerator and the denominator in any given fraction.

Pupils should be able to add fractions with the same denominator.

Support activity

If pupils add fractions with the same denominator they may make the mistake of adding the numerators as well as the denominators. This mistake must be remedied immediately. Repeat the starter activity with concrete teaching aids.

Extension activity

Pupils can complete the following:

$$\frac{1}{2} + \frac{2}{2} = ; \frac{3}{4} + \frac{1}{4} + \frac{3}{4} = ; \frac{3}{8} + \frac{1}{8} + \frac{5}{8} =$$

Homework activity

Pupils complete questions 5 and 6 on page 16 of the WB.

Lesson 2 *Pupil's Book page 66; Workbook page 21*

Preparation

Prepare same size paper sheets (for example A4) divided into halves, quarters and eighths.

Starter activity

Write $\frac{1}{2} + \frac{1}{4}$ on the board. Ask the pupils what they notice about the two denominators of the two fractions. They should be able to point out that the denominators are different. Ask them how they think the fractions could be added. Demonstrate to the pupils using one piece of paper divided into halves and another piece of paper divided into quarters. Stick a half of the paper onto the board write a + sign and then stick $\frac{1}{4}$ of the sheet of paper to the board. Now demonstrate that if we fold the half into quarters and tear, we can stick two quarters to the board in place of the half + the other quarter and we now have three quarters. Repeat the demonstration with other fractions, for example, $\frac{1}{2} + \frac{1}{8}$. You would divide the half into four eighths and so on.

Lesson focus

Explain to the pupils that in order to add fractions with different denominators we have to change one of the fractions so that it has the same denominator as the other fraction. In other words the fractions must be changed to equivalent fractions. The fractions to be added must all have the same denominator. Show pupils that the same principle applies if we subtract fractions. Work through the examples on page 66 of the PB.

Pupils complete Exercise 2. Assist pupils while they complete the exercise.



Answers

Exercise 2

1. a) $\frac{2}{6} + \frac{3}{6} = \frac{5}{6}$; b) $\frac{4}{10} + \frac{4}{10} = \frac{8}{10} = \frac{4}{5}$; c) $\frac{6}{9} + \frac{2}{9} = \frac{8}{9}$;
 d) $\frac{3}{8} + \frac{2}{8} = \frac{5}{8}$; e) $\frac{2}{4} + \frac{1}{4} = \frac{3}{4}$; f) $\frac{2}{8} + \frac{4}{8} = \frac{6}{8} = \frac{3}{4}$
 2. a) $\frac{7}{10} - \frac{6}{10} = \frac{1}{10}$; b) $\frac{2}{4} - \frac{1}{4} = \frac{1}{4}$; c) $\frac{6}{8} - \frac{2}{8} = \frac{4}{8} = \frac{1}{2}$;
 d) $\frac{5}{8} - \frac{4}{8} = \frac{1}{8}$; e) $\frac{8}{8} - \frac{4}{8} = \frac{4}{8} = \frac{1}{2}$; f) $\frac{7}{8} - \frac{4}{8} = \frac{3}{8}$

Workbook

1. a) $\frac{5}{4}$; b) $\frac{1}{3}$; c) $\frac{5}{4}$; d) $\frac{31}{36}$; e) $\frac{11}{6}$; f) $\frac{19}{10}$; g) $\frac{9}{4}$;
 h) $\frac{19}{8}$; i) $\frac{37}{60}$; j) $\frac{5}{21}$; k) $\frac{17}{14}$; l) 2

Assessment

Pupils should know the meaning of the terms denominator and numerator.

Pupils should know how to add and subtract fractions with the same denominator.

Pupils should know how to add and subtract fractions with different denominators.

Support activity

Pupils may add fractions with different denominators by adding the numerators and the denominators, for example, $\frac{1}{3} + \frac{1}{4} = \frac{2}{7}$. Explain to the pupils that this is not correct and then revise the starter activity using paper fractions. For each worked example give the pupils opportunity to write the calculation step by step, for example:

$$\frac{1}{2} + \frac{1}{4} \text{ Pupils write: } \frac{1}{2} + \frac{1}{4}$$

Then tear the $\frac{1}{2}$ into quarters.

$$\text{Pupils write: } \frac{2}{4} + \frac{1}{4}$$

$$\text{Pupils then write the answer: } \frac{2}{4} + \frac{1}{4} = \frac{3}{4}$$

Repeat with other fractions until pupils understand the principle that they have to add using equivalent fractions. Once they have the same denominator they can add the fractions.

Extension activity

Ask pupils to show $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$ on a number line.

Homework activity

Pupils complete question 1 on page 21 in the WB.

Lesson 3

Pupil's Book pages 67 and 68;

Workbook page 21



Preparation

Work through the examples on pages 67 and 68 of the PB carefully. Decide what would be appropriate for your class. You may want to introduce one method and allow pupils to practice the one method before introducing the other. Introducing both methods at once may confuse the pupils, depending on how confident the pupils are with adding and subtracting fractions with different denominators and mixed numbers.



Starter activity

Revise the concept of mixed numbers and revise the method of adding and subtracting fractions with different denominators.



Lesson focus

The focus of this lesson is on adding and subtracting mixed numbers. This is important as it will be a necessary skill in more advanced maths and algebra. Once you have revised the concepts as explained in the starter activity, work through the examples as you have planned to do. It is a good idea to allow the pupils to choose which ever method they best understand to calculate the answers.

Pupils complete Exercise 3. Assist pupils where necessary while they complete the exercise.



Answers

Exercise 3

1. a) $3\frac{4}{5}$; b) $7\frac{3}{4}$; c) 4; d) $14\frac{5}{7}$; e) $6\frac{1}{4}$; f) $5\frac{1}{4}$; g) $10\frac{7}{8}$;
 h) $5\frac{1}{12}$; i) $28\frac{1}{2}$; j) $6\frac{25}{28}$
 2. a) $2\frac{3}{8}$; b) $1\frac{1}{2}$; c) $\frac{3}{10}$; d) $1\frac{1}{6}$; e) $1\frac{5}{12}$; f) $1\frac{7}{8}$; g) $3\frac{3}{16}$;
 h) $2\frac{7}{10}$; i) $3\frac{11}{15}$; j) $1\frac{13}{18}$; k) $\frac{23}{24}$; l) $5\frac{11}{12}$

Workbook

2. $\frac{1}{3}$; 3. $\frac{13}{15}$ km

Assessment

Pupils are confident in finding equivalent fractions.

Pupils should be able to convert mixed numbers to fractions and vice versa.

Pupils can add and subtract mixed numbers.

Support activity

If pupils struggle to add mixed numbers, ensure that they are able to add and subtract fractions with different denominations. Once they have mastered this then introduce them to very easy examples of addition of mixed numbers, for example, $1\frac{1}{2} + \frac{3}{4} =$. If the pupils struggle with the concept of adding the numbers it may be a good idea to use paper fractions to demonstrate the process to them.

Homework activity

Pupils complete questions 2 and 3 on page 21 of the WB.

Lesson 4 *Pupil's Book pages 69 and 70;* *Workbook page 22*



Preparation

You will need to have:

- Examples of fractions used in pupils' daily activities
- Worked through pages 69 and 70 carefully in order to familiarise yourself with the work that is expected of the pupils.



Starter activity

Ask pupils to identify instances where they would come across fractions in everyday life. If possible show them advertisements, news articles, magazine articles which contain fractions, for example, prices slashed by $\frac{1}{2}$ and so on.



Lesson focus

The lesson focuses on the ability of pupils to calculate addition and subtraction of mixed numbers within the context of word problems. This implies that pupils must be able to read and interpret the meaning of the contextualised problems. Use the following as an introductory example:

Linda has $1\frac{1}{4}$ metres of material. She buys another $2\frac{1}{2}$ metres. How many metres does she have?

Emphasise the importance of writing a number sentence.

1. $1\frac{1}{4} + 2\frac{1}{2}$ metres; 2. $3\frac{1}{4} + \frac{1}{2}$ metres;
3. $3\frac{1}{4} + \frac{2}{4}$ metres; 4. $= 3\frac{3}{4}$ metres

Steps:

1. Amount of material
2. Add the whole numbers
3. Make the fractions equivalent
4. Add the fractions

Work through the worked examples on page 69 with the pupils.

Pupils complete Exercise 4 on page 70. Assist the pupils who may struggle with reading. It may be useful to allow a more able pupil to work with a pupil who struggles with the reading demands of this exercise.



Answers

Exercise 4

1. $4\frac{3}{5}$; 2. $2\frac{1}{6}$; 3. $2\frac{7}{20}$; 4. $42\frac{11}{12}$; 5. $\frac{1}{3}$; 6. 36 metres;
7. $5\frac{1}{8}$; 8. $4\frac{2}{3}$; 9. $7\frac{7}{8}$; 10. $3\frac{5}{8}$ and $6\frac{1}{8}$

Workbook

4. $5\frac{9}{20}$ kg; 5. $3\frac{1}{6}$ m; 6. $6\frac{1}{3}$ kg; 7. $1\frac{13}{20}$ bottles;
8. $76\frac{7}{10}$ litres

Assessment

Pupils should be able to read and interpret the problems as presented.

Ensure pupils can add and subtract mixed numbers.

Support activity

If pupils struggle with reading and interpreting the problems it is important to improve their reading ability and also to revise important words. For example, what is left, the difference between, etc.

Extension activity

Pupils make their own word problems involving adding and subtracting of mixed numbers. They swap with a partner and solve the problems.

Homework activity

Pupils complete questions 4–8 on page 22 of the WB.

Lesson 5 *Pupil's Book pages 71 and 72*

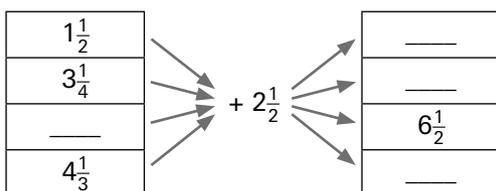
Preparation

You will need to have:

- Worked through the example in order to understand the logical flow of the reasoning. This will enable you to guide the pupils with the rest of the exercise
- Prepared fractions and mixed numbers for flannel board demonstration in the starter activity.

Starter activity

Use the flannel board and give the pupils the following example:



Lesson focus

Revise addition and subtraction of mixed numbers. Work through the worked example with the pupils.

Pupils complete Exercise 5. In Exercise 5, the top number is the sum of the bottom two numbers. Once pupils have completed the exercise it is

important to revise the work of the unit before expecting them to complete the Revision exercise on page 72.

Use this exercise to assess which pupils may still need extra work on this unit.

Answers

Exercise 5

1. $\frac{24}{6}$; 2. $\frac{4}{4}$ or 1; 3. $\frac{7}{6}$; 4. $\frac{21}{8}$

Revision exercise

1. a) $\frac{103}{70}$; b) $\frac{34}{24}$; c) $\frac{4}{10}$; d) $\frac{39}{72}$

2. a) $\frac{48}{12} = 4$; b) $\frac{283}{63}$; c) $\frac{5}{6}$; d) $\frac{8}{10}$

3. a) $\frac{36}{8} = 4$; b) $\frac{188}{30} = 6\frac{8}{30}$; c) $-1\frac{1}{6}$; d) $\frac{236}{70} = 3\frac{26}{70}$

Assessment

Pupils should be able to solve problems using quantitative reasoning and mixed numbers.

Ensure pupils are able to calculate addition and subtraction of fractions and mixed numbers.

Homework activity

Pupils can complete any unfinished questions from the Revision exercise at home.

Objectives

By the end of this unit, each pupil should be able to:

- Add and subtract decimal numbers up to three places
- Correctly add and subtract decimal numbers found in everyday life
- Solve problems using quantitative reasoning involving addition and subtraction of decimals.

**Suggested resources**

Charts; Addition cards; Quantitative aptitude charts containing worked problems.

**Key word definitions**

approximate: close to but not exactly the same

**Frequently asked questions**

Q *What prior knowledge do pupils need?*

A Pupils need to:

- understand place value very well
- know that decimals are another way of representing fractions.

**Common errors pupils make**

Pupils will often add or subtract incorrectly. Ensure that they know their basic number combinations.

**Evaluation guide**

Pupils to:

1. Give four examples of everyday activities that require correct addition and subtraction of decimal numbers.
2. Solve problems on addition and subtraction of decimal numbers up to three decimal places.
3. Solve quantitative aptitude problems involving addition and subtraction of decimal numbers with up to three decimal places.

Lesson 1

*Pupil's Book pages 73 and 74;
Workbook page 23*

**Preparation**

You will need to have:

- A flannel board with correct columns
- An abacus in order to illustrate tenths, hundredths and thousandths.

**Starter activity**

Revise the notion of decimal fractions and how to represent decimal fractions using an abacus. For example, 25.532. Then revise how to represent decimal numbers in columns on the flannel board.

Ask pupils to show representations of the following numbers on an abacus: 15.415; 37.073; 56.109

**Lesson focus**

The lesson focuses on the addition and subtraction of decimal numbers. Explain to the pupils that we use the column method to add and subtract decimal numbers and that they should remember to keep the decimal point in the correct place. They should write the columns very carefully keeping the decimal point lined up. They should write the decimal point into the answer line before they begin the addition or subtraction. Explain to the pupils what the word “approximate” means. Work through the examples on pages 73 and 74. It is important to explain to the pupils how to add or subtract numbers that do not have the same number of decimal places. Remind them to use zero as a place holder.

Once you have worked through the examples the pupils should complete Exercise 1. Encourage all pupils to attempt the puzzle. Here is the magic square:

2.8	6.3	
2.1		
	0.7	

Answers

Puzzle

2.8	6.3	1.4
2.1	3.5	4.9
5.6	0.7	4.2

Exercise 1

- a)** 81.72; **b)** 88.358; **c)** 84.801; **d)** 51.327
- a)** 47.52; **b)** 42.624; **c)** 66.24; **d)** 78.59;
e) 40.756; **f)** 76.986
- a)** 17.28; **b)** 19.25; **c)** 21.877; **d)** 14.494;
e) 43.28; **f)** 14.429
- a)** 42.36; **b)** 73.86; **c)** 35.451; **d)** 36.867;
e) 22.535; **f)** 17.325

Workbook

- a)** 2.23; **b)** 11.523; **c)** 15.42; **d)** 0;
e) 0.06; **f)** 3.414; **g)** 186.36; **h)** 33.1;
i) 13.142; **j)** 132.024

Assessment

Pupils should be able to add and subtract decimal numbers extending to three decimal places using the column method.

Pupils should be able to use zero appropriately as a place holder in decimal numbers.

Support activity

If pupils do not understand how to use zero as a place holder revise this concept using an abacus. Pupils should be able to represent a number on an abacus, for example, 23.708. They should then write the number down. Pupils repeat this activity until they grasp the concept of using zero as a place holder in decimal numbers.

Extension activity

Pupils complete the following questions:

- What number should be added to 3.572 to give 10.405?
- What is the sum of: 12.58, 23.007 and 32.109?

Homework activity

Pupils complete question 1 on page 23 of the WB.

Lesson 2 *Pupil's Book pages 75 and 76; Workbook page 23*

Preparation

You will need to have:

- Created a poster that depicts where pupils could come across addition and subtraction of decimals in their daily lives.

Starter activity

Discuss the poster you made with the pupils. Encourage them to mention their own examples of using decimal fractions in their everyday life.

Lesson focus

Pupils engage with word problems in this section of the unit. They need to use their knowledge of addition and subtraction of decimals as well as their reading and interpretative skills. It may be useful to read through each problem with the pupils and then guide them on how to write a number sentence for each of the problems.

Remind them to find the approximate answer for each of the problems. Pupils should also be reminded to always write the correct unit of measurement with each of the answers.

Answers

Exercise 2

- a)** ₦98.60; **b)** ₦1.40
- a)** 20.471 g; **b)** 36.166 g; **c)** 46.977 g; **d)** Emerald

Workbook

- 1.66 m
3. 8.81 kg
4. 60.56 ℓ

Assessment

Pupils are aware of decimal fractions in their day to day life.

Pupils are able to solve word problems using addition and subtraction of decimal numbers.

Support activity

If pupils struggle with adding and subtracting the decimal numbers it would be important to revise how to represent the numbers correctly in columns. Ensure that they know how to use a zero as a place holder in a decimal number.

Extension activity

Pupils create their own poster of how decimal numbers are used in everyday activities. Their poster should depict at least four examples.

Homework activity

Pupils complete questions 2–4 of page 23 of the WB.

Lesson 3 *Pupil's Book pages 76 and 77; Workbook page 23*

Preparation

Work through the worked example in order to understand the logical flow of the reasoning. This will enable you to guide the pupils through the rest of the exercise.

Starter activity

Revise addition and subtraction of decimal numbers. Work through the first example with the pupils. It becomes clear that the two numbers in the squares are added to equal the numbers in the oval.

Lesson focus

Pupils complete Exercise 3. Once pupils have completed the exercise it is important to revise the work of the unit before expecting them to complete the Revision exercise on page 77.

Use this exercise to assess which pupils may still need extra work on this unit.

Answers

Exercise 3

2. 69.34 kg; 3. ₦7.85; 4. 95.1m

Revision exercise

1. a) 29.534; b) 82.128; c) 19.862; d) 48.828;
e) 48.601; f) 78.594; g) 19.954; h) 92.101

2. a) 23.471 km; b) Wednesday

Workbook

5. 1.58 m

6. 11.8 kg

Assessment

Can the pupils solve problems using quantitative reasoning and decimal numbers?

Homework activity

Pupils complete questions 5 and 6 of page 23 of the WB.

Pupil's Book page 78

Objectives

Pupils use Roman numerals correctly to complete a clock face and a calendar.

**Guidelines**

It may be appropriate for pupils to choose which of the activities they would like to complete.

Pupils should be provided with sufficient card; pencils, crayons, pens; other stationary to make a clock face. Assist the pupils to choose the shape of the clock face they want to make. Guide them through the process of placing the numbers correctly. Explain to them how to make hands for their clocks and how to fix the hands to the clock face.

The second activity demands that the pupils should have grid paper which they could use to prepare a calendar for a month using Roman numerals.

Activities 3 and 4 are less practical and can be done just with pencil and paper. Ensure that pupils are able to read and interpret the instructions correctly.

**Answers**

1. Pupils make a clock.
2. Pupils design a calendar.
3. a) i) 117
ii) 126
iii) 138
iv) 149
v) 207
vi) 212
b) I, II, III, IV, V, VI, VII, VIII, IX, X, XI, XII, XIII, XIV, XV, XVI, XVII, XVIII, XIX, XX, XXI, XXII, XXIII, XXIV, XXV
4. a) Last will and testament
I leave all my
b) Pupils write their own message.

Pupil's Book page 80

Objectives

This assessment is a summative assessment of work covered in Units 1 to 12.

This assessment is designed to assess the pupils' mathematical understanding and not their reading ability. It is also important that it is completed by individuals and not with the support of other pupils as this would not uncover any difficulties a learner may be having with particular concepts.

 **Guidelines**

It is therefore best carried out with small groups of pupils under the guidance of the teacher who should read each question carefully to them, and give them time to complete the question before moving on to the next question.

A more able group within the class may be able to complete the assessment without the need for the teacher to read the questions. However, observing pupils while they are completing the assessment provides further information about them.

On completion of the assessment, teachers should look for correct answers and mistakes made by individuals. They should also be checking to see if there is a pattern in terms of any particular question causing a significant number of pupils' difficulties. By analysing the results of an assessment, teachers can identify weaknesses in individuals and provide the necessary support, and also strengths of individuals and provide them with more challenging activities. They are also able to identify any weaknesses in their teaching programme and make adjustments as necessary.

 **Answers**

1. a) 11 222, 12 223, 13 224, 14 225, 15 226, 16 227, 17 228, 18 229
- b) 102 005, 102 007, 102 009, 102 011, 102 013, 102 015, 102 017, 102 019
- c) 929 005, 929 007, 929 009, 929 011, 929 013, 929 015, 929 017, 929 019
2. a) 441 220, 441 225, 441 230, 441 235, 441 240, 441 245, 441 250, 441 255
- b) 102 007, 102 002, 101 997, 101 992, 101 987, 101 982, 101 977, 101 972
- c) 38, 45, 52, 59, 66, 73, 80, 87
- d) 157, 217, 277, 337, 397, 457, 517, 677
- e) 105, 98, 91, 84, 77, 70, 63, 56
- f) 480, 420, 360, 300, 240, 180, 120, 60
3. a) 6 hrs; b) 7 hrs 30 mins
4. 7 weeks 6 days
5. a) $7\ 000 + 800 + 30 + 8$; b) $2\ 000 + 2$
6. a) $556 > 536$; b) $319 < 391$
7. a) 551, 556, 1 125, 2 249, 2 252
- b) 95, 91, 89, 87, 85
8. a) XCV; b) XLIV; c) LXXXVIII
9. a) 49; b) 94; c) 77
10. a) 6, 12, 18, 24, 30, 36, 42, 48, 54, 60, 8, 16, 24, 32, 40, 48, 56, 64, 72, 80
- b) 24
11. a) $6: 2 \times 3$; $9: 3 \times 3$; b) $\text{LCM} = 3 \times 3 \times 2 = 18$
12. a) $33: 3 \times 11$; $42: 2 \times 3 \times 7$; $\text{HCF} = 3$
- b) $18: 2 \times 3 \times 3$; $30: 2 \times 3 \times 5$; $42: 2 \times 3 \times 7$; $\text{HCF} = 6$
13. a) $\frac{5}{7}, \frac{5}{6}$; b) $\frac{29}{3}$; c) $3\frac{3}{2}, 5\frac{5}{6}$; d) $9\frac{2}{3}$; e) $\frac{11}{3}$
14. a) $6\frac{2}{5}$; b) $10\frac{3}{4}$; c) $80\frac{2}{5}$
15. a) $\frac{47}{5}$; b) $\frac{55}{9}$; c) $\frac{23}{4}$
16. a) $\frac{16}{20} < \frac{18}{20}$; b) $\frac{4}{6} < \frac{5}{6}$; c) $\frac{33}{12} > \frac{19}{12}$
17. a) Mary $\frac{2}{12}$, Brother $\frac{3}{12}$, Sister $\frac{4}{12}$, Father $\frac{3}{12}$
- b) cupcakes: i) 2; ii) 3; iii) 4; iv) 3
18. 35 plates = $\frac{35}{100}$
19. a) $\frac{9}{10}$; b) $\frac{6}{10}$; c) $\frac{4}{10}$; d) $\frac{7}{10}$; e) $\frac{15}{10}$
20. a) $\frac{55}{100}$; b) $\frac{63}{100}$; c) $\frac{80}{100}$; d) $\frac{25}{100}$; e) $\frac{135}{100}$
21. 0.09, 0.89, 0.90, 0.91, 0.95
22. a) $0.45 < 0.54$; b) $1.25 > 0.75$; c) $0.6 > 0.06$
23. a) 7 924; b) 4 902; c) 8 001
24. visitors: a) 5 263; b) 4 018; c) 9 281
25. cans: a) 1 123; b) 6 202; c) 5 520; d) 4 326; e) 2 276

Objectives

By the end of this unit, each pupil should be able to:

- Multiply a whole number by 2-digit numbers
- Solve quantitative reasoning problems multiplying whole numbers.

**Suggested resources**

2 ten-sided dice; 0 to 9 digit cards; Optional blank place value charts showing Th H T U . t h; A set of large triangle times table cards (see Lesson 2 of this Unit); Three or more six-sided dice; A soft ball or other soft object suitable for throwing; A timer
Wall chart of 20×20 squares; A set of about two dozen large cards showing 2-digit whole numbers on one side and the corresponding multiple of ten on the other.

**Key word definitions**

multiplicand: the number being multiplied

multiplier: the number used to multiply another number by

suffixed: to put on the end of

**Common errors that pupils make**

Pupils use and apply the correct method, but make errors in calculations due to poor knowledge of times table facts. See Lesson 1.

Pupils have problems keeping track of their calculations, especially when multiplying 3-digit numbers. Teach these pupils the grid method of setting out multiplication.

For example, set out 256×30 like this:

$$256 \times 30 = 256 \times 3 \times 10$$

$$256 \times 3 = (200 + 50 + 6) \times 3$$

$$= 600 + 150 + 18 = 768$$

$$768 \times 10 = 7\,680$$

Pupils make errors due to losing track of calculations in a problem that requires several steps. Encourage pupils to show their working to help them keep track of what calculations they need

to do and in what order. You could talk through a problem with the pupils, making notes as you go. Remind pupils that they need not follow your working layout exactly, but they should write down whatever they think will help them remember things, such as what they have already worked out and what they need to do next.

**Evaluation guide**

Pupils to:

1. Multiply whole numbers by 2-digit numbers not exceeding 50.
2. Solve quantitative aptitude problems involving multiplication of whole numbers by 2-digit numbers not exceeding 50.

Lesson 1

Pupil's Book page 82

**Preparation**

You will need to have:

- Ten multiplication questions written on the board using 2-digit whole numbers.

**Starter activity**

Ask pupils to solve the multiplication questions you have written on the board. Give them five minutes to complete as many questions as they can. After the time is up, check how many questions the pupils answered correctly. This will help you identify how strong your pupils are with multiplication.

Watch out for pupils multiplying the two multiples of ten incorrectly. To overcome this problem, teach pupils the following method and give them lots of

practice in using it. Express each multiple of 10 as a multiplication involving 10, for example:

$$90 = 9 \times 10$$

$$30 = 3 \times 10$$

$$\text{So } 90 \times 30 = 9 \times 10 \times 3 \times 10$$

Group the single-digit numbers together and the tens together.

$$= 9 \times 3 \times 10 \times 10 = 27 \times 100 = 2\,700$$

Note: Avoid teaching the method that involves 'taking off' the zeros in the starting numbers and then 'adding them on' at the end, as this will not give pupils an understanding of what they are doing, and will only serve to confuse pupils later on, when they begin to multiply by decimals.

Lesson focus

The focus of this lesson is to identify any difficulties pupils may have with multiplication.

Support activity

Provide pupils who are struggling with a times table reference sheet so that they can look up the relevant multiplication facts. Have them spend a short amount of time every day practising times tables. Some pupils learn best from seeing information, some from hearing it, some from reading it, and others from carrying out physical actions. It is best to include a variety of different approaches to times table practice.

Lesson 2 *Pupil's Book pages 83 and 84;* *Workbook page 24*

Preparation

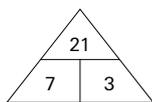
You will need to have:

- Made the triangle times table cards for the starter activity.

Starter activity

Choose a single times table (3, 4, 6, 7, 8 or 9). Make a set of 11 times table triangle cards for all of the facts in that table from $0 \times$ to $10 \times$.

The cards should look like this:



The number at the top of the triangle is the product of the two numbers at the bottom.

This triangle gives the following times table facts: $7 \times 3 = 21$, $3 \times 7 = 21$, $21 \div 7 = 3$ and $21 \div 3 = 7$. However, in this lesson we will be focusing on multiplication facts.

Shuffle the cards and hold them up one at a time. Call out a multiplication associated with that card, asking pupils to give the product. For example, ask: "What is seven times three?" and the pupils answer "21". Repeat for the other multiplication (for example three times seven). Work through all the cards in this manner, keeping the pace brisk.

Shuffle the cards. Once again hold up each card in turn, but this time obscure the top number (i.e. the product) on each one. Ask pupils to write down or call out the missing number.

Lesson focus

Read through the introductory text with your class. Work through the worked example on pages 83 and 84 with them, making sure that all your pupils are comfortable with the multiplication of 2-digit and 3-digit numbers by a single-digit number.

Answers

Exercise 1

1. a) 258; b) 490; c) 474
2. a) 144; b) 738; c) 435
3. a) 48 kilometres; b) 512 oranges

Workbook

1. a) $2 \times 7 = 14$; b) $3 \times 2 = 6$; c) $4 \times 3 = 12$;
d) $5 \times 5 = 25$; e) $6 \times 5 = 30$; f) $7 \times 4 = 28$;
g) $8 \times 2 = 16$; h) $9 \times 5 = 40$; i) $10 \times 7 = 70$;
j) $11 \times 6 = 66$; k) $12 \times 4 = 48$; l) $4 \times 8 = 32$

Assessment

Observe pupils as they solve word problems involving multiplication of 3-digit whole numbers by single digit numbers. Look at pupils' answers to Exercise 1.

Pupils should be able to solve word problems involving multiplying 3-digit whole numbers by single digit numbers.

Ensure pupils can correctly identify the number of different multiplication sentences that they can write, given certain digits.

Extension activity

You can write nine different multiplication sentences using just two digits from the digits 9, 3 and 6. They are: $3 \times 3 = 9$, $6 \times 6 = 36$, $9 \times 9 = 81$, $3 \times 6 = 18$, $6 \times 3 = 18$, $6 \times 9 = 54$, $9 \times 6 = 54$, $9 \times 3 = 27$, $3 \times 9 = 27$.

If you multiply more than two digits together at once, how many combinations can the pupils make? (there is an infinite number of multiplication sentences).

Homework activity

Pupils to complete question 1 on page 24 of the WB.

Lesson 3 *Pupil's Book page 85; Workbook page 24*



Preparation

You will need to have:

- Drawn a 3×3 grid on the board
- A set of large 0 to 9 number cards
- Three six-sided dice.



Starter activity

Write the numbers 1 to 10 on the board. Next to each number write a 2-digit whole number. Include some numbers with a zero in the Units column. Ask pupils to write each number in its expanded form, as an addition involving tens and units. For example, if you wrote 61, pupils would write $60 + 1$. Challenge pupils to write the expanded numbers as quickly as they can.

Repeat the activity, but now write 2-digit whole numbers in their expanded form, asking pupils to write the numbers in figures. For example, if you wrote $70 + 4$, pupils would write 74.



Lesson focus

Work through the introductory text with your class, making sure that your pupils understand the worked examples. Give them practice in multiplying 3-digit and 2-digit numbers with 2-digit numbers, including using a grid to keep track of their calculations. You could do this by drawing a 3×3 grid on the board, which pupils copy into their note books. Ask a volunteer to

draw four cards from a set of large 0 to 9 number cards, and place them in the top row and left-hand column of the grid to make a multiplication. Do the first couple of calculations together as a class, gradually asking pupils to do more, until they are working independently.

When most pupils are able to do the calculations without any help, move on to Exercise 2 on page 85 of the PB.



Answers

Exercise 2

1. a) 1 786; b) 2 759; c) 7 397
2. a) 2 277; b) 2 925; c) 28 675
3. a) 4 836 aeroplanes; b) 8 268 aeroplanes; c) 9 984 aeroplanes

Workbook

2. a) 20; b) 450; c) 640; d) 320; e) 12; f) 455; g) 1 350; h) 30; i) 400; j) 112; k) 180; l) 126; m) 208; n) 187; o) 114; p) 280; q) 225; r) 196

Assessment

Look at pupils' answers to Exercise 2. Pupils should be able to multiply any 2- or 3-digit whole number by another 2-digit number.

Extension activity

Draw the following on the board (or on a piece of paper if playing in groups):

$$\square \square \times \square$$

Roll three six-sided dice. Place one die in each box to create a multiplication problem (for example, 36×4). Challenge pupils or groups of pupils to work out the answer as quickly as possible.

Homework activity

Ask pupils to complete question 2 page 24 of the WB.

Lesson 4 *Pupil's Book page 86*



Preparation

You will need to have:

- A soft ball

- A timer
- Three six-sided dice
- A4 card or paper for the homework activity.

Starter activity

You will need a soft ball, or any other soft object suitable for throwing. All pupils stand up. Start a timer. Call out a multiplication or division question from the times table, for example: “What is seven times eight?” or “What is thirty-six divided by six?” As you call the question, throw the ball to a pupil. The pupil catches the ball, works out the answer and throws the ball back to you at the same time as they call out the answer. If their answer is correct, signal to the pupil to sit down. If their answer is not correct, give the correct answer. The pupil remains standing. You can differentiate the activity by asking pupils of different abilities questions at an appropriate level of difficulty. Continue asking questions until all pupils are sitting down. Stop the timer.

Play again, challenging the class to beat their previous time.

Lesson focus

Work through the three worked examples with your class. These examples demonstrate how to multiply whole numbers with up to two digits by a multiple of 10.

Then give the pupils practice in doing similar calculations on their own before asking them to complete Exercise 3.

Answers

Exercise 3

1. a) 790; b) 1 360; c) 2 880; d) 480; e) 3 800; f) 3 800

Assessment

Observe pupils as they complete the exercise. Look at their answers to Exercise 3.

Ensure pupils can multiply 2-digit whole numbers by multiples of ten up to 90.

Support activity

Ask pupils who are struggling to redo selected questions from Exercise 3 using the grid method.

Homework activity

Give the pupils card and/or paper to take home. Ask them to devise their own game involving multiplying 2-digit numbers by multiples of 10 up to 90.

Lesson 5 *Pupil's Book page 87*

Preparation

You will need to have:

- Drawn a 3×3 grid on the board
- A set of large 0 to 9 number cards
- Two ten-sided dice for the starter activity.

Starter activity

Give your pupils quick, oral questions on their times table facts. You can generate random times table facts by rolling two ten-sided dice. For example, a roll of 7 and 3 could give 7×3 or 3×7 . Read a zero as a ten.

Lesson focus

This lesson helps pupils identify where they would use multiplication in everyday life. Work through the introductory text with your class, making sure that your pupils understand the worked example. Give them practice in multiplying two 2-digit whole numbers, including using a grid to keep track of their calculations. You could do this by drawing a 3×3 grid on the board, which pupils copy into their note books. Ask a volunteer to draw four cards from a set of large 0 to 9 number cards, and place them in the top row and left-hand column of the grid to make a multiplication. Do the first couple of calculations together as a class, gradually asking pupils to do more, until they are working independently.

When most pupils are able to do the calculations without any help, move on to Exercise 4 on page 87 in the PB.

Answers

Exercise 4

1. 490 pupils; 2. 960 seats; 3. 1 320 seconds;
4. 312 bottles; 5. 6 490 pages

Workbook

3. a) 2 205; b) 5 040; c) 11 025
4. 30
5. a) 3 598; b) 14 392; c) 15
6. a) 7 000; b) 9 520; c) 14 000

Assessment

Looking at pupils' answers to Exercise 4, ensure they can perform multiplication in everyday life encounters.

Extension/Support activity

Pair stronger and weaker pupils and ask them to set each other word problems to solve with given numbers.

Homework activity

Pupils are to complete questions 3–6 on page 25 of the WB.

Lesson 6 *Pupil's Book page 88*



Preparation

You will need to have:

- The answers to the Quantitative reasoning exercise to hand.



Lesson focus

This and the next lesson gauges the extent to which individual pupils have achieved the objectives stated at the beginning of this unit.

Guide the pupils through the completed question 1 in Exercise 5. Help them to see the pattern and allow them to complete questions 2–6 on their own.

If you have time at the end of the lesson, you could discuss some or all of the questions.



Answers

Exercise 5

2. 20; 3. 100; 4. 20; 5. 2 250; 6. 170

Assessment

Pupils should be able to identify the relationship between the numbers (on their own or with assistance) and complete the exercise on their own.

Lesson 7 *Pupil's Book page 89*



Preparation

You will need to have:

- The answers to the Revision exercise to hand.



Lesson focus

This lesson continues to gauge whether pupils have achieved the objectives of this unit.

You should give pupils a set time in which to complete the Revision exercise. Most pupils should be able to achieve their maximum score in about 20 minutes.

Pupils should work through the questions individually. Encourage them not to spend too much time on any one question if they are stuck. Instead, they should go on to the next question, and come back to the question they were struggling with if they have time at the end of the assessment.



Answers

Revision exercise

1. a) 1 782; b) 864; c) 28 260; d) 1 240;
e) 6 864; f) 31 815; g) 1 296; h) 10 989
2. 7 616 match sticks
3. ~~£~~2 808
4. 4 056 cupcakes

Assessment

When the time is up, take in the pupils' answers. If you have time at the end of the lesson, you could discuss some or all of the questions. Mark the exercise, taking note of where individual pupils have not met the unit objectives, in order to give these pupils additional teaching input where required.

Objectives

By the end of this unit, each pupil should be able to:

- Multiply decimals by 2-digit whole numbers
- Solve quantitative reasoning problems involving multiplication of decimals.

**Suggested resources**

Flash cards; Multiplication charts; Quantitative aptitude chart; A flannel board.

**Key word definitions**

product: the answer to two numbers being multiplied

**Common errors that pupils make**

Pupils forget the decimal point or put it in the wrong place. Remind the pupils to use approximation to work out where the decimal point should be and to count the decimal places in the question.

The pupils make multiplication errors. Help them to learn the times table to 10×10 .

**Evaluation guide**

Pupils to:

1. Multiply decimals by 2-digit numbers.
2. Solve quantitative aptitude problems involving multiplication of decimal numbers by 2-digit numbers.

Lesson 1

Pupil's Book pages 90 and 91;

Workbook page 26

**Preparation**

You will need to have:

- Prepared flashcards for decimal multiplication.

**Starter activity**

Pupils should practise mentally multiplying decimals by 2, 3, 4 and 5. Explain each strategy in turn, and give them several examples to do before moving on to the next one.

- × 2 double the number
- × 3 double and add original number
(for example $3 \times 24 = 48 + 24 = 72$)

- × 4 double and double again
- × 5 halve and multiply by 10
(for example $5 \times 24 = 12 \times 10 = 120$)

Also practise multiplying decimals that are less than 1, for example 0.5×6 . Explain that they are simply using their knowledge of multiplication facts and of place value.

**Lesson focus**

This lesson shows the pupils how to use short multiplication to multiply decimals by single-digit numbers. Ask the pupils to complete Exercise 1 on page 91 in the PB.

**Answers****Exercise 1**

1. a) 4.8; b) 0.56; c) 75.6; d) 73.6; e) 13.6;
f) 12.99; g) 36.64; h) 6.3

Workbook

1. a) 75; b) 155; c) 270; d) 55; e) 504; f) 900;
g) 364; h) 432; i) 750; j) 2 304; k) 2 940;
l) 5 400

Assessment

Pupils should be able to multiply decimals by single-digit numbers.

Extension activity

Ask the pupils to find out the cost of six items in a shop or newspaper. They should then calculate the cost of four and five of those items.

Homework activity

Pupils are to do question 1 on page 26 of the WB.

Lesson 2 *Pupil's Book pages 91 and 92*



Preparation

You will need to have:

- A flannel board (optional).



Starter activity

Revise counting forwards and backwards in 10s, starting at any multiple of 10 to 1 000. Then, count forwards and backwards in 10s starting at any other 2- or 3-digit number. Then, practise multiplying mentally by 10, for example 34×10 , 45×10 , $560 \div 10$ and $2\,300 \div 10$. Ask the pupils if they can see any pattern in the answers. Make sure that they can see that the digits move one place to the left in multiplication (the units' digit becomes the tens' digit, the tens' digit become the hundreds' digit and so on).



Lesson focus

Read through the introductory text with your class. Go through the worked examples with them, making sure that all your pupils are comfortable with the multiplication of a decimal by 10 and its multiples. Illustrate moving the decimal point using a flannel board. Place a decimal number on the board and ask a pupil to come up and move the decimal point to show a multiplication by 10.

Pupils are to do Exercise 2 on pages 91 and 92 of the PB.



Answers

Exercise 2

1. **a)** 13; **b)** 56; **c)** 82; **d)** 110.4; **e)** 153.3;
f) 201.6; **g)** 79.32; **h)** 123.8
2. 67.2 kg
3. ~~£~~8 037.90

Challenge

10, 40, 6, 20, 60, 40

Assessment

Assess the pupils' answers to Exercise 2 and ensure they can multiply any decimal by 10 and its multiples.

Extension activity

Ask the pupils to find out the cost of six items in a shop or newspaper. They should then calculate the cost of five, ten, twenty and sixty of those items.

Homework activity

Pupils are to complete anything unfinished from question 1 on page 26 of the WB.

Ask pupils to complete the **Challenge** on page 91 of the PB.

Lesson 3 *Pupil's Book page 92; Workbook page 26*



Preparation

You will need to have:

- Flash cards for the starter activity.



Starter activity

Write ten decimal numbers on flashcards. Include some numbers with a zero in the Units column and some with a zero in the Tenths column. Ask pupils to write each number in expanded form, as an addition involving tens, units, tenths and hundredths. For example, if you wrote 10.4, pupils would write $10 + 0.4$. Challenge pupils to write the expanded numbers as quickly as they can. Briefly go through the correct answers.



Lesson focus

Read through the introductory text with the class. Ensure the pupils understand the method of multiplying decimals and keeping the same number of decimal places in their answers. Break each multiplier up into tens and units and work each out as a separate sum. Then bring them together.

Pupils to do Exercise 3 on page 92.



Answers

Exercise 3

1. **a)** 131.1; **b)** 88.2; **c)** 116.64; **d)** 330.19
2. **a)** 86.4; **b)** 152.496; **c)** 1 099.9; **d)** 18 928;
e) 6 497.5; **f)** 11 827.2
3. 2 204.4 cm

Workbook

2. 238 kg; 3. 36 cm, 96 cm; 4. 9 tins; 5. 1 426 mm

Assessment

Pupils should be able to multiply decimals by 2-digit whole numbers. Observe pupils as they multiply decimals by 2-digit whole numbers and assess their answers to Exercise 3.

Support activities

If you have pupils who are struggling, you could show them an alternative method. Explain that to solve, for example, 34.7×4 , you should first ignore the decimal point and work out the calculation as before. When you have the answer (1388), you should: use approximation to find where the decimal point should go and then check that the number of decimal places in the question is the same as in the answer.

Homework activity

Pupils are to complete questions 2 to 5 on page 26 of the WB.

Lesson 4 *Pupil's Book pages 93 and 94*



Preparation

You will need to have:

- The answers to the Quantitative reasoning exercise to hand.



Lesson focus

This and the next lesson gauges the extent to which individual pupils have achieved the objectives stated at the beginning of this unit.

Guide the pupils through the example on page 93 of the PB. Help them to see the pattern and allow them to complete questions 1–6.

If you have time at the end of the lesson, you could discuss some or all of the questions.



Answers

Exercise 4

1. 82.2; 2. 96; 3. 2.06; 4. 17; 5. 207; 6. 1.68

Assessment

Pupils should be able to identify the relationship between the numbers (on their own or with assistance) and complete the exercise on their own.

Lesson 5 *Pupil's Book pages 94*



Preparation

You will need to have:

- The answers to the Revision exercise to hand.



Lesson focus

You should give pupils a set time in which to complete the Revision exercise. Most pupils should be able to achieve their maximum score in about 20 minutes.

Pupils should work through the questions individually. Encourage them not to spend too much time on any one question if they are stuck. Instead, they should go on to the next question, and come back to the question they were struggling with if they have time at the end of the assessment.



Answers

Revision exercise

1. a) 21.35; b) 265.32; c) 18.942; d) 809.4
2. a) 32.8; b) 22.64; c) 4 443.03; d) 8.3; e) 4.56; f) 142.5; g) 252; h) 97.934; i) 287.43

Assessment

When the time is up, take in the pupils' answers. If you have time at the end of the lesson, you could discuss some or all of the questions. Mark the exercise, taking note of where individual pupils have not met the unit objectives, in order to give these pupils additional teaching input where required.

Objectives

By the end of this unit, each pupil should be able to:

- Find the square of 1- and 2-digit numbers
- Identify objects with perfect faces
- Find the square root of perfect squares up to 400
- Solve quantitative reasoning problems of squares and square roots of perfect squares.

**Suggested resources**

Wall chart of 20×20 squares; Everyday objects that have perfect faces.

**Key word definitions**

index form: a number written as a base and its power i.e. 2^2

power: the power shows how many times the given number must be multiplied

square root: the number that when multiplied by itself gives the square of that number

**Frequently asked questions**

Q *What prior knowledge do the pupils need?*

A Pupils should be able to find factors of numbers.

**Common errors that pupils make**

Pupils sometimes find it difficult to remember their times tables without looking at their multiplication table. This problem can be remedied by drilling the pupils very well on the multiplication table.

**Evaluation guide**

Pupils to:

1. Find the square of given numbers using a 20 by 20 square chart.
2. Give examples of objects with perfect square faces in their homes and school.
3. Solve quantitative aptitude problems involving finding of squares.
4. Find square roots of given numbers using a 20 by 20 square chart.

5. Find the square root of perfect squares using the factor method.
6. Solve quantitative aptitude problems involving squares and square root numbers.

Lesson 1

*Pupil's Book pages 95 and 96;
Workbook page 27*

**Preparation**

You will need to have:

- Flashcards for the Starter activity.

**Starter activity**

Show the wall chart of 20×20 squares. Ask the pupils to look at how the multiplications are done once again. $1 \times 8 = 8$, $3 \times 7 = 21$, $5 \times 8 = 40$, etc.

Hold up flash cards of 1- and 2-digit numbers up to 12. Ask a pupil to pick another flash card from a bag where they are kept. Ask the pupil for the product of the two numbers.

**Lesson focus**

Ask pupils to look at the main diagonal of the wall chart and write down the numbers that are multiplied with their answers. These are $1 \times 1 = 1$, $2 \times 2 = 4$, $3 \times 3 = 9$, $4 \times 4 = 16$, etc. up to 20×20 . Lead the pupils to understand that the square of 1 is $1 \times 1 = 1$, the square of 2 is $2 \times 2 = 4$, the square of 3 is $3 \times 3 = 9$ etc. up to 20×20 . Ask them to find the square of 9, the square of 16, and so on.

Work through the examples with the pupils and ask them to answer Exercise 1.

Answers

Exercise 1

- 9, 16, 36, 49, 64
- a) $3 \times 3 = 3^2 = 9$; b) $5 \times 5 = 5^2 = 25$;
c) $9 \times 9 = 9^2 = 81$; d) $11 \times 11 = 11^2 = 121$
e) $10 \times 10 = 10^2 = 100$; f) $13 \times 13 = 13^2 = 169$
-

Number	2	6	11	13	15	16	17	20
Index form	2^2	6^2	11^2	13^2	15^2	16^2	17^2	20^2
Square	4	36	121	169	225	256	289	400

Challenge

1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144, 169, 196, 225, 256, 289, 324, 361, 400

Workbook

- $2^2 = 4$, $3^2 = 9$, $4^2 = 16$, $5^2 = 25$, $6^2 = 36$,
 $7^2 = 49$, $8^2 = 64$, $9^2 = 81$, $10^2 = 100$, $11^2 = 121$,
 $12^2 = 144$

Assessment

Pupils should be able to find the squares of numbers and solve problems involving squares of numbers.

Observe the responses of the pupils during the lesson. Look at their answers to Exercise 1.

Support activity

Ask pupils who struggle to identify square numbers on the 20×20 square wall chart again. Practise the relevant times table where necessary.

Homework activity

Pupils are to complete question 1 on page 27 of the WB.

Lesson 2 *Pupil's Book pages 96 and 97*

Preparation

You will need to have:

- Collected examples of everyday objects that have perfect faces to show the class.

Starter activity

Show pupils the examples of objects with perfect faces. Ask if they can tell what makes these objects similar. Try to get them to realise that all the sides have the same length.

Lesson focus

Work through the introductory text on page 96 of the PB with your class, making sure that your pupils understand what is meant by a perfect face. Use the given examples to illustrate.

Asks pupils to complete Exercise 2.

Answers

Exercise 2

Pupils find, draw and label objects with perfect faces.

Assessment

Pupils should be able to identify objects with perfect faces. Observe pupils during the starter activity and look at their answers to Exercise 2.

Support activity

Ask pupils who find this lesson difficult to sort mixed objects into those with perfect faces and those without.

Homework activity

Pupils could find objects with perfect faces at home and bring them to class to show the other pupils.

Lesson 3 *Pupil's Book pages 97–99;* *Workbook page 27*

Preparation

You will need to have:

- A number chart to refer to.

Starter activity

Drill the pupils on squares of numbers. Let the pupils say the square of a number as fast as possible. They may check the wall chart on multiplication for a guide.

Lesson focus

Explain to the pupils that if 144 is the square of 12, i.e. $12 \times 12 = 144$, then 12 is the square root of 144. This is the number that you multiply by itself to have the result. Ask them what is the square root of 4? What is the square root of 169? And so on.

Work through the text and example on page 97 in the PB and ask them to answer Exercise 3.

Answers

Exercise 3

- a) $\sqrt{36} = \sqrt{6 \times 6} = 6$; b) $\sqrt{16} = \sqrt{4 \times 4} = 4$;
c) $\sqrt{100} = \sqrt{10 \times 10} = 10$;
d) $\sqrt{144} = \sqrt{12 \times 12} = 12$;
e) $\sqrt{121} = \sqrt{11 \times 11} = 11$

Workbook

- a) square root; b) square; c) square;
d) square root; e) square; f) square
- a) 6; b) 12; c) 9; d) 13; e) 4; f) 15

Assessment

Pupils should be able to find the squares of numbers and solve problems involving squares of numbers.

Observe pupils responses during the lesson.
Look at their answers to Exercise 3.

Extension activity

Ask pupils to find the squares and square roots of selected numbers between 20 and 40.

Homework activity

Pupils are to complete questions 2 and 3 of page 27 of the WB.

Lesson 4 *Pupil's Book pages 98-99;*
Workbook page 27

Preparation

You will need to have:

- A number chart to refer to.

Starter activity

Drill the pupils on square roots of numbers. Pick ten square numbers and let the pupils say the square root of the number as fast as possible. They may make calculations, but encourage them to do the working out in their heads.

Lesson focus

Revise the meaning of a factor and then work through the examples on page 98 of the PB. Make sure that each pupil understands the process and can explain it to a partner.

Give pupils a selection of square numbers and ask them to find the square roots using the factor method.

Ask them to complete Exercise 4 using the factor method.

Answers

Exercise 4

- a) 8; b) 12; c) 18; d) 17; e) 13
- a) 66; b) 20; c) 45; d) 152; e) 30

Workbook

- 5
- a) 7; b) -9; c) opposite signs; d) -13; e) 13

Assessment

Pupils should be able to find the squares of numbers and solve problems involving squares of numbers.

Observe pupils responses during the lesson.
Look at their answers to Exercise 3.

Support activity

For pupils that are having difficulty, use the number chart to show them how they can find the square root of a number. Find the number on the number chart and then draw a line up to the top of the chart and to the left of the chart.

Homework activity

Pupils are to complete questions 4 and 5 of page 27 of the WB.

Lesson 5 *Pupil's Book page 99*



Preparation

You will need to have:

- The answers to the Quantitative reasoning exercise to hand.



Lesson focus

This and the next lesson gauges the extent to which individual pupils have achieved the objectives stated at the beginning of this unit.

Guide the pupils through the example for Exercise 5. Help them to see the pattern and allow them to complete the questions on their own.

If you have time at the end of the lesson, you could discuss some or all of the questions.



Answers

Exercise 5

- a) 36; b) 9; c) 4; d) 15; e) 144; f) 13; g) 16;
h) 289; i) 16; j) 20

Assessment

Pupils should be able to identify the relationship between the numbers (on their own or with assistance) and complete the exercise on their own.

Lesson 6 *Pupil's Book page 100*



Preparation

You will need to have:

- The answers to the Revision exercise to hand.



Lesson focus

This lesson continues to gauge the extent to which individual pupils have achieved the objectives of this unit.

You should give pupils a set time in which to complete the Revision exercise. Most pupils should be able to achieve their maximum score in about 20 minutes.

Pupils should work through the questions individually. Encourage them not to spend too much time on any one question if they are stuck. Instead, they should go on to the next question, and come back to the question they were struggling with if they have time at the end of the assessment.



Answers

Revision exercise

1. a) $13^2 = 169$ b) $36^2 = 1\,296$
c) $26^2 = 676$ d) $43^2 = 1\,849$
e) $55^2 = 3\,025$
2. a) $64: 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2$
 $\sqrt{64} = \sqrt{(2 \times 2 \times 2) \times (2 \times 2 \times 2)}$
 $= \sqrt{8 \times 8} = 8$
b) $225: 3 \times 3 \times 5 \times 5$
 $\sqrt{225} = \sqrt{(3 \times 5) \times (3 \times 5)}$
 $= \sqrt{15 \times 15} = 15$
c) $361: 19 \times 19$
 $\sqrt{361} = \sqrt{19 \times 19} = 19$
d) $256: 2 \times 2$
 $\sqrt{256} = \sqrt{(2 \times 2 \times 2 \times 2) \times (2 \times 2 \times 2 \times 2)}$
 $= \sqrt{16 \times 16} = 16$
e) $196: 2 \times 2 \times 7 \times 7$
 $\sqrt{196} = \sqrt{(2 \times 7) \times (2 \times 7)}$
 $= \sqrt{14 \times 14} = 14$
f) $9: 3 \times 3; 16: 2 \times 2 \times 2 \times 2$
 $\sqrt{9 \times 16} = \sqrt{(3 \times 2 \times 2) \times (3 \times 2 \times 2)}$
 $= \sqrt{12 \times 12} = 12$
3. a) and d)

Assessment

When the time is up, take in the pupils' answers. If you have time at the end of the lesson, you could discuss some or all of the questions.

Mark the exercise, taking note of where individual pupils have not met the unit objectives, in order to give these pupils additional teaching input where required.

Objectives

By the end of this unit, each pupil should be able to:

- Divide a whole number by 1-digit numbers
- Divide whole numbers by 10 and multiples of 10
- Solve problems on quantitative reasoning with division.

**Suggested resources**

Times table triangle cards (from Unit 13).

**Frequently asked questions**

Q *Why not teach the standard short division algorithm in this grade?*

A An algorithm is a mathematical method, and the term is most often used to refer to a method used for computation. The standard algorithm for short division looks like this for $235 \div 39$:

$$\begin{array}{r} 6 \text{ r } 1 \\ 39 \overline{)235} \\ \underline{-234} \\ 1 \text{ remainder} \end{array}$$

This method may at first glance seem simpler than the method taught in this unit, but it is a method that appears to work ‘as if by magic’ for Primary 4 pupils. Teaching the standard algorithm too early, before pupils have a solid understanding of the process of division, can lead to problems later on.

**Common errors that pupils make**

Pupils only think in terms of adding or removing zeros when multiplying and dividing by 10 and 100. Because pupils are very familiar with the ten times table, they often wrongly assume that adding a zero to the right of the original number is the **method** of multiplying by ten rather than a **result** of it under certain circumstances (i.e. when you start with a whole number). If pupils have formed this incorrect assumption, they are likely to transfer this to dividing by ten (‘remove a zero’) and multiplying and dividing by 100 (‘add/

remove two zeros’). This can result in the pupils encountering real problems with the following types of calculations:

$$\begin{array}{ll} 3.6 \times 10 & 250 \div 100 \\ 0.8 \times 100 & 74 \div 10 \end{array}$$

It is important to emphasise that multiplying by powers of ten involves moving digits to the left on the place value chart, and dividing by powers of ten involves moving them to the right. Pupils who have problems grasping this should place the starting numbers on a blank Th H T U. t h place value chart using digit cards or ten-sided dice, and then physically move all the cards/dice the appropriate number of places to the left or right.

**Evaluation guide**

Pupils to:

1. Divide a given 2- or 3-digit number by numbers between 2 and 9.
2. Divide a given 2- or 3-digit by 10 and multiples of 10, up to 50.
3. Solve quantitative aptitude problems involving division.

Lesson 1

Pupil's Book pages 101–103;

Workbook page 28

**Preparation**

You will need to have:

- The times table triangle cards from Unit 13.

**Starter activity**

Use the same set of times table triangle cards that you used in Lesson 2. Shuffle the cards and

hold them up one at a time. Call out a division associated with that card, asking pupils to give the answer. For example, ask: “What is twenty-one divided by three?” and the pupils answer “seven”. Repeat for the other division (for example $21 \div 7$). Work through all the cards in this manner, keeping the pace brisk.

Shuffle the cards. Once again hold up each card in turn, but this time obscure one of the bottom numbers on each one. Ask pupils to write down or call out the missing number.

Lesson focus

After working through the first worked example, work through another two or three similar division calculations on the board, in which there are no remainders and the numbers divide easily when partitioned into hundreds, tens and units. You could include one example that involves dividing zero, to remind pupils that zero divided by any number always is zero. With each new example, ask pupils to do more and more of the work. For the final example you could ask them to close their PB so that they cannot refer to the worked example. Don't forget to include the final stage in every calculation: checking the quotient using multiplication.

Next, work through the second worked example in the PB (division with remainders) and give pupils practice performing a few more similar calculations.

Answers

Exercise 1

- a)** 7; **b)** 7; **c)** 22; **d)** 49; **e)** 23; **f)** 12; **g)** 43; **h)** 13
- a)** 15 rem 5; **b)** 23; **c)** 6 rem 5; **d)** 9 rem 1; **e)** 7 rem 5; **f)** 13 rem 1
- a)** 6 boxes (5 full, 1 with 4 eggs); **b)** 7 kg

Workbook

- a)** 11; **b)** 13; **c)** 3; **d)** 3 rem 1; **e)** 13 rem 3; **f)** 9 rem 2; **g)** 4 rem 3; **h)** 2 rem 6; **i)** 3 rem 15; **j)** 2 rem 19

Assessment

Pupils should be able to divide 2-digit numbers by 1-digit numbers, both with and without remainders. Check pupils' answers to Exercise 1.

Support activity

Often pupils who struggle with division do not know their division facts. In the short term, provide these pupils with some sort of times tables reference sheet so that they can look up the relevant division facts. In the longer term, they will need to learn their times tables.

Homework activity

Pupils are to complete questions 1. a)–j) on page 28 of the WB.

Lesson 2 *Pupil's Book pages 103 and 104; Workbook page 28*

Preparation

You will need to have:

- The times table triangle cards (from Unit 13).

Starter activity

Revise multiplying numbers by 10 and how the decimal point moves one place to the right. Then show pupils how with division the decimal moves one place to the left. You could also use the times table triangle cards again.

Lesson focus

Division of 3-digit numbers is exactly the same as covered in the previous lesson, it is just the division table that gets longer.

The **Challenge** activity is suitable for all pupils.

Answers

Exercise 2

- a)** 152; **b)** 26; **c)** 109; **d)** 145; **e)** 117; **f)** 227; **g)** 264; **h)** 90

2. a) 126; b) 50 rem 2; c) 98 rem 2; d) 48 rem 3;
e) 209 rem 1; f) 93 rem 3
3. a) $294 \div 7 = 42$ km; b) $336 \div 6 = 56$ kg

Workbook

1. k) 28 rem 1; l) rem 1; m) 75; n) 88; o) 22 rem 4;
p) 72 rem 4; q) 33 rem 4; r) 10 rem 49;
s) 5 rem 5; t) 8 rem 7

Assessment

Pupils should be able to divide any 3-digit number by a 1-digit numbers. Look at pupils' answers to Exercise 2.

Extension activity

Pupils who complete Exercise 2 quickly can move on to the **Challenge** and design some of their own puzzles.

Homework activity

Pupils are to complete questions 1. k)–t) on page 28 of the WB.

Lesson 3 *Pupil's Book pages 105 and 106; Workbook page 28*



Preparation

You will need to have:

- A set of about two dozen large cards showing 2-digit whole numbers
- On the back of each card write the number from the front of the card multiplied by ten.



Starter activity

Start a timer. Hold up the cards you have prepared one at a time, showing the front of the cards, and asking pupils to multiply the number on the card by ten and then call out the answer. As soon as you have the correct answer, show the next card. Stop the timer as soon as all the cards have been used. Make a note of the time taken. Shuffle the cards and repeat the activity, but this time showing pupils the back of the cards (the multiples of ten) and asking them to divide the number on the card by ten. Compare times for multiplying and dividing.

Repeat the dividing activity, challenging the class to beat their previous time.



Lesson focus

Read through the introductory text with your class, and work through the worked example with them. Make sure that your pupils are all able to use the method shown in the worked examples.

Give them several similar divisions to do, preferably with a partner, so that they can discuss what they are doing. Confirm the correct answer for each example. Make sure that every example you give divides exactly.

Once your pupils have done Exercise 3, ask them to do the Puzzle. The Puzzle is suitable for all pupils.



Answers

Exercise 3

1. 82 bags; 2. 26 weeks 2 days; 3. $630 \div 18 = \text{R}35$;
4. $910 \div 70 = 13$ boxes; 5. a) $165 \div 7 = 23$ rem 4, so 23 groups; b) 4 pupils were left;
6. $640 \div 10 = 64$ packets

Puzzle

Adding 1 and multiplying by 10 adds 10 to the original number.

Adding 10 means 20 is now added to the original number.

Dividing by 10 then means 2 is added to the original number.

Taking away the original number will therefore always leave 2.

Workbook

2. 114 m; 3. 112 marbles; 4. $\text{R}109$; 5. $5\frac{1}{2}$ hours

Assessment

Pupils should be able to divide numbers by 10 and multiples of 10. Observe pupils as they divide by multiples of 10. Look at their answers to Exercise 3.

Support activities

Encourage pupils to make use of both methods of division to begin with and then to choose the method that works best for them.

Homework activity

Pupils are to complete questions 2-5 on page 28 of the WB.

Lesson 4 *Pupil's Book page 106*

Preparation

You will need to have:

- The answers to the Quantitative reasoning exercise to hand.

Lesson focus

Guide the pupils through the completed first line of question 1 in Exercise 4. Help them to see the pattern and allow them to complete the questions on their own.

If you have time at the end of the lesson, you could discuss some or all of the questions.

Answers

Exercise 4

1. 3, 24, 6, 2; 2. 720, 60, 5, 1

Assessment

Pupils should be able to identify the relationship between the numbers (on their own or with assistance) and complete the exercise on their own.

Lesson 5 *Pupil's Book pages 107*

Preparation

You will need to have:

- The answers to the Revision exercise to hand.

Lesson focus

This lesson gauges the extent to which individual pupils have achieved the objectives stated at the beginning of this unit.

You should give pupils a set time in which to complete the Revision exercise. Most pupils should be able to achieve their maximum score in about 20 minutes.

Pupils should work through the questions individually. Encourage them not to spend too much time on any one question if they are stuck. Instead, they should go on to the next question, and come back to the question they were struggling with if they have time at the end of the assessment.

When the time is up, take in the pupils' answers. If you have time at the end of the lesson, you could discuss some or all of the questions.

Mark the exercise, taking note of where individual pupils have not met the unit objectives, in order to give these pupils additional teaching input where required.

Answers

Revision exercise

1. a) 9; b) 9; c) 25; d) 14; e) 105; f) 104; g) 50 rem 6; h) 26 rem 2; i) 8; j) 22; k) 24 rem 5; l) 15 rem 20
2. a) $680 \div 30 = 22$ rem 20, so 22 crates; b) 20 left over
3. $297 \div 9 = \cancel{N}33$
4. $152 \div 8 = 19$ minivans

Assessment

When the time is up, take in the pupils' answers. If you have time at the end of the lesson, you could discuss some or all of the questions.

Mark the exercise, taking note of where individual pupils have not met the unit objectives, in order to give these pupils additional teaching input where required.

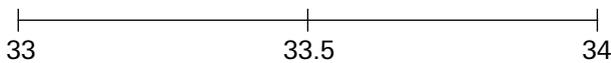
Objectives

By the end of this unit, each pupil should be able to:

- Make an estimation of a sum or product of numbers.

**Suggested resources**

Charts on estimates; A wall chart showing a straight line as below:

**Key word definitions**

estimation: a rough calculation

accuracy: how correct it is

**Frequently asked questions**

Q *What prior knowledge do the pupils need?*

A Pupils should:

- be able to compare pairs of whole numbers with up to three digits, saying which is the greater or lesser
- have a sound understanding of place value as it relates to whole numbers up to ten thousand and decimals with up to two decimal places
- know how to order whole numbers to 1 000
- recognise multiples of ten
- count forwards and backwards in 10s and 100s
- add and subtract numbers
- find product of numbers
- add and subtract decimal numbers.

**Common errors that pupils make**

Pupils round numbers down when they should round up and vice versa. Give pupils a visual aid in the form of a colour-coded number line, as shown in the figure below.



For most pupils this will be enough help, but some pupils may want to write the relevant tens digits in the boxes for each question. They could write lightly in pencil, rubbing it out when they have finished. Alternatively, you could laminate the number line so that pupils can write on it with dry wipe markers.

Some pupils may find it difficult to remember and apply the rounding rules, and may adopt the strategy of rounding every number down or every number up. These pupils might find it useful to circle the units' digit in each number, using different coloured pencils, for example a green pencil for the digits that are less than 5 and a red pencil for the digits that are 5 or more. This should help them to focus on the units' digit when they decide whether to round up or down.

Pupils tend to discard the last digit when working to the nearest 10 and write the remaining digit(s) without replacing the removed one with zero. Remind pupils to write the zero.

Pupils may find the estimate of only one of the pairs of numbers to multiply. It should be stressed that the estimates of the two numbers need to be found to get a good approximation of the actual product.

**Evaluation guide**

Pupils to:

1. Estimate the sum and product of numbers, height, lengths and widths within and outside the school.
2. Carry out estimates involving sums and products of numbers.

Lesson 1 *Pupil's Book page 108;*
Workbook page 29

 **Preparation**

You will need to have:

- Colour-coded number lines for the class, as shown above.

 **Starter activity**

On the board, draw a number line divided into ten. At either end draw a box.



Ask pupils to copy this number line onto a sheet of paper in ink (or onto a mini board or mini whiteboard, if available). On the board write a 2-digit whole number that is not a multiple of ten (for example 68). Ask pupils between which two multiples of ten this number lies (60 and 70). Write these multiples of ten in the boxes on the number line, the smaller on the left and the larger on the right. Ask a pupil to draw a labelled arrow on the number line to show where the number 68 belongs. Write another 2-digit number on the board and ask your pupils to show it in the same way on the number line they have drawn.

Repeat several times, and then extend to 3-digit whole numbers.

 **Lesson focus**

Read through the worked example on page 108 with your class, making sure that all your pupils understand this work. Rounding to the nearest ten using a number line is very straightforward, and it is unlikely that any pupils will have any problems with Exercise 1.

 **Answers**

Exercise 1

1. a) 60; b) 50; c) 80; d) 90; e) 110
2. a) 240; b) 80; c) 410; d) 30; e) 130; f) 150; g) 930; h) 370

Workbook

1. a) 30; b) 70; c) 2 570; d) 6 600; e) 690

Assessment

Pupils should be able to round whole numbers to the nearest ten with and without a number line. Observe responses of the pupils as they round whole numbers to the nearest ten. Look at their answers to Exercise 1.

Support activity

Revise bonds of ten with pupils by calling out a number and asking for the number which will add that number up to ten.

Homework activity

Pupils are to complete question 1 on page 29 of the WB.

Lesson 2 *Pupil's Book pages 109 and 110;*
Workbook page 29

 **Preparation**

You will need to have:

- Colour-coded number lines for the class, as for Lesson 1.

 **Starter activity**

Repeat the starter activity from Lesson 1 once more with 2-digit numbers. Then extend to 3-digit whole numbers.

 **Lesson focus**

Read through the worked example on page 109 with your class, making sure that all your pupils understand this work. Rounding to the nearest hundred using a number line is very straightforward, and it is unlikely that any pupils will have any problems with Exercise 2.

 **Answers**

Exercise 2

1. a) 200; b) 600; c) 100; d) 1 000
2. a) 300; b) 100; c) 1 800; d) 8 100
e) 600; f) 2 100; g) 900; h) 1 300

Workbook

2. a) 300; b) 800; c) 6 500; d) 100; e) 6 400; f) 300

Assessment

Pupils should be able to round whole numbers to the nearest hundred with and without a number line. Observe responses of the pupils as they round whole numbers to the nearest hundred. Look at their answers to Exercise 2.

Homework activity

Pupils are to complete question 2 on page 29 of the WB.

Lesson 3 *Pupil's Book pages 110 and 111; Workbook page 29*

Preparation

You will need to have:

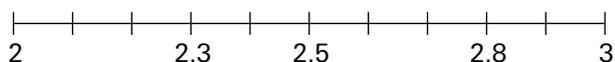
- A wall chart with a straight line, as shown in the Suggested resources.

Starter activity

Ask the pupils to draw a number line in their books. Let them mark 0 to 9 and locate 4.5 on the number line. Repeat this activity with some other decimal numbers on the number line e.g. 2.5, 5.5, 8.5, and so on.

Lesson focus

Lead the pupils to understand that 0.5 is the midpoint of each pair of numbers on the number line such that between 5 and 6, the midpoint is 5.5 etc. If a number is below this midpoint it is estimated down but if it falls above the midpoint, it is estimated up. For example, 2.3 is estimated to 2 (down) but 2.8 is estimated to 3 (up) to the nearest whole number. Show this relationship on the number line.



Go through the worked examples in the PB. Ask them to do Exercise 3.

Answers

Exercise 3

1. a) 6; b) 63; c) 12; d) 101
2. a) 235; b) 86; c) 72; d) 409; e) 107; f) 81; g) 21; h) 40

Workbook

3. a) 3; b) 13; c) 2; d) 97; e) 1; f) 5

Assessment

Pupils should be able to find the estimates of decimal numbers to the nearest whole numbers. Observe the pupils' responses during the lesson. Look at their answers to Exercise 3.

Extension activity

Ask pupils to round off some numbers with two decimal places to the nearest whole number.

Homework activity

Pupils are to complete question 3 on page 29 of the WB.

Lesson 4 *Pupil's Book pages 111 and 112; Workbook pages 29 and 30*

Preparation

You will need to have:

- Multiplication tables to refer to, if necessary.

Starter activity

Write two different numbers on the board and ask the pupils to add them together. Repeat the activity with some other numbers. Make sure you time the pupils when working the sums. Let the pupils find the differences in the pairs of numbers written on the board.

Now ask the pupils to find an estimate of each of the pairs of numbers written on the board to the nearest 10 or 100 as the case may be. Correct the pupils where necessary. Lead the pupils to discover that whole numbers can also be approximated to the nearest number, for example:

$$67 = 70 \quad (\text{to the nearest } 10)$$

$$245 = 250 \text{ (to the nearest 10)}$$

$$152 = 200 \text{ (to the nearest 100)}$$

Repeat this process for multiplication.

Lesson focus

Have a class discussion about rounding. Why would we sometimes want to round numbers off? Ask your class to come up with some practical ideas. Here are some suggestions:

- Sometimes we want to know rough numbers only, and not specifics.
- When we shop for a few items, and want to keep a running total in our heads, it is much easier to round each price off to the nearest 10, for example, and then add the rounded off figure to the running total.

Challenge your class by asking them questions like:

- “When buying material or paint, we round our estimate up, not down. Why?” (It is better to have some material or paint left over, rather than not having enough.)
- “When we have a fixed amount to spend, and want to make sure that we have enough money to pay for the items we choose, would we round the individual prices up or down? Why?” (We would rather have money left over than not have enough money to pay for our purchases.)

Answers

Exercise 4

- $1 + 5 = 6$; $0.8 + 4.9 = 5.7$; Difference: 0.3
 - $160 + 40 = 200$; $163 + 41 = 204$; Difference: 4
 - $110 + 160 = 270$; $111 + 159 = 270$; Difference: 0
 - $8 + 10 = 18$; $7.9 + 9.8 = 17.7$; Difference = 0.3
 - $20 \times 10 = 200$; $18 \times 13 = 234$; Difference: 34
 - $650 \times 50 = 32\,500$; $645 \times 45 = 29\,025$; Difference: 3 475
- Patrick: 16, Bunmi: 12
 - $15.6 + 11.9 = 27.5$, 28 years (to the nearest whole number)
- $35 + 39 = 74$ m; **b)** $39 - 35 = 4$ m

Workbook

- 100; **b)** 2 200; **c)** 500; **d)** 22; **e)** 80; **f)** 20 000
- ~~₦~~2 500 low estimate; **6.** ~~₦~~450

Assessment

Pupils should be able to find the estimates of sums and products of numbers. Observe the pupils’ responses during lesson. Look at their answers to Exercise 4.

Support activity

You may need to drill the pupils on their multiplication tables. Revise the expansion method to multiply numbers – a 2-digit number by a single digit number, and so on. Give pupils the Homework activity for extra practice.

Homework activity

Pupils are to complete questions 4–6 on pages 29 and 30 of the WB.

Lesson 5 *Pupil’s Book page 112*

Preparation

You will need to have:

- Gone over the Quantitative reasoning exercise and understand the pattern used.

Lesson focus

This and the next lesson gauges the extent to which individual pupils have achieved the objectives stated at the beginning of this unit.

Guide the pupils through the example for Exercise 5. Help them to see the pattern and allow them to complete questions 1–6 on their own.

If you have time at the end of the lesson, you could discuss some or all of the questions.

Answers

Exercise 5

- 70; **2.** 890 or 900; **3.** 9; **4.** 30; **5.** 12; **6.** 9

Assessment

Pupils should be able to identify the relationship between the numbers (on their own or with assistance) and complete the exercise on their own.

Lesson 6 *Pupil's Book page 113;*
Workbook page 30



Preparation

You will need to have:

- The answers to the Revision exercise to hand.



Lesson focus

This lesson continues to gauge the extent to which individual pupils have achieved the objectives stated at the beginning of this unit.

You should give pupils a set time in which to complete the Revision exercise. Most pupils should be able to achieve their maximum score in about 20 minutes.

Pupils should work through the questions individually. Encourage them not to spend too much time on any one question if they are stuck. Instead, they should go on to the next question, and come back to the question they were struggling with if they have time at the end of the assessment.

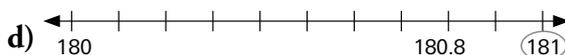
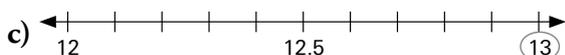
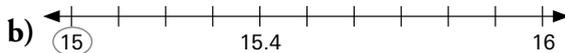
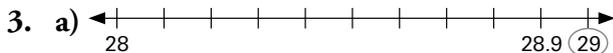


Answers

Revision exercise

1. a) 70; b) 80; c) 840; d) 290;

2. 56, 88, 101, 133



4. a) $1.5 + 1.5 = 3$; $1.3 + 1.4 = 2.7$; Difference: 0.3

b) $16 \times 3 = 48$; $16.2 \times 3 = 48.6$; Difference: 0.6

c) $13.5 + 1.5 = 15$; $13.6 + 1.4 = 15$; Difference: 0

d) $11 + 2 = 13$; $11.4 + 1.8 = 13.2$; Difference: 0.2

e) $90 + 101 = 191$; $89.9 + 101.1 = 191$; Difference: 0

f) $340 \times 50 = 17\,000$; $338 \times 46 = 15\,548$;

Difference: 1 452

5. 410 spectators

Workbook

7. ~~₹~~640

8. a) 710; b) 700; c) 10

9. ~~₹~~90

Assessment

When the time is up, take in the pupils' answers. If you have time at the end of the lesson, you could discuss some or all of the questions.

Mark the exercise, taking note of where individual pupils have not met the unit objectives, in order to give these pupils additional teaching input where required.

Homework activity

Pupils are to complete questions 7–9 on page 30 of the WB.

Objectives

By the end of this unit, each pupil should be able to:

- Define an open sentence
- Find a missing number in an open sentence
- Solve related quantitative reasoning problems.

**Suggested resources**

Chart containing worked examples on open sentences; Flashcards showing open sentences and balancing scales showing balancing equations.

**Key word definitions**

inverse: opposite

**Frequently asked questions**

Q *What prior knowledge do the pupils need?*

A Pupils need to understand addition and subtraction facts very well. They should be able to multiply and divide simple numbers. Pupils are to remember that division is the inverse of multiplication and vice versa.

**Common errors that pupils make**

Pupils find it difficult to see that shapes represent unknown numbers. Write down the missing numbers on card and place them over the shapes in the number sentence so that pupils can see how it works.

**Evaluation guide**

Pupils to:

1. Solve given problems on open sentences involving the four basic operations.
2. Find missing numbers in quantitative aptitude diagrams drawn from open sentences.
3. Solve some problems of quantitative aptitude involving open sentences.

Lesson 1

*Pupil's Book pages 114 and 115;
Workbook page 31*

**Preparation**

You will need to have:

- Flashcards showing open sentences
- Balancing scales showing balancing equations.

**Starter activity**

Before you start this lesson, ask the pupils what must be added to 6 to get 10. Try this activity with many other addition facts, for example, facts to 20: $14 + 6 = 20$ therefore, $20 - 6 = 14$.

Revise how to balance scales learnt in Primary 2. Ten fish will balance a scale to the same level but only four have been put on the scale, how many fish need to be put on the scale for it to balance. Make the lesson as practical as possible.

**Lesson focus**

Explain the meaning of open sentences and relate it to the scale balance introduced earlier.

Lead pupils to understand the different symbols used in representing unknowns, such as rectangular box, triangular box and circular box. Alphabets are also used to represent unknowns. Lead them to determine the unknowns in the given examples.

Guide them through the examples and ask them to answer Exercise 1.

Answers

Exercise 1

1. a) $28 + 38 = 66$; b) $64 - 37 = 27$;
c) $382 - 141 = 241$; d) $8 + 22 = 30$;
e) $494 - 373 = 121$; f) $9.25 + 10.4 = 19.65$

Puzzle

The digit is 7.

Workbook

1. a) 25; b) 5; c) -27; d) 32; e) 30; f) 9.56; g) 56;
h) 2.15; i) 12; j) 18; k) 56

Assessment

Pupils should be able to find the unknown or missing number in an open sentence. Observe how the pupils find missing or unknown numbers during the lesson. Look at their answers to Exercise 1.

Support activity

Work through some of the number sentences on the board with pupils who are struggling, and stick the missing numbers over the shapes to show how to work out the missing numbers.

Homework activity

Pupils are to complete question 1 a)–k) on page 31 of the WB.

Lesson 2 *Pupil's Book pages 115 and 116;*
Workbook page 31

Preparation

You will need to have:

- Flashcards showing open sentences
- Balancing scales showing balancing equations.

Starter activity

Revise how to find the unknown in an open sentence. Lead them to write mathematical statements for some given information.

Lesson focus

Allow pupils to interpret some given mathematical statements. Lead them to write open sentences in the form of mathematical statements and then solve the equation formed.

Discuss the examples with the pupils and make sure they understand both methods for finding an unknown in division and multiplication problems. Ask them to complete Exercise 2.

Answers

Exercise 2

1. a) $9 \times 5 = 45$; b) $4 \div 7 = 12$; c) $6 \times 7 = 42$;
d) $102 \div 3 = 34$; e) $27 \times 5 = 135$;
f) $34 \times 6 = 204$; g) $44 \div 4 = 11$; h) $56 \div 4 = 14$;
i) $13 \times 9 = 117$

Workbook

1. l) 4
2. a) $\square \times 4 = 76$ $\square = 19$; b) $7.48 + \square = 12$ $\square = 4.52$;
c) $\square \times 5 = 155$ $\square = 31$; d) $4 \times \square = 98$ $\square = 24.5$

Assessment

Pupils should be able to find the unknown or missing number in an open sentence.

Observe how the pupils find missing or unknown numbers during the lesson. Look at their answers to Exercise 2.

Extension activity

Give pupils some number sentences with two terms, for example:

$$2 \times \square + 5 = 11$$

Homework activity

Pupils are to complete question 1. l) and question 2 on page 31 of the WB.

Lesson 3 *Pupil's Book pages 116 and 117*

Preparation

You will need to have:

- The answers to the Quantitative reasoning exercise to hand.

Lesson focus

This and the next lesson gauges the extent to which individual pupils have achieved the objectives stated at the beginning of this unit.

Guide the pupils through the completed question 1 in Exercise 3. Help them to see the pattern and allow them to complete questions 2–9 on their own.

If you have time at the end of the lesson, you could discuss some or all of the questions.

Answers

Exercise 3

1. 63; 2. 13; 3. 42; 4. 42; 5. 3; 6. 14; 7. 8; 8. 78; 9. 7

Assessment

Pupils should be able to identify the relationship between the numbers (on their own or with assistance) and complete the exercise on their own.

Lesson 4 *Pupil's Book page 117*

Preparation

You will need to have:

- The answers to the Revision exercise to hand.

Lesson focus

This lesson continues to gauge the extent to which individual pupils have achieved the objectives stated at the beginning of this unit.

You should give pupils a set time in which to complete the Revision exercise. Most pupils should be able to achieve their maximum score in about 20 minutes.

Pupils should work through the questions individually. Encourage them not to spend too much time on any one question if they are stuck. Instead, they should go on to the next question, and come back to the question they were struggling with if they have time at the end of the assessment.

Answers

Revision exercise

- | | |
|--------------------------|-------------------------------|
| a) $95 + 9 = 104$ | b) $70 + 22 = 92$ |
| c) $42 - 19 = 23$ | d) $49 - 16 = 33$ |
| e) $2.7 + 3.1 = 5.8$ | f) $11.9 + 36.5 = 48.4$ |
| g) $5 \times 15 = 75$ | h) $3.5 \times 4 = 14$ |
| i) $1\,125 \div 15 = 75$ | j) $\frac{1}{2}$ of $36 = 18$ |
- | | |
|---|------------------------------|
| a) $9 + 9 = 18$ | b) $6.3 + 6.3 = 12.6$ |
| c) $9 + 9 + 9 = 27$ | d) $1.4 + 1.4 + 1.4 = 4.2$ |
| e) $4 \times 4 = 16$ | f) $5 \times 5 = 25$ |
| g) $\frac{3}{2} \times \frac{3}{2} = \frac{9}{4}$ | h) $2 \times 2 \times 2 = 8$ |

Assessment

When the time is up, take in the pupils' answers. If you have time at the end of the lesson, you could discuss some or all of the questions.

Mark the exercise, taking note of where individual pupils have not met the unit objectives, in order to give these pupils additional teaching input where required.

Objectives

By the end of this unit, each pupil should be able to:

- Solve problems on adding and subtracting money
- Solve related quantitative reasoning problems.

**Suggested resources**

Empty containers of: milk, fish, tomato, sugar, and so on; Basic addition table for money; Real and model money; Nigerian currencies and cardboard showing all the money in use in Nigeria.

**Key word definitions**

afford: have enough money for

**Frequently asked questions**

Q *What prior knowledge do the pupils need?*

A Pupils need to have mastered the concept of addition and subtraction of ordinary numbers. They need to have the idea of buying and selling from home. Children in their different homes are sent on errands to buy food items like salt, pepper, oil, etc. It is important that the pupils are taught this topic using a practical approach. This will enable them to understand the concept of profit and loss very well.

**Evaluation guide**

Pupils to:

1. Solve given problems on addition of money.
2. Solve quantitative reasoning problems involving money.
3. State two or three reasons why addition of money is important in business transaction.
4. Solve quantitative aptitude problems involving the subtraction of money.
5. Solve quantitative problems.

Lesson 1

Pupil's Book pages 118 and 119;

Workbook page 32

**Preparation**

You will need to have:

- A selection of Nigerian currencies
- Cardboard showing all the money in use in Nigeria
- A variety of shopping items for the Starter activity.

**Starter activity**

Arrange shopping items at the front of the class with prices on them. Ask the class the cost of each item. Ask them to tell you what money they would use to pay for each item.

**Lesson focus**

Read through the text and the worked examples on pages 118 and 119 in the PB with your class, making sure that all your pupils understand how to read money amounts.

Go through the example on money addition and ask the class to complete Exercise 1.

**Answers****Exercise 1**

1. a) $325 + 605.60 = \text{N}390.60$
 b) $50 + 60 + 85 = \text{N}195$
 c) $150 + 1\,068.75 = \text{N}1\,218.75$
 d) $50 + 120 = \text{N}170$
 e) $175.50 + 605.60 = \text{N}781.10$
2. a) $1\,068.75 + 605.60 + 120 = \text{N}1\,794.35$
 b) $93 + 85 = \text{N}178$ Yes, it was enough money.

Workbook

1.

+	₦20	₦30	₦40	₦50
₦100	120	130	140	150
₦150	170	180	190	200
₦200	220	230	240	250
₦250	270	280	290	300
2. Any amounts provided by the pupils which would add up to total amounts given.

Assessment

Pupils should be able to understand and add money amounts. Observe responses of the pupils as they add money amounts. Look at their answers to Exercise 1.

Support activity

Set up a table with empty boxes, tins and bottles of everyday items used at home. Price each item and have the pupils make up money on pieces of paper. Get pupils to role-play going to the shop and buying goods. The 'shopkeeper' must add up the total cost of the items bought.

Homework activity

Pupils are to read through the example and complete questions 1 and 2 on page 32 of the WB.

Lesson 2 *Pupil's Book pages 119 and 120; Workbook page 33*



Preparation

You will need to have:

- A selection of Nigerian currencies
- Cardboard showing all the money in use in Nigeria
- A variety of shopping items for the Starter activity.



Starter activity

Arrange shopping items at the front of the class with prices on them. Ask the class the total cost of two or three items. Ask them to tell you what

money they would use to pay for each item. Ask them what change they would get in each case.



Lesson focus

Lead pupils to understand why we need to be able to subtract money amounts (in order to calculate change).

Go through the worked examples on page 120 in the PB. Ask them to do Exercise 2.



Answers

Exercise 2

1. a) ₦103.80 b) ₦603.90
c) ₦730 d) ₦318.90
e) ₦433.87 f) ₦576.88
2. a) ₦23.85 change b) ₦533

Workbook

3.

9	14	7
18	10	12
13	16	11

27	32	25
26	28	30
31	24	29

Assessment

Pupils should be able to subtract money amounts. Observe the pupils' responses during the lesson. Look at their answers to Exercise 2.

Support activity

Set up a table with empty boxes, tins and bottles of everyday items used at home. Price each item and have the pupils make up money on pieces of paper. Get pupils to role-play going to the shop and buying goods. The 'shopkeeper' must add up the total cost of the items bought and work out the required change. The 'shopper' should check their change.

Homework activity

Pupils are to complete question 3 on page 33 of the WB.

Lesson 3 *Pupil's Book pages 121 and 122*



Preparation

You will need to have:

- The answers to the Quantitative reasoning exercise to hand.



Lesson focus

This and the next lesson gauges the extent to which individual pupils have achieved the objectives stated at the beginning of this unit.

Guide the pupils through the completed question 1 in Exercise 3. Help them to see the pattern and allow them to complete the questions on their own.

If you have time at the end of the lesson, you could discuss some or all of the questions.



Answers

Exercise 3

2. ₦2 235; 3. ₦68.50; 4. ₦6 322; 5. ₦5 780;
6. ₦97.47; 7. ₦5 870; 8. ₦712.867

Assessment

Pupils should be able to identify the relationship between the numbers (on their own or with assistance) and complete the exercise on their own.

Lesson 4 *Pupil's Book pages 123*



Preparation

You will need to have:

- The answers to the Revision exercise to hand.



Lesson focus

This lesson continues to gauge the extent to which individual pupils have achieved the objectives stated at the beginning of this unit.

You should give pupils a set time in which to complete the Revision exercise. Most pupils should be able to achieve their maximum score in about 20 minutes.

Pupils should work through the questions individually. Encourage them not to spend too much time on any one question if they are stuck. Instead, they should go on to the next question, and come back to the question they were struggling with if they have time at the end of the assessment.



Answers

Revision exercise

1. a) ₦33.50; b) ₦42.25; c) ₦192.25;
d) ₦264.30; e) ₦254.05; f) ₦244.05
2. a) ₦8 558.50; b) ₦1 441.50
3. ₦296.80
4. ₦1 210.25

Assessment

When the time is up, take in the pupils' answers. If you have time at the end of the lesson, you could discuss some or all of the questions.

Mark the exercise, taking note of where individual pupils have not met the unit objectives, in order to give these pupils additional teaching input where required.

Objectives

By the end of this unit, each pupil should be able to:

- Multiply and divide money by a whole number
- Calculate profit and loss
- Solve related quantitative reasoning problems.

**Suggested resources**

Cards on multiplication of money by whole numbers; Real and models of money; Empty packets of: sugar, matches; Empty tins of: powder chocolate drink, tomatoes, milk; Nigerian currencies; Multiplication tables; Shopping items.

**Key word definitions**

cost price: amount an item is bought for

selling price: amount an item is sold for

profit: when an item is sold for more than it was bought for

loss: when an item is sold for less than it was bought for

**Common errors that pupils make**

Pupils usually find division of numbers more difficult to operate than multiplication. When a division of number has a remainder, pupils sometimes ignore the remainders and write only the quotient.

**Evaluation guide**

Pupils to:

1. Solve problems of multiplication of money by whole numbers.
2. Solve problems of division of money by whole numbers.
3. Solve quantitative aptitude problems involving division of money.
4. Solve problems on the calculations of profit and loss.
5. Solve problems on quantitative reasoning involving profit and loss.
6. State ways on how to make profit in life.

Lesson 1

*Pupil's Book pages 124 and 125;
Workbook page 34*

**Preparation**

You will need to have:

- Cards on multiplication of money by whole numbers
- A selection of shopping items
- Nigerian currency
- Multiplication tables.

**Starter activity**

Before the lesson, drill the pupils on multiplication tables up to 10. For example, $8 \times 5 = 5$ groups of $8 = 40$. Make a table of multiplication and ask the pupils to complete as fast as possible. For example:

×	4	5	6	7
2	8			
3			18	
4				

**Lesson focus**

Go through the worked examples with the pupils. Encourage your pupils to use the expansion method where necessary.

Before the pupils attempt Exercise 1, show them some flashcards on multiplication of numbers from 2 to 10 for example: 5×7 , 2×4 , 10×8 . Ask them to say the answers as fast as possible.

Answers

Exercise 1

1. a) ₦450; b) ₦526.50; c) ₦2 137.50;
d) ₦340; e) ₦975; f) ₦3 028
2. a) ₦270.45; b) ₦622.08; c) ₦1 130.57;
d) ₦742.38
3. ₦5 913.24
4. ₦316.86

Workbook

1.

x	₦20	₦30	₦40
5	100	150	200
7	140	210	280
10	200	300	400

Assessment

Pupils should be able to multiply money by whole numbers.

They should be able to solve day to day problems involving the multiplication of money.

Observe the pupils' responses during the lesson as they multiply money by whole numbers. Look at their answers to questions 3 and 4.

Extension activity

Using examples of shopping items, get pupils to test each other in pairs calculating the cost of multiple items.

Homework activity

Pupils are to complete question 1 on page 34 of the WB.

Lesson 2 *Pupil's Book pages 125 and 126;
Workbook page 34*

Preparation

You will need to have:

- Flashcards on division of money by whole numbers
- A selection of shopping items
- Nigerian currency
- Multiplication tables.

Starter activity

Prepare 30 flashcards with simple divisions of numbers without remainders. Ask pupils to say the answers to them as they pick one by one at random from a bag. For example, $28 \div 4 = 4$ since $4 \times 7 = 28$.

Lesson focus

Introduce the lesson by making the pupils recall that division is the inverse of multiplication, for example, $35 = 5 \times 7 = 7 \times 5$ and so $35 \div 5 = 7$ or that $35 \div 7 = 5$.

Since pupils have learnt how to divide numbers by whole numbers with or without remainder, then they should know how to divide money by whole numbers. Use the multiplication facts as much as possible.

Work through the example on page 125 of the PB with the pupils and ask them to answer Exercise 2.

Answers

Exercise 2

1. ₦61.50; 2. ₦28.35; 3. ₦83; 4. ₦1 100;
5. a) ₦354.40; b) ₦47.87; c) ₦432.50;
d) ₦123.70; e) ₦47.50; f) ₦965

Workbook

2.

÷	4	5	10
₦120	30	24	12
₦150	37.50	30	15
₦200	50	40	20

Assessment

Pupils should be able to divide money by whole numbers.

They should be able to solve problems involving the division of money.

Observe the pupils' responses during lesson. Assess the method they use in division of money. Look at their answers to Exercise 2.

Support activity

Revise division of decimals by whole numbers. Encourage pupils to use the method in the example.

Homework activity

Pupils are to complete question 2 on page 34 of the WB.

Lesson 3 *Pupil's Book pages 126 and 127; Workbook page 34*

Preparation

You will need to have:

- A selection of shopping items
- Nigerian currency.

Starter activity

Prepare a shopping scene with articles with price tags on them. Ask children how much is written on each of the articles. Tell them the price tag is the cost price of the articles. The amount that the article is sold for is the selling price. The selling price depends on the article owner and the cost price. Sometimes the selling prices are fixed by the government of the country, for example, a litre of petrol is sold for ₦70 in Nigeria.

Lesson focus

Lead the pupils to buy and sell in the class. Explain that when the article is sold at a price higher than the cost price we have a 'profit' or 'gain'. When the selling price is less than the cost price we have a 'loss'.

Explain the worked examples in the PB, showing to them clearly when a profit or loss is made and guiding them to determine the profit or loss made.

Guide them on how to find the cost price when the profit and selling prices are given or find the selling price when profit or loss and the cost prices are known.

Lead the pupils to know that when the cost price and the selling price are the same, the buyer makes neither a profit nor a loss and we say he 'breaks even'.

Answers

Exercise 3

1.

Cost Price	₦40.70	₦70.10	₦18.60	₦462	₦804.40
Selling Price	₦50.00	₦90.20	₦25.00	₦528	₦910.14
Profit	₦9.30	₦20.10	₦6.40	₦66	₦105.74

2.

Cost Price	₦900	₦80.20	₦236	₦265	₦604
Selling Price	₦600	₦50.40	₦176	₦247	₦526
Loss	₦300	₦29.80	₦60	₦18	₦78

3. ₦175.90 loss; 4. ₦210 profit; 5. ₦120 profit; 6. ₦1 414

Workbook

3.

Article	Number Purchased	Cost Price	Total Cost
Paracetamol	200	₦1 000	₦200 000
Quinine	50	₦2 500	₦125 000
Blood tonic	325	₦4 800	₦1 560 000
Antibiotics	40	₦5 600	₦224 000
Aspirin	365	₦1 250	₦456 250
Bottled water	120	₦2 050	₦246 000
Toothpaste	68	₦1 555	₦105 740

Assessment

Pupils should be able to find profit or loss of articles and solve problems involving profit and loss.

Observe the pupils' responses during lesson. Look at their answers to Exercise 3.

Extension activity

Get some pupils to come and buy items in bulk from you to stock their shop table. Help these new shop owners to re-price their items for sale in their shop. Get pupils to write down all sales.

Homework activity

Pupils are to complete question 3 on page 34 of the WB.

Lesson 4 *Pupil's Book page 129*

Preparation

You will need to have:

- The answers to the Quantitative reasoning exercise to hand.

Lesson focus

This and the next lesson gauges the extent to which individual pupils have achieved the objectives stated at the beginning of this unit.

Guide the pupils through the beginning of question 1 in Exercise 4. Help them to see the pattern and allow them to complete the questions.

Answers

Exercise 4



$$\begin{aligned} \text{N}9\,090 \div 3 &= \text{N}3\,030 \div 2 = \text{N}1\,515 \div 5 \\ &= 303 \div 3 = \text{N}101 \div 2 = \text{N}50.50 \end{aligned}$$

2. $\text{N}16.8 \times 3 = \text{N}50.4 \times 2 = \text{N}100.8 \times 5$
 $= \text{N}504 \times 4 = \text{N}2\,016 \times 2 = \text{N}4\,032$

Assessment

Pupils should be able to identify the relationship between the numbers (on their own or with assistance).

Lesson 5 *Pupil's Book pages 129 and 130;* *Workbook page 33*

Preparation

You will need to have:

- The answers to the Revision exercise to hand.

Lesson focus

You should give pupils a set time in which to complete the Revision exercise. Most pupils should

be able to achieve their maximum score in about 20 minutes.

Pupils should work through the questions individually. Encourage them not to spend too much time on any one question if they are stuck. Instead, they should go on to the next question, and come back to the question they were struggling with if they have time at the end of the assessment.

Answers

Revision exercise

- a) $\text{N}2\,010.42$; b) $\text{N}1\,912.50$; c) $\text{N}686.35$;
d) $\text{N}333.12$
- a) $\text{N}98.80$; b) $\text{N}171.67$; c) $\text{N}263.70$; d) $\text{N}735.76$
- a) $\text{N}179.44$; b) $\text{N}1\,338.24$; c) $\text{N}23$; d) $\text{N}313.73$
- a)

Selling Price	$\text{N}3\,800$	$\text{N}2\,165$	$\text{N}980$	$\text{N}1\,530$
Cost Price	$\text{N}3\,100$	$\text{N}3\,000$	$\text{N}1\,100$	$\text{N}2\,015$
Profit	$\text{N}700$	$\text{N}835$	$\text{N}120$	$\text{N}485$

b)

Cost Price	$\text{N}580$	$\text{N}2\,210$	$\text{N}6\,025$	$\text{N}680$
Selling Price	$\text{N}490$	$\text{N}1\,795$	$\text{N}5\,675$	$\text{N}520$
Loss	$\text{N}90$	$\text{N}415$	$\text{N}350$	$\text{N}160$

5. $\text{N}1\,825$ loss

Workbook

3.

Item	Cost Price	Selling Price	Profit	Loss
Yams	$\text{N}1\,000$	$\text{N}1\,500$	$\text{N}500$	
Mangoes	$\text{N}1\,570$	$\text{N}1\,950$	$\text{N}380$	
Carrots	$\text{N}5\,600$	$\text{N}5\,400$		$\text{N}200$
Apples	$\text{N}790$	$\text{N}640$		$\text{N}150$
Bananas	$\text{N}2\,500$	$\text{N}4\,300$	$\text{N}1\,800$	
Onions	$\text{N}1\,600$	$\text{N}2\,050$	$\text{N}450$	
Cabbage	$\text{N}5\,760$	$\text{N}4\,700$		$\text{N}1\,060$

Assessment

Mark the exercise, taking note of where individual pupils have not met the unit objectives, in order to give these pupils additional teaching input where required.

Homework activity

Pupils are to complete question 4 on page 33 of the WB.

Objectives

By the end of this unit, each pupil should be able to:

- Make estimates of lengths in metres and centimetres
- Estimate distances in kilometres
- Compare estimates with actual measurements
- Add and subtract lengths.

**Suggested resources**

Rulers with mm and cm markings on them; Metre stick(s); Pieces of card cut in strips one metre long; Objects your pupils can measure for their length (books, pieces of wood, rectangular boxes); Pieces of string; wool and tape ready to help the pupils measure in different ways; Ruler on the cover of the book; Pieces of card cut to lengths of 10, 20 and 39 cm.

**Key word definitions**

length: how long something is

width: how wide something is

**Frequently asked questions**

Q *Why do some pupils not have a clear idea of how long a metre is?*

A Pupils often do not have a clear idea of how long a metre is because they have never worked with a metre stick or a tape measure. If you see that this is the case, ensure that you do a lot of practical work with metre sticks and tape measures. Let them cut a strip of paper a metre long and use it to measure as many objects as possible. Get them to close their eyes and visualise the length of their metre strip. Encourage them to use their hands to show the approximate length of a metre. You should adopt a similar approach, should pupils not have a good idea of the length of a centimetre. Help them to cut off a 1 cm piece of string or wool. Ask them to compare it to their metre strip and let them talk about the difference in length. Ask them once more to visualise the centimetre next to the metre.

**Common errors that pupils make**

Pupils don't know how to use a ruler, tape measure or metre stick to measure. Ensure they know that they must start measuring from the 0 mark. Point out to them that in most cases they should not measure from the edge of the ruler, tape measure or metre stick. (You will need to check tape measures as some have a metal fitting at the ends to protect the measuring tape and because of this the tape does start at 0 from the very edge.)

**Evaluation guide**

Pupils to:

1. Estimate given length and distances.
2. Estimate given objects and distances.
3. Compare estimates and actual measurement.

Lesson 1

*Pupil's Book pages 131 and 132;
Workbook page 35 and 36*

**Preparation**

You will need to have:

- Rulers
- Tape measure
- Metre stick
- String or wool to be used as non-standard units of length.

**Starter activity**

Start the work in this unit by talking about different ways of measuring. Explain that in much of the world today the metric system is the generally accepted way of measuring.

Lesson focus

Introduce the millimetre, the centimetre and the metre. Discuss which unit would be most suitable for measuring a) the length of one's little finger, b) the length of the corridor, c) the width of a textbook and d) the length of a matchstick. Explain how to measure using a standard unit of measurement, for example a centimetre. Show your pupils the importance of starting at 0 on the ruler, tape measure or metre stick.

It is important that pupils know how to estimate length. Give them the opportunity to estimate the lengths of different objects in the classroom before completing Exercise 1.

Make sure that pupils do not confuse the measurements in centimetres with those in metres. Question 2 is important to give pupils a real sense of how long 1 m is. Make sure that your pupils understand that the photograph of a metre stick is not to scale.

Answers

Exercise 1

Pupils estimate and measure various lengths.

Workbook

1. Estimate: pupils' own estimates
Measurements: 3 cm, 7 cm, 4 cm, 6 cm, 5 cm
2. a), c), e), d), b)
3. Check pupil's lengths are accurate.
4. b), e), a), c), d)

Assessment

Pupils should be able to choose the appropriate unit of length for measuring an object.

Ensure they can estimate the length of lines and then accurately measure these lengths in centimetres.

Observe and listen to the pupils whilst working through the example and during the lesson. Look at their answers to Exercise 1.

Support activity

Pupils who struggle with this activity should be given more practice with estimating and measuring lengths of everyday objects.

Homework activity

Pupils are to complete questions 1–4 on page 35 and 36 of the WB.

Lesson 2 *Pupil's Book pages 133; Workbook page 34*

Preparation

You will need to have:

- String or wool to be used as non-standard units of length.

Starter activity

Let different pupils measure different objects in the classroom, for example the desk and the length of the classroom using non-standard units of measurement. Provide your pupils with a piece of string or wool as a non-standard unit of length. Discuss the necessity of having standardised units of length.

Lesson focus

Read through the examples on page 133. Ensure pupils understand the steps in the calculations.

Note also that the measurements are in kilometres. We use kilometres to measure long distances.

Assist pupils to complete question 1 of Exercise 2 and then let them do question 2 on their own.

Answers

Exercise 2

1. Pupils' own answers
2. a) 6 km; b) 7 km; c) 11 km; d) 9 km

Assessment

Pupils should be able to measure lengths using metres.

They need to know how to work with distances in kilometres.

Observe and listen to the pupils during the lesson. Look at their answers to Exercise 2.

Homework activity

Give your pupils the following task to do at home:

1. Measure the height of all the adults in your house and write the measurements down.
2. Measure the height of all the children in your house and write the measurements down.
3. Order the heights from shortest to tallest.

Lesson 3 *Pupil's Book pages 134 and 135; Workbook page 36*

Preparation

You will need to have:

- Rulers with mm and cm markings on them
- Metre stick(s)
- Pieces of card cut in strips one metre long
- Objects your pupils can measure for their length, for example, books, pieces of wood, rectangular boxes, and so on.

Starter activity

Ask your pupils to work in pairs for this activity. In advance, cut metre long strips of paper, one strip for each pair. Ask your pupils to measure their strip of paper in centimetres. This requires careful measuring, using their rulers. Ask them how many centimetres make up one metre. Lead them to arrive at the answer of 100 cm, which equals one metre. You will have to remediate if pairs have not measured accurately. Point out that 1 metre = 100 cm and 100 cm can be written as 1 metre.

Paste a strip of paper that measures exactly one metre on the board. Then ask them to describe 1 cm compared to 1 m. It is important to discuss the differences in the units so that your pupils are able to form a very clear impression of the different units of length. This will help to avoid confusion between metres and centimetres.

Summarise the conversion factors on the board, using both the full name of each unit (metres, centimetres), as well as the abbreviations (m, cm).

Lesson focus

In this lesson, your pupils will learn how to convert between metres and centimetres. This is an important

life skill as well as an important mathematical concept. Not only does this enable pupils to write one unit of measurement as another one, it will also further develop the concept of equivalence. After the starter activity, ask your pupils questions like: "If there are 100 cm in 1 metre, how many centimetres are there in 2 metres?" Write on the board: 1 m = 100 cm; 2 m = 200 cm.

Ask them how they calculated the answer and then consolidate that $2 \times 100 \text{ cm} = 200 \text{ cm}$. Then ask them how they would write 200 cm as metres.

Once you have discussed this with your pupils, go through the worked examples with them. Ask pupils to do Exercise 3.

Answers

Exercise 3

1. **a)** 2.6 km; **b)** 9.617 km; **c)** 19.642 km; **d)** 4.315 km; **e)** 8.352 km; **f)** 26.602 km
2. **a)** 7 km 530 m; **b)** 11 km 254 m; **c)** 18 km 232 m; **d)** 6 km 248 m; **e)** 4 km 400 m; **f)** 47 km 457 m
3. **a)** 4 013 m; **b)** 16 000 m; **c)** 6 445 m; **d)** 2 652 m; **e)** 15 480 m; **f)** 24 001 m

Workbook

6. **a)** 100 cm **b)** 6 m

Assessment

Pupils should be able to convert metres to centimetres and centimetres to metres.

Observe and listen to pupils' responses during the lesson. Look at their answers to Exercise 3.

Support activity

If pupils find it difficult to convert lengths given in mixed units then encourage these pupils to take a multi-step approach to these conversions and to write their reasoning down. For example, to convert 1 m and 57 cm to cm, they could reason: 1 m = 100 cm, so $100 \text{ cm} + 57 \text{ cm} = 157 \text{ cm}$.

Homework activity

Pupils are to complete question 6 on page 36 of the WB.



Preparation

You will need to have:

- The Revision exercise to hand.



Lesson focus

This lesson gauges the extent to which individual pupils have achieved the objectives stated at the beginning of this unit.

You should give pupils a set time in which to complete the Revision exercise. Most pupils should be able to achieve their maximum score in about 20 minutes.

Pupils should work through the questions individually. Encourage them not to spend too much time on any one question if they are stuck. Instead, they should go on to the next question, and come back to the question they were struggling with if they have time at the end of the assessment.



Answers

Revision exercise

1. **a)** cm or m; **b)** cm; **c)** m; **d)** m
2. **a)** **b)** **c)** **d)** **e)** **f)** **g)** **h)**

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- a)** Pupils estimate the lengths of the lines.
b) 7 cm, 5 cm, 9 cm, 3 cm, 6 cm, 10 cm, 12 cm, 8.5 cm
c) 12 cm, 10 cm, 9 cm, 8.5 cm, 7 cm, 6 cm, 5 cm, 3 cm
d) Pupils indicate whether or not their estimates were almost correct.
3. **a)** 4.32 m; **b)** 5.74 m; **c)** 164 cm; **d)** 417 cm;
e) 186 cm; **f)** 9.55 m; **g)** 14.837 km;
h) 35 075 m; **i)** 8 505 m; **j)** 14.837 km

Workbook

5. and 6. Pupils' own answers. Check for accuracy.

Assessment

When the time is up, take in the pupils' answers. If you have time at the end of the lesson, you could discuss some or all of the questions.

Mark the exercise, taking note of where individual pupils have not met the unit objectives, in order to give these pupils additional teaching input where required.

Homework activity

Pupils are to complete questions 5 and 7 on page 36 of the WB.

Objectives

By the end of this unit, each pupil should be able to:

- Add and subtract lengths in centimetres and metres
- Add and subtract lengths in metres and kilometres
- Solve word problems on addition and subtraction of length.

**Suggested resources**

Rulers with mm and cm markings on them; Metre stick(s).

**Frequently asked questions**

Q *What prior knowledge do the pupils need?*

A Pupils should:

- have a good understanding of a standard unit of measurement
- be able to use a ruler
- be comfortable with basic addition and subtraction methods
- be able to multiply and divide with whole numbers.

**Common errors that pupils make**

Pupils struggle to add and subtract lengths. It is important to check that they know their basic number bonds (combinations). If they do not, you need to give additional attention to this aspect of the work.

Pupils often forget to write down the unit of measurement required in the answer. Point out to the pupils that this is necessary so that they do not forget with which units they are working. Point out too, that this distinguishes working with measurements and working with ordinary numbers.

Pupils choose the wrong calculation in word problems. Some pupils are reluctant readers and are unable to engage with the situation described in a word problem. As a result, they tend to choose an operation at random, in the hope that

it may be the correct one. Encourage your pupils to draw a picture or a diagram that illustrates the problem, writing in the given lengths. Some problems also lend themselves to role-play, which is helpful as your pupils can act out the situation and ‘experience’ what is happening.

Pupils do the calculation but forget to answer the question that was posed. Read the problem with the class so that they have a clear understanding of what is required. Also remind them to always check what was asked, once they have arrived at an answer.

**Evaluation guide**

Pupils to:

1. Solve given problems on addition and subtraction of lengths.

Lesson 1

*Pupil's Book pages 137 and 138;
Workbook page 37*

**Preparation**

You will need to have:

- Place value columns drawn on the board for illustration.

**Starter activity**

Revise basic addition, subtraction, multiplication and division skills. Set your pupils the questions below, and ask them to answer verbally or in written form. Correct the answers and assess your pupils' competence with the four arithmetic operations.

Questions 9 and 10 involve multiplying a 2-digit number by a one-digit number. You may wish to do an example of this on the board first.

1. $16 + 5$; 2. $30 + 50 + 20$; 3. $100 - 45$;
4. $40 - 5 - 10$; 5. 4×8 ; 6. 7×7 ; 7. $40 \div 8$;
8. $56 \div 7$; 9. 72×4 ; 10. 35×6

Lesson focus

Work through the worked examples with your pupils so that they understand how to do the calculations. In Exercise 1, your pupils add and subtract lengths with the same units. Point out that we can only add and subtract lengths that have the *same* unit.

Pupils must make sure that they do the calculations correctly. When adding or subtracting, it is important that they align the numbers correctly in the place value columns.

Before your pupils do question 4, it is important to discuss strategies of how to approach such examples. Remind your pupils to write the unit of length with every answer.

Answers

Exercise 1

1. a) 48 cm; b) 74 cm; c) 95 cm; d) 98 cm
2. a) 54 m; b) 44 m; c) 40 m; d) 382 m
3. a) 125.59 m; b) 10.204 km; c) 246.16 m; d) 19.387 km
4. a) 18 m; b) 44 cm; c) 51 m; d) 59 m

Challenge

Check the answers together with the pupils.

Workbook

1. a) 1 043 m; b) 531 m; c) 282 cm
2. a) 65 cm; b) 187 m; c) 133 cm
3. a) 300 cm; b) 700 cm; c) 1 400 cm; d) 250 cm
4. a) 1 m; b) 4 m; c) 6 m; d) 21.2 m

Assessment

Pupils should be able to add and subtract lengths and write their answers with the relevant unit of measurement.

Observe and listen to pupils' responses during the lesson. Look at their answers to Exercise 1.

Extension activity

Ask pupils to work in pairs to make up a **Challenge** similar to the one on page 138 in the PB.

Homework activity

Pupils are to complete questions 1–4 on page 37 of the WB.

Lesson 2 *Pupil's Book pages 138 and 139; Workbook page 38*

Preparation

You will need to have:

- Prepared some problems for the Starter activity.

Starter activity

Write down three lengths on the board, for example 2 m, 5 m and 8 m. Your pupils should work in pairs. Each pupil should individually devise a word problem that involves all three measurements, and write their word problem down. They then swap their problem with their partner and solve one another's word problems.

Repeat this activity, but this time using a mixture of units, for example 60 cm, 1 m and 5 cm.

Lesson focus

This lesson focuses on problems with mixed units and word problems involving lengths and distances. Read through the problems in Exercise 2 with your pupils. Pause after each one and invite your pupils to ask any questions that they might have. Try to avoid spelling out to them what operations to use.

Answers

Exercise 2

1. a) 96 km 751 m; b) 1 047 km 281 m; c) 149 km 849 m; d) 5 km 703 m; e) 18 km 696 m; f) 239 km 920 m
2. a) $14.63 + 18.5 + 34.47 = 67.6$ cm
b) $134.5 - 97.9 = 36.6$ m longer
c) $10.86 + 12.258 = 23.118$ km
d) $52.705 - 31.950 = 20.755$ km

Workbook

5. a) 346 cm b) 3.46 m
6. a) 2.56 m b) 256 cm
7. a) 1.35 m

Assessment

Pupils should be able to solve problems involving lengths and distances. Observe how the pupils solve these problems. Look at their answers to Exercise 2.

Support activity

You may need to devise simpler questions for pupils that struggle with this activity. You could just focus on lengths of the same unit.

Homework activity

Ask the pupils to do questions 5–7 on page 38 of the WB.

Lesson 3 *Pupil's Book page 140*



Preparation

You will need to have:

- The answers to the Revision exercise to hand.



Lesson focus

This lesson gauges the extent to which individual pupils have achieved the objectives stated at the beginning of this unit.

You should give pupils a set time in which to complete the Revision exercise. Most pupils should be able to achieve their maximum score in about 20 minutes.

Pupils should work through the questions individually. Encourage them not to spend too much time on any one question if they are stuck. Instead, they should go on to the next question, and come back to the question they were struggling with if they have time at the end of the assessment.



Answers

Revision exercise

1. a) 6 m 37 cm b) 14 m 2 cm
 c) 2.58 m d) 3.53 m
 e) 1 km 527 m f) 11.298 m
2. $9.050 + 11.86 = 20.91$ km
3. $4 \times 8 = 32$ m
4. a) 550 m b) 200 m

Assessment

When the time is up, take in the pupils' answers. If you have time at the end of the lesson, you could discuss some or all of the questions.

Mark the exercise, taking note of where individual pupils have not met the unit objectives, in order to give these pupils additional teaching input where required.

Pupil's Book page 142

Objectives

Pupils are given an opportunity to practice working with measurement in length through Project 2.

Encourage pupils to complete the investigation and draw their own conclusions, to be discussed as a class.

**Guidelines**

Pupils complete the project in their exercise book, on their own or in pairs. Walk around the classroom while the pupils are working. Offer support by checking that all pupils understand the questions, use their rulers to measure correctly, and perform correct addition.

The project should be completed in a single lesson. Any questions that are not completed in the allowed time can be assigned as homework.

**Answers**

1. a) i) Pupils estimate
ii) $AB = 7$ cm, $BC = 4.3$ cm
iii) 11.3 cm
- b) i) Pupils estimate
ii) $EF = 5$ cm
iii) $4 \times 5 = 20$ cm
2. a)–e) Pupils' own drawings, estimates and actual measurements. If they are working in pairs, have the partners check their answers.
3. a) Pupils estimate.
b) & c)

Assessment

Observe and listen to the pupils during the lesson. Pupils should be able to complete the worksheet on their own with limited support from the teacher. Pupils should be able to use a ruler to make accurate measurements. Pupils should be able to add lengths correctly.

Side	Estimate length	Measured length
AB	Pupils' own answers.	5 cm
BC		3 cm
CD		7 cm
DA		5.8 cm
Sum of lengths		20.8 cm

Pupil's Book page 142

Objectives

This assessment is a summative assessment of work covered in Units 13 to 22.

This assessment is designed to assess the pupils' mathematical understanding and not their reading ability. It is also important that it is completed by individuals and not with the support of other pupils as this would not uncover any difficulties a pupil may be having with particular concepts.

 Guidelines

This Assessment is best carried out with small groups of pupils under the guidance of the teacher who should read each question carefully to the pupils and give them time to complete the question before moving on to the next question.

A more able group within the class may be able to complete the assessment without the need for the teacher to read the questions. However, observing pupils while they are completing the assessment provides further information about their abilities.

This Assessment should be carried out over two lessons. Complete questions 1–14 in the first lesson, and then complete questions 15–27 in the second lesson.

 Answers

- a) $\frac{14}{16} = \frac{7}{8}$; b) $\frac{18}{20} = \frac{9}{10}$; c) $\frac{7}{10} + \frac{2}{10} = \frac{9}{10}$; d) $\frac{2}{4} + \frac{1}{4} = \frac{3}{4}$
- a) $\frac{8}{12} + \frac{9}{12} = \frac{17}{12} = 1\frac{5}{12}$; b) $\frac{11}{14} + \frac{10}{14} = \frac{21}{14} = 1\frac{1}{2}$;
 c) $\frac{7}{16} + \frac{14}{16} = \frac{21}{16} = 1\frac{5}{16}$; d) $\frac{35}{28} = \frac{22}{28} = \frac{57}{28} = 2\frac{1}{28}$
- a) $\frac{40}{6} + \frac{5}{6} = \frac{45}{6} = 7\frac{1}{2}$; b) $\frac{13}{3} + \frac{20}{3} = \frac{33}{3} = 11$;
 c) $\frac{6}{4} + \frac{15}{4} = \frac{21}{4} = 5\frac{1}{4}$; d) $\frac{6}{20} + \frac{48}{20} + \frac{6}{20} = \frac{60}{20} = 3$;
 e) $\frac{12}{5} + \frac{8}{5} = \frac{20}{5} = 4$; f) $\frac{60}{9} + \frac{17}{9} = \frac{77}{9} = 8\frac{5}{9}$;
 g) $\frac{36}{15} + \frac{20}{15} = \frac{56}{15} = 3\frac{11}{15}$; h) $\frac{19}{16} + \frac{26}{16} = \frac{45}{16} = 2\frac{13}{16}$
- a) $\frac{4}{16} = \frac{1}{4}$; b) $\frac{12}{20} = \frac{3}{5}$; c) $\frac{5}{10} = \frac{1}{2}$; d) $\frac{3}{4}$
- a) $\frac{48}{12} - \frac{9}{12} = 3\frac{1}{4}$; b) $\frac{31}{14} - \frac{10}{14} = 1\frac{1}{2}$; c) $\frac{7}{16} - \frac{2}{8} = \frac{3}{16}$;
 d) $\frac{20}{4} = 5$
- a) $\frac{14}{6} - \frac{5}{6} = \frac{9}{6} = 1\frac{1}{2}$; b) $\frac{20}{3} - \frac{13}{3} = \frac{7}{3}$; c) $\frac{14}{4} + \frac{7}{4} = 5\frac{1}{4}$;
 d) $\frac{6}{20} + \frac{12}{5} - \frac{6}{20} = 2\frac{2}{5}$; e) $\frac{12}{5} - \frac{8}{5} = \frac{4}{5}$;
 f) $\frac{60}{9} - \frac{17}{9} = 4\frac{7}{9}$; g) $\frac{36}{15} - \frac{20}{15} = 1\frac{1}{15}$; h) $\frac{51}{16} - \frac{26}{16} = 1\frac{9}{16}$

- a) $\frac{5}{18} + \frac{2}{18} = \frac{7}{18}$; b) $\frac{11}{18}$
- $\frac{15}{30} + \frac{10}{30} + \frac{12}{30} = \frac{37}{30} = 1\frac{7}{30}$
- a) 0.6; b) 0.85; c) 0.04; d) 0.12; e) 0.04; f) 0.4;
 g) 0.15; h) 1.5
- a) $\frac{9}{10}$; b) $\frac{1}{2}$; c) $\frac{1}{4}$; e) $\frac{75}{100}$
- 8.01 m
- a) 4.25; b) 11.225; c) 68.675; d) 6.461;
 e) 15.25; f) 9.206
- a) ~~₺~~30; b) ~~₺~~29.20
- a) 418.29 ₺; b) 95.7 ₺; c) August
- a) 9.465 m; b) 0.535 m
- a) 7 020; b) 48 100; c) 77 868; d) 246 825;
 e) 12.5; f) 790; g) 18; h) 7.1
- a) 27 300 sequins; b) 34 125 sequins;
 c) 52 325 sequins
- a) 235.2 ₺; b) 558.6 ₺; c) 960.4 ₺
- a) 121 m²; b) 225 m²; c) 400 m²
- a) $81 = (3 \times 3) \times (3 \times 3) = 9$ m;
 b) $196 = 2 \times (2) \times 7 \times (7) = 14$ m;
 c) $324 = 2 \times (2) \times 3 \times (3) \times 3 \times (3) = 18$ m
- a) $9\frac{7}{9}$, $14\frac{2}{3}$; b) 11, $16\frac{1}{2}$; c) $17\frac{4}{9}$, $26\frac{1}{6}$; d) 66, 99
- a) 1.61; b) 3.05; c) 3.925; d) 1.48
- ~~₺~~42.25
- a) 75; b) 9; c) 51; d) 48; e) 16; f) 160; g) 180;
 h) 720; i) 480; j) 20; k) 26.5; l) 5
- a) ~~₺~~148.27; b) ~~₺~~126.14; c) ~~₺~~117 Yes
- a) 122.5 km; b) 20.42 km
- 49.2 km

Assessment

On completion of the assessment, look for correct answers and mistakes made by individuals. Check to see if there is a pattern in terms of any particular question causing a significant number of pupils' difficulties.

By analysing the results of this assessment, you can identify weaknesses in individuals and provide the necessary support, and also strengths of individuals and provide them with more challenging activities.

The results can be used to identify any weaknesses in the teaching programme and make adjustments as necessary.

Objectives

By the end of this unit, each pupil should be able to:

- Change from one unit of weight to another
- Add and subtract weight in kilograms and grams
- Solve word problems involving addition and subtraction of weight.

**Suggested resources**

Weighing or balance scale; Objects to weigh, for example, bags sand or stones, weighing more than 1 kg; Small objects weighing less than 1 kg, for example, a pencil or note book; Wall charts showing place value of decimal numbers; Wall charts showing addition and subtraction of decimal numbers.

**Key word definitions**

weigh: put on a scale to measure the heaviness of something

mass: weight or heaviness

kilogram: the base unit used for measuring mass

gram: one 1 000th of a kg

**Common errors that pupils make**

Pupils struggle to estimate mass, choosing objects that are totally inappropriate. Some pupils find it very difficult to form a mental idea of a kilogram. It will help these pupils greatly if they can hold a bag containing 1 kg of sand in one hand and an object weighing 1 kg in the other. Similarly, let them weigh off a mass of 50 g of sand in a bag, to compare with an object weighing 50 g.

**Evaluation guide**

Pupils to:

1. Change from one unit of measure to another.
2. Perform addition and subtraction sums of kilograms and grams.
3. Solve problems on addition and subtraction of weights.

Lesson 1

Pupil's Book pages 146–147;
Workbook page 40

**Preparation**

You will need to have:

- Scale balance and weighing scale
- 1 kg bag of sand or stones
- 500 g tin of sand or stones.

**Starter activity**

Collect a variety of items on which the mass is clearly indicated. Ask your pupils to order the items from the lightest to the heaviest, and vice versa. Ask pupils to classify the items into two groups namely heavy and light. Items that do not fit into either of the categories could be the source of interesting discussion. Allow pupils to handle the different items as much as possible to build their concept of mass. Pupils can also be asked to arrange items into groups of similar masses.

**Lesson focus**

The emphasis of this lesson is on practical work, so that your pupils can build a realistic concept of 1 kg and 1 g.

Read through the introductory text with your class. Have a class discussion about why we need measuring tools if we want to measure accurately. Discuss why we need the units of kilogram and gram. What would the implication be if we used only kilograms or only grams? Did you know that some countries still use the Imperial system of measurement? Point out that we use the metric system, based on powers of 10.

Prepare a bag containing 1 kg of sand in advance and show your class how to measure this bag in a scale or a balance. If you feel it is practical to do so, you could let your pupils work in pairs as they measure off their own bags of 1 kg of sand. At the very least, allow all your pupils to feel the weight of the bag of sand that you have prepared, so that they can develop a sense of the weight of 1 kg.

Guide pupils to revise the conversion of kilograms to grams $1 \text{ kg} = 1\,000 \text{ g}$.

Ask pupils to do Exercise 1 then discuss the answers.



Answers

Exercise 1

1. a) 7 kg 234 g; b) 7 kg 690 g; c) 3 kg 600 g;
d) 15 kg 8 g
2. a) 6.890 kg; b) 2.674 kg; c) 38.700 kg;
d) 49.275 kg
3. a) 11 050 g; b) 12 600 g; c) 4 372 g

Workbook

3. a) 1 000; b) 4 000; c) 15 000; d) 1 700
4. a) 0.2; b) 0.4; c) 0.75; d) 3.4
5. a) 2 350; b) 2.35

Assessment

Pupils should be able to change from grams to kilograms and vice versa.

Homework activity

Pupils are to complete questions 3–5 on page 40 of the WB.

Lesson 2

*Pupil's Book pages 147–149;
Workbook pages 39 and 40*



Preparation

You will need to have:

- Scale balance and weighing scale
- Objects to weigh, for example, bags sand or stones, weighing more than 1 kg
- Small objects weighing less than 1 kg, for example, a pencil or note book
- Wall charts showing place value of decimal numbers
- Wall charts showing addition and subtraction of decimal numbers.



Starter activity

Allow pupils to work in pairs to weigh small items of less than 500 g. Each pair weighs 2 items separately, and notes down the weights, which should have a sum of less than 1 kg. They then add the weights of the two items together and compare their addition with the actual weight. Repeat this exercise with a variety of items. Repeat this exercise with items weighing between 500 g and 1 kg.



Lesson focus

The focus of the lesson is to add grams and kilograms and then convert the sum to grams and/or kilograms. Ask pupils to do Exercise 2.



Answers

Exercise 2

1. a) 13 kg 200 g; b) 107 kg 80 g; c) 56.91 kg;
d) 131.837 kg
2. a) 160.2 kg; b) 61 kg 80 g; c) 1 087.85 kg

Workbook

1. a) 283 g; b) 669 kg; c) 464 g; d) 862 kg
6. $350 \text{ g} = 0.35 \text{ kg}$; Total weight = 705.3 kg

Assessment

Pupils should be able to add weights correctly and be able to change from grams to kilograms and vice versa.

Extension activity

Ask pupils to find 2–3 objects at home that together weight approximately 1 kg. Bring the objects to class and weigh them to see how accurate the pupils' estimations were.

Homework activity

Pupils are to complete questions 1 and 6 on pages 39 and 40 of the WB.

Lesson 3

*Pupil's Book page 149;
Workbook pages 39 and 40*



Preparation

You will need to have:

- Scale balance and weighing scale

- Objects to weigh, for example, bags sand or stones, weighing more than 1 kg
- Small objects weighing less than 1 kg, for example, a pencil or note book
- Wall charts showing place value of decimal numbers
- Wall charts showing addition and subtraction of decimal numbers.



Starter activity

Repeat the exercise done in Lesson 2 but find the difference between the weights of items weighing less than 500 grams. Repeat this exercise with items weighing between 500 g and 2 kg.

Read through the text about subtracting weights.



Lesson focus

The focus of the lesson is to subtract grams and kilograms and then convert the difference to grams and/or kilograms. Ask your class to do Exercise 3.

Allow pupils to have fun together as a class completing the Puzzle on page 147 of the PB.



Answers

Exercise 3

1. a) 45 kg 942 g; b) 14 kg 107 g; c) 5.305 kg; d) 16.78 kg
2. a) 96 kg 490 g; b) 1.95 kg; c) 28.97 kg

Puzzle

1. Some whales are heavier than an elephant.
2. It is very unlikely that a person could weigh as much as a lion.
3. Dwarf hamsters are smaller than a mouse.

Workbook

2. a) 75; b) 102; c) 432; d) 133
7. 165 g; 8. 55.7 kg

Assessment

Pupils should be able to subtract grams and kilograms and provide the answer in the correct unit of measure.

Support activity

Have pupils convert the weights in Exercise 3 question 1 into grams.

Homework activity

Pupils are to complete questions 2, 7 and 8 on pages 39 and 40 of the WB.

Lesson 4

Pupil's Book page 151



Preparation

You will need to have:

- The answers to the Revision exercise to hand.



Lesson focus

Pupils revise the concepts covered in this unit by working through the Revision exercise. Check pupils' progress and monitor how they cope with integrating the content covered in this unit.



Answers

Revision exercise

1. a) 8 kg 750 g; b) 13 kg 450 g; c) 69.145 kg; d) 500 g; e) 250 g; f) 725 g
2. a) 66.95 kg; b) 10.28 kg; c) 16.5 kg; d) 16.1 kg
3. a) 28.98 kg; b) 2.95 kg
4. a) 150 g < 420 g; b) 0.9 kg < 1 000g; c) $\frac{3}{4}$ kg > $\frac{1}{2}$ kg; d) $\frac{3}{5}$ kg > $\frac{1}{2}$ kg

Assessment

Pupils should be able to arrange objects according to how heavy or light they are. They should be able to decide whether an object would be best measured in grams or in kilograms.

Check pupils' estimates of the masses of different objects and check pupils' answers to the Revision exercise.

Homework activity

Ask your pupils to make a list of five objects at home that weigh more than 1 kg and five that weigh less than 1 kg.

Objectives

By the end of this unit, each pupil should be able to:

- Multiply and divide weight by whole numbers
- Solve problems on multiplication and division of weight
- Learn how to multiply and divide with kilograms and grams.

**Suggested resources**

Place value table; Objects to weigh, for example, bags or cans of sand, stones, etc., weighing more than 1 kg; Small objects weighing less than 1 kg, for example, a pencil or notebook; Decimal chart showing division and multiplication; A chart showing multiplication and division of kg and g; Times table chart.

**Key word definitions**

multiply: find the product of two numbers

divide: find the quotient of two numbers

dividend: the number to be divided into another number

divisor: a number that divides into another

**Frequently asked questions**

Q *Is multiplying and dividing units of weight the same as working with decimal numbers?*

A It is exactly the same. Units of weight can be written as decimal numbers, for example,
 $5 \text{ g} = 0.005 \text{ kg}$. $5 \text{ g} \times 10 = 50 \text{ g} = 0.05 \text{ kg}$ and
 $0.005 \text{ kg} \times 10 = 0.05 \text{ kg}$.

**Common errors that pupils make**

Pupils may make mistakes when adding or subtracting mass with mixed units of kilograms and grams. This is often due to the pupils misreading the questions. For example, if pupils add 150 kg and 150 g. The second mass in the addition does not have both kg and g, pupils should be alerted to the fact that the second mass is 150 kg, not 150 g. If your pupils tend to make mistakes like these, you could ask them to work in

pairs and to check one another's calculations. Pupils at this level often enjoy playing 'teacher'; in other words, they enjoy finding and pointing out one another's mistakes. The need to be critical of a partner's work teaches them to be critical of their own work and to be more alert to possible mistakes.

Some pupils make simple calculation errors.

Encourage pupils to use inverse operations to check answers.

Pupils write the wrong units in their answers, or forget to write the units altogether. Remind your pupils that masses are always written with the appropriate units. A mass of 50, for example, is meaningless— 50 what? Pumpkins? Carrots? Dogs? Kilograms? Grams?

**Evaluation guide**

Pupils to:

1. Multiply and divide weight by whole numbers.

Lesson 1

*Pupil's Book pages 152 and 153;
 Workbook page 41*

**Preparation**

You will need to have:

- Place value table
- Decimal chart showing multiplication
- Chart showing multiplication of kg and g
- Times table chart.

Starter activity

Use mental calculation activities to refresh your pupils' memory and skill at number work. Ask questions involving simple addition and subtraction as well as multiplication and division facts.

Lesson focus

The focus of this lesson is on calculating with units of mass. Read through the introductory text, and work through the worked examples with your class. It is important to work through the examples carefully for all the operations, making sure that all your pupils understand the various methods.

Encourage them to verbalise various strategies to solve the problems before deciding on a specific strategy.

Guide pupils to revise the conversion of kilograms to grams $1 \text{ kg} = 1\,000 \text{ g}$ and $1 \text{ g} = 0.001 \text{ kg}$.

Lead pupils to solve problems using multiplication and division of weights.

Answers

Exercise 1

- a)** 10 kg 203 g; **b)** 75 kg 700 g; **c)** 17 kg 300 g; **d)** 51 kg; **e)** 84.8 kg; **f)** 263.88 kg
- a)** 69 kg 420 g; **b)** 175 kg; **c)** 128.61 kg

Workbook

- a)** 25; **b)** 5; **c)** -27; **d)** 32; **e)** 30; **f)** 9.56; **g)** 56; **h)** 2,15; **i)** 12; **j)** 18; **k)** 56; **l)** 4
- a)** 315; **b)** 320; **c)** 266; **d)** 84

Assessment

Pupils should be able to multiply weight by whole numbers correctly and solve problems on multiplication of weight.

Extension activity

Pupils who have proved they understand the concepts can be put in groups to make up their own multiplication problems with weight for the group to do.

Homework activity

Pupils are to complete question 1 and 2 on page 41 of the WB.

Lesson 2 *Pupil's Book pages 154 and 155;* *Workbook page 42*

Preparation

You will need to have:

- Place value table
- Decimal chart showing division
- Chart showing division of kg and g
- Times table chart.

Starter activity

Write division sums on the board using whole numbers and ask a pupil to come up and circle the dividend and another pupil to circle the divisor. Write the labels below each circle.

Lesson focus

Read through the rules on how best to divide weight. Make sure that pupils understand which number is the dividend and which is the divisor. Work through the example as a class and explain why the division starts with the kilograms to any pupils who are unsure.

Pupils can then complete Exercise 2 on their own.

Answers

Exercise 2

- a)** 7 kg 167 g; **b)** 4 kg 750 g; **c)** 3 kg 356 g; **d)** 3.41 kg; **e)** 2 kg 247 g; **f)** 3 kg 729 g
- a)** 551 g; **b)** 3.75 kg; **c)** 211 bags

Workbook

- a)** 12; **b)** 33; **c)** 19; **d)** 53
- 4.5 kg

Assessment

Pupils should be able to divide weight by whole numbers correctly and solve problems on division of weight.

Extension activity

Pupils who have proved they understand the concepts can be put in to groups to make up their own division problems with weight for the group to do.

Homework activity

Pupils are to complete questions 3 and 4 on page 42 of the WB.

Lesson 3

Pupil's Book pages 156;

Workbook page 42



Preparation

You will need to have:

- The answers to the Revision exercise to hand.



Lesson focus

Pupils revise the concepts covered in this unit by working through the Revision exercise. Check pupils' progress and monitor carefully how they cope with integrating the content covered in this unit.



Answers

Revision exercise

1. a) 65 kg 750 g; b) 43 kg 830 g; c) 289.89 kg;
d) 205.76 kg; e) 49 kg 830 g; f) 8 kg 450 g;
g) 21.2 kg; h) 5.6815 kg
2. a) 64 kg; b) 233.1 kg; c) 128.61 kg; d) 4 days

Workbook

5.

Description	Quantity bought	Package weight	Total weight kg
Maize meal	20	7 kg	140
Rice	40	2 kg	80
Salt	200	500 g	100
Flour	30	5 kg	150
Coffee	10	1 kg	10
Soap powder	40	1.5 kg	60
Sugar	20	3 kg	60
Total weight in kg			600 kg

Assessment

Pupils should be able to multiply and divide decimal numbers.

Understand how to apply this to working with grams and kilograms.

Observe pupils' response during lessons and look at their answers to the exercises.

Homework activity

All pupils must convert the following to grams and divide the result by 5:

5 kg 100 g; 6 kg 100 g; 7 kg 5 g

Pupils are then to complete question 5 on page 42 of the WB.

Objectives

By the end of this unit, each pupil should be able to:

- Tell the time in hours and minutes
- Know when to use the notations a.m. and p.m.
- Read a calendar and write dates
- Solve quantitative reasoning problems related to time.

**Suggested resources**

Cardboard clocks; Other different types of clocks; Current calendar; Supplies such as cardboard, pins and scissors.

**Key word definitions**

notations: a symbol used to represent something

dawn: the first light in the sky after the night

noon: midday

ante meridian: the time after midnight but before midday

post meridian: the time past midday up to midnight

**Frequently asked questions**

Q *What prior knowledge do the pupils need?*

A Pupils:

- will need to be familiar with analogue and digital clock faces and be able to tell the time to the nearest five minutes on both analogue and digital clocks
- should have an awareness of events related to dates and times and months, for example religious holidays, national holidays and so on
- should be able to calculate the duration of time in hours, half hours, quarter hours, in days, weeks and months
- need to have a good concept of time and how long a second, a minute and an hour are.

**Evaluation guide**

Pupils to:

1. Give time on a clock or calendar.

2. Indicate important activities at their homes and times when they take place.
3. Write the dates of some given important dates.
4. Solve quantitative aptitude problems involving time.
5. Record three important times of the (school) day and the activities associated with them indicating which times are a.m. and p.m.

Lesson 1

Pupil's Book page 157

**Preparation**

You will need to have:

- Cardboard clock
- Cardboard, pins, scissors.

**Starter activity**

Develop your pupils' sense of the passage of time by timing them doing various activities, for example count to 20 in ones; counting to 100 in ones. Challenge them to hop as many times as they can on one leg during 30 seconds; one minute, and so on.

**Lesson focus**

When introducing this unit, ask your pupils to look at the analogue clock faces very carefully. Point out to them that each little line between the longer lines indicates a minute. Encourage them to count the minutes as they point to them on the clock face. Explain that we read a digital clock according to the figures on the display. Be careful to explain how the reading of time from a digital clock works

after 30 minutes, for example that twenty to six will become six forty, meaning that this is forty minutes past 6 o'clock.

Remember that pupils who are learning through the medium of a second language will need more time to assimilate this description. Once you are confident that your pupils understand these concepts, ask them to do Exercise 1.



Answers

Exercise 1

- Clock times to be shown:
a) 11.30; b) 1.15; c) 4.15; d) 1.30; e) 4.45;
f) 11.45; g) 3.30; h) 9.45

Assessment

Pupils should be able to read the time on an analogue clock in hours and minutes.

Extension activity

Ask pupils to draw analogue clocks showing the following times: 11:37 12:12 07:41 01:27

Lesson 2 *Pupil's Book pages 157 to 159;
Workbook pages 43 and 44*



Preparation

You will need to have:

- Different types of clocks.



Starter activity

Have a discussion in class about different activities and the length of time that it takes to complete each activity. Include activities like sport events, activities at home and activities at school. Record the different units of time that are mentioned. Discuss the recorded units of time to establish what pupils know about these units.



Lesson focus

Revise the division of the clock face into 12 hours, and each hour into 60 minutes. Work through the worked example and introduce pupils to digital clock display. If possible, pass around some digital clocks in the classroom.



Answers

Exercise 2

- a) 12:41; b) 09:25; c) 04:10; d) 05:50;
e) 08:48; f) 08:20
- Clock faces should show the following times:
a) 9:12; b) 12:08; c) 11:38; d) 5:52; e) 5:48;
f) 9:28

Workbook

- a) 12:25; b) 05:40; c) 08:55; d) 10:15;
e) 11:54; f) 01:42
- Digital and analogue clocks showing the following times: a) 12:25; b) 1:45; c) 7:08;
d) 3:30; e) 3:50; f) 12:10

Assessment

Pupils should be able to read time on both analogue and digital clocks.

Extension activity

Go back to Exercise 1 and 2 and ask pupils to draw the times using a digital clock face.

Homework activity

Pupils are to complete questions 1 and 2 on pages 43 and 44 of the WB.

Lesson 3 *Pupil's Book pages 159 to 161;
Workbook page 45*



Preparation

You will need to have:

- A digital and an analogue clock.



Starter activity

Ask pupils to list different activities that they do throughout the day, such as waking up, doing homework, playing with friends, eating supper, and so on. Divide the board in half and write "Before midday" and "After midday" at the top of each half. Pupils must come up and write their activity in the section of time they perform it.

Lesson focus

Explain what midday means and draw or show a clock showing midday, 12:00. We use a.m. after a time to indicate that it is before midday, and we use p.m. after a time to indicate it is after midday. Continue this discussion by asking pupils to come up to the board and writing the digital time of each activity they listed in the Starter activity. They must also write am or pm after the time, depending on which side of the midday line it is written.

Pupils can complete Exercise 3.

Answers

Exercise 3

- a)** 7:30 a.m.; **b)** 3:00 pm; **c)** 2:30 pm;
d) 4:00 pm; **e)** 9:00 pm
- a)** 8:15 am; **b)** 6:05 pm; **c)** 8:10 am;
d) 9:42 pm; **e)** 12:30 pm
- a)** Seven o'clock in the morning; **b)** Half past 1 in the afternoon; **c)** Twenty past three in the morning; **d)** Quarter to two in the morning;
e) Twenty to eleven at night; **f)** Twenty five to ten at night
- a)** 7:00 am; **b)** 4:00 am; **c)** 6:00 pm; **d)** 10:00 pm

Workbook

3. d), c), a), b); 4. **a)** 08:15; **b)** 10:30; **c)** 10:30;
d) same opponent

Assessment

Pupils should be able to use a.m. and p.m. notation correctly.

Homework activity

Pupils are to complete questions 3 and 4 on page 45 of the WB.

Lesson 4 *Pupil's Book pages 161 and 162;* *Workbook page 46*

Preparation

You will need to have:

- A current calendar.

Starter activity

Divide your class into groups for this activity. Ask each group to prepare a short role play, based on the following theme: "What would a day at school be like if we had no idea of the time?" Give them some time to discuss their ideas in their groups, and then ask each group in turn to perform their role play in front of the class.

Lesson focus

Recite together the days of the week, and then the months of the year. When we write a date, there are three parts: the day, the month and the year, for example 21 September 2014. Write this example on the board and label the day, month and year below. Ask pupils to write the date of their birthday and offer guidance as needed.

Pupils can complete Exercise 4.

Answers

Exercise 4

- a)** 1 month ends on a Saturday; **b)** 2 months begin on a Wednesday
- a)** January 26 is a Sunday; **b)** July 15 is a Tuesday; **c)** May 27 is a Tuesday; **d)** October 1 is a Wednesday; **e)** December 20 is a Saturday
f) August 17 is a Sunday
- a)** The first week; **b)** January, May, August and October; **c)** March, June August and November
- 1 September
- 5 May

Challenge

1. 6 months; 2. 4 months 1 week; 3. 14 months 2 weeks; 4. 27 months

Workbook

7. Ruth: 112, Esther: 138, Hannah: 119,
Naomi: 123

Assessment

Pupils should be able to read and write dates correctly.

Extension activity

As an extension activity, pupils can attempt to do the **Challenge** on page 162 of the PB.

Homework activity

Pupils are to complete question 7 on page 46 of the WB.

Lesson 5 *Pupil's Book pages 162*

Preparation

You will need to have:

- The answers to the Quantitative reasoning exercise to hand.

Lesson focus

Write all the months of the year on the board. Without looking at a calendar, pupils must say if a month has 30 or 31 days. Which month is left over and how many days are in that month? Use the remaining time to consolidate writing dates correctly.

Pupils can complete Exercise 5.

Answers

Exercise 5

1. a) 4:00 am; b) 9:00 am; c) 4:00 pm; d) 11:00 pm; e) 4:00 pm

Assessment

Observe pupils during the lesson and check their answers to Exercise 5.

Lesson 6 *Pupil's Book pages 163; Workbook pages 45 and 46*

Preparation

You will need to have:

- The answers to the Revision exercise to hand.

Lesson focus

Pupils revise the concepts covered in this unit by working through the Revision exercise. Check pupils' progress and monitor carefully how they cope with integrating the content covered in this unit.

Answers

Revision exercise

1. Clock faces showing the following times:
a) 4:32; b) 9:15; c) 2:22; d) 3:46
2. a) Eleven in the morning; b) Ten past six in the evening; c) Three minutes past four in the morning; d) Twenty five past eleven at night
3. a) 8:15 am; b) 7:30 pm; c) 6:40 am; d) 11:35 pm
4. a) 1 month; b) 3 months; c) 365 days
d) i) 4 months; ii) 5 months; iii) 4 months

Workbook

5. a) 60; b) 60; c) 24; d) 12; e) 96; f) 300; g) 600; h) 840; i) 21
6. a) 120; b) 31; c) 3

Assessment

Observe pupils as they complete the revision exercise and offer guidance as needed. Pupils should be able to read and write analogue and digital time. Pupils should be able to use a.m. and p.m. notation correctly, and be able to read and write dates.

Extension activity

Pupils who have proved they understand the concept should be encouraged to draw up weekly timetables to show their own afternoon programs. This must include getting home, having lunch, extra mural activities, homework, and the likes.

Homework activity

Pupils are to complete questions 5 and 6 on pages 45 and 46 of the WB.

Objectives

By the end of this unit, each pupil should be able to:

- Find the area of rectangles and squares
- Find the area of shapes that can be divided into rectangles and squares
- Solve quantitative aptitude problems involving area.

**Suggested resources**

6 cm² paper sheets; Objects made up of a rectangle and a square, or two rectangles.

**Key word definitions**

area: the size of a 2-dimensional surface

square units: area is measured in square units

row: on a table the horizontals are the rows

column: on a table the verticals are the columns

estimate: an educated guess, or a rough judgment

polygon: a two dimensional shape with straight sides

**Frequently asked questions**

Q *What prior knowledge do the pupils need?*

A Pupils need to be able to:

- distinguish the surface area from other aspects of a shape, for example the angles or the length of the sides
- estimate, find and compare the area of plain shapes on grid paper.

Q *Is it important to ask pupils to find the area of irregular shapes?*

A It is important that pupils find the area of irregular objects. This relates particularly to the application of calculating area in everyday life. Pupils will often be confronted with irregular shapes and it will be useful for them to have developed strategies for finding the area of these shapes. This kind of activity also encourages pupils to develop their problem solving skills.

**Common errors that pupils make**

Pupils sometimes ignore square units that are partly shaded and count only those square units that are fully shaded. The most likely cause of this is that these pupils are unsure about how to award a value to a partially shaded square unit. Show them that a square unit that is shaded on one side of a diagonal has a value of $\frac{1}{2}$ a square unit.

Pupils often forget to write the units in their answers. You will need to keep reminding your pupils to write the units.

**Evaluation guide**

Pupils to:

1. Find areas using formulae.

Lesson 1

Pupil's Book pages 164–166;

Workbook pages 48 and 49

**Preparation**

You will need to have:

- 6 cm² paper sheets.

**Starter activity**

Ask your pupils to work in pairs for this activity. Give each pair 12 or more cardboard square centimetres. Ask them to make as many different squares and rectangles as possible. They should draw their shapes on centimetre square grid paper. Discuss these shapes with your class. Ask questions like: “Are all the shapes the same size? Are some shapes bigger or smaller than other shapes? How do you know if a shape is bigger or smaller than

another shape?” Go on to ask them to build other shapes besides squares and rectangles.

Lesson focus

Read through the introductory text and work through the worked examples with your pupils. As this is basically revision work, your pupils should cope with it quite easily.

Ask the class to do Exercise 1 pointing out that in question 1 the measurements are given for the length and the breadth. The patterns have nothing to do with the measurements.

Answers

Exercise 1

1. a) 42 cm^2 ; b) 20 cm^2

2. a)

Length	Breadth	Area
12 cm	9 cm	108 cm^2
21 cm	6 cm	126 cm^2
60 cm	30 cm	1800 cm^2
18 cm	9 cm	162 cm^2

b)

Length of sides	Area
6 cm	36 cm^2
30 cm	900 cm^2
15 cm	225 cm^2
25 cm	625 cm^2

3. a) 40 cm^2 ; b) 336 cm^2 ; c) 72.25 cm^2 ; d) 324 cm^2

Workbook

2. a) 16; b) 9; c) 12
 3. Pupils' own rectangles measuring 3×5 squares.
 4. a) 15 cm^2 ; b) 12 cm^2 ; c) 16 cm^2
 6. $8\,050 \text{ m}^2$

Assessment

Pupils should be able to find the areas of rectangles and squares.

Extension activity

Pupils can complete the **Challenge** on page 166.

Homework activity

Pupils are to complete questions 2–6 on pages 48 and 49 of the WB.

Lesson 2 *Pupil's Book pages 166–168; Workbook pages 47 and 49*

Preparation

You will need to have:

- Objects made up of a rectangle and a square, or two rectangles.

Starter activity

Discuss the shapes on page 166 in the PB with your class. Ask them to suggest ways of calculating the areas of the different shapes.

Allow some pupils to demonstrate on the board how they would calculate the answers.

Lesson focus

Read through the Solution on page 167 with your class. Give pupils the opportunity to ask questions and then ask them to do Exercise 2.

Answers

Exercise 2

1. a) $(8 \times 3) + (4 \times 3.5) + (4 \times 8) = 70 \text{ cm}^2$
 b) $(18 \times 2.5) + (6 \times 3) + (6 \times 3) = 99 \text{ cm}^2$
 c) $34.2 + 21 = 55.2 \text{ cm}^2$
 d) $28 + 28 + 15 = 71 \text{ cm}^2$
2. Pupils draw rectangles of the dimensions listed in question 3.
3. 4 rectangles of dimensions $1 \times 36 \text{ cm}$, $2 \times 18 \text{ cm}$, $3 \times 12 \text{ cm}$, and $4 \times 9 \text{ cm}$.
4. Perimeter of rectangle $1 \times 36 \text{ cm}$: $= 74 \text{ cm}$
 Perimeter of rectangle $2 \times 18 \text{ cm}$: $= 40 \text{ cm}$
 Perimeter of rectangle $3 \times 12 \text{ cm}$: $= 30 \text{ cm}$
 Perimeter of rectangle $4 \times 9 \text{ cm}$: $= 26 \text{ cm}$

Workbook

1. a) 7 cm^2 ; b) 8 cm^2 ; c) 10 cm^2 ; d) 4 cm^2
 7. 33 cm^2

Assessment

Pupils should be able to divide complex shapes into squares and rectangles in order to solve problems.

Extension activity

Tell pupils that the perimeter of a square is 28 cm and ask them to find the area of the square. Repeat with a square of perimeter 12 cm, 32 cm, 40 cm and 1 m.

Homework activity

Pupils are to complete questions 1 and 7 on pages 47 and 49 of the WB.

Lesson 3 *Pupil's Book pages 168–169*



Preparation

You will need to have:

- The answers to the Quantitative reasoning exercise to hand.



Starter activity

Ask your pupils once more to work in pairs for this activity. Let them discuss what they think is required in Exercise 3.



Lesson focus

Ask individual pupils to volunteer to tell the class what they think the focus is of the lesson. Discuss the summary in the PB on page 169.

Looking at the example, encourage pupils to ask questions and make suggestions. Describe how the required measurements are calculated. In the first example, the given length is 4 cm and the given breadth is 2 cm, so the area is $2 \text{ cm} \times 4 \text{ cm} = 8 \text{ cm}^2$.

Ask pupils to do Exercise 3.



Answers

Exercise 3

1. a) 24 cm^2 ; b) 17.64 cm^2 ; c) 4.762 cm ;
d) 24 cm ; e) 10 cm ; f) 8 cm

Assessment

Check the answers that pupils give for Exercise 3. During the lesson, ask pupils to explain the relationship in one of the examples.

Lesson 4 *Pupil's Book page 169*



Preparation

You will need to have:

- The answers to the Revision exercise to hand.



Lesson focus

Pupils revise the concepts covered in this unit by working through the Revision exercise. Check pupils' progress and monitor carefully how they cope with integrating the content covered in this unit.



Answers

Revision exercise

1. a) 96 cm^2 ; b) 49 cm^2 ; c) 51 cm^2 ; d) 133 cm^2
2. a) 40 m^2 ; b) $100 \text{ m} \times 65 \text{ m} = 6\,500 \text{ m}^2$

Assessment

Pupils should be able to calculate the areas of a variety of shapes made up of squares or rectangles.

They should be able to work out the lengths of the sides of shapes if they are given enough information.

Homework activity

Pupils who have not completed the set work, should complete it for homework.

All pupils must measure the length and breadth of at least three rectangular shapes and calculate the areas.

Objectives

By the end of this unit, each pupil should be able to:

- Calculate the area of farmlands, towns and cities in square kilometres (km^2)
- Read and write area in square metres (m^2)
- Measure large areas like buildings in square metres (m^2)
- Solve problems relating to area.

**Suggested resources**

Area and m^2 diagrams on grid paper; Grid paper with floor plans of the classroom, school grounds and a farm land; Overhead projector, transparency sheets; Cardboard and unit square chart; Measuring tapes.

**Key word definitions**

dimensions: measurements

**Common errors that pupils make**

Pupils often forget to write the units in their answers. For example in question 1 of Exercise 3 it is of the greatest importance to specify whether the answers are cm^2 or cm , or m^2 or m . You will need to keep reminding your pupils to write the units. Explain that an answer of 10 is meaningless if the answer should actually be 10 m^2 or 10 seconds or 10 oranges.

**Evaluation guide**

Pupils to:

1. Find large areas in square metres and hectares.

Lesson 1 *Pupil's Book page 170; Workbook page 50*

**Preparation**

You will need to have:

- Area and m^2 diagrams on grid paper
- Grid paper with floor plans of the classroom, school grounds and a farm land
- Measuring tapes.

**Starter activity**

Ask your pupils to work in small groups of

about three for this activity. Give each group a measuring tape. One member measures, the second writes down the measurement and the third calculates the area. Ask them to measure as many different squares and rectangles as possible. The measurements must be in metres, so they must measure things like a desk top, carpet, door, floor or wall.

**Lesson focus**

Put pupils into groups and assign each pupil a specific task. After the group has measured, noted and calculated two areas, the pupils will swap tasks. Each pupil should have the chance to measure, note down and calculate. Measurement must be done in metres. Demonstrate an example on the board, for example, a door is 2.1 m high and 0.9 m wide. The area is $2.1 \times 0.9 = 1.89 \text{ m}^2$

Ask your class to do Exercise 1 questions 1–4, pointing out that in each question they should first estimate the area of each shape as closely as possible.

**Answers****Exercise 1**

1. 25.2 m^2 ; 2. $6\,500 \text{ m}^2$; 3. $10\,000 \text{ m}^2$; 4. 21 m

Workbook

2. **b)** 416; **d)** 326; 3. **a)** 35; **c)** 78; 4. **b)** 288; **d)** 180

Assessment

Pupils should be able to calculate areas of farmlands, towns and cities using the appropriate units.

Homework activity

Pupils are to complete questions 2. b) and d), 3. a) and c) and 4. b) and d) on page 50 of the WB.

Lesson 2 *Pupil's Book page 171; Workbook page 50*



Preparation

You will need to have:

- Area and m^2 diagrams on grid paper
- Grid paper with floor plans of the classroom, school grounds and a farm land
- Measuring tapes.



Starter activity

Ask your pupils to work individually on this exercise. They should each do a drawing similar to the one of Jumai's compound on page 171 of the PB. The pupils drawing must be of their own home and garden. As far as possible they should try to estimate the right measurements.



Lesson focus

Discuss hectares (ha) with the pupils. $1\ 000\ m^2 = 1\ ha$. Give them the opportunity to ask you any questions that they might have.

Ask your class to do questions 5–7 of Exercise 1 on page 171 of the PB pointing out that in each question they should estimate the area of each shape as closely as possible before calculating the answer accurately.



Answers

Exercise 1

5. $20\ 000\ m^2$; 6. 1 ha
7. Blue: $6\ 000\ km^2$, Green: $3\ 400\ km^2$

Workbook

1. a) 10 000; b) 30 000; c) 5; 2. a) 141; c) 41;
3. b) 107; d) 155; 4. a) 175; c) 142

Assessment

Pupils should be able to calculate areas of farmlands, towns and cities using the appropriate units.

Homework activity

Pupils are to complete questions 1, 2. a) and c), 3. b) and d) and 4. a) and c) on page 50 of the WB.

Lesson 3 *Pupil's Book page 172; Workbook pages 50 and 51*



Preparation

You will need to have:

- The answers to the Revision exercise to hand.



Lesson focus

Pupils revise the concepts covered in this unit by working through the Revision exercise. Check pupils' progress and monitor carefully how they cope with integrating the content covered in this unit.



Answers

Revision exercise

1. $20\ 000\ m^2$
2. a) $4\ 800\ m^2$; b) $200\ m^2$; c) $4\ 600\ m^2$
3. a) Square and rectangle; b) The rectangle looks larger. The length on the square marked 4 m is equal to the length on rectangle marked 2 m. The scales are different.; c) The square = $16\ m^2$. The rectangle = $16\ m^2$. Both have the same area.

Workbook

5. 6; 7. a) 0.4; b) 4 000; 8. 1 160 ha; 9. 11.3436 ha

Assessment

Mark the assessments, taking note of where individual pupils have not met the unit objectives, in order to give these pupils additional teaching input where required.

Homework activity

Pupils are to complete questions 5–9 on pages 50 and 51 of the WB.

Objectives

By the end of this unit, each pupil should be able to:

- Add and subtract in litres and millilitres
- Solve problems on addition and subtraction involving litres
- Measure, compare, order and estimate capacity
- Calculate using litres and millilitres.

**Suggested resources**

Variety of containers (milk, yoghurt, juice) of water and/or sand; Measuring cups, jugs, cylinders; Plastic bottles; Teaspoons; Containers that can hold 250 ml, 500 ml and 1 litre; Cardboard.

**Key word definitions**

capacity: how much a container can hold

liquid: fluid, water

litre: a measure of liquid

millilitre: a small measure of liquid

measuring jug: a container to measure

**Frequently asked questions**

Q *What prior knowledge do the pupils need?*

A Pupils need:

- to have an understanding of litres and millilitres
- to be able to do simple calculations
- reading interpretation skills for problem solving
- to know what estimation is.

Q *Are capacity and volume the same thing?*

A No, although they are closely related concepts. Capacity is the amount that a container can hold. Volume is the amount of space taken up by an object.

**Common errors that pupils make**

Pupils find it difficult to read off the measurement from a measuring jug/cylinder. It is important to explain carefully how to measure the amount of liquid in a measuring jug or cylinder.

Ensure that the pupils are aware that they should take the error of parallax into account. It is not necessary for them to know the name of this concept at this stage, but it is important that you teach them the concept if they are to measure correctly.

Pupils read the capacities on pictures of measuring jugs incorrectly. It is vital that pupils should examine each measuring jug carefully in order to be able to work out the scale, especially if the level of the liquid in a jug does not lie exactly on a marked division. Help the pupils who struggle with this skill by drawing examples of your own on the board. Work through one or two of these examples, and then ask the pupils to do the remaining examples on their own.

**Evaluation guide**

Pupils to:

1. Add and subtract given problems in litres.

Lesson 1**Preparation**

You will need to have:

- Graduated containers, such as measuring jugs, of different capacities
- Bucket of water.

**Starter activity**

Show the different containers to the pupils and ask them to read off the capacity of each measuring jug. Ask pupils if they can explain how to measure liquid accurately.

Lesson focus

This is a practical lesson to teach pupils how to measure capacity accurately. Demonstrate the steps below to the class. Then allow pupils to work in pairs to practice measuring.

1. Place the container of liquid on a flat, horizontal surface (such as a table).
2. Wait a few seconds for the surface of the liquid to stop moving.
3. Move your head so that you can see the scale clearly and your eyes are level with the top of the liquid.
4. Calculate how many millimetres each unmarked division on the scale represents.
5. Read the scale.
6. Write down your reading straight away.
7. Ask someone else to check your reading or check it yourself.

Assessment

Pupils should be able to accurately measure and read liquid capacities.

Lesson 2 *Pupil's Book pages 173 and 174; Workbook pages 52 and 53*

Preparation

You will need to have:

- Variety of containers (milk, yoghurt, juice) of water and/or sand
- Measuring cups, jugs, cylinders
- Plastic bottles
- Teaspoons
- Containers that can hold 250 ml, 500 ml and 1 litre
- Chart showing conversion of litres and millilitres to litres
- Cardboard.

Starter activity

Collect a variety of containers on which the capacity is clearly indicated. Ask your pupils to order the containers from those that hold the most to those that hold the least, and vice versa. Ask pupils to classify the containers into two basic groups, namely 'small' and 'large'. Containers that do not fit into either of the categories could be the source of interesting discussion.

Pupils should have the opportunity to handle the different containers as much as possible to build the concept of capacity. Ensure that pupils are stimulated to be aware of capacity in the classroom and in the world around them.

Lesson focus

In this unit, your pupils will work with the basic units of capacity. Have a class discussion about why we need both the units of litre and millilitre. It could be useful to collect a number of pictures that show containers with capacity indicated on them.

Make a poster for your classroom and discuss the poster with your pupils. Encourage them to notice capacity in the world around them. The exercises have been structured to progress from familiar concepts to less familiar ones. It is therefore important to go through this unit exercise by exercise.

Pupils will also need the chance to verbalise their learning as much as possible to come to grips with the concepts in the unit.

In Lesson 1, work through the notes on page 173 and 174 to ensure pupils can convert, estimate and measure capacity thus further developing the concept of litres and millilitres. It is important that you spend enough time with your pupils on this lesson. They should develop a very sound concept of how much a litre of liquid is and how small an amount a millilitre is. Pupils should be encouraged to estimate wherever possible and then to assess their estimation once they have established the answer.

The focus of this lesson is to revise units of capacity learnt in Primary 3 and to ensure pupils are comfortable with converting between millilitres and litres. Practical application is best for this.

Answers

Workbook

1. Pupils' own answers.
2. **a)** 500 ml; **b)** 250 ml; **c)** 400 ml; **d)** 100 ml; **e)** 50 ml

Assessment

Pupils should be able to discern between millilitres and litres and order volumes of liquid accordingly.

Homework activity

Pupils should complete questions 1 and 2 on pages 52 and 53 of the WB.

Lesson 3 *Pupil's Book pages 174 and 175; Workbook page 53*

Preparation

You will need to have:

- Charts showing addition and subtraction of decimal numbers
- Chart showing conversion of litres and millilitres to litres
- Place value table.

Starter activity

Revise decimal point addition and subtraction by putting a few sums up on the board with up to two decimal points. Write the numbers in the sums above on another, but purposefully do not align the digits and decimal points. Emphasise the importance of lining up the decimal points first, before calculating the answers. Use a place value table to help pupils line up the numbers correctly.

Lesson focus

Discuss the examples of addition and subtraction on page 174 of the PB.

The focus of this lesson is on comparing and ordering capacities. Read through the introductory text with your class, making sure that all the pupils understand how to compare the capacity of two different containers in a practical way.

Ask the pupils to complete Exercise 1.

Answers

Exercise 1

1. a) 24.307 ℓ; b) 11.783 ℓ; c) 23.714 ℓ; d) 2.67 ℓ;
e) 5.598 ℓ; f) 20.628 ℓ; 2. 18.1 ℓ; 3. 15.150 ℓ;
4. 173.37 ℓ

Workbook

3. a) 750 ml; b) 600 ml; c) 500 ml; d) 1 350 ml
4. a) 260 ml; b) 660 ml; c) 124 ml; d) 386 ml

Assessment

Pupils should be able to add and subtract in millilitres and litres.

Homework activity

Pupils to complete questions 3 and 4 on page 53 of the WB.

Lesson 4 *Pupil's Book pages 175 and 176*

Preparation

You will need to have:

- The answers to the Quantitative reasoning exercise to hand.

Lesson focus

Look at the two example patterns given and allow pupils some time to work out the relationship on their own. Ask pupils to come and write the pattern for each diagram on the board. Once all pupils grasp the concept and the pattern, they can complete Exercise 2.

Answers

Exercise 2

1. 30.47 ℓ; 2. 7.49 ℓ; 3. 25.5 ℓ; 4. 10.91 ℓ;
5. 14.66 ℓ; 6. 43.9 ℓ

Assessment

Observe pupils as they complete Exercise 2. At random, ask a pupil to explain the pattern in one of the shapes. Check that their addition and subtraction is accurate, especially around the decimal point.

Extension activity

Pupils can create their own picture problems, with one missing value, for a friend to solve.

Lesson 5 *Pupil's Book page 176; Workbook page 53*



Preparation

You will need to have:

- The answers to the Revision exercise to hand.



Lesson focus

Pupils revise the concepts covered in this unit by going over the summary and completing the Revision exercise. Check pupils' progress and monitor carefully how they cope with integrating the content covered in this unit.



Answers

Revision exercise

1. a) 74.114 ℓ; b) 106.667 ℓ; c) 38.762 ℓ;
d) 28.876 ℓ; 2. 231 ℓ of fuel; 3. 1 091.625 ℓ

Challenge

Some examples are:

$$75 + 25 + 20 + 15 = 135 \ell$$

$$45 + 45 + 25 + 20 = 135 \ell$$

$$50 + 45 + 15 + 25 = 135 \ell$$

Workbook

5. 2.365 ℓ; 6. 255 ml; 7. 186 ℓ

Assessment

This unit assessment gauges the extent to which individual pupils have achieved the objectives stated at the beginning of this unit. You should give pupils a set time in which to complete the assessment. Most pupils should be able to achieve their maximum score in about 40 minutes. Pupils should work through the questions individually. Encourage them not to spend too much time on any one question if they are stuck. Instead, they should go on to the next question, and come back to the question they were struggling with if they have time at the end of the assessment. When the time is up, take in the pupils' answers. If you have time at the end of the lesson, you could discuss some or all of the questions.

Pupils should be able to add and subtract using capacity.

They should also be able to find combinations of capacities that will make up a given total capacity.

They should be able to solve word problems involving capacity.

Observe pupils' responses during lesson and look at their answers to the exercises.

Extension activity

Ask pupils to do the **Challenge** exercise on page 175 of the PB. They must find various combinations of small containers that can be used to fill the big container.

Homework activity

Pupils to complete questions 5–7 on page 53 of the WB.

Objectives

By the end of this unit, each pupil should be able to:

- Multiply and divide in litres
- Solve problems on multiplication and division involving litres.

**Suggested resources**

Charts showing multiplication and division of decimal numbers; Chart showing conversion of litres and millilitres to litres; Cardboard.

**Key word definitions**

place value: the value of a digit based on its position in a number

volume: the amount of space taken up by an object or substance

convert: change, for example, convert litres to millilitres

**Frequently asked questions**

Q *How can pupils check that their answers to calculations are correct?*

A Remind pupils to use the inverse operation to check that they have calculated correctly.

For example:

$$17 + 19 = 36 \quad \text{Test: } 36 - 19 = 17$$

$$13 \times 3 = 39 \quad \text{Test: } 39 \div 3 = 13$$

**Common errors that pupils make**

Pupils may be tempted to multiply or divide litres and millilitres. Pupils should once more be made aware that with all measurements we may only calculate amounts with like units.

Pupils write the wrong units in their answers, or forget to write the units altogether. If pupils are still making this error, explain that you will no longer accept answers written without units, or with the wrong units. Ask them to correct their work for

homework, making sure to concentrate on what units they should write.

**Evaluation guide**

Pupils to:

1. Divide and multiply with whole numbers in problems involving litres.
2. Solve problems on quantitative aptitude on multiplication and division involving litres.

Lesson 1

Pupil's Book pages 177 and 178;

Workbook page 54

**Preparation**

You will need to have:

- Charts showing multiplication and division of decimal numbers
- Chart showing conversion of litres and millilitres to litres.

**Starter activity**

Work through the multiplication examples in the PB. Demonstrate an example on the board and then invite two or three volunteers to do examples on the board.

**Lesson focus**

Read the introductory page on the multiplication of litres on page 177 in the PB. Remind pupils that multiplication is done the same way as multiplying decimals. Place value must be maintained.

In this lesson, the focus is on calculating with units of capacity. Stress that one can only multiply and

divide capacities if the numbers are in the correct place value column. Explain that this is no different from decimal numbers. Work through the worked examples with your class, making sure that all your pupils are following the different methods.

Answers

Exercise 1

1. **a)** 7.36 ℓ; **b)** 59.68 ℓ; **c)** 173.95 ℓ; **d)** 185.20 ℓ;
e) 185.402 ℓ; **f)** 132.184 ℓ
2. 52.608 ℓ; **3.** 54.6 ℓ

Challenge

1. 2 ℓ; **2.** 60 ℓ; **3.** 730 ℓ

Workbook

1. **a)** 315 ℓ; **b)** 624 ml; **c)** 750 ℓ; **d)** 1 272 ml

Assessment

Pupils should be able to multiply litres and give their answers in the correct units.

Extension activity

Pupils can complete the **Challenge** on page 178.

Homework activity

Pupils should complete question 1 on page 54 of the WB.

Lesson 2 *Pupil's Book page 178;* *Workbook page 54*

Preparation

You will need to have:

- Charts showing multiplication and division of decimal numbers
- Chart showing conversion of litres and millilitres to litres.

Starter activity

Ask some pupils to volunteer to do simple long division examples using decimal numbers on the board. An example could be $6.75 \div 5$. Discuss the method used.

Next, work through the examples on page 178 with your pupils.

Lesson focus

In this lesson, the focus is once more on calculating with units of capacity. Stress that division of capacities can only be done if the numbers are in the correct place value columns.

Ask the pupils to complete Exercise 2.

Answers

Exercise 2

1. **a)** 3.08 ℓ; **b)** 5.11025 ℓ; **c)** 9.7 ℓ; **d)** 4.315 ℓ;
e) 2.85 ℓ; **f)** 3.568 ℓ
2. 24.6 ℓ; **3.** 9.33 ℓ

Workbook

2. **a)** 151 ℓ; **b)** 90 ml; **c)** 24 ℓ; **d)** 32 ml

Assessment

Pupils should be able to multiply litres and give their answers in the correct units.

Extension activity

Pupils who have proved they understand the concepts can be put in groups to make up their own multiplication and division problems with litres for the group to do.

Homework activity

Pupils should complete question 2 on page 54 of the WB.

Lesson 3 *Pupil's Book page 179;* *Workbook page 54*

Preparation

You will need to have:

- The answers to the Quantitative reasoning exercise to hand.

Starter activity

Discuss the methods used in multiplication and division.

Examine the examples on page 179 with your pupils and discuss the 'patterns' used to multiply or divide. Pupils should try to work out whether the arrows mean multiplication or division.

Lesson focus

In this lesson, the focus is once more on calculating with units of capacity. Pupils must concentrate to work out how they have to apply their knowledge to the given numbers. Logic must be used.

Answers

Exercise 3

1. 43.60 ℓ; 2. 3.2 ℓ; 3. 1.669 ℓ; 4. 11.959 ℓ;
5. 13.6 ℓ; 6. 11.76 ℓ

Workbook

5. a) 720 ℓ; b) 3 960 ml; c) 24 ml; d) 12 ℓ;
e) 36 ml; f) 26; g) 3; h) 1 088 ℓ

Assessment

Pupils should be able to solve multiplication and division problems involving litres. Pupils should be able to correctly perform calculations with decimals.

Extension activity

Pupils can create their own picture problems, with one missing value, for a friend to solve.

Homework activity

Pupils should complete question 5 on page 54 of the WB.

Lesson 4 *Pupil's Book page 180;*
Workbook page 54

Preparation

You will need to have:

- The answers to the Revision exercise to hand.

Starter activity

Revise multiplication and division of decimal numbers.

Encourage pupils working in pairs to do examples on the board.

Lesson focus

Pupils revise the concepts covered in this unit by working through the Revision exercise. Check pupils' progress and carefully monitor how they cope with integrating the content covered in this unit.

Answers

Revision exercise

1. a) 606.96 ℓ; b) 367.68 ℓ; c) 9.412 ℓ; d) 7.332 ℓ
2. 187.92 ℓ; 3. a) 54.84 ℓ; b) 91.40 ℓ

Workbook

3. 4 500 ml; 4. 72 ℓ; 6. 300 ml; 7. 27 days

Assessment

Pupils should be able to multiply and divide using capacity.

They should be able to find combinations of capacities that will make up a given total capacity.

They should also be able to solve word problems involving capacity.

Extension activity

Pupils write a list of ten situations in day-to-day life that use division or multiplication of litres.

Homework activity

Pupils should complete questions 3, 4, 6 and 7 on page 54 of the WB.

Objectives

By the end of this unit, each pupil should be able to:

- Identify and label three-dimensional shapes
- Distinguish between open and closed shapes
- Identify the uses of three-dimensional shapes in your environment.

**Suggested resources**

Wall charts with 3-D shapes, each named, clearly visible in the class; Boxes of many shapes and sizes; Spheres, balls and cylindrical containers; Models of all the different 3-D objects; Paper and cardboard, scissors, rulers, glue and tape; Angle testers; Plastic buckets.

**Key word definitions**

face: a flat surface of a 3-D object

edge: a line where two faces meet

vertex: the point where two or more edges meet

curve: a line that has no part that is straight or a surface that bends smoothly and evenly

cuboid: a polyhedron with six rectangular faces

cylinder: a solid object with two flat circular ends and one curved side

**Frequently asked questions**

Q What prior knowledge do pupils need?

A Pupils should:

- recognise 3-D shapes in their environment. Some examples are buildings, books, lunch boxes and tin cans
- know how to identify and name the sphere, cube, cuboid, cylinder, cone, triangular prism and pyramid shapes
- be able to identify, count and describe faces, edges, corners and symmetry of 3-D shapes
- be able to create their own 3-D shapes and to solve problems and puzzles.

Q How can I help my pupils to understand the new concepts?

A Allow the pupils to use the new words as much as possible. They need to describe and draw the different shapes when they work with them.

Q What link is there between 2-D shapes and 3-D objects?

A The faces that make up 3-D objects are 2-D shapes.

**Common errors that pupils make**

Pupils may confuse the names of objects. If this happens use the wall chart and the examples of 3-D shapes to clear the misunderstanding.

Pupils sometimes confuse a square-based pyramid and a triangular prism. Display a picture of an Egyptian pyramid in your classroom and use this as a reference point for a pyramid. Once your pupils have made this connection, they will not easily confuse a triangular prism with a pyramid.

**Evaluation guide**

Pupils to:

1. Distinguish between open and closed shapes from a given collection of shapes.

Lesson 1

Pupil's Book pages 181–182;

Workbook page 55 and 56

**Preparation**

You will need to have:

- Wall charts with 3-D shapes, each named, clearly visible in the class
- Boxes of many shapes and sizes
- Spheres, balls and cylindrical containers
- Models of all the different 3-D objects.

➡ Starter activity

Allow pupils to count the faces, edges and vertices on 3-D objects and then compare them to the drawings in the PB on page 182. Discuss the difference between open and closed shapes. Show examples of both.

🔍 Lesson focus

Prepare wall charts and matching 3-D objects so that pupils can grasp that the 2-D drawings represent 3-D objects.

Ask pupils to identify the 3-D objects in the example on page 181.

In this unit, your pupils will expand their existing knowledge of 3-D shapes. We reinforce the idea that a solid shape is made up of faces and that each face is a known plane shape. Make your pupils aware of 3-D shapes in their everyday world. This will make the link between mathematics and their everyday world. The work in this unit is developed in a logical sequence. We strongly recommend that you present the work in the order in which it appears in this unit. Read through the introductory text with the pupils. Ask them to relate each of the five everyday objects to its correct mathematical name (cylinder, cube, sphere, cuboid, triangular prism). Make sure that your pupils are comfortable with all the terminology used in this introductory text.

Ask pupils to work in pairs as they do Exercise 1. Allow them to discuss the different questions, but they should each write down their own answers.

📖 Answers

Exercise 1

1.

Name	Number of faces	Number of vertices	Number of edges
Cylinder	3	0	2
Cuboid	6	8	12
Cube	6	8	12

Workbook

1. a) cube, pyramid on square base, right circular cone, sphere, triangular prism, cylinder, rectangular box with square cross section

b)–d) Pupils own answers.

2. a) E; b) B; c) A

Assessment

Pupils should be able to identify and name 3-dimensional shapes.

Extension activity

Ask pupils to make a table of 3-D objects. They must start by writing as many 3-D shapes that they know in the first column. In the second column, they must make a drawing of a real object with that shape.

Homework activity

Pupils to complete questions 1 and 2 on pages 55 and 56 of the WB.

Lesson 2 *Pupil's Book page 183*

⚙️ Preparation

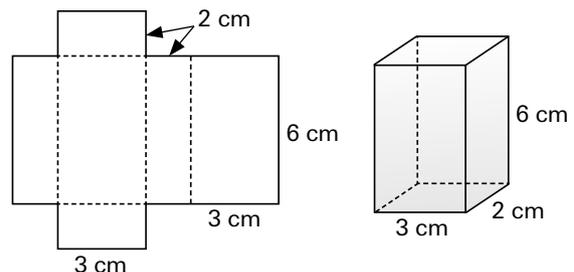
You will need to have:

- Wall charts with 3-D shapes, each named, clearly visible in the class
- Boxes of many shapes and sizes
- Spheres, balls and cylindrical containers
- Models of all the different 3-D objects.

➡ Starter activity

Ask the pupils to identify open and closed 3-D shapes. Discuss how the shapes differ, for example how many faces, vertices and edges each has.

Then ask the pupils to cut open an empty cuboid shaped container and examine the basic pattern and how the 6 sides are related.



Lesson focus

Sort and compare 3-D shapes and ask your pupils to sort different 3-D shapes into groups, depending on their properties. They also compare different 3-D shapes, identifying the similarities and the differences between the shapes. In doing this, your pupils' understanding of the properties of different 3-D shapes is re-enforced.

Answers

Exercise 2

- Cuboid: 5; Cube: 5; Cylinder: 2
 - Cuboid: 6; Cube: 6; Cylinder: 3
- Check that pupils draw the correct shapes:
 - Cone; b) Sphere; c) Square based pyramid;
 - Cube; e) Cylinder; f) Cuboid

Challenge

Sketched flat plan of cuboid pattern showing measurements as given in PB on page 183.

Assessment

Pupils should be able to identify properties of 3-D shapes.

Support activity

If pupils struggle to complete Exercise 2, they may not understand the parts of a 3-D shape. Have pupils draw a 3-D cube and help them to write the labels of face, edge and vertex on their diagram. Pupils can refer to the diagram when they complete Exercise 2.

Homework activity

Pupils are to complete the **Challenge** lesson. As pupils construct a cuboid out of paper, they engage with 3-D shapes in a practical way. This practical work is very important, as it assists your pupils' conceptual development. Make sure that you give your pupils enough time to complete this work.

Lesson 3 *Pupil's Book page 184; Workbook page 57*

Preparation

You will need to have:

- Models of 3-D shapes
- A glass or cup.

Starter activity

Place a variety of models of 3-D shapes in a row on a flat surface that all your pupils can see clearly. Include a cone, a sphere, a cube, a cuboid, a pyramid and a cylinder, as well as any other shapes that you wish to add. Explain that each shape has advantages and disadvantages when used. Revise the names of the shapes, then ask your class questions like:

“Which shapes are suitable for rolling?” (sphere, cylinder, cone); “On which shapes could you safely balance a glass?” (cube, cuboid, cylinder); “Which shapes are suitable for stacking?” (cube, cuboid, cylinder); “If you stacked two cubes on top of one another, what shape would you get?” (cuboid); “If you stacked two cuboids on top of one another, what shape would you get?” (cuboid); “If you stacked two cylinders on top of one another, what shape would you get?” (cylinder); Add any other questions that you can think of.

Lesson focus

In this lesson, your pupils sort different 3-D shapes into groups based on the properties of the shapes. They also compare different 3-D shapes, identifying the similarities and the differences between the shapes. Read through the introductory text with your pupils, making sure that they understand all the terminology involved. Use models of 3-D shapes to demonstrate the terms ‘face’, ‘edge’ and ‘vertex’ to your class.



Answers

Exercise 3

1.	Cuboid	Cube	Cylinder	Sphere
	Sugar	Die	Mug	Ball
	Milk		Candle	
	Book		Cake	
	Shoe box		Can	
	Matchbox			
	Soap			

Workbook

3.	Shape	Number of vertices	Number of faces	Number of edges
a)	Cuboid	8	6	12
b)	Cube	8	6	12
c)	Square pyramid	5	5	8
d)	Triangular prism	6	5	9
e)	Triangular pyramid	4	4	6
f)	Cone	1	2	1
g)	Cylinder	0	3	2
h)	Sphere	0	1	0

4. **a)** 2; **b)** 2; **c)** 2; **d)** 2; **e)** 2; **f)** All equal to 2; **g)** yes for f), no for g) and h); **h)** They have curved surfaces

Assessment

Pupils should be able to identify properties of 3-D shapes. Pupils should be able to sort 3-D shapes according to similarities and differences.

Homework activity

Pupils to complete questions 3 and 4 on page 57 of the WB.

Lesson 4 *Pupil's Book page 185*



Preparation

You will need to have:

- The answers to the Revision exercise to hand.



Starter activity

Read through and discuss the summary on page 185 of the PB.



Lesson focus

Pupils revise the concepts covered in this unit by working through the Revision exercise. Check pupils' progress and monitor carefully how they cope with integrating the content covered in this unit. The focus is on ensuring that the pupils are able to recognise and identify 3-D shapes and to say whether they are closed or open shapes. Revision exercise page 185.



Answers

Revision exercise

1. cube; 2. cylinder or a cuboid; 3. five; 4. two; 5. five; 6. six; 7. six; 8. three; 9. The faces of a cube are all square. The faces of a cuboid are rectangular.; 10. A closed shape has a lid or a cover. An open solid shape does not have a lid or a cover.; 11. Open shapes: soap, candle, die, cake, sugar, book, mug. Closed shapes: shoe box, matchbox.

Assessment

Pupils should be able to identify, name and draw 3-D shapes.

They should know the number of faces, edges and vertices of 3-D shapes.

They should also be able to sort 3-D objects into groups.

Extension activity

Encourage pupils who are able to do so to build other 3-D shapes, such as pyramids and cylinders.

Homework activity

Ask pupils to find 3-D shaped objects in their own homes. They should write down what the object is and its related shape.

Objectives

By the end of this unit, each pupil should be able to:

- Identify the symmetry and non-symmetry of objects and shapes
- Find lines of symmetry in everyday objects
- Understand that not all shapes have a line of symmetry.

**Suggested resources**

Charts showing a variety of plane shapes, some with one line of symmetry, some with two or more and some with no lines of symmetry; Paper and scissors for experiments.

**Key word definitions**

symmetry: one half of a shape being exactly the same as the other half

**Common errors that pupils make**

Pupils often think a diagonal in a rectangle is a line of symmetry. Emphasize that only when the two halves about the line are identical, are they symmetric.

**Evaluation guide**

Pupils to:

1. Identify line(s) of symmetry of plane shapes.
2. Locate lines of symmetry of given objects in their homes.

Lesson 1

Pupil's Book pages 186

**Preparation**

You will need to have:

- The suggested resources per above.

**Starter activity**

Show examples of symmetrical shapes. Have some cut out shapes and fold them in half to demonstrate symmetry. Read through the introductory example in the PB with the class. Ask

pupils to suggest some shapes that are symmetrical and some that are not. Allow them to sketch the shapes on the board. Discuss each shape with the class.

**Lesson focus**

The focus of the lesson is to ensure that pupils recognise lines of symmetry in shapes. Work through the text and both worked examples with the class. Explain that if a shape can be folded in half, and both halves are the same shape, then the shape is symmetrical. A shape can have more than one way that it can be folded and be symmetrical.

Give each pupil a loose sheet of rectangular paper. Fold the paper in half along the length and show that both halves are identical, therefore it is symmetrical. Unfold the paper and draw a line along the fold. Explain that this is called the line of symmetry, and cuts the shape into two halves that are the same.

Fold the paper again, but along the width and repeat the explanation of symmetry. Unfold the paper and draw in the 2nd line of symmetry. Ask pupils if they can find any other lines of symmetry in the rectangle.

Assessment

Pupils should be able to identify symmetry in shapes, explain what symmetry is and draw lines of symmetry on shapes.

Extension activity

Pupils can complete the Puzzle on page 186.

Lesson 2 *Pupil's Book page 187; Workbook page 58*

Preparation

You will need have:

- Square pieces of paper, cut in half diagonally to form triangles.

Starter activity

Give each pupil a triangle of paper. Fold the triangle in any way and draw all the lines of symmetry that can be found.

Lesson focus

This lesson continues to look at symmetry of 2-dimensional shapes. Now the pupils are shown more complex shapes where the lines of symmetry are not always obvious. Some pupils may find it easier to trace each shape onto a separate piece of paper, and then cut out the shape and look for the lines of symmetry by physical inspection. This method is useful but time consuming.

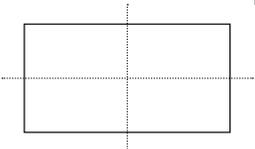
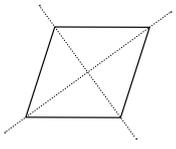
Pupils to complete Exercise 1.

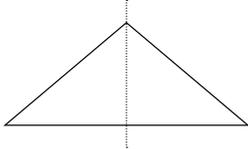
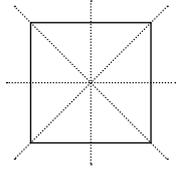
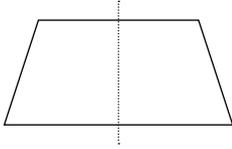
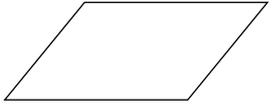
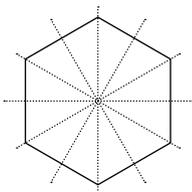
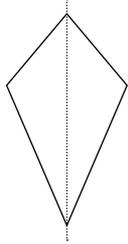
Answers

Exercise 1

1. **a)** 1 line of symmetry; **b)** 3 lines of symmetry;
c) 3 lines of symmetry; **d)** 2 lines of symmetry;
e) no lines of symmetry; **f)** 1 line of symmetry
2. **a)** no lines of symmetry; **b)** 1 line of symmetry;
c) 3 lines of symmetry; **d)** 1 line of symmetry
3. **a)** 1 line of symmetry; **b)** 1 line of symmetry;
c) no lines of symmetry; **d)** no lines of symmetry

Workbook

1. **a)** 
2 lines of symmetry **b)** 
2 lines of symmetry

- c)** 
1 line of symmetry
- d)** 
4 lines of symmetry
- e)** 
1 line of symmetry
- f)** 
no lines of symmetry
- g)** 
6 lines of symmetry
- h)** 
1 line of symmetry

Assessment

Pupils should be able to find lines of symmetry in everyday objects.

Extension activity

Pupils look for a shape in nature with symmetry. Bring the objects to class and identify the lines of symmetry.

Homework activity

Pupils to complete question 1 on page 58 of the WB.

Lesson 3 *Pupil's Book page 188; Workbook page 60*

Preparation

You will need to have:

- Charts showing a variety of plane shapes, some with one line of symmetry, some with two or more and some with no lines of symmetry
- Paper and scissors for experiments.

➔ Starter activity

Allow pupils to fold sheets of paper in half and cut out shapes. The fold in the paper forms the line of symmetry.

Then allow pupils to fold sheets of paper in half and cut out a square, a circle and a rectangle. Ask them to fold the square, circle and rectangle as indicated in the PB on page 186.

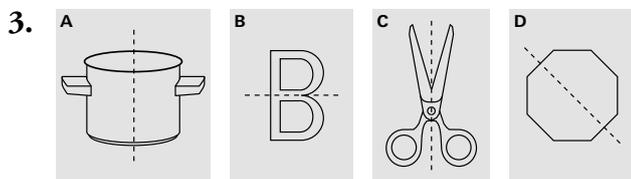
🔍 Lesson focus

Pupils revise the concepts covered in this unit by working through the Revision exercise. Check pupils' progress and monitor carefully how they cope with integrating the content covered in this unit.

📖 Answers

Revision exercise

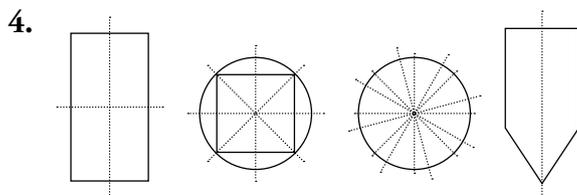
- a)** 1 line of symmetry; **b)** 1 line of symmetry; **c)** 2 lines of symmetry; **d)** 1 line of symmetry
- a)** 1 line of symmetry; **b)** no lines of symmetry; **c)** no lines of symmetry; **d)** 1 line of symmetry; **e)** no lines of symmetry; **f)** 1 line of symmetry; **g)** 6 lines of symmetry; **h)** no lines of symmetry



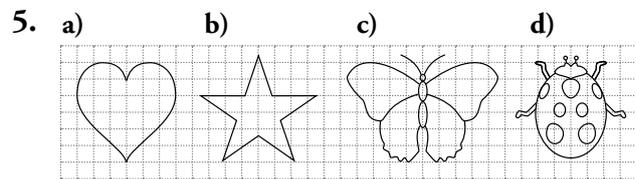
Puzzle

The rectangle has 2 lines of symmetry.
The square has 4 lines of symmetry.
The circle has innumerable lines of symmetry.

Workbook



The circle has infinitely many lines of symmetry, all diameters.



Assessment

Evaluation of this unit gauges the extent to which individual pupils have achieved the objectives stated at the beginning of this unit. You should give pupils a set time in which to complete the assessment. Most pupils should be able to achieve their maximum score in about 40 minutes. Pupils should work through the questions individually. Encourage them not to spend too much time on any one question if they are stuck. Instead, they should go on to the next question, and come back to the question they were struggling with if they have time at the end of the assessment.

When the time is up, take in the pupils' answers. If you have time at the end of the lesson, you could discuss some or all of the questions. Mark the assessments, taking note of where individual pupils have not met the unit objectives, in order to give these pupils additional teaching input where required.

Homework activity

Ask learners to find five examples of shapes at home that have one line of symmetry for example, a spoon, a pan, etc.

Get pupils to complete questions 4 and 5 on page 60 of the WB.

Objectives

By the end of this unit, each pupil should be able to:

- Review the properties of plane shapes
- Identify the horizontal and vertical lines
- Identify the primary and secondary cardinal points.

**Suggested resources**

Wall charts with examples of plane shapes emphasizing horizontal and vertical lines; Chart and model of the four cardinal points; Accurate drawing of a compass with needle pointing N and S; A map of Nigeria indicating N, S, W and E.

**Key word definitions**

compass: an instrument used to find a direction such as N, S, E or W

horizontal: parallel to the horizon

vertical: at right angles to horizontal

oblique: a line at an angle between horizontal and vertical

isosceles: triangle with two equal sides

polygon: a closed, plane figure with three or more straight sides

**Common errors that pupils make**

Pupils may be confused about the definition of vertical being straight up on the board and straight up on the page (even though the page itself is horizontal.) Make sure you refer to shapes drawn both on a vertical board and on a flat sheet of paper. Explain that it is easiest to think of vertical as straight up, whether this is in the air or on the table.

Pupils may confuse the relative positions of East and West. Use some form of memory exercise such as the body shapes or a mnemonic such as that given in the lesson focus, to help them to remember, and give lots of practice. Make sure that all pupils are fully sure about which is their right or left, or the practical exercises may cause more confusion. Pupils may sometimes write ES rather

than SE for the mid-positions. Remind pupils that these directions always start with North or South. For example, North East or South West.

**Evaluation guide**

Pupils to:

1. Locate the horizontal and vertical lines on given objects.
2. Mention five objects or materials that have horizontal and vertical lines in their environment.
3. Locate given cardinal points on the chart and model.
4. Mention the location of two given capitals of states in Nigeria.

Lesson 1

Pupil's Book pages 189–190;

Workbook pages 59–60

**Preparation**

You will need to have:

- Wall charts with examples of plane shapes emphasizing horizontal and vertical lines.

**Starter activity**

Discuss the properties of plane shapes as shown on page 189 of the PB.

**Lesson focus**

Draw a rectangle on the board, and ask pupils to tell you all the things they know about the rectangle. Tell them that they are going to list some instructions to tell somebody, who doesn't know what a rectangle is, how to draw one. Ask them to

think about the words they need to use to describe the direction they need to draw the lines, and how long they should be. Guide them to make precise instructions, using correct vocabulary. For example it is not enough to say “draw four lines”, without also saying how the lines relate to each other. They may refer to right angles, or they may talk about across and up. Encourage them to explore the different ways to say the same thing.

Now show them a shape made up of horizontal and vertical lines such as a desk. Ask pupils to give you instructions to tell you how to copy the shape. They need to remember to tell you where to start and in which direction to go (up/down or right/left). Repeat with different shapes to reinforce the idea.

Pupils then complete Exercise 1.

Answers

Exercise 1

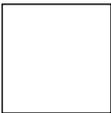
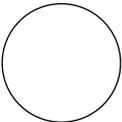
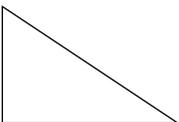
- squares and equilateral triangles;
 - equilateral;
 - two;
 - one;
 - unlimited;
 - rectangles and parallelograms;
 - kites and isosceles triangles;
 - rectangles and rhombus;
 - four;
 - trapezium and parallelogram

Challenge

- Equilateral triangle; 2. Square; 3. Trapezium

Workbook

- regular octagon;
 - equilateral triangle;
 - regular pentagon
- both pairs of opposite sides equal and parallel, both pairs of opposite angles equal;
 - all sides equal in rhombus;
 - 2 sides and 2 angles equal;
 - not all sides equal;
 - all sides equal;
 - no right angles

- 
 - 
 - 
 - 
 - 

Assessment

Pupils should be able to state the properties of plane shapes.

Extension activity

Pupils can complete the **Challenge** on page 190.

Homework activity

Pupils to complete questions 2, 3 and 6 on pages 59 and 60 of the WB.

Lesson 2 *Pupil's Book pages 190–191; Workbook page 61*

Preparation

You will need to have:

- Wall charts with examples of plane shapes emphasizing horizontal and vertical lines
- The rectangle drawn from Lesson 1.

Starter activity

Ask pupils to each draw a rough sketch of a landscape (two minutes maximum time). Choose a few that show the horizon. Discuss the term ‘horizon’ with the class.

Ask pupils to point to vertical lines in the classroom for example, edges of doors and windows and the chalk board; corners where walls join; chair and table legs. Next, ask them to point to horizontal lines for example, table and desk tops, tops of doors and windows and so on.

Lesson focus

In this lesson your pupils will learn to recognise horizontal and vertical lines in 2-D shapes. Refer back to the starting activity from Lesson 1 and explain that there is a word that describes all the lines that go across from left to right – it is horizontal. Ask pupils to show you all the horizontal lines in the shape you have drawn. Then repeat to define vertical. Ask them to draw a rectangle on a piece of paper, and compare it to the one on the board. Explain that we still define the

upright sides of the rectangle as being vertical, even though they are flat on the desk.

Read through the example on pages 190–191 and then pupils can complete Exercise 2.

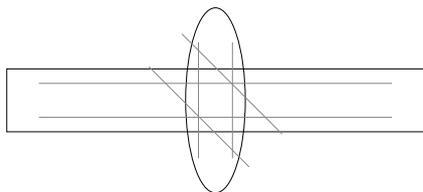
Answers

Exercise 2

1. a) H; b) V; c) O; d) O; e) H and V; f) H and V; g) H and V
2. a) V; b) V and H; c) neither; d) H; e) H

Workbook

1.



2. a) 2 horizontal and 2 vertical; b) 0 Horizontal and 2 vertical; c) 2 horizontal and 2 vertical; d) 2 Horizontal and 3 vertical

Assessment

Pupils should be able to identify horizontal and vertical lines.

Extension activity

Ask pupils to identify two horizontal and two vertical lines in the classroom. The lines can be part of the room or objects in the room.

Homework activity

Pupils to complete questions 1 and 2 on page 61 of the WB.

Lesson 3 *Pupil's Book pages 192–193; Workbook page 61–62*

Preparation

You will need to have:

- Chart and model of the four cardinal points
- Accurate drawing of a compass with needle pointing N and S
- A map of Nigeria indicating N, S, W and E.

Starter activity

Ask pupils to describe their walk to school, using words such as straight on, turn right and turn left. Use one pupil's route and represent this on the board, starting at a point on the left of the board, and representing left and right turns as a series of right angles. Ask a pupil to come to the front of the class and describe some simple instructions: Go forward, turn left, go forward, turn right, go forward, turn right, go forward, turn left, go forward, stop. As the pupil follows the instructions, draw the path he takes on the floor, to show the right-angled turns. Copy the path onto the board. Ask the pupils to make up a list of instructions, and together track the path on the board. Remind them they need to know where they are starting and finishing.

Lesson focus

Show the pupils a map, or draw a simple map on the board (with North/South marked vertically) and explain that when reading maps it is important to know which direction is North, or which is South, in order to describe how to go from one place to another. Point to two places on the map (choose one which is due north of another), and explain that if you wanted to travel from place A to place B you would need to know which direction to go. Point out the arrow on the map which labels North. Explain that if we know which direction is North, then we can work out all other directions from this. Show them a compass (or refer to the introductory text) and point out that there are four main cardinal points called North, South, East and West, but the pointer always points to North. These directions are all at right-angles to each other. The order of these points is important. Pupils should know that South is opposite to North, and East is opposite West. The introductory text explains a way to use your body to remember which is which, and you can ask them to stand up and demonstrate this. (Be careful to all face the same way – if you face the pupils and raise your right arm, it is the mirror image of their left arms!)

Another useful way to remember which direction is which is to use the mnemonic, reading clockwise around the compass: Naughty Elephants Squirt Water. Draw (or put down a large picture of) a

compass on the floor, and ask someone to stand at the centre, facing North. Ask him/her to turn right (through a right angle) and ask the class to tell you which direction they are now facing. Use lots of examples to practise, starting facing one way and turning left and right, to find the new direction.

Ask pupils to complete Exercise 3.

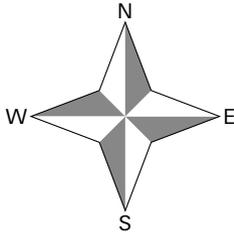
Answers

Exercise 3

- North
 - South West
 - south
 - North West
 - North East

Workbook

3.



- West; b) East; c) South
- North; b) South; c) West
- East; b) North; c) one right angle to the right

Assessment

Pupils should be able to identify and name the primary and secondary cardinal points.

Extension activity

Make a compass. You will need a pin or needle, a magnet, a piece of cork and a glass of water. Hold the pin or needle in one hand and run the magnet along it, always in the same direction, 80-100 times. Stick the pin or needle through the piece of cork so that it is balanced. Float the cork in the glass of water and allow it to settle. Test the compass by moving the cork – observe how it returns to the original position.

Homework activity

Pupils to complete questions 3–6 on pages 61 and 62 of the WB.

Lesson 4 *Pupil's Book page 194;* *Workbook page 62*

Preparation

You will need to have:

- The answers to the Revision exercise to hand.

Lesson focus

Pupils revise the concepts covered in this unit by working through the Revision exercise. Check pupils' progress and monitor carefully how they cope with integrating the content covered in this unit.

Answers

Revision exercise

- four; b) four; c) triangle; d) oblique line; e) West; f) South West
- Yankari National Park is East of Jos.;
 - Lagos is South of Ibadan; c) Kano is North East of Kamuka Wildlife Reserve; d) Kamuka Wildlife Reserve is South West of Kano;
 - Benin is South of Pategi; f) Baga is East of Nguru)

Workbook

7–8. Pupils' own answers.

Assessment

Evaluation of this unit gauges the extent to which individual pupils have achieved the objectives stated at the beginning of this unit. You should give pupils a set time in which to complete the assessment. Most pupils should be able to achieve their maximum score in about 40 minutes. Pupils should work through the questions individually. Encourage them not to spend too much time on any one question if they are stuck. Instead, they should go on to the next question, and come back to the question they were struggling with if they have time at the end of the assessment.

Homework activity

Pupils to complete questions 7 and 8 on page 62 of the WB.

Unit 33 Bar graphs

Objectives

By the end of this unit, each pupil should be able to:

- Review work done in pictographs
- Draw and read a bar graph.



Suggested resources

Charts showing examples of tally charts, pictograms and bar graphs; Examples of easy graphs and tables from the media; Unifix cubes or any other stackable cubes or blocks; Enlarged pictogram; Cardboard pieces in different colours; Cardboard showing horizontal and vertical bar graphs.



Key word definitions

represent: show in a certain way

mode: the most commonly occurring value

pictogram: table using pictures to represent information

tally: count

graph: a drawing showing the relation between pieces of information

bar graph: where bars of different lengths show the information



Frequently asked questions

Q *What prior knowledge do the pupils need?*

A Pupils should:

- have learnt about and mastered pictograms and the one-to-one correspondence between data given and the pictures in Primary 3
- be able to collect simple data and display the data in a pictogram.

Q *What is the difference between bar graphs and pictograms?*

A In pictograms, data is represented using pictures or diagrams. In bar graphs, data is represented using bars or columns.



Evaluation guide

Pupils to:

1. Construct horizontal and vertical bar graphs of given data.

2. Solve problems from their environment where data can be represented using bar graphs.
3. Identify a bar graph.
4. Determine the mode of a bar graph generated from their environment.

Lesson 1

Pupil's Book page 195;

Workbook page 63



Preparation

You will need to have:

- Charts showing examples of tally charts, pictograms and bar graphs.



Starter activity

Introduce this topic by explaining to the class why it is important to be able to collect and display data. If possible, show them examples of easy graphs and tables from the media. Ask them easy questions about why data is used in the world around us. For example, you may ask them questions like: "What is this graph/table about? Why do you think this information was used in this way?" Encourage your pupils to ask questions about the graphs and data. It is important that you allow them time to engage with the questions and give them time to think about the answers.



Lesson focus

In this unit the pupils are introduced to new concepts relating to data handling in a carefully graduated way. It is important that you work through the exercises in the order that they are presented in the PB.

Throughout this unit, you continually ask your pupils to engage with the information in the

diagrams and text. This is a very important aspect of representing data on graphs. Make sure that you allow them ample time to engage with the questions and to consider their answers. The exercises are structured in such a way that your pupils can engage with the new knowledge that they are acquiring.

In Lesson 1, your pupils interpret and record data in pictograms. In Lesson 2, your pupils work with different representations of data in bar graphs.

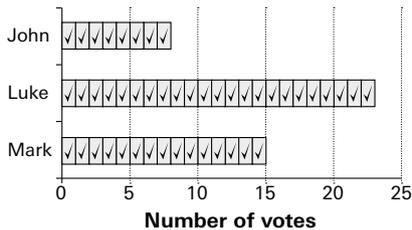
The focus of this lesson is on interpreting, ordering and organising data. Read through the introductory text with your class and explain the definitions in the Key words feature. Read through Exercise 1 with your class. This exercise is about reading information from a pictogram and interpreting this information. Remind pupils about the concept of a tally sheet. Explain that tallies allow us to count items by grouping the counts into bunches of five. Show them the charts on the wall.

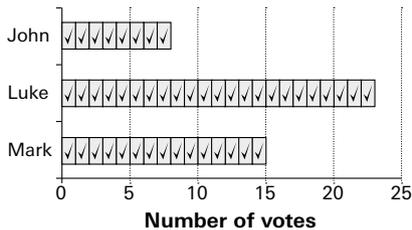
Answers

Exercise 1

1. a) 250 cars; b) 2012; c) 130 cars;
d) 40 more cars; e) 2011

Workbook

2. a)  b) 46



Assessment

Pupils should be able to represent information in a pictogram. Pupils should be able to read information from a pictogram.

Extension activity

Ask children to collect data on how many children in their class like sport. How many like tennis, cricket, rugby, netball, hockey and soccer. Ask them to draw a pictogram of the data.

Homework activity

Pupils to complete question 2 on page 63 of the WB.

Lesson 2 *Pupil's Book pages 196–197;* *Workbook page 63*

Preparation

You will need to have:

- The suggested resources.

Starter activity

Draw the table from the homework exercise in the previous lesson on the board. Explain to your class that, together, you are going to make a bar graph that represents the data in the table. Ask pupils to form a tally table on the board. Ask one of the pupils to demonstrate how he could use the data to draw a bar graph consisting of six columns and ten rows, alongside the table.

Under the columns, write the names of the sports in the table, one sport per column. Number the rows from 0 to 10, by writing the numbers to the left of each row: 0 should be alongside the bottom line and 10 should be alongside the top line. Ask for a different volunteer for each column. The volunteers should shade the columns to correspond to the number of pupils who voted for each sport. Make sure that they shade the correct number of blocks each time, working from the bottom row upwards. Once the bar graph is complete, discuss the table and the graph with your class. Do they all see the correspondence between the two representations? How do the two representations differ?

Lesson focus

Read through the introductory text with your class and work through the example on page 196 of the PB with them. Use the bar graph to explain that the mode is the item with the tallest bar or with the highest frequency. Reading through the table used in the starter activity, explain how the data has been used to draw the bar graph. Guide them to see the differences between pictograms and bar graphs.

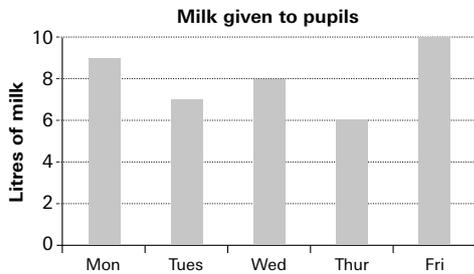
Pupils must complete Exercise 2.



Answers

Exercise 2

1. a) 30 pupils in the class; b) the cat; c) the dog;
d) eight; e) hamsters; f) gold fish
2. a)



- b) Thursday; c) Friday; d) 10; e) 16 ℓ; f) 40 ℓ

Workbook

1. a) Languages; b) Physical Education; c) 105

Assessment

Pupils should be able to represent information in a bar graph. Pupils should be able to read information from a bar graph.

Extension activity

Pupils find examples of other ways of representing data from media sources such as newspapers, magazines and the internet. Pupils must find out the name of the graph, for example, pie chart, line graph or bar graph.

Homework activity

Pupils to complete question 1 on page 63 of the WB.

Lesson 3 *Pupil's Book page 198; Workbook page 64*



Preparation

You will need to have:

- The answers to the Revision exercise to hand.



Lesson focus

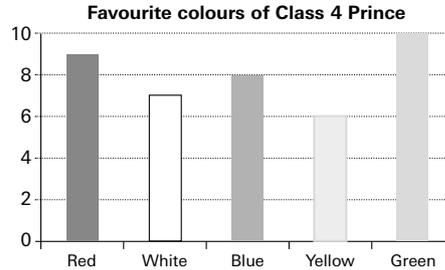
Pupils revise the concepts covered in this unit by working through the Revision exercise. Read through and discuss the Summary in the PB before they do the Revision exercise.

Check pupils' progress and monitor carefully how they cope with integrating the content covered in this unit.



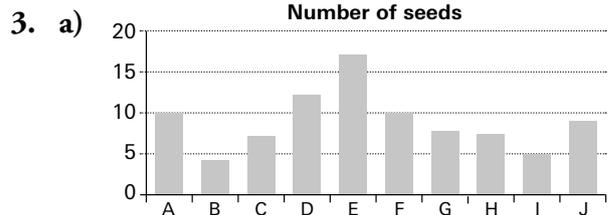
Answers

Revision exercise



1. a) blue; b) white; c) red; d) green; e) 10; f) 3;
g) 1; h) 37

Workbook



- b) 5 c) 1 d) 89 e) 7 and 10
4. a) July, August and September
b) December, January and February
c) 1 175 mm

Assessment

Pupils should be able to interpret data in a table and a tally chart.

They should be able to write numbers in the form of tallies and keep accurate records of data.

They also need to be able to draw a pictogram and a bar graph and find mode from a bar graph.

Homework activity

Pupils to complete questions 3 and 4 on page 64 of the WB.

Pupil's Book page 199

Objectives

This project requires the pupils to interview class mates in order to collect data. It gives pupils the opportunity to put what they have learnt about data collection into practice, and shows some applications of mathematics in real-life.

**Guidelines**

Complete this project in class over two lessons.

In Lessons 1, pupils will complete questions 1 and 2. Pupils should start off by deciding what topic they would like to use. Read over the suggestions A, B, C and D in the PB with the class. They might choose a topic from the book, or they might suggest a different topic, for example favourite animal, car or TV program. Allow ten minutes for discussion.

Once pupils have chosen their topics ask them to draw up a tally table to collect their data. Draw an example of a tally table on the board to assist pupils. Remind them that they need to have responses from at least 30 people, and they need to record the data on their tally tables, using tally marks. If there are less than 30 people in the class, arrange with another class to survey. Pupils may have more than 30 responses.

In Lesson 2, pupils will complete questions 3-5. Allow pupils to work on their own or in small groups to answer the questions. Check that pupils draw up the pictogram table correctly, using suitable icons, and remind them to count their tallies carefully. Encourage pupils to work neatly with a ruler to draw their bar graphs and ask them to colour each bar a different colour.

**Answers**

1.-5. Pupils' own answers.

Assessment

Because the pupils' findings will be different, assess pupils on the following criteria:

- Collecting data
- Identifying the mode of the data
- Representing the data on a pictogram
- Representing the data on a vertical bar graph.

Pupil's Book page 201

Objectives

This assessment is a summative assessment of work covered in Units 23 to 33.

This assessment is designed to assess the pupils' mathematical understanding and not their reading ability. It is also important that it is completed by individuals and not with the support of other pupils as this would not uncover any difficulties a learner may be having with particular concepts.

**Guidelines**

It is therefore best carried out with small groups of pupils under the guidance of the teacher who should read each question carefully to them, and give them time to complete the question before moving on to the next question. Complete the Assessment over two lessons: questions 1–7 in Lesson 1 and questions 8–15 in Lesson 2.

A more able group within the class may be able to complete the assessment without the need for the teacher to read the questions. However, observing pupils while they are completing the assessment provides further information about them.

**Answers**

- a)** 10 kg; **b)** 7.5 kg; **c)** 187.5 kg; **d)** 13.750 kg;
b) 17.5 kg; **c)** 218.75 kg; **d)** No they cannot all be packed on the shelf.; **e)** He will need 3 shelves.
- a)** $\text{R}2\ 713.68 - \text{R}2\ 094.05 = \text{R}619.63$
b) $100 \times 776.25 + 150 \times 210.60 + 125 \times 792 + 55 \times 315.20 = \text{R}225\ 551$
c) $72 \times 1\ 034.29 + 104 \times 269.55 + 119 \times 989.55 + 23 \times 420.29 = \text{R}229\ 925.20$
d) $72 \times 776.25 + 104 \times 210.60 + 119 \times 792 + 23 \times 315.20 = \text{R}179\ 290$
 $229\ 925.20 - 179\ 290 = \text{R}50\ 635.20$ profit – Yes.
- a)** Five past two; **b)** Twenty-five past one;
c) Five to five; **d)** Quarter to two in the afternoon; **e)** Quarter past six in the evening;
f) Five past eight in the morning

- a)** D; **b)** C; **c)** A; **d)** E; **e)** F; **f)** B
- a)** A: 12 cm^2 ; B: 5 cm^2 ; C: 9 cm^2 ; D: 12 cm^2
b) A: 4×3 ; B: 5×1 ; C: 3×3 ; D: 5×2 ; 1×2
c) A: 48 cm^2 ; B: 20 cm^2 ; C: 36 cm^2 ; D: 48 cm^2
- a)** 15 km^2
- a)** $150\ 000\text{ m}^2$; **b)** 15 ha
- a)** 10.5 l; **b)** 4.5 l; **c)** 15 l
- a)** 0.4 l; **b)** 6.8 l; **c)** 1.2 l
- a)** A, E; **b)** B, D, F; **c)** C, G
- All four sides are equal length.
- a)** none; **b)** A, E; **c)** C, G
- a)** vertical, horizontal; **b)** north east
- a)**
- a)** $19 + 12 + 7 + 25 = 63$ tins
b) Condensed milk
c) Canned fish

Assessment

On completion of the assessment, look for correct answers and mistakes made by individuals. You should also be checking to see if there is a pattern in terms of any particular question causing a significant number of pupils' difficulties. By analysing the results of an assessment, you can identify weaknesses in individuals and provide the necessary support, and also strengths of individuals and provide them with more challenging activities.

You are also able to identify any weaknesses in the teaching programme and make adjustments as necessary.

Pupil's Book page 205

Objectives

This practice examination is a summative assessment of work covered throughout the year.

It is important that it is completed by individuals and not with the support of other pupils as this would not uncover any difficulties a learner may be having with particular concepts.

Encourage pupils to not spend too much time on one problem. They should rather move onto the next problem and return to the difficult ones if they have time at the end of the examination.

 **Guidelines**

Simulate examination conditions: tell the pupils that they have to work on their own and may not discuss questions or answers with other pupils; ensure quiet in the classroom while pupils work; write the start and end time of the examination on the board, with 10 minute intervals – cross out the time interval as the session progresses to help pupils keep track on time.

Complete the practice examination over two class sessions. Complete questions 1–10 in Session 1 and then questions 11–20 in Session 2.

Have pupils write their answers and workings out on loose sheets of paper so that you can take them in for marking.

 **Answers**

1. **a)** 101 992, 101 987, 101 982, 101 977, 101 072; **b)** 59, 66, 73, 80, 87; **c)** 337, 397, 457, 517, 577
2. **a)** LVI; **b)** XXVIII; **c)** LXXIX
3. **a)** 36; **b)** 99; **c)** 41
4. **a)** $823 < 832$; **b)** $569 > 470$; **c)** $0.45 < 0.54$; **d)** $1.25 > 0.75$; **e)** $\frac{4}{5} < \frac{9}{10}$; **f)** $\frac{7}{5} < 1\frac{3}{7}$
5. **a)** 4, 8, 12, 16, 20, 24, 28, 32, 36, 40, 7, 14, 21, 28, 35, 42, 49, 56, 63, 70; **b)** 28
6. **a)** 8; **b)** 7; **c)** 6
7. **a)** $\frac{11}{3}$; **b)** $\frac{50}{9}$; **c)** $\frac{12}{5}$; **d)** $\frac{799}{100}$
8. **a)** $\frac{72}{100}$; **b)** $\frac{12}{100}$; **c)** $4\frac{70}{100}$; **d)** $7\frac{99}{100}$

9. **a)** 0.85, 0.81, 0.80, 0.79, 0.08; **b)** $\frac{28}{6}$, $3\frac{5}{7}$, $2\frac{4}{5}$, $\frac{1}{2}$
10. **a)** 8 045; **b)** 3 919; **c)** 4 619; **d)** $\frac{11}{20}$; **e)** $3\frac{2}{3}$; **f)** 11.17; **g)** 3.33; **h)** 836; **i)** 86; **j)** 46
11. **a)** 75; **b)** 62; **c)** 180; **d)** 720; **e)** 40.75; **f)** 42
12. **a)** 2.85 m; **b)** 17.1 m; **c)** ₦11 400; **d)** ₦1 660
13. **a)** 12 m; **b)** 16 m; **c)** 56 m;
14. **a)** 5 km (or 5.5 km); **b)** 5.2 km; **c)** 26 km
15. **a)** Tele; **b)** 5 hrs 15 min
16. **a)** 5 June 2016; **b)** Tuesday 28 June; **c)** 11:30 am
17. **a)** 102 km²; **b)** 10 200 ha
18. **a)** 1 650 ℓ; **b)** 12 150 ℓ
19. **a)** All four sides of a square are equal in length
b) Squares have four sides, squares have four angles, squares have four right angles, all sides of a square are equal in length (any two of these)
20. South

Assessment

On completion of the practice exam, look for correct answers and mistakes made by pupils. You should also be checking to see if there is a pattern in terms of any particular question causing a significant number of pupils' difficulties. By analysing the results of an examination, you can identify weaknesses in individual pupils and provide the necessary support and revision needed in preparation for the final examination.

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