Unit 1 — Counting up to one million

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**).

abc 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:

1. Count up to 999 999 and one million using intervals of ones, tens, hundreds and thousands.
2. Solve problems on counting numbers up to one million.
3. 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

1. **a)** 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67
    b) 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329
    c) 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
    d) 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
    e) 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
    f) 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
2. **a)** 3, 4, 5, 6, 7, 8, 9, 11
    b) 88, 89, 90, 91, 92, 93, 94, 95
    c) 380, 382, 384, 385, 386, 387, 388
    d) 2 713, 2 714, 2 715, 2 717, 2 718, 2 719, 2 720, 2 722
    e) 869 242, 869 243, 869 244, 869 245, 869 246, 869 247, 869 249, 869 250, 869 251
    f) 999 991, 999 992, 999 993, 999 994, 999 995, 999 996, 999 997, 999 998, 999 999

Exercise 2

1. **a)** 27, 37, 47, 57, 67, 87, 97, 107
    b) 985, 995, 1 005, 1 015, 1 025, 1 035, 1 045, 1 055, 1 065, 1 075, 1 085, 1 095
    c) 9 890, 9 900, 9 910, 9 920, 9 930, 9 940, 9 950, 9 960, 9 970, 9 980, 9 990, 10 000
    d) 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

e) 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
f) 999 920, 999 930, 999 940, 999 950, 999 960, 999 970, 999 980, 999 990, 1 000 000

2. **a)** 42, 52, 62, 72, 82 , 92, 102
    b) 4 759, 4 769, 4 779, 4 799, 4 809, 4 819, 4 829
    c) 10 002, 10 012, 10 022, 10 032, 10 042, 10 052, 10 062, 10 072
    d) 10 984, 10 994, 11 004, 11 014, 11 024, 11 034, 11 044, 11 054
    e) 889 940, 889 950, 889 960, 889 970, 889 980, 889 990, 890 010
    f) 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:
1. Count backwards in ones:
    a) 98, 97, …, …, …, …, 92
    b) 2 005, 2 004, …, …, …, …, …, 1 998
2. Count backwards in tens:
    a) 674, 664, …, …, …, …,
    b) 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

1. **a)** 100, 200, 300, 400, 500, 600, 700, 800, 900, 1 000, 1 100, 1 200, 1 300, 1 400
   b) 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
   c) 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
   d) 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
   e) 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
   f) 999 100, 999 200, 999 300, 999 400, 999 500, 999 600, 999 700, 999 800, 999 900, 1 000 000
2. **a)** 139, 239, 539, 639, 739, 839, 939
   b) 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

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

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

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:
1. 840, 940, …, …
2. 975, 985, 995, …, …
3. 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.

Lesson focus

The lesson on quantitative reasoning focuses on counting in ones, hundreds and thousands. The lesson ends with the Revision exercise which is used to revise and consolidate concepts from this unit. Once you have introduced the topic of number patterns and using a pattern to find the answers work through the example on page 12. It is important for the pupils to understand that the shapes in which the numbers appear are connected to the number pattern so, for example the numbers written in the rectangles increase by 100, the numbers written in the circles increase by 1 and the numbers written in the parallelograms increase by 1 000. Point out to the pupils that the number that is at the top in the rectangle [395] is one hundred **more** than the number below it to the left [295] and that 295 is 100 **less** than the number above it [395]. Repeat this for the other patterns in the example. Once you have worked through the example and have discussed it with the pupils ask them to complete Exercise 5 of the PB.

Once pupils have completed Exercise 5 proceed to page 13 which provides a summary and overview of the unit. Review the contents of the summary with the pupils. Ask them to complete the Revision exercise. Pupils should be given a reasonable time limit to complete the questions.

Answers

Exercise 5
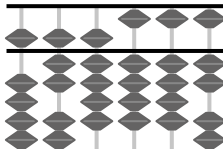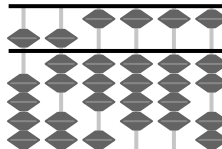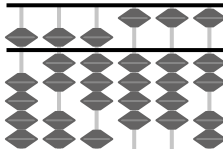
1. 1 825, 2 025   2. 998, 1 000
3. 1 218, 2 218   4. 4 429, 5 429
5. 689, 789   6. 1 100, 1 101
7. 21 122, 21 322   8. 46 985, 47 985

Revision exercise

1. a) 274, 304, 314   b) 2 656, 2 756, 2 856
2. a) 0, 100, 200, 300, 400, 500, 600, 700, 800, 900, 1 000, 1 100, 1 200, 1 300, 1 400, 1 500, 1 600, 1 700, 1 800, 1 900, 2 000
    b) 0, 1 000, 2 000, 3 000, 4 000, 5 000, 6 000, 7 000, 8 000, 9 000, 10 000, 11 000, 12 000, 13 000, 14 000, 15 000
3. a) 236, 238   b) 564, 560
    c) 1 300, 1 310   d) 9 257, 9 261, 9 265

4. a) 998 000, 997 000, 996 000, 995 000, 994 000, 993 000, 992 000
    b) 18 250, 18 350, 18 650, 18 750, 18 850, 18 950, 19 050
    c) 4 805, 5 805, 6 805, 7 805, 9 805, 10 805, 11 805, 12 805
    d) 2 487, 2 497, 2 507, 2 517, 2 527, 2 537, 2 567

Workbook

5. a) 578 442   b) 579 442

    c) 573 442

6. 300   7. 500
8. a) 25 000   b) 17 000
9. 127

Assessment

Use this work to assess if the pupils have mastered the concept of counting forwards and backwards in different intervals. The pupils should also be able to identify the number pattern in counting in intervals. Provide extra help to those pupils who have difficulty in completing the work.

Extension activity

Ask pupils to make up their own exercise of counting in intervals, for example, they could start at any number and count forwards in threes and then backwards in threes. They can write the numbers as they count.

Homework activity

Pupils can complete questions 5–9 on page 6 of the WB.

Unit 2 — Writing up to one million

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.

abc 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

2. **a)**   **b)**

   c)   **d)**

   e)
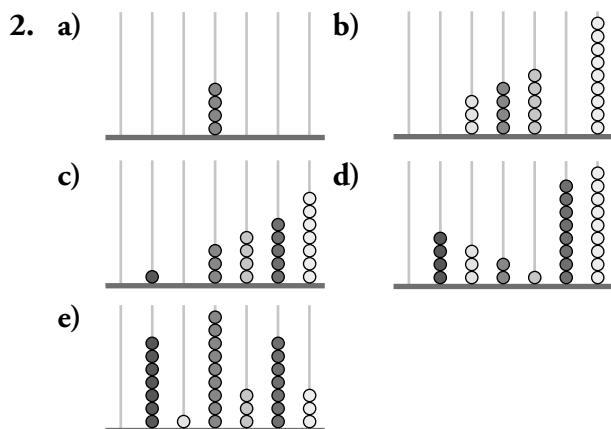
Challenge

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 swop cards and complete the **Challenge** a few times.

📖 Answers

Exercise 2

1. **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
2. **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

1. 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 = …

🔍 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

1. 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

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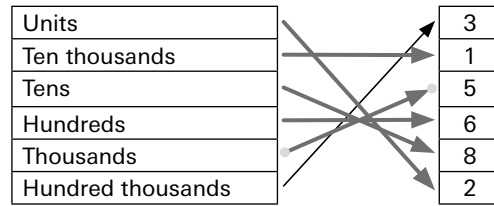
Guide the pupils through each of the exercises as questions 1 and 5 demand different approaches to questions 2 to 4.

📖 Answers

Exercise 4

1.

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

2. 2 3 6 5 7

3. 1 0 0 0 5

4. 9 0 0 9 0 9 9

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

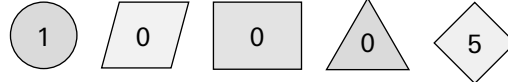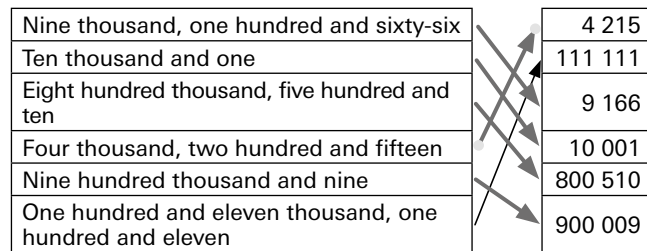### Assessment

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

1. **a)** 5 000; **b)** 50 000; **c)** 500 000; **d)** 50; **e)** 500; **f)** 5
2. **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
3. **a)** 2 345; **b)** 65 432; **c)** 460 715; **d)** 805 302; **e)** 900 009
4. **a)** 1 092; **b)** 4 446; **c)** 100 864; **d)** 618 502; **e)** 909 909
5. **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.

abc 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

d) 10 111, 10 118, 10 125, 10 132, 10 139, 10 146, 10 153, 10 160, 10 167, 10 174, 10 181, 10 188, 10 195, 10 202, 10 209, 10 216, 10 223, 10 230, 10 237, 10 244

e) 121 007, 121 014, 121 021, 121 028, 121 035, 121 042, 121 049, 121 056, 121 063, 121 070, 121 077, 121 084, 121 091, 121 098, 121 105

f) 999 902, 999 909, 999 916, 999 923, 999 930, 999 937, 999 944, 999 951, 999 958, 999 965, 999 972, 999 979, 999 986, 999 993, 1 000 000

2. a) 49; **b)** 224; **c)** 609; **d)** 777; **e)** 7 168; **f)** 150 374

3. a) 84; **b)** 175; **c)** 1 260; **d)** 24 878; **e)** 70 287; **f)** 668 500

4. a) 8 weeks; **b)** 21 weeks; **c)** 364 days; **d)** 356 weeks 3 days; **e)** 3 794 days; **f)** 13 793 weeks

Puzzle

4 weeks

Workbook

4. a) 3; **b)** 24

5. a) 28, 35, 49, 63; **b)** 35, 40, 55, 65, 70; **c)** 127, 148, 155, 169, 176; **d)** 2 000, 2 015, 2 020, 2 025

6. a) 21; **b)** 28; **c)** 49

7. 29   **8.** 182

> **Assessment**
>
> Pupils should be able to count in sevens and therefore calculate the number of days in a given number of weeks.
>
> Ensure pupils can problem solve using division and multiplication by seven or counting in sevens.

> **Homework activity**
> Pupils complete questions 4–8 on pages 8 and 9 of the WB.

Lesson 3   *Pupil's Book page 22; Workbook page 9*

⚙ Preparation

You will need to have:
- Read through the example on page 22
- Prepared flash cards with the numbers: 60, 120, 180, 240, 300.

➲ Starter activity

Revise concepts of how many minutes in an hour and how many seconds in a minute.

Ask the pupils to count in sixties. As they count, place the correct number onto the board. Encourage them to continue counting as far as they can.

🔍 Lesson focus

Repeat the information that there are 60 seconds in a minute and 60 minutes in one hour. Work through the example on page 22 and encourage the pupils to repeat the counting exercise as in the starter activity. This repetition will ensure that the concept is consolidated for the pupils.

Ask the pupils to complete Exercise 3. Pupils may need assistance with numbers 3 and 4 where they are working with bigger numbers.

📖 Answers

Exercise 3

1. a) 300; **b)** 240; **c)** 1 800; **d)** 3 600; **e)** 86 400

2. a) 360; **b)** 600; **c)** 720; **d)** 1 440; **e)** 10 080

3. a) 300; **b)** 5 700; **c)** 66 600; **d)** 315 000; **e)** 618 900; **f)** 847 200

4. a) 360 mins; **b)** 60 hrs; **c)** 58 500 secs; **d)** 602 400 mins; **e)** 50 hrs; **f)** 16 620 mins

Challenge

1 280, 1 260, 1 200, 1 140, 1 080, 1 020, 960, 900, 840, 780, 720

Workbook

9. 480   **10.** 5   **11.** 540

> **Assessment**
>
> Pupils should be able to count in sixties.
>
> It is important that pupils can calculate the number of seconds in a minute and the number of minutes in hours.
>
> Pupils to solve problems using division and multiplication by sixty or counting in sixties.

> **Homework activity**
> Pupils complete questions 9–11 on page 9 of the WB.

Lesson 4 *Pupil's Book page 23*

⚙ 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

1. 2 847, 2 852, 2 857
2. 782, 789, 796
3. 27 000, 7 hrs 30 mins, 450

4. 4 320, 1 hr 12 mins, 72
5. 488, 493, 498
6. 18 000, 18 007, 18 014
7. 32 242, 32 247, 32 252
8. 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

1. 7, 14, 21, 28, 35, 42, 49
2. 56, 63, 70, 77, 84, 91
3. a) 60, 120, 180, 240, 300
   b) 300, 240, 180, 120, 60
   c) 697 200, 697 260, 697 320, 697 380, 697 440, 697 500, 697 560, 697 620, 697 680, 697 740
   d) 1 000 000, 999 940, 999 880, 999 820, 999 760, 999 700, 999 640, 999 580, 999 520, 999 460
4. a) 300 mins
   b) 420 mins
   c) 480 mins
5. a) 28 days
   b) 35 days
   c) 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.

Unit 4　Roman numerals

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.

abc 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:
1. Read given Roman numerals and state the corresponding values in the Hindu/Arabic form.
2. Write the value of the Roman numeral I to C in the Hindu/Arabic form.
3. Write 1 to 100 in Roman numerals.
4. 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

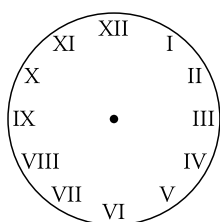### Exercise 1

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.

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?

Unit 5 — Ordering of whole numbers up to 1 000

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.

abc 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 ... 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 → 26 < 406 and then they continue with the next numbers 406, 62 → 406 > 62 and lastly 62, 7 → 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.

Unit 6   Highest common factor

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.

abc 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
1. Find the factors of:
    a) 10; **b)** 18; **c)** 21; **d)** 24
2. 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:

$24 = 2 \times 2 \times 2 \times 3$ $36 = 2 \times 2 \times 3 \times 3$
Common prime factors: 2 and 3
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

1. 10, 20, 40, 45
2. 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: 5×5; 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

1. a) 5; b) 6; c) 7; d) 10; e) 8; f) 8; g) 11
2. 12 m × 12 m = 144 m^2
3. a) 5; b) 6; c) 4; d) 24; e) 35
4. 5
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.

Unit 7 — Lowest common multiple

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.

abc 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

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, <u>18</u>, 20: E
2. 3, 6, <u>9</u>, 12, 15, 18: N
3. <u>20</u>: T; The mystery number is <u>TEN</u>.

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

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 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.

Unit 8 — Proper and improper fractions

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.

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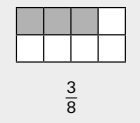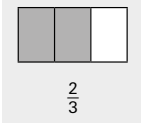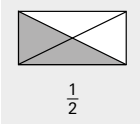
Work through the content of page 43 of the PB with the pupils. Work through the example on page 43 very carefully and if you assess that the pupils are still struggling to understand the concepts use a sheet of card or paper to demonstrate the example in a more concrete way.

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)   **b)**   **c)**

$\frac{3}{8}$ $\frac{2}{3}$ $\frac{1}{2}$

Challenge

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

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

1. $\frac{1}{3}$; $\frac{9}{10}$; $\frac{2}{27}$; $\frac{19}{21}$

2. $\frac{1}{9}$, $\frac{2}{9}$, $\frac{3}{9}$, $\frac{4}{9}$, $\frac{5}{9}$, $\frac{6}{9}$, $\frac{7}{9}$, $\frac{8}{9}$ (any five)

3. **a)** 5 biscuits   **b)** 2 biscuits
   c) $\frac{2}{5}$ **d)** $\frac{3}{5}$

4. In two weeks he reads 4 books out of 6. $\frac{4}{6} = \frac{2}{3}$

Puzzle

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

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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.

⚙ 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

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

Exercise 3

1. $\frac{4}{3}$; $\frac{9}{2}$; $\frac{10}{9}$; $\frac{11}{9}$; $\frac{6}{5}$
2. Pupils write five improper fractions.
3. **Proper fractions:** $\frac{4}{9}$; $\frac{3}{4}$; $\frac{1}{2}$; $\frac{8}{15}$; $\frac{2}{13}$; $\frac{5}{6}$

   Improper fractions: $\frac{10}{3}$; $\frac{9}{7}$; $\frac{4}{2}$; $\frac{15}{9}$; $\frac{7}{8}$
4. **a)** $\frac{5}{9}$; **b)** $\frac{4}{9}$

Workbook

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

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 than 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

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

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.

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:

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

$\frac{28}{18}=1\frac{10}{18}$ $\frac{9}{3}=3$

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.

Unit 9 Decimal fractions and equivalent fractions

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.

abc 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.
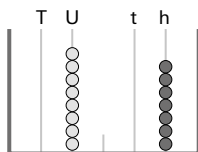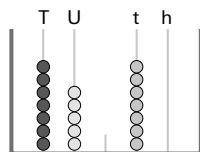
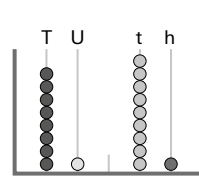## Answers

Exercise 1

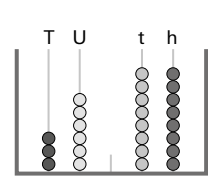1. **a)** 3.8   **b)** 12.35
2. **a)**

b)

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?

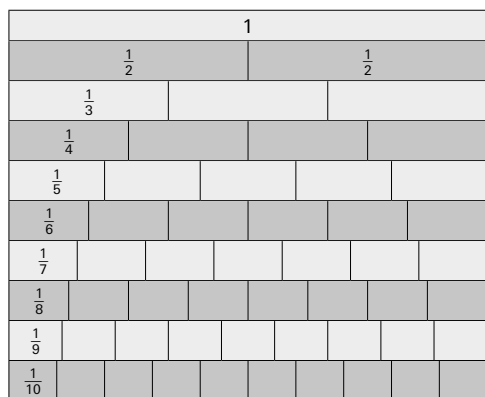## Lesson 2   *Pupil's Book pages 52 and 53*

⚙ Preparation

Prepare a fraction wall on a chart as follows:

1									
$\frac{1}{2}$					$\frac{1}{2}$				
$\frac{1}{3}$									
$\frac{1}{4}$									
$\frac{1}{5}$									
$\frac{1}{6}$									
$\frac{1}{7}$									
$\frac{1}{8}$									
$\frac{1}{9}$									
$\frac{1}{10}$									

⮕ 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 $\frac{2}{3}$s? 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

1. **a)** 2; **b)** 2; **c)** 4; **d)** 2; **e)** 4; **f)** 8; **g)** 6
2. **a)** 2; **b)** 4; **c)** 2; **d)** 3; **e)** 4; **f)** 3

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

Assessment

Are pupils able to convert fractions to equivalent fractions?

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

1. **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)** $\frac{1 \times 3}{3 \times 3} = \frac{3}{9}$
2. **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)** $\frac{6}{8}$, $\frac{9}{12}$, $\frac{15}{20}$, …; **b)** $\frac{4}{12}$, $\frac{6}{18}$, $\frac{8}{24}$, …; **c)** $\frac{14}{16}$, $\frac{21}{24}$, $\frac{28}{32}$, …;
    d) $\frac{18}{8}$, $\frac{27}{12}$, $\frac{36}{16}$, …; **e)** $\frac{24}{10}$, $\frac{36}{15}$, $\frac{48}{20}$, …; **f)** $\frac{20}{18}$, $\frac{30}{27}$, $\frac{40}{36}$, …

> **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.** $\frac{1}{3}$: $\frac{2}{5}$, $\frac{3}{6}$, $\frac{2}{6}$ $\left(\frac{3}{6}\right)$; **2.** $\frac{3}{4}$: $\frac{3}{8}$, $\frac{6}{8}$, $\frac{5}{8}$ $\left(\frac{6}{8}\right)$;
> **3.** $\frac{2}{5}$: $\frac{3}{10}$, $\frac{4}{10}$, $\frac{6}{10}$ $\left(\frac{4}{10}\right)$; **4.** $\frac{2}{3}$: $\frac{5}{6}$, $\frac{8}{12}$, $\frac{3}{9}$ $\left(\frac{8}{12}\right)$;
> **5.** $\frac{4}{6}$: $\frac{6}{9}$, $\frac{4}{5}$, $\frac{6}{8}$ $\left(\frac{6}{9}\right)$

> **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.
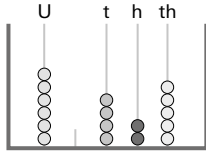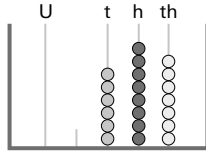
Answers

Exercise 5

1. $0.25 = \frac{2}{8}$; **2.** $\frac{4}{25} = 0.16$; **3.** $0.05 = \frac{1}{20}$; **4.** $0.85 = \frac{85}{100}$

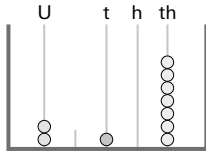**5.** $\frac{6}{10} = 0.6$; **6.** $\frac{20}{50} = 0.4$

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.

Unit 10   Adding and subtracting whole numbers

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?

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.

Lesson 4 *Pupil's Book page 61; Workbook page 20*

⚙ 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
	$^4\cancel{5}$	$^{11}\cancel{2}$	$^{12}\cancel{3}$	$^1\cancel{1}$
–	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)**

500	
260	240

140	120	120

c)

520	
290	230

120	170	60

d)

800	
520	280

270	250	30

e)

350	
200	150

100	100	50

f)

1 410	
650	760

270	380	380

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.

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

1. 4 529 people; **2.** 6 037 pupils; **3.** ₦4 669 profit;
4. 8 125 km
5. a) 67 passengers; **b)** 59 passengers;
   c) 177 passengers

Workbook

1. a) 78; **b)** 32; **c)** 21; **d)** 73; **e)** 762; **f)** 54
   g) 1 005; **h)** 483
2. 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.

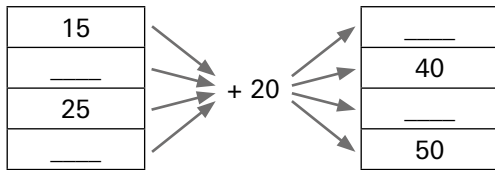## Lesson 6   *Pupil's Book pages 63 and 64*

⚙ 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:
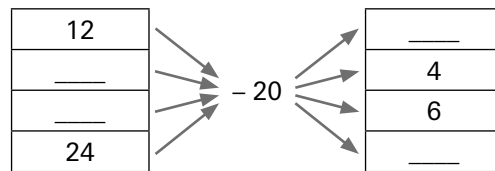
Pupils should explain to you how they calculated the answers.

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.

$$\boxed{\tfrac{1}{4}} \ + \ \boxed{\tfrac{1}{4}}$$

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)** $\frac{6}{8} - \frac{2}{8} = \frac{4}{8} = \frac{1}{4}$;
   d) $\frac{5}{8} - \frac{4}{8} = \frac{1}{8}$; **e)** $\frac{8}{8} - \frac{4}{8} = \frac{4}{8} = \frac{1}{4}$; **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:

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

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

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

   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.

## 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:
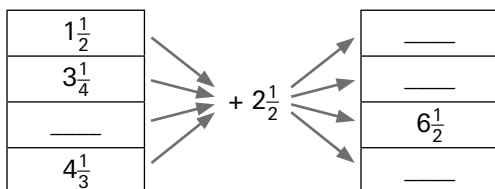
🔍 Lesson focus

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)** $\frac{236}{70} = 3\frac{26}{70}$

Unit 12 Adding and subtracting decimals

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

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

Workbook

1. **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:
1. What number should be added to 3.572 to give 10.405?
2. 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

1. **a)** ₦98.60; **b)** ₦1.40
2. **a)** 20.471 g; **b)** 36.166 g; **c)** 46.977 g; **d)** Emerald

Workbook

2. 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, XII, 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: 2×3; 9: 3×3; **b)** LCM = $3 \times 3 \times 2 = 18$
12. **a)** 33: 3×11; 42: $2 \times 3 \times 7$; HCF = 3
    b) 18: $2 \times 3 \times 3$; 30: $2 \times 3 \times 5$; 42: $2 \times 3 \times 7$; 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