Objectives

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

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

Suggested resources

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

Key word definitions

interval: gap or space between
count forwards: count up, numbers get bigger
count backwards: count down, numbers get smaller

Frequently asked questions

Q  What prior knowledge do the pupils need?
A  Pupils should be able to:
- count forwards and backwards up to at least 1 000, in a variety of whole-number intervals, including using starting numbers other than zero
- write 3-digit whole numbers in their expanded form
- order whole numbers up to 1 000.

Common errors pupils make

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

Evaluation guide

Pupils to:
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) 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529
   
   d) 10000, 10001, 10002, 10003, 10004, 10005, 10006, 10007, 10008, 10009, 10010, 10011, 10012, 10013, 10014, 10015, 10016, 10017, 10018, 10019, 10020, 10021, 10022
   
   e) 987654, 987655, 987656, 987657, 987658, 987659, 987660, 987661, 987662, 987663, 987664, 987665, 987666
   
   f) 999989, 999990, 999991, 999992, 999993, 999994, 999995, 999996, 999997, 999998, 999999, 1000000

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) 2713, 2714, 2715, 2717, 2718, 2719, 2720, 2722
   
   e) 869242, 869243, 869244, 869245, 869246, 869247, 869248, 869250, 869251
   
   f) 999991, 999992, 999993, 999994, 999995, 999996, 999997, 999998, 999999

**Exercise 2**

1. a) 27, 37, 47, 57, 67, 87, 97, 107
   
   b) 985, 995, 1005, 1015, 1025, 1035, 1045, 1055, 1065, 1075, 1085, 1095
   
   c) 9890, 9900, 9910, 9920, 9930, 9940, 9950, 9960, 9970, 9980, 9990, 10000
   
   d) 327726, 327736, 327746, 327756, 327766, 327776, 327786, 327796, 327806, 327816, 327826, 327836, 327846
   
   e) 989690, 989700, 989710, 989720, 989730, 989740, 989750, 989760, 989770, 989780, 989790, 989800, 989810
   
   f) 999920, 999930, 999940, 999950, 999960, 999970, 999980, 999990, 1000000

2. a) 42, 52, 62, 72, 82, 92, 102
   
   b) 4759, 4769, 4779, 4799, 4809, 4819, 4829
   
   c) 10002, 10012, 10022, 10032, 10042, 10052, 10062, 10072
   
   d) 10984, 10994, 11004, 11014, 11024, 11034, 11044, 11054
   
   e) 889940, 889950, 889960, 889970, 889980, 889990, 890010
   
   f) 999920, 999930, 999940, 999950, 999960, 999970, 999980, 999990

**Challenge**

(Page 8)

1. 100 2. 1000 3. 10000 4. 100000

(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
   

2. Count backwards in tens:
   a) 674, 664, …, …, …
   
   b) 895630, 895620, …, …, …
Lesson 2  Pupil’s Book pages 10 and 11; Workbook page 5

Preparing
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
   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, 339, 439, 539, 639, 739, 839, 939
   b) 5 732, 5 832, 5 932, 6 032, 6 132, 6 232, 6 332
### Unit 1: Counting up to one million

#### 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, 3 345, 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, 4 099, 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**


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. 9 75, 9 85, 9 95, ..., ...
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
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.

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**


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:

<table>
<thead>
<tr>
<th>Thousands</th>
<th>Hundreds</th>
<th>Tens</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>8</td>
<td>6</td>
<td>4</td>
</tr>
</tbody>
</table>

Now replace the digits with words

<table>
<thead>
<tr>
<th>Thousands</th>
<th>Hundreds</th>
<th>Tens</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>five</td>
<td>eight</td>
<td>six</td>
<td>four</td>
</tr>
</tbody>
</table>

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

Five thousand, eight hundred and sixty-four.

Repeat with another number.

**Lesson focus**

This lesson focuses on teaching pupils to write numbers in words. Once you have completed the starter activity read the method for writing numbers in words as explained on pages 15 and 16 of the PB.
Work through the examples with the pupils. Explain to the pupils that it is important that we use the correct words to read and write numbers as mistakes are often made if a number like 5 864 is read as “five eight six four” instead of “five thousand eight hundred and sixty-four”.

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

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

**Answers**

**Exercise 2**

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.

<table>
<thead>
<tr>
<th>Units</th>
<th>Ten thousands</th>
<th>Tens</th>
<th>Hundreds</th>
<th>Thousands</th>
<th>Hundred thousands</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>1</td>
<td>5</td>
<td>6</td>
<td>8</td>
<td>2</td>
</tr>
</tbody>
</table>

2. 2 3 6 5 7

3. 1 0 0 0 5

4. 9 0 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.

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**Lesson 5**  **Pupil's Book page 19**

**Preparation**

Read through the summary and examine all the questions in the Revision exercise.
Unit 2: Writing up to one million

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 + 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.

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  
   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.
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 an 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. 30 minutes
   45 fingers
   18 000 seconds
   20 fingers
   3 days
   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.
Objectives
By the end of this unit, each pupil should be able to:
• Count in Roman numbers up to 100
• Solve problems on quantitative reasoning involving use of Roman numerals.

Suggested resources
Clock with Roman numerals; Pictures of ancient Romans.

Key word definitions
combine: put together
numeral: a symbol that stands for a number
convert: change

Frequently asked questions:
Q What prior knowledge should pupils have?
A Pupils should know that different civilizations or cultures may have used different ways of representing numbers. They should be aware that Roman numerals are still used today in different contexts, for example, on clock faces or sometimes in books.

Q Why do pupils have to know and be able to use Roman numerals as they are from an ancient civilization?
A It is important to recognize and interpret Roman numerals as they are still in use today. These numerals are used on clock and watch faces; they are used to number book pages and sometimes to number exercises and questions in textbooks.

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

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

Evaluation guide
Pupils to:
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. 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

4. b) 55, LIV, 53, LII, 51, L, 49, XLVIII c) 7, XIV, 21, XXVIII, 35, XLII, 49, LVI d) LX, 55, L, 45, XL, 35, XXX, XXV

Assessment

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

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

Support activity

Allow the pupils to use the Roman number chart they made to convert the following numbers to Roman numerals:
3, 4, 5, 6, 8, 9, 10

Allow the pupils to use the chart to convert these Roman numerals to numbers:
 XV, XX, XXVI, XCIII, CVI

Extension activity

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

1 was represented as:

10 was represented as:

100 was represented as:

631 could be written as:

Write these numbers using Egyptian numerals:
56, 172, 392.
Homework activity
Pupils to complete questions 3 and 4 on page 10 of the WB.

Lesson 3 Pupil’s Book pages 28 and 29

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

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

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

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

Answers

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

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

Assessment
Can pupils solve problems with Roman numerals using quantitative reasoning?

Homework activity
Pupils complete any unfinished questions from the Revision exercise.
Objectives
By the end of this unit, each pupil should be able to:

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

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

Key word definitions
compare: look at the difference between
different: not the same

Frequently asked questions:
Q What prior knowledge should pupils have?
A Pupils should have a sound knowledge of place value and be able to recognize that one number is bigger or smaller than another because of the position of the digits in the number.

Common errors pupils make
Pupils are confused by the symbols < and > and therefore cannot use them correctly.

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

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

Lesson 1 Pupil’s Book page 30

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

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

Read through page 30 of the PB carefully.

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

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

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

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

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

Ask them to complete Exercise 1 on page 30.

Answers

Exercise 1

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

Assessment

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

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

Support activity

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

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

Extension activity

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

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

Homework activity

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

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

Lesson 2  Pupil’s Book page 31

Preparation

You will need to have:

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

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

Starter activity

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

<table>
<thead>
<tr>
<th>Hundreds</th>
<th>Tens</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>7</td>
<td>3</td>
<td>6</td>
</tr>
</tbody>
</table>

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 1000?

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

<table>
<thead>
<tr>
<th>4</th>
<th>3</th>
<th>5</th>
<th>1</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>2</td>
<td>4</td>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>6</td>
<td>9</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>5</td>
<td>7</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>8</td>
<td>4</td>
<td>5</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

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, $26, 406 \rightarrow 26 < 406$ and then they continue with the next numbers $406, 62 \rightarrow 406 > 62$ and lastly $62, 7 \rightarrow 62 > 7$. Allow the pupils to complete the exercise in this manner. Ask them to then try to do the exercise as is.

Homework activity
Pupils complete questions 4–7 on page 12 of the WB.
Objectives
By the end of this unit, each pupil should be able to:
• Find the highest common factor of 2-digit numbers.

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

Key word definitions
remainder: left over
prime number: a number which has only two factors, 1 and itself. 1 is not a prime number
factor: numbers you can multiply together to get another number
common: found in two or more things
inspection: look at closely
product: the result of numbers multiplied together

Frequently asked questions
Q What prior knowledge should the pupil have?
A Pupils should know the multiplication tables well. They should also understand the concept of a prime number.

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

Evaluation guide
Pupils to:
1. Find the common factors of given numbers and then determine the highest common factor.

Lesson 1  Pupil’s Book page 34
Preparation
You will need to have:
• A 100 number chart for each pupil to work on for the starter activity

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, 3, 7, 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 x 3, 5 x 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 HCF of 2-digit numbers.

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

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

Homework activity
Ask pupils to find the highest common factors of the following pairs of numbers:
1. 6 and 12  2. 16 and 20  3. 100 and 150

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

Preparation
You will need to have:
• Sufficient flash cards for the starter activity.

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

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

\[
24 = 2 \times 2 \times 2 \times 3 \quad \quad 36 = 2 \times 2 \times 3 \times 3 \\
\text{Common prime factors: } 2 \text{ and } 3 \\
\text{HCF } = 2 \times 3 = 6
\]

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

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

Answers

Exercise 3
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: \(5 \times 5\) \(; 45: 3 \times 3 \times 5\); HCF = 5
   e) 60: \(2 \times 2 \times 3 \times 5\) \(; 75: 3 \times 5 \times 5\); HCF = 15
   f) 84: \(2 \times 2 \times 3 \times 7\) \(; 90: 2 \times 3 \times 3 \times 5\); HCF = 6

Puzzle
\(2 \times 2 \times 2 \times 2 \times 3\)

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

Workbook
1. a) 5; b) 6; c) 7; d) 10; e) 8; f) 8; g) 11
2. \(12 \text{ m} \times 12 \text{ m} = 144 \text{ m}^2\)
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.
Objectives
By the end of this unit, each pupil should be able to:
• Find the lowest common multiple of numbers up to 9.

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

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

Frequently asked questions
Q What prior knowledge do the pupils need?
A Pupils need to know their multiplication table very well.

Common errors that pupils make
Pupils may become confused between the terms “factor” and “multiple”.

Evaluation guide
Pupils to:
1. Obtain the LCM by identifying the lowest of the common multiples.
2. Find the LCM by factor method.

Lesson 1  Pupil’s Book page 38; Workbook page 15
Preparation
You will need to have:
• Sufficient number charts for pupils to be able to use charts to find multiples of different numbers
• Perused the contents of page 38 in order to know what is required of the pupils for this lesson.

Starter activity
Explain to the pupils what a multiple is. Ask them to take their number charts and to shade all the multiples of 2 and 4. Ask them what they notice about the multiples. They should notice that all multiples of 2 are also multiples of 4. Repeat for other numbers. For example, find all the multiples of 5 and 8. This exercise gives the pupils plenty of opportunity to practice the skill of finding multiples of numbers.

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

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

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

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

Workbook
2. a) 5; b) 4; c) 40
Assessment
Pupils should be able to find multiples of numbers from 1 to 9.
Are pupils able to find common multiples of pairs or sets of numbers?

Support activity
If pupils confuse factors with multiples it is important to compare factors of a number with the multiples of a number. Ask the pupils to try and verbalise what the difference between the two terms is. Correct any misconceptions. Give them an easy exercise to consolidate their understanding. For example, Write the factors of 9: 1, 3, 9 Write the multiples of 9: 9, 18, 27, 36.
Now ask the pupils again to compare the two sets of numbers and to explain what the differences are between multiples and factors.

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

Lesson 2  Pupil’s Book page 39; Workbook page 15

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

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

Lesson focus
Place the numbers 3 and 4 on the flannel board. Ask the pupils to identify the first 8 multiples of 3.
Tell pupils that they will find the first multiples by multiplying 3 by 1, then by 2, 3, 4, 5, 6, 7, 8. They then put the multiples on the flannel board next to the 3. Repeat the same process with the multiples of 4.
Put the circle on the flannel board. Now ask the pupils to place the numbers that appear in the list of multiples of 3 and the list of multiples of 4 in the circle.
Point out to the pupils that these numbers are multiples of both 3 and 4. They are therefore common multiples. Ask pupils what multiple is the lowest one. They should be able to identify that 12 is the lowest common multiple. Ensure that pupils understand the language and the words.
Hand out the number charts and ask the pupils to shade in the multiples of 2, 5 and 8. Now ask them to list the numbers that are shared as multiples by these three numbers: 40 and 80. Ask pupils how they would describe these numbers. Pupils may respond that the numbers are both multiples of 10; they are even numbers; 80 is double 40 and so on. Point out to them that 40 is the lowest common multiple. Work through the worked example on page 40 of the PB.
Pupils complete Exercise 2. Encourage pupils to complete the puzzle on page 39.

Answers
Puzzle
1. 10, 12, 14, 16, 18, 20: E
2. 3, 6, 12, 15, 18: N
3. 20: T; The mystery number is TEN.
Exercise 2
1. a) 8; b) 12; c) 15; d) 18
Workbook
1. a) 60; b) 84; c) 84; d) 30; e) 36; f) 72; g) 84

Assessment
Pupils should be able to find multiples of single digit numbers.
Are the pupils able to find the lowest common multiple of at least two numbers ranging between 1 and 9?
Support activity
Pupils may be confused between multiples and factors. If this is the case ensure that pupils understand the meaning of the words. Ask them to work through the following exercise:

Fill in the correct words from those in brackets:
Factors are all numbers that can be divided _____ into another number, without leaving a ____. [exactly; remainder]
Multiples are _____ which are the result of two numbers being ____. [numbers; multiplied]

Choose the correct word:
4 is a [factor; multiple] of 16
5 is a [factor; multiple] of 25
18 is a is a [factor; multiple] of 3
25 is a [factor; multiple] of 5

Extension activity
Ask pupils to complete the following:
What is the lowest common multiple of:
1. 4, 7 and 2;
2. 2, 5 and 9;
3. 4, 6 and 8;
4. 7, 9 and 3

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

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

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

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

Lesson focus
Ensure that the pupils understand the meaning of the word “frequent”. The focus of the lesson is to enable the pupils to use prime factors to find the LCM of bigger numbers. Work through the worked example on page 41 with the pupils. It may be easier to work through the example on the board with the pupils. You could invite them to write the prime factors for each number. Then demonstrate how to multiply the prime factors to get the LCM.

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

Answers

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

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

Exercise 3
1. 42
2. a) 24; b) 36; c) 90; d) 150; e) 120; f) 180

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

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

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

Extension activity
Pupils should attempt the Challenge on page 40.

Homework activity
Pupils complete questions 3 and 4 on page 16 of the WB.
Objectives
By the end of this unit, each pupil should be able to:
• Differentiate between proper and improper fractions
• Change improper fractions to mixed numbers and vice versa
• Apply fractions in sharing commodities at home, market, school, and the likes
• Solve quantitative reasoning problems involving fractions.

Suggested resources
Paper cuttings of different shapes; Fraction charts; Cardboard.

Key word definitions
numerator: the number above the fraction line
denominator: the number below the fraction line
whole number: a positive number used to count with

Frequently asked questions
Q What prior knowledge do pupils need?
A Pupils need to:
• know how to divide numbers
• understand the concept of sharing
• understand the term “part of a whole”
• understand that fractions are numbers that were designed to meet the needs of people over time
• have a good grasp of the work covered in previous grades
• be able to recognise the fractions that were introduced in previous grades
• be able to recognise simple equivalence.

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

Common errors pupils make
Pupils easily confuse the numerator and the denominator.

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.
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. Emphasize the language of fractions as you go through the activity: The orange is divided into two halves. Demonstrate how the fraction is written. Emphasize which number is the numerator and which is the denominator. When you divide the halves into halves again emphasize that to get quarters one divides a half by two. Again emphasize the language and the words that pupils need to know. Emphasize 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. $\frac{9}{8}$, $\frac{5}{6}$, $\frac{1}{5}$, $\frac{1}{4}$, $\frac{3}{16}$, $\frac{7}{12}$;  
2. a) $\frac{1}{4}$, b) $\frac{1}{2}$, c) $\frac{3}{6}$ = $\frac{1}{2}$, d) $\frac{2}{5}$
3. a) b) c)

**Challenge**

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

**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:

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. \( \frac{1}{3}, \frac{9}{10}, \frac{2}{7}, \frac{19}{21} \)
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 = \( \frac{2}{3} \times \text{tail} + 18 + \frac{1}{2} \times \text{body} = \frac{2}{3} \times \text{tail} + 18 + 9 = 6 + 18 + 9 = 33 \text{ cm} \)

### 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 = \(\frac{2}{3} \times \text{tail} + 18 + \frac{1}{2} \times \text{body} = \frac{2}{3} \times \text{tail} + 18 + 9 = 6 + 18 + 9 = 33\) cm

Exercise 3
1. \(\frac{4}{3}, \frac{9}{2}, \frac{10}{6}, \frac{11}{9}, \frac{6}{5}\)
2. Pupils write five improper fractions.
3. Proper fractions: \(\frac{4}{3}, \frac{3}{4}, \frac{1}{2}, \frac{8}{15}, \frac{2}{13}, \frac{5}{6}\)
   Improper fractions: \(\frac{10}{3}, \frac{9}{4}, \frac{4}{15}, \frac{7}{13}\)
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

Preparation
You will need to have:
- Sheets of A4 paper to demonstrate halves, quarters and eighths
- Extra sheets in order to show mixed fractions.

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

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

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

Support activity
If the pupils cannot write an improper fraction as a mixed number it would be important to repeat the example on page 47 of the PB. If necessary go back to the starter activity and repeat.
Homework activity
Ask pupils to complete the following:
Write each of the improper fractions as mixed numbers:
1. \( \frac{4}{3} = \)
2. \( \frac{6}{2} = \)
3. \( \frac{5}{4} = \)
4. \( \frac{11}{8} = \)

Lesson 5  Pupil’s Book pages 48 and 49;  Workbook page 17

Preparation
Write the following questions on the board:
• What is the bottom number of a fraction called?
• In a proper fraction which number is the smaller? The numerator or the denominator?
• What kind of fraction has a numerator which is smaller than the denominator?
• A mixed number is made up of a ____ number and a fraction.
• Can a mixed number be changed into a proper fraction?

Write the following answers on flash cards:
• numerator, denominator, improper fraction, proper fraction, whole, yes, no.

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

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

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

Answers
Exercise 4
1. The fractions which can be changed to mixed numbers are:
\[
\begin{align*}
\frac{14}{10} &= 1 \frac{4}{10} \\
\frac{41}{11} &= 3 \frac{8}{11} \\
\frac{62}{40} &= 1 \frac{22}{40} \\
\frac{28}{18} &= 1 \frac{10}{18} \\
\frac{9}{3} &= 3
\end{align*}
\]
2. a) \( \frac{21}{10} = \frac{8}{10} \)
   b) \( \frac{14}{10} = \frac{41}{11} = \frac{62}{40} = \frac{122}{40} = \frac{28}{18} = \frac{10}{18} = \frac{9}{3} = 3 \)
   c) \( \frac{46}{8} = \frac{6}{12} = \frac{11}{18} = \frac{6}{4} = \frac{2}{2} \)
   d) \( \frac{46}{8} = \frac{6}{12} = \frac{11}{18} = \frac{6}{4} = \frac{2}{2} \)
   e) \( \frac{46}{8} = \frac{6}{12} = \frac{11}{18} = \frac{6}{4} = \frac{2}{2} \)

Revision exercise
1. a) \( \frac{21}{10} ; \) b) \( \frac{21}{10} ; \) c) \( \frac{21}{10} ; \) d) \( \frac{21}{10} ; \) e) \( \frac{51}{5} ; \) f) \( \frac{7}{7} \)
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. \( \frac{250}{50} = \frac{430}{50} = \frac{4.5}{5} \)

Workbook
4. a) \( \frac{1}{3} \); b) \( \frac{5}{9} \); c) \( \frac{3}{20} \); d) \( \frac{1}{60} \); e) \( \frac{7}{24} ; \) f) \( \frac{4}{15} \)
   g) \( \frac{9}{10} ; \) h) \( \frac{1}{3} ; \) i) \( \frac{3}{16} ; \) j) \( \frac{1}{20} ; \) l) \( \frac{3}{37} \)
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) \( \cdot ; \)
   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.

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?
Homework activity
Pupils complete question 1 on page 18 of the WB.

Lesson 2  Pupil’s Book pages 52 and 53

Preparation
Prepare a fraction wall on a chart as follows:

<table>
<thead>
<tr>
<th>1</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2</td>
<td>1/4</td>
<td>1/8</td>
</tr>
<tr>
<td>1/3</td>
<td>1/6</td>
<td>1/12</td>
</tr>
<tr>
<td>1/5</td>
<td>1/10</td>
<td></td>
</tr>
</tbody>
</table>

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 1/2. Write the answer to the question $1/2 = 2/4$. Continue with other fractions, for example, how many sixths make $1/3$? How many sixths make $2/3$? And so on.

Point out to the pupils that fractions can be written as other fractions, for example, $1/8$ 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?

Extension activity
Pupils can attempt the Challenge on page 53.

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

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

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

Lesson focus
In this lesson pupils learn the algorithm for finding equivalent fractions. Work through the example on page 54 carefully using the diagram to assist your explanation. Work through the example that changes $3/4$ to the equal fraction $6/8$. If you think it necessary, work through another example using a similar diagram. For example, changing $1/4$ to $2/8$.

Once pupils understand that the numerator and denominator can be multiplied by the same number, move to the next example of changing $5/10$ to the equal fraction $1/2$.

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

Answers
Exercise 3
1. a) $1 \times 2 = \frac{2}{4} \times \frac{2}{2} = \frac{2}{8}$; 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) $\frac{4 + 4}{8 + 4} = \frac{1}{2}$; b) $\frac{5 + 3}{9 + 3} = \frac{2}{3}$; c) $\frac{4 + 2}{6 + 2} = \frac{2}{3}$; d) $\frac{5 + 5}{10 + 5} = \frac{1}{2}$
Workbook

4. a) \(\frac{6}{8}, \frac{9}{12}, \frac{15}{20}, \ldots\); b) \(\frac{4}{12}, \frac{6}{18}, \frac{8}{24}, \ldots\); c) \(\frac{14}{16}, \frac{21}{24}, \frac{28}{32}, \ldots\); d) \(\frac{18}{24}, \frac{27}{36}, \frac{36}{48}, \ldots\); e) \(\frac{24}{30}, \frac{36}{40}, \frac{48}{50}, \ldots\); f) \(\frac{20}{24}, \frac{30}{36}, \frac{40}{48}, \ldots\);

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. a) \(\frac{1}{3}\); b) \(\frac{2}{3}\); c) \(\frac{3}{4}\); d) \(\frac{5}{10}\); e) \(\frac{8}{5}\); 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) \(\frac{4}{100} < \frac{9}{10}\);

3. a) \(\frac{4}{8}\); b) \(\frac{5}{10}\); c) \(\frac{8}{12}\); d) \(\frac{6}{8}\); e) \(\frac{5}{10}\); f) \(\frac{2}{3}\);

Workbook

5. a) \(<\); b) \(<\); c) \(<\); d) \(<\); e) \(\geq\); f) \(<\); g) \(\geq\); h) \(\geq\); i) \(\geq\); j) \(\geq\)

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 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.

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) \(\frac{4}{100} < \frac{9}{10}\);

3. a) \(\frac{4}{8}\); b) \(\frac{5}{10}\); c) \(\frac{8}{12}\); d) \(\frac{6}{8}\); e) \(\frac{5}{10}\); f) \(\frac{2}{3}\);

Workbook

5. a) \(<\); b) \(<\); c) \(<\); d) \(<\); e) \(\geq\); f) \(<\); g) \(\geq\); h) \(\geq\); i) \(\geq\); j) \(\geq\)

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)  
   ![Diagram](image1)

   b)  
   ![Diagram](image2)

   c)  
   ![Diagram](image3)

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

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

### Workbook

2. a) $<; b) >; c) =; d) >; e) <; f) <; g) <; h) >;$  
   i) $=; j) <; k) >; l) >; m) <; n) <; o) <$

3. a) $0.6$; b) $1.667$; c) $0.75$; d) $0.625$; e) $1.167$;  
   f) $1.25$; g) $1.8$; h) $2.4$; i) $1.111$

### Assessment

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

### Support activity

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

### Homework activity

Pupils complete questions 2 and 3 on pages 18 and 19 of the WB.
Objectives
By the end of this unit, each pupil should be able to:

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

Suggested resources
Abacus; Charts.

Frequently asked questions
Q What prior knowledge should pupils have?
A Pupils should
- understand the concept of place value very well
- have mastered addition of 3-digit numbers
- have mastered subtraction of 3-digit numbers
- know number combinations very well.

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

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

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

Lesson 1   Pupil’s Book page 58

Preparation
You will need to have:
- An abacus and a flannel board with the necessary numbers and letters to demonstrate addition.

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

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

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

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

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

Support activity
If pupils struggle to add and subtract 4-digit numbers without renaming then it is important to go back to basics. Assess whether they know their basic number combinations. If they know these combinations of single digit additions and subtractions move on to adding and subtracting double digits without renaming. Work incrementally like this until you can see where they are not managing and then using the abacus method explain addition and subtraction again. Give the pupils a practice exercise like this one if they are only starting to master addition and subtraction of 3-digit numbers:
1. 124 + 231 =
2. 347 + 112 =
3. 452 + 236 =
4. 689 − 126 =
5. 899 − 455 =
6. 754 − 213 =

Homework activity
Pupils can complete the following exercise:
1. 2 146 + 231 =
2. 3 213 + 4 426 =
3. 5 689 − 1 327 =
4. 6 848 − 6 422 =

Lesson 2  Pupil’s Book page 59

Preparation
You will need to have:
• An abacus.

Starter activity
Revise the examples from the previous lesson.

Lesson focus
The focus of this lesson is to enable the pupils to add more than two numbers. Use the abacus to demonstrate the following example:
2 120 + 1 232 + 4 413 =

<table>
<thead>
<tr>
<th></th>
<th>T</th>
<th>H</th>
<th>Th</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>7</td>
<td>6</td>
<td>5</td>
</tr>
</tbody>
</table>

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

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

Answers

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

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

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

Do pupils know that they should start adding from the Units side of the columns?
Support activity
If pupils find adding three numbers too difficult it would be important to revise the work of the previous lesson to build their confidence. You may also ask them to complete the following exercise:
1. 454 + 325 =; 2. 732 + 125 =; 3. 1 000 + 2 000 =; 4. 4 500 + 2 400 =

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

Lesson 3   Pupil’s Book page 60

Preparation
You will need to have:
• An abacus
• Worked through the examples on page 60 carefully
• Experimented with an abacus in order to plan how best to explain this concept to your class.

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

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

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

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

Answers
Exercise 3
1. a) 7 761; b) 5 627; c) 7 848; d) 6 102; e) 6 834; f) 6 312

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

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

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

Homework activity
Pupils can complete the following for homework:
Calculate using a place value table:
1. 2 367 + 1 462 =; 2. 1 056 + 3 985 =; 3. 7 428 + 3 539 =
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.

\[
\begin{array}{cccc}
\text{Th} & \text{H} & \text{T} & \text{U} \\
45 & 112 & 123 & 11 \\
- 25 & 4 & 5 & \\
26 & 8 & 6 & \\
\end{array}
\]

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) 500 260 240 140 120 120 120 170 60
c) 520 290 230 120 170 60
d) 800 520 280 270 250 30 100 100 50
e) 350 200 150
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. 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?

Revise how to add with renaming the digits.

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:

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

<table>
<thead>
<tr>
<th>Th</th>
<th>H</th>
<th>T</th>
<th>U</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>8</td>
<td>2</td>
</tr>
</tbody>
</table>

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. N4 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:

```
<table>
<thead>
<tr>
<th>15</th>
<th>+ 20</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td></td>
</tr>
<tr>
<td></td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>50</td>
</tr>
</tbody>
</table>
```

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:

```
<table>
<thead>
<tr>
<th>12</th>
<th>- 20</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>6</td>
</tr>
</tbody>
</table>
```

Pupils should explain to you how they calculated the answers.
Unit 11  Adding and subtracting fractions

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: \( \frac{1}{2}, \frac{1}{4}, \frac{3}{4}, \frac{1}{2}, \frac{3}{4}, \frac{1}{4}, \frac{5}{8}, \frac{7}{8} \)
• Prepare same size paper sheets (for example A4) divided into quarters and eighths.

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

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

\[ \frac{1}{4} + \frac{1}{4} \]

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

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

### Answers

#### Exercise 1

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

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

#### Workbook

5. a) $\frac{1}{3} = \frac{5}{15}$; b) $\frac{3}{5} = \frac{9}{15}$; c) $\frac{14}{15}$

6. a) $\frac{5}{6}$; b) $\frac{5}{12}$; c) $\frac{19}{35}$; d) $\frac{5}{8}$

### Assessment

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

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

### Support activity

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

### Extension activity

Pupils can complete the following:

$\frac{1}{2} + \frac{2}{2} = \frac{3}{2} + \frac{1}{4} + \frac{3}{4} = \frac{3}{8} + \frac{1}{4} + \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, $\frac{1}{2} + \frac{1}{3}$. 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) \(7\frac{3}{9}\); 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) \(2\frac{3}{9}\); b) \(12\frac{2}{9}\); 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) \(23\frac{23}{24}\); 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{2}{3} = $. 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 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 $1\frac{1}{2}$ 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. $4\frac{3}{3}$; 9. $7\frac{7}{8}$; 10. $3\frac{5}{8}$ and $6\frac{1}{8}$

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

Assessment
Pupils should be able to read and interpret the problems as presented.
Ensure pupils can add and subtract mixed numbers.
Support activity
If pupils struggle with reading and interpreting the problems it is important to improve their reading ability and also to revise important words. For example, what is left, the difference between, etc.

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

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

Lesson 5  Pupil’s Book pages 71 and 72

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

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

\[
\begin{align*}
1 \frac{1}{2} &+ 2 \frac{1}{2} = 3 \frac{1}{2} \\
3 \frac{1}{4} &+ 6 \frac{1}{2} = 9 \frac{3}{4} \\
4 \frac{1}{3} &+ 6 \frac{1}{2} = 10 \frac{5}{6}
\end{align*}
\]

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. \(4\); or 1; 3. \(\frac{7}{6}\); 4. \(\frac{21}{8}\)

Revision exercise
1. \(\frac{103}{70}\); b) \(\frac{34}{24}\); c) \(\frac{4}{10}\); d) \(\frac{39}{72}\)
2. a) \(\frac{48}{12} = 4\); b) \(\frac{283}{63}\); c) \(\frac{5}{6}\); d) \(\frac{8}{10}\)
3. a) \(\frac{36}{8} = 4\); b) \(\frac{188}{30} = 6\frac{8}{30}\); c) \(-1\frac{1}{6}\); d) \(\frac{236}{70} = 3\frac{26}{70}\)

Assessment
Pupils should be able to solve problems using quantitative reasoning and mixed numbers.
Ensure pupils are able to calculate addition and subtraction of fractions and mixed numbers.

Homework activity
Pupils can complete any unfinished questions from the Revision exercise at home.
Objectives
By the end of this unit, each pupil should be able to:
• Add and subtract decimal numbers up to three places
• Correctly add and subtract decimal numbers found in everyday life
• Solve problems using quantitative reasoning involving addition and subtraction of decimals.

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

Key word definitions
approximate: close to but not exactly the same

Frequently asked questions
Q What prior knowledge do pupils need?
A Pupils need to:
• understand place value very well
• know that decimals are another way of representing fractions.

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

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

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.

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.
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, XIV, XV, XVI, XVII, XVIII, XIX, XX, XIX, XXII, XXIII, XXIV, XXV
4. a) Last will and testament
   I leave all my
   b) Pupils write their own message.
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
    b) 18, 24, 30, 36, 42, 48, 56, 64, 72, 80
   11. a) 6: 2 × 3; 9: 3 × 3; b) LCM = 3 × 3 × 2 = 18
   12. a) 33: 3 × 11; 42: 2 × 3 × 7; HCF = 3
   b) 18: 2 × 3 × 3; 30: 2 × 3 × 5; 42: 2 × 3 × 7; HCF = 6
   13. a) 5/7; b) 29/3; c) 32/5; d) 92/3; e) 11/3
   14. a) 62/5; b) 10/3; c) 80/3
   15. a) 42/5; b) 55/9; c) 23/4
   16. a) 16/20 < 18/20; b) 4/6 < 5/6; c) 33/12 > 19/12
   17. a) Mary 2/12, Brother 3/12, Sister 4/12, Father 3/12;
       b) cupcakes: i) 2; ii) 3; iii) 4; iv) 3
   18. 35 plates = 35/100
   19. a) 9/10; b) 6/10; c) 4/10; d) 7/10; e) 15/10
   20. a) 55/100; b) 63/100; c) 80/100; d) 25/100; e) 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