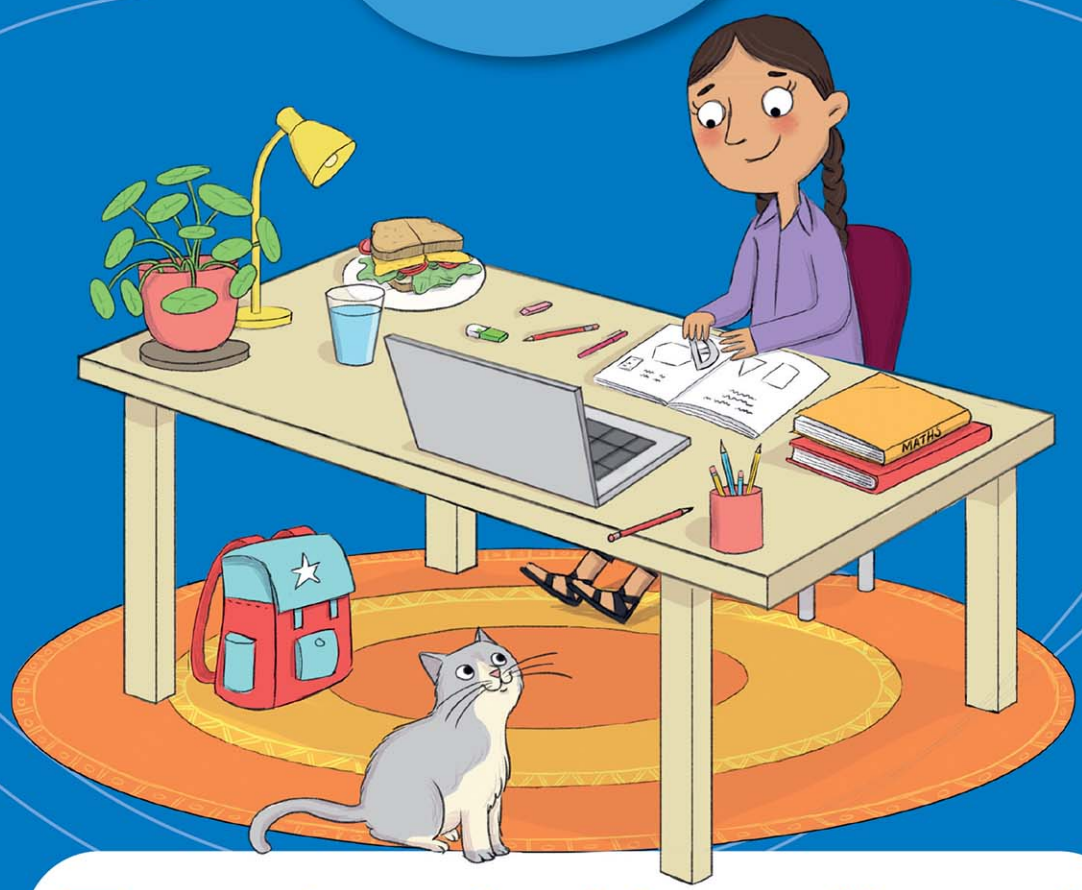
Cambridge Primary
Revise for Primary Checkpoint

Mathematics

Second Edition

Paul Broadbent



Teacher's Handbook

HODDER EDUCATION

Contents

Geometry and Measure

Statistics and Probability

Practice Tests

How to use this book

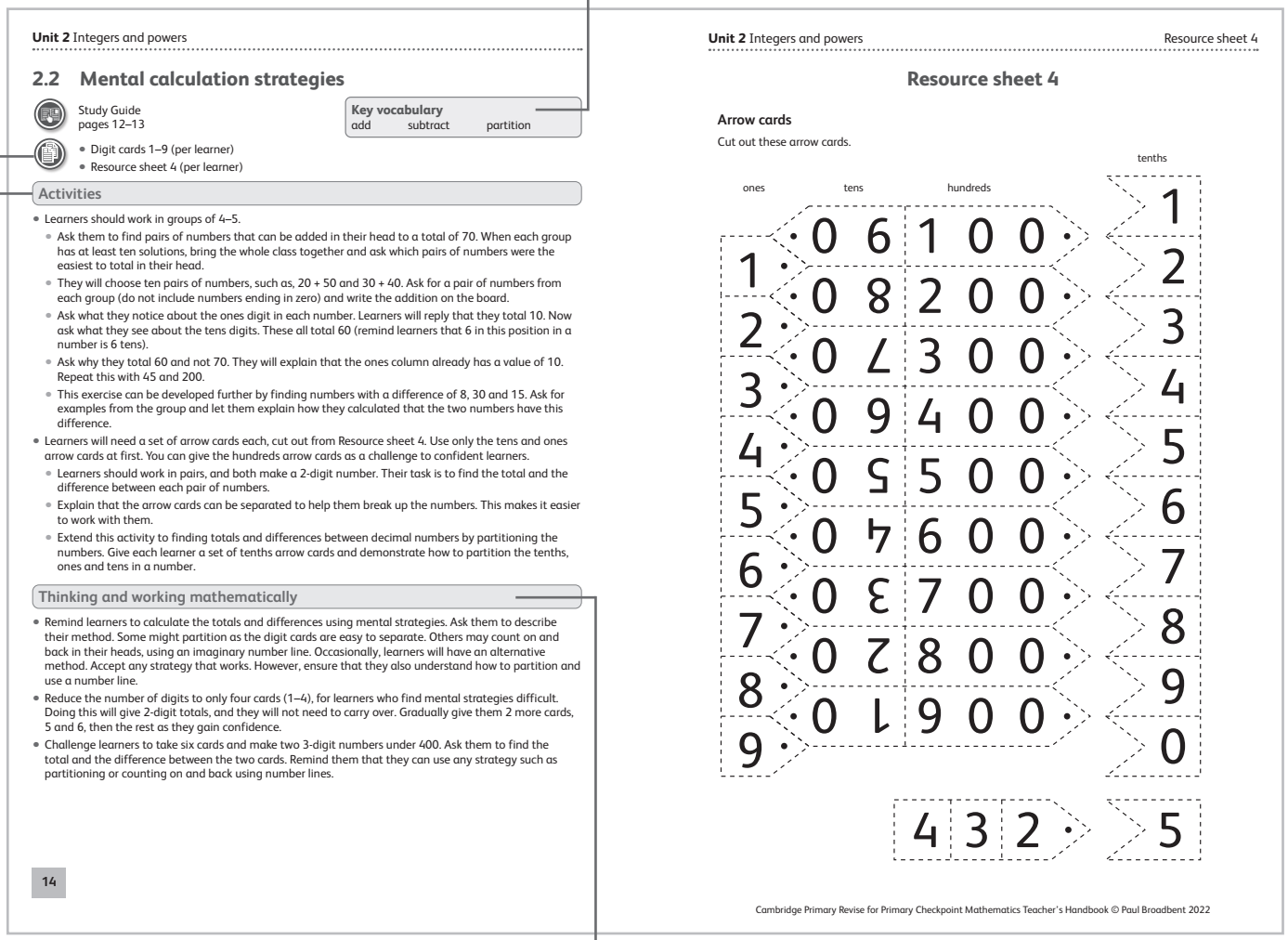
This Teacher's Guide supports the Study Guide. The Study Guide gives learners revision and practice for important skills and concepts in preparation for the Cambridge Primary Checkpoint Mathematics test. The books have been structured to reflect and complement Hodder Education's other resources for the Cambridge Primary Mathematics framework. However, they can be used independently of those if needed.

The book is divided into three chapters: Number, Geometry and Measure, Statistics and Probability and Practice Tests. Each chapter has several units broken down into the key topics for each unit, based on the content of the Cambridge Primary Mathematics framework.

Resources A reference to the corresponding Study Guide pages and the resources needed.

Key vocabulary A list of the essential words that the learners need to know.

Resource sheets A photocopiable sheet is included to go with each topic. They have a variety of purposes, including practical manipulatives, challenge activities and further practice exercises.



Unit 2 Integers and powers

2.2 Mental calculation strategies

Study Guide pages 12–13

Key vocabulary
add subtract partition

- Digit cards 1–9 (per learner)
- Resource sheet 4 (per learner)

Activities

- Learners should work in groups of 4–5.
  - Ask them to find pairs of numbers that can be added in their head to a total of 70. When each group has at least ten solutions, bring the whole class together and ask which pairs of numbers were the easiest to total in their head.
  - They will choose ten pairs of numbers, such as, 20 + 50 and 30 + 40. Ask for a pair of numbers from each group (do not include numbers ending in zero) and write the addition on the board.
  - Ask what they notice about the ones digit in each number. Learners will reply that they total 10. Now ask what they see about the tens digits. These all total 60 (remind learners that 6 in this position in a number is 6 tens).
  - Ask why they total 60 and not 70. They will explain that the ones column already has a value of 10. Repeat this with 45 and 200.
  - This exercise can be developed further by finding numbers with a difference of 8, 30 and 15. Ask for examples from the group and let them explain how they calculated that the two numbers have this difference.
- Learners will need a set of arrow cards each, cut out from Resource sheet 4. Use only the tens and ones arrow cards at first. You can give the hundreds arrow cards as a challenge to confident learners.
  - Learners should work in pairs, and both make a 2-digit number. Their task is to find the total and the difference between each pair of numbers.
  - Explain that the arrow cards can be separated to help them break up the numbers. This makes it easier to work with them.
  - Extend this activity to finding totals and differences between decimal numbers by partitioning the numbers. Give each learner a set of tenths arrow cards and demonstrate how to partition the tenths, ones and tens in a number.

Thinking and working mathematically

- Remind learners to calculate the totals and differences using mental strategies. Ask them to describe their method. Some might partition as the digit cards are easy to separate. Others may count on and back in their heads, using an imaginary number line. Occasionally, learners will have an alternative method. Accept any strategy that works. However, ensure that they also understand how to partition and use a number line.
- Reduce the number of digits to only four cards (1–4), for learners who find mental strategies difficult. Doing this will give 2-digit totals, and they will not need to carry over. Gradually give them 2 more cards, 5 and 6, then the rest as they gain confidence.
- Challenge learners to take six cards and make two 3-digit numbers under 400. Ask them to find the total and the difference between the two cards. Remind them that they can use any strategy such as partitioning or counting on and back using number lines.

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Unit 2 Integers and powers — Resource sheet 4

Resource sheet 4

Arrow cards

Cut out these arrow cards.

Activities These are practical class, group or individual teaching activities to use with the learners to reinforce their learning.

Thinking and working mathematically This directly links to the activity in the Study Guide, with teacher support given to help learners use their reasoning and problem-solving skills.

Unit 1 Counting and sequences

1.1 Number sequences

Study Guide
pages 6–7

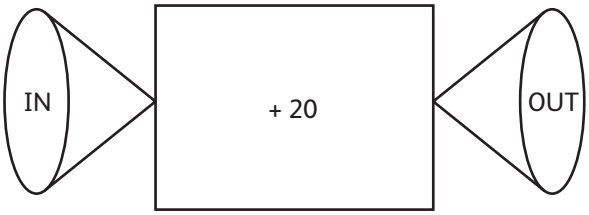
- Resource sheet 1 (per pair)
- Spinner numbered 1–6 (per pair)

Key vocabulary

sequence	pattern
term	negative numbers
difference	

Activities

- Learners work in pairs with Resource sheet 1 and a 1–6 spinner. Explain that they will be 'jumping' along the number line in steps. Learners spin the spinner and jump that number of steps along the number line.
- Complete two examples with the whole class: spin a spinner once and read the number (always ignore the spin if it is 1).
  - Write on the board, *'The rule is to add __'.* (Use the number you spun.)
  - Starting at zero on the first number line, ask learners to use their fingers to jump along in steps by adding the number you spin each time.
  - On the board, write the sequence of numbers on which they land.
  - Spin the spinner again, but this time write on the board *'The rule is to subtract __'.* (Use the number you spun.)
  - Start at 20 on the right side and jump back along the number line, writing each number in the sequence on the board.
- Learners should then work in pairs and take turns spinning the spinner and making their own sequences by jumping in steps.
  - Ask them to record an add rule and a subtract rule for each number line and write the numbers they land on in each sequence.
  - Let them swap papers with another pair of learners and try to discover the rule for one another's sequences.
- Work with the whole class. Draw a function box like this on the board. Explain that this machine adds 20.



  - You can use an actual cardboard box with holes on either side. Place sticky notes on the side to show the function.

    Ask a learner to give you a number. Write the number near IN and ask learners to provide the number that will come out, writing that answer near OUT.
  - Repeat a few times, changing the function and swapping between adding and subtracting. You can use fractions and decimal numbers as functions and starting numbers.
  - When learners are confident about using the function machine, write a function you have used before and give the answer coming OUT, leaving the IN number blank. Ask learners, *'What number do you think went into the machine?'* Repeat a few times.
  - Finally, leave the rule blank and write a number going IN and another coming OUT and ask, *'What is the rule?'* You could use 33 IN and 45 OUT. Repeat a few times.
  - For example, IN = 6.2 and OUT = 6.5, IN = 80 and OUT = 71, IN = 9 and OUT = $8\frac{1}{2}$.
- Learners should work in groups of 3–4. Write this table on the board. Explain that these are the numbers in a sequence if the IN numbers are 1, 2, 3 and 4.

IN	1	2	3	4	?
OUT	4	8	12	16	

- Ask each group to find the rule. Next, ask learners to find the 5th number in this sequence, then the 10th and the 100th number.
- For groups that finish quickly, give them this table:

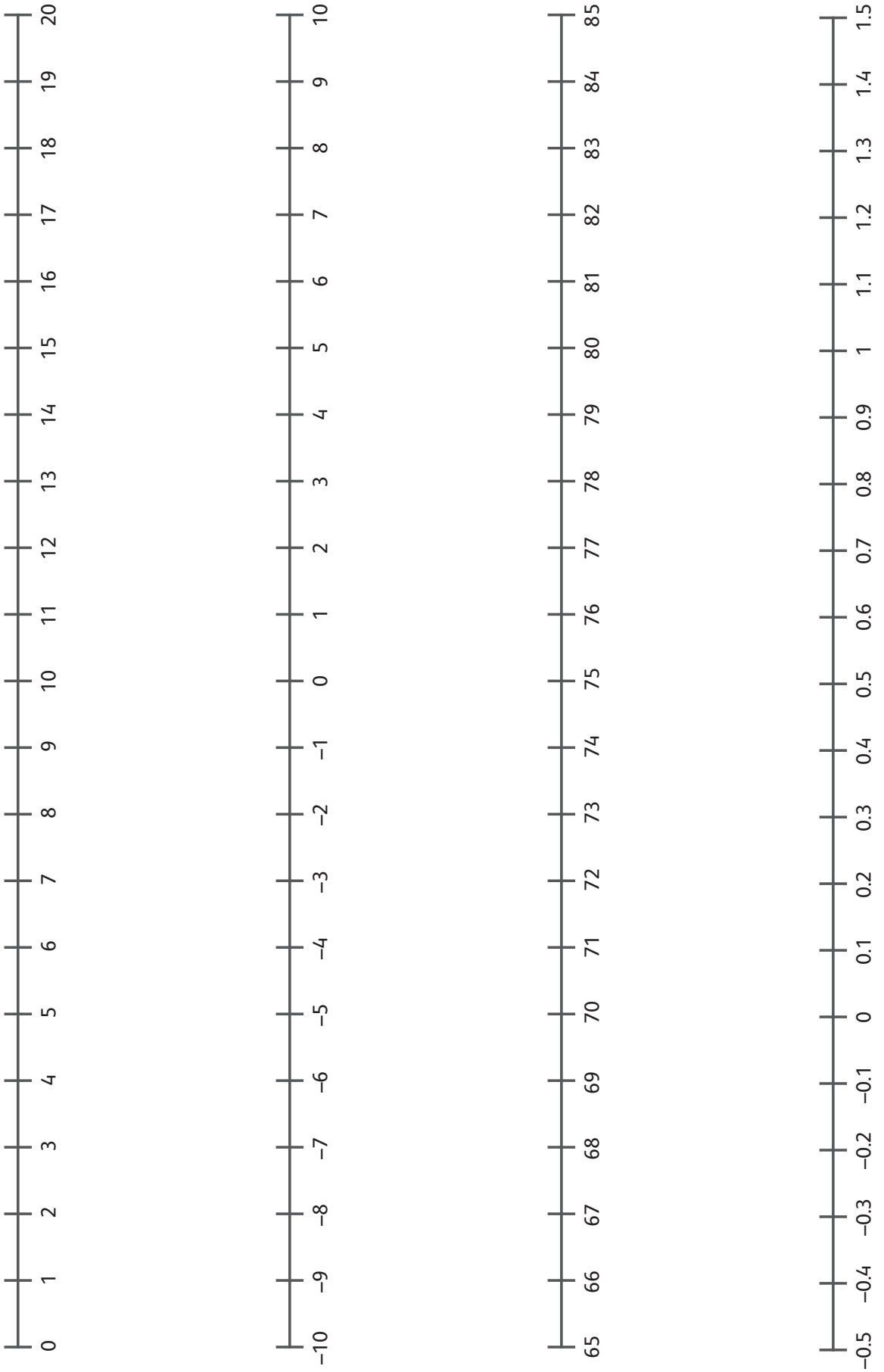
IN	1	2	3	4	?
OUT	0.5	1	1.5	2	

- Bring the whole class together and check that everyone found the 5th, 10th and 100th numbers in the first sequence.
  - Ask one group to give the rule and explain their method to find the 5th number.
  - Ask another group how they found the 10th and 100th numbers.
- Learners may have continued the rule of adding 4 to find the 5th and 10th numbers. However, to find the 100th number, they can multiply.
- Explain the link between repeated addition and multiplication, that adding 4 nine times, 4 + 4 + 4 + 4 + 4 + 4 + 4 + 4 + 4 is the same as 4 × 9. Ask the class for each of these numbers in the sequence: 8th, 20th, 7th, 11th. Write new tables on the board using other multiplication sequences.

Thinking and working mathematically

- Ask learners to look at each rule and the sequences. Will the rule be adding or subtracting?
  - To find out, add 2 to each of the starting numbers. Is the answer greater or smaller? Now subtract 2 from each starting number. Is the answer greater or smaller?
  - Next, look at the last number in each sequence. Is that greater or smaller than the starting number?
  - In conclusion, for each sequence, will the rule be adding or subtracting?
- Learners can use a blank number line to help or imagine the sequence as a number line. Make sure they can see that b) ends with a negative number.
- Encourage learners to use estimation. Look at the first sequence.
  - Is the rule going to be less than or more than 1?
  - If they count on in ones, they will realise that it must be a number less than 1.
- For sequence b), calculate the difference between 25 and –65.
  - 25 to 0 is 25 and 0 to –65 is 65, so 25 + 65 is 90.
  - There are 5 spaces which means the answer will be between 10 and 20.
- Use this same method for c).

Resource sheet 1



1.2 Letters and objects as unknowns

Study Guide
pages 8–9

Key vocabulary
represent unknown quantities

- 12 counters (per pair)
- 2 large containers/boxes
- 8 bricks (or other similar objects)
- 2 containers (teacher only)
- Resource sheet 2 (per pair)

Activities

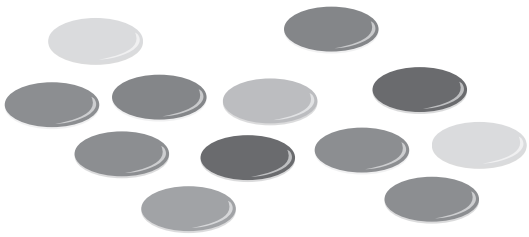
- Use two large boxes/containers and 8 bricks. Hide the bricks and ask the class to close their eyes. Place a different number of bricks in each container. Tell learners you have put all 8 bricks into the two containers without revealing the number in each container. Ask the class how many bricks they think may be in each container.
  - Write their solutions on the board in a table labelled 'Container A' and 'Container B'. Take all possible answers, then ask if any pairs of numbers are not possible.
  - Give your class clues about the number in each container. For example, there is an even number in each container, one container is greater than 5, or there are equal numbers in each container. Continue until someone guesses the correct number of bricks.
  - Select a learner to place the bricks in the containers and allow the class to ask that learner questions about the numbers to help them guess the correct number.
- Learners can play a variation of the activity above as a game in groups of 4–5 using 20 counters.
  - Learners should take turns placing different numbers of counters under their hands or in two bags. The rest of the group writes a possible solution.
  - Next, the players count the amount in each set. Players get a point if they have guessed the exact number in the two groups. The player with the most points at the end is the winner.
- Learners should work in pairs with Resource sheet 2 and 12 counters (or cubes).
  - In question 1, learners place counters in the containers and fill all possibilities in the chart.
  - Question 2 uses letters to represent counters of different colours: b for blue and r for red. Remind learners that there are still 12 counters in total.
  - It would help if they wrote out the calculation by replacing each letter with a known value, $12 - 4 = r$ and $12 = 9 + b$. Explain that $12 = 9 + \boldsymbol{b}$ can be written as $12 - \boldsymbol{b} = 9$.
  - For question 3, learners still start with 12 counters, but this time they are a mix of three different colours. They must find as many solutions as possible. Do not expect them to find all the possible solutions. Check that all the solutions total 12.

Thinking and working mathematically

- If learners find the formula for finding an area challenging to understand, draw a 3 cm × 4 cm rectangle on centimetre squared paper. Count the squares to give the area of the rectangle. Write the length and width on the rectangle and multiply to show that it equals the same area. You can show the same for the formula for finding the perimeter of a rectangle. Count the squares to show learners that you need to add the length and the width, then multiply by 2 (or add the other two sides).
- Encourage learners to write a calculation to include l for the missing length. $20\,\text{cm}^2 = 2.5\,\text{cm} \times l$. Explain this can be written using the inverse calculation $l = 20 \div 2.5$. They can use the same method to find the perimeter, replacing the letter with numbers, $P = 2(8 + 2.5) \rightarrow P = 2 \times 10.5 \rightarrow P = 21\,\text{cm}$

Resource sheet 2

You will need 12 counters.



Put all 12 of your counters into the containers.
How many different ways can you place all the counters in containers A and B?

1 Record your results here:

A											
B											

2 If some of the counters are blue (b) and the rest are red (r), use the table to help answer these.

a $b = 4$ → $12 - b = r$ → $r =$ ☐

b $r = 9$ → $12 = r + b$ → $b =$ ☐

3 If there are 3 different colours of counters, blue (b), red (r) and yellow (y), what are the possible values of b, r and y?
Record ten of your solutions in the table.
Place your 12 counters in the containers labelled b, r and y.

b	+	***r***	+	***y***	=	**12**

b	***r***	***y***

Unit 2 Integers and powers

2.1 Addition and subtraction

Study Guide
pages 10–11

- Resource sheet 3 (per group)
- Digit cards 0–9 (per group)
- 2 1–6 spinners (per pair)
- 1 counter (per pair)
- 1 sheet of A4 paper and a ruler (per pair)

Key vocabulary

add	subtract
estimate	approximate
round	negative numbers
difference	

Activities

- Play 'Match my answer' with the whole class. Write this addition on the board: 36.82 + 27.09.
  - Ask learners to find the answer and then write new additions using two different numbers that give the same answer.
  - Once all learners have completed at least one new addition, ask for the original answer and 5 or 6 example additions to write on the board. Check that the answer is the same each time.
  - Ask a learner to explain their method of finding new additions. They may have made one number and used subtraction from the answer to find the other number.
  - Ask if anyone used a different method. Accept all methods that work. Repeat the activity but change the starting number to include 3 place decimals and subtraction.
- Learners should work in groups of 3–4 with Resource sheet 3 and a set of digit cards 0–9.
  - Let each learner choose 4 of the digit cards so that they each make different numbers. Learners should follow the instructions on the sheet and check that their group members have correctly made the largest and smallest possible number with their 4 digits and have subtracted correctly.
- Learners should work in pairs with 2 spinners and 1 counter.
  - Let them use a ruler to draw one number line 24 cm long with markers every centimetre, labelled –12 to 12. Check that they include zero. Learners must place their counter at zero on the number line.
  - Next, both learners spin their 1–6 spinner. The learner with the odd number will add, and the learner with the even number will subtract. If both numbers are odd or even, spin again.
  - The learner with the highest number starts. Learners take turns to spin their spinners and move the counter along the number line, one learner adding every spin, the other subtracting.
  - The target is to get back to zero in as few spins as possible. If the counter goes beyond –12 or 12, the game is finished, and they start back at zero.
  - They should record how many spins it takes to reach zero and then try to beat that score next time.

Thinking and working mathematically

- For learners using written addition or subtraction methods and trial and error at the start to solve the task, prompt them to round each number to the nearest tenth. Remind learners that if the digit is 4 or less, it rounds down and digits 5 or more round up.
- Some learners may need a worked example.
  - Start with 5.093 and round it to 5.1. Can they find another tenth that, when added to 0.1, gives a whole number? 0.1 + ? = 1.
  - Ask them to look for a number with a tenth that rounds to 0.9.

- Once they have found 2.907, ask them to add the two full numbers either mentally or using a written method to check the answer.
- It is important to add the two original numbers in case, by rounding, the answer is not an exact whole number.
- For example, 7.283 rounds to 7.3 and 9.719 rounds to 9.7. When rounded 7.3 + 9.7 gives a whole number 17. However, 7.283 + 9.719 = 17.002.
- As learners gain confidence, they will start to check the hundredths and thousandths using mental methods, only using written addition for the final check.

- As a challenge to confident learners, ask if they have noticed a pattern in the digit totals in pairs of decimals numbers that total a whole number. The sum of the thousandth digits is 10, and the totals of the hundredths and tenths digits are 9.
- Ask learners to explain why this is always true. They may use a written method and demonstrate it to the class. As an extension, ask how this would change if you added numbers with only two decimal places.

Resource sheet 3

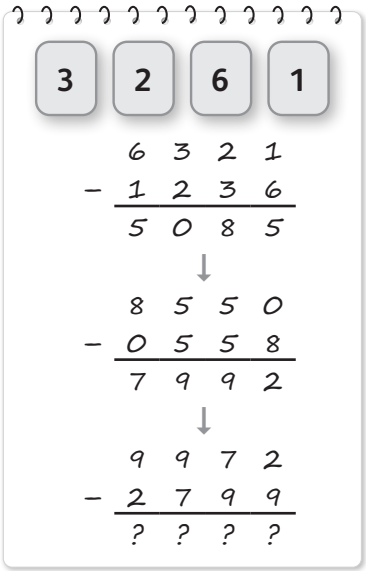
Difference chains

You will need digit cards 0–9.

Follow these instructions:

1. Choose 4 digit cards.
2. Make the largest possible number using your 4 digits.
3. Make the smallest possible number using your 4 digits.
4. Find the difference between your 2 numbers.
5. Make the largest possible number using the 4 digits from your new number.
6. Make the smallest possible number using the same new 4 digits.
7. Find the difference between these new two numbers.
8. Continue using the 4 digits from the last answer to make the largest and smallest possible number. Then find the difference until the chain ends.
9. Make 4 or more Difference chains.
10. What do you notice about the Difference chains?

For example:



2.2 Mental calculation strategies

Study Guide
pages 12–13

Key vocabulary
add subtract partition

- Digit cards 1–9 (per learner)
- Resource sheet 4 (per learner)

Activities

- Learners should work in groups of 4–5.
  - Ask them to find pairs of numbers that can be added in their head to a total of 70. When each group has at least ten solutions, bring the whole class together and ask which pairs of numbers were the easiest to total in their head.
  - They will choose ten pairs of numbers, such as, 20 + 50 and 30 + 40. Ask for a pair of numbers from each group (do not include numbers ending in zero) and write the addition on the board.
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Thinking and working mathematically

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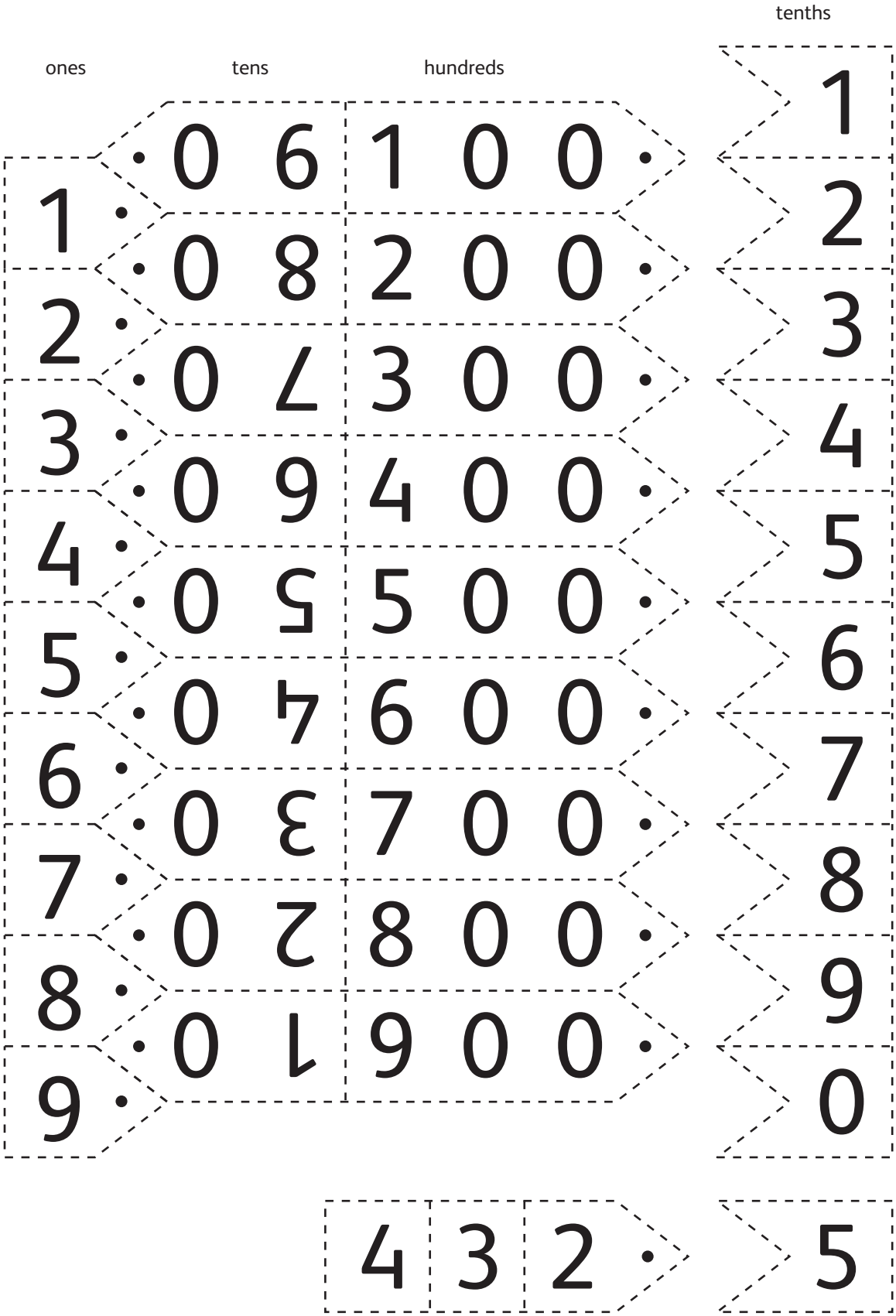
- Challenge learners to take six cards and make two 3-digit numbers under 400. Ask them to find the total and the difference between the two cards. Remind them that they can use any strategy such as partitioning or counting on and back using number lines.

Resource sheet 4

Arrow cards

Cut out these arrow cards.



2.3 Brackets and order of operations

Study Guide
pages 14–15

Key vocabulary
order operations brackets

- Resource sheet 5 (per learner)
- Fours cards with +, –, ×, ÷ (per group)
- Four cards with brackets (, (,),) (per group)
- Digit cards 1–9 (per group)

Activities

- Play 'Think of a number' with the whole class. It may be helpful if learners have a pen and paper to write their starting number and answers.
  - Ask them to *'Think of a number less than 10, double it, add 12, subtract 8, halve it, and take away their starting number. The answer is 2'.*
  - Repeat this with different operations to make your own clues. Ensure that you include the inverse of any operation (if you add 20, you could subtract 8 and later subtract 12). Always ask learners to take away their starting numbers.
  - After 3–4 have been completed, discuss why it is possible to predict the final number with the class. Challenge learners to make up their own rules for a number game. They can work in pairs and swap their clues with another team to work out one another's answers.
- Learners should work in groups of 3–4 with four operations cards showing +, –, × and ÷ signs, four cards making 2 pairs of brackets and digit cards 1–9.
  - Write *'The answer is 21'* on the board. Ask learners to make a calculation with the cards to give this answer. They must use brackets and at least two operation signs.
  - Ask them to make a different calculation using different operation signs. Challenge learners to make this answer using all four operation signs. Repeat with other answers less than 30.
- Learners must work in pairs to investigate square numbers. Write these calculations on the board:
  $2^2 = (1 \times 3) + 1$ $3^2 = (2 \times 4) + 1$ $4^2 = (3 \times 5) + 1$.
  Explain that you can find a square number by multiplying the numbers on each side of it (for example $3^2 \rightarrow 2 \times 4$) and adding 1. Ask learners to investigate other square numbers to see if the pattern continues. To challenge learners, ask them to investigate cube numbers too. Write these on the board:
  $2^3 = (1 \times 2 \times 3) + 2$ $3^3 = (2 \times 3 \times 4) + 3$ $4^3 = (3 \times 4 \times 5) + 4$.
  Let learners work out the pattern for themselves and see if it continues for other cube numbers.

Thinking and working mathematically

- If learners need help to start, work through a) together. Start with the answer, 17, then read the second part, *'add 3.'* Explain that a number add 3 gives a total of 17 and write ? + 3 = 17 on the board.
  - Ask them to calculate the missing number and write 14 + 3 = 17 on the board.
  - Now read the first part of the question, *'I double my number'*, and explain that 14 is the answer when you double the number. Write ? × 2 = 14 on the board and ask for the missing number.
  - Next ask *'What's my number?'* and write 7 on the board. Write the whole calculation on the board and read through the question again, (7 × 2) + 3 = 17.
- Ask learners to write a calculation for each question, using an empty box for the missing starting number, for example, (☐ ÷ 3) +5 = 12.
- Ask learners to write their own *'What's my number?'* clues and swap with other learners to find one another's answers.

Cambridge Primary
Revise for Primary Checkpoint

Mathematics Teacher's Handbook

Second Edition

Focus revision where learners need most support and ensure coverage of the Cambridge Primary Mathematics curriculum framework with easy to follow teaching notes.

- Assess knowledge and progress with structured practice tests and whole-class activities.
- Improve understanding and technique with photocopiable resources such as practice questions and games.
- Introduce strategies for supporting recall and revision with further ideas to stretch learners and marking guidance.

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