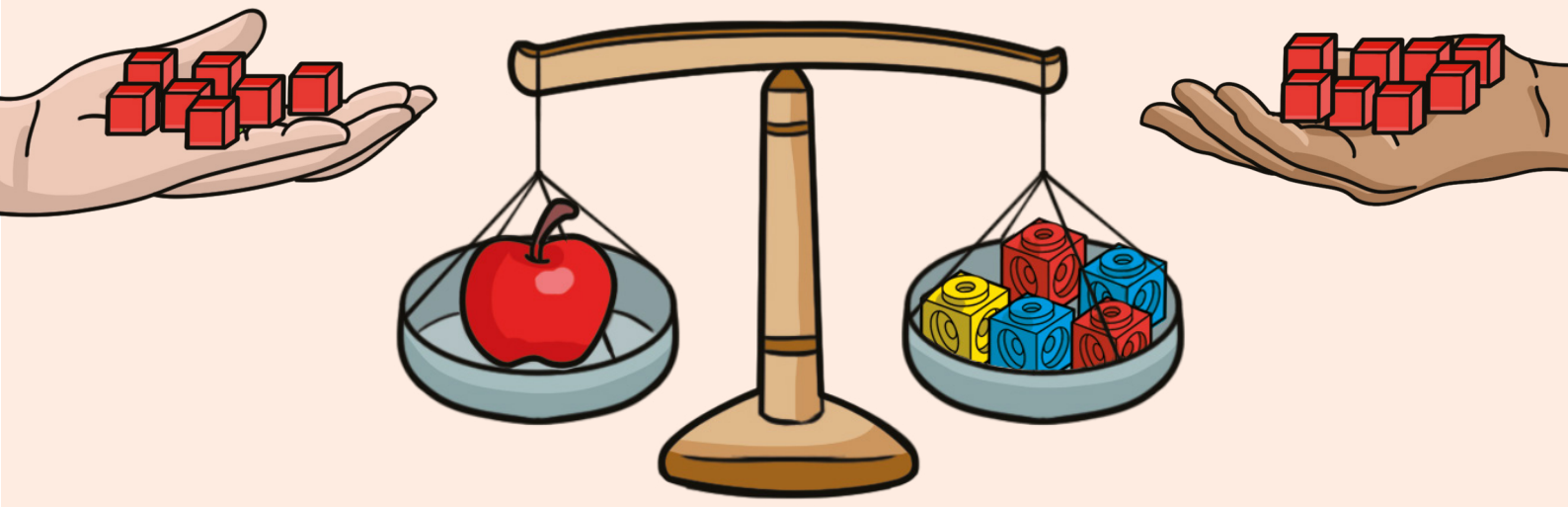
Oxford International Primary **Maths**

How Oxford International Primary Maths supports a Mastery approach

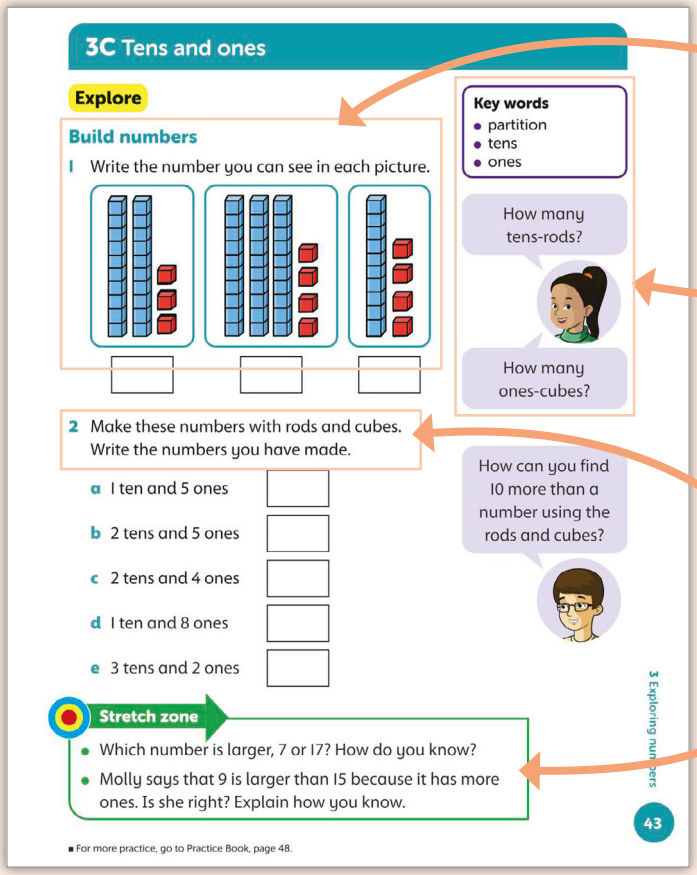
Oxford International Primary Maths embeds a mastery approach to learning and teaching mathematics. The essence of mastery is to develop students who have a deep conceptual understanding of mathematics and a procedural fluency through learning in a collaborative and problem-solving context. The Oxford International Primary Maths approach to mastery includes:

- A concrete, pictorial, abstract (CPA) approach to learning number and calculation including the use of manipulatives and a range of representations of the number system
- The development of mathematical thinking including developing reasoning skills
- Fluency, particularly around number facts
- Small steps approach to developing conceptual understanding
- Whole class teaching and differentiation through depth
- The development of mathematical language

The following extracts from Oxford International Primary Maths show how mastery learning is supported. There are three main components of the course: Student Books; Practice Books and Teacher's Guides. The following exemplars draw on all three components. They also draw from across the age range of learners, from Stage 1 to Stage 6.



Concrete, pictorial, abstract (CPA) approach



3C Tens and ones

Explore

Build numbers

1 Write the number you can see in each picture.

Key words
- partition
- tens
- ones

How many tens-rods?

How many ones-cubes?

2 Make these numbers with rods and cubes. Write the numbers you have made.

a 1 ten and 5 ones

b 2 tens and 5 ones

c 2 tens and 4 ones

d 1 ten and 8 ones

e 3 tens and 2 ones

How can you find 10 more than a number using the rods and cubes?

Stretch zone

- Which number is larger, 7 or 17? How do you know?
- Molly says that 9 is larger than 15 because it has more ones. Is she right? Explain how you know.

For more practice, go to Practice Book, page 48.

3 Exploring numbers

43

Page offers pictorial version of concrete materials to support visualisation of place value.

Modelling of mathematical language.

Activity developed practically using manipulatives.

Applying ideas in the abstract. Pictorial representations such as a 100 square could also be used for support.

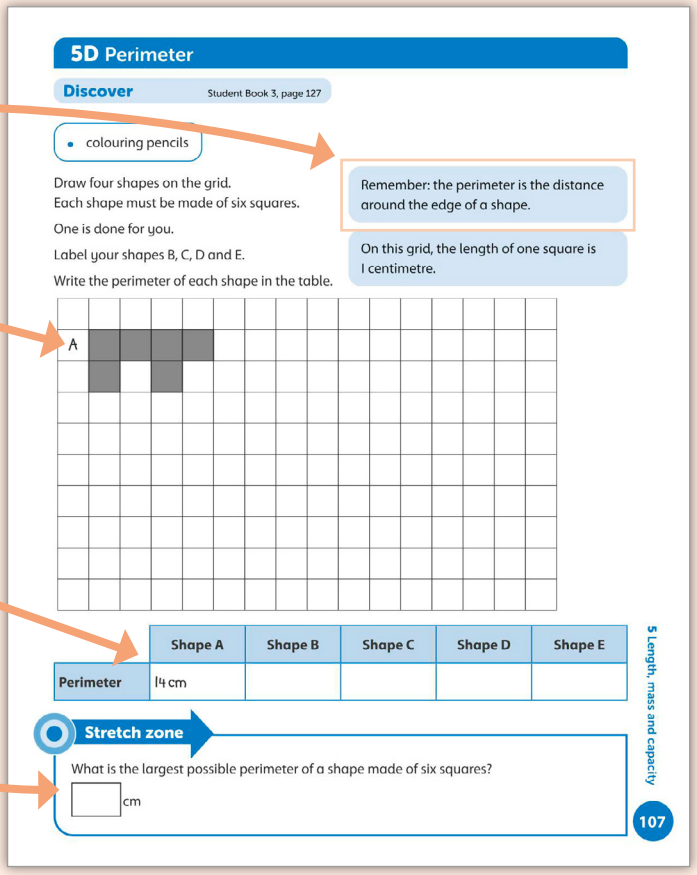
Mathematical thinking

Drawing on previous understanding to support access to activity.

Repeat activity to allow for specialisation and generalisation.

'Cognitive conflict' to motivate mathematical thinking. Students come to understand that not all shapes with the same area have the same perimeter.

Stretch zone encourages students to apply new learning.



5D Perimeter

Discover Student Book 3, page 127

- colouring pencils

Draw four shapes on the grid.
Each shape must be made of six squares.
One is done for you.
Label your shapes B, C, D and E.
Write the perimeter of each shape in the table.

Remember: the perimeter is the distance around the edge of a shape.

On this grid, the length of one square is 1 centimetre.

A

	Shape A	Shape B	Shape C	Shape D	Shape E
Perimeter	14 cm				

Stretch zone

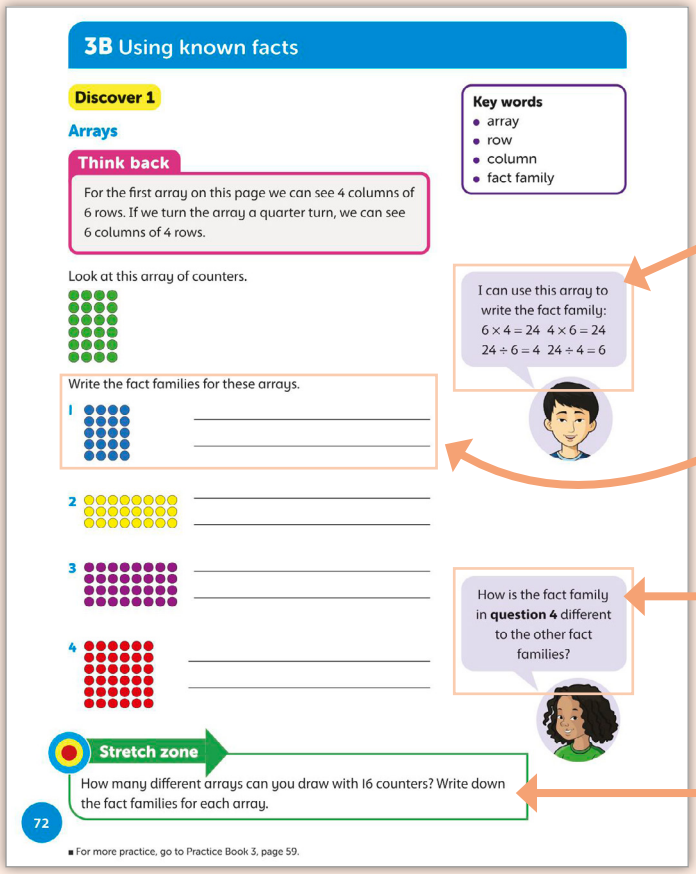
What is the largest possible perimeter of a shape made of six squares?

cm

5 Length, mass and capacity

107

Fluency



3B Using known facts

Discover 1

Arrays

Think back

For the first array on this page we can see 4 columns of 6 rows. If we turn the array a quarter turn, we can see 6 columns of 4 rows.

Key words
- array
- row
- column
- fact family

Look at this array of counters.

I can use this array to write the fact family:
$6 \times 4 = 24$ $4 \times 6 = 24$
$24 \div 6 = 4$ $24 \div 4 = 6$

Write the fact families for these arrays.

1

2

3

4

How is the fact family in **question 4** different to the other fact families?

Stretch zone

How many different arrays can you draw with 16 counters? Write down the fact families for each array.

72

For more practice, go to Practice Book 3, page 59.

Make connections between different number facts.

Use pictorial representations to support development of fluency.

Use known facts to derive new facts.

Develop families of facts to cement connections.

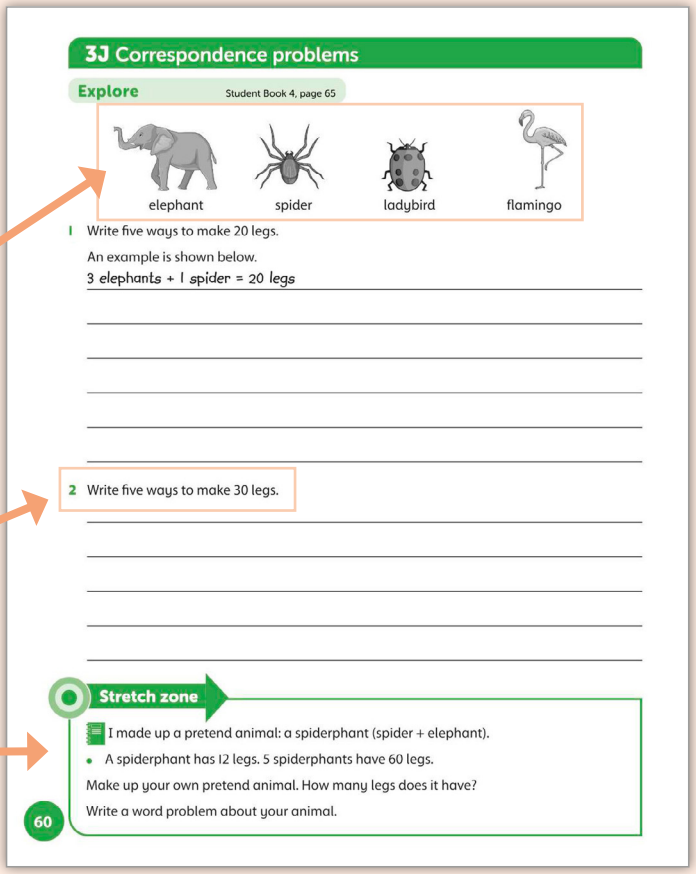
Small steps

Accessible to all learners. Additional support using concrete objects or representations.

Children can draw or make the animals and touch count the legs.

Differentiation by outcome. Teachers encourage challenge and stretch.

Extension to offer greater depth.



3J Correspondence problems

Explore Student Book 4, page 65

elephant

spider

ladybird

flamingo

1 Write five ways to make 20 legs.

An example is shown below.

3 elephants + 1 spider = 20 legs

2 Write five ways to make 30 legs.

Stretch zone

I made up a pretend animal: a spiderphant (spider + elephant).

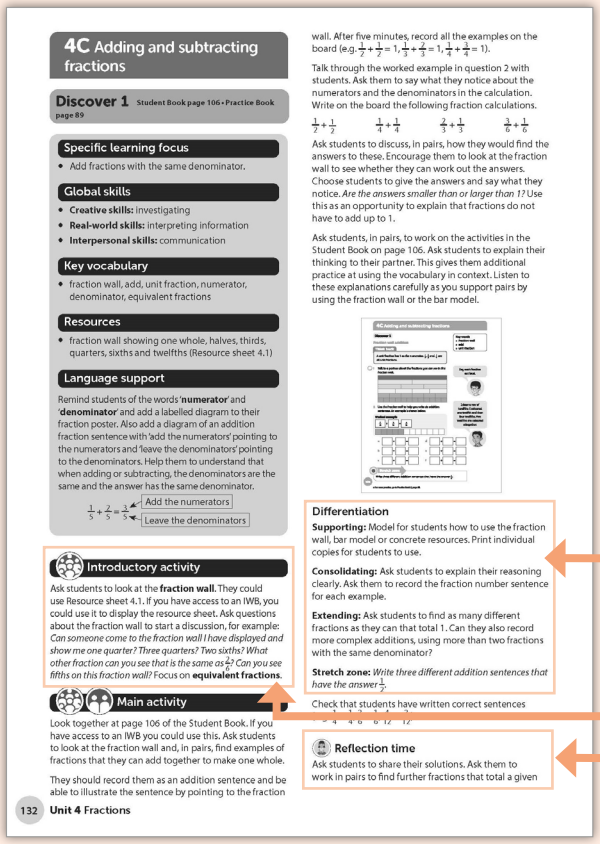
- A spiderphant has 12 legs. 5 spiderphants have 60 legs.

Make up your own pretend animal. How many legs does it have?

Write a word problem about your animal.

60

Whole class teaching



4C Adding and subtracting fractions

Discover 1 Student Book page 106 • Practice Book page 89

Specific learning focus
- Add fractions with the same denominator.

Global skills
- **Creative skills:** Investigating
- **Real-world skills:** interpreting information
- **Interpersonal skills:** communication

Key vocabulary
- fraction wall, add, unit fraction, numerator, denominator, equivalent fractions

Resources
- fraction wall showing one whole, halves, thirds, quarters, sixths and twelfths (Resource sheet 4.1)

Language support

Remind students of the words '**numerator**' and '**denominator**' and add a labelled diagram to their fraction poster. Also add a diagram of an addition fraction sentence with 'add the numerators' pointing to the numerators and 'leave the denominators' pointing to the denominators. Help them to understand that when adding or subtracting, the denominators are the same and the answer has the same denominator.

$\frac{1}{5} + \frac{2}{5} = \frac{3}{5}$ — Add the numerators; Leave the denominators

Introductory activity

Ask students to look at the **fraction wall**. They could use Resource sheet 4.1. If you have access to an IWB, you could use it to display the resource sheet. Ask questions about the fraction wall to start a discussion, for example: *Can someone come to the fraction wall I have displayed and show me one quarter? Three quarters? Two sixths? What other fraction can you see that is the same as $\frac{2}{3}$? Can you see fifths on this fraction wall?* Focus on **equivalent fractions**.

Main activity

Look together at page 106 of the Student Book. If you have access to an IWB you could use this. Ask students to look at the fraction wall and, in pairs, find examples of fractions that they can add together to make one whole.

They should record them as an addition sentence and be able to illustrate the sentence by pointing to the fraction wall. After five minutes, record all the examples on the board (e.g. $\frac{1}{2} + \frac{1}{2} = 1$, $\frac{1}{3} + \frac{2}{3} = 1$, $\frac{1}{4} + \frac{3}{4} = 1$).

Talk through the worked example in question 2 with students. Ask them to say what they notice about the numerators and the denominators in the calculation. Write on the board the following fraction calculations.

$\frac{1}{2} + \frac{1}{2}$ $\quad \frac{1}{4} + \frac{1}{4}$ $\quad \frac{4}{5} + \frac{1}{5}$ $\quad \frac{3}{6} + \frac{1}{6}$

Ask students to discuss, in pairs, how they would find the answers to these. Encourage them to look at the fraction wall to see whether they can work out the answers. Choose students to give the answers and say what they notice. *Are the answers smaller than or larger than 1?* Use this as an opportunity to explain that fractions do not have to add up to 1.

Ask students, in pairs, to work on the activities in the Student Book on page 106. Ask students to explain their thinking to their partner. This gives them additional practice at using the vocabulary in context. Listen to these explanations carefully as you support pairs by using the fraction wall or the bar model.

Differentiation

Supporting: Model for students how to use the fraction wall, bar model or concrete resources. Print individual copies for students to use.

Consolidating: Ask students to explain their reasoning clearly. Ask them to record the fraction number sentence for each example.

Extending: Ask students to find as many different fractions as they can that total 1. Can they also record more complex additions, using more than two fractions with the same denominator?

Stretch zone: *Write three different addition sentences that have the answer $\frac{1}{2}$.*

Check that students have written correct sentences

Reflection time

Ask students to share their solutions. Ask them to work in pairs to find further fractions that total a given

132 **Unit 4** Fractions

Advice for differentiation through additional resources or differential questioning, not alternative activity.

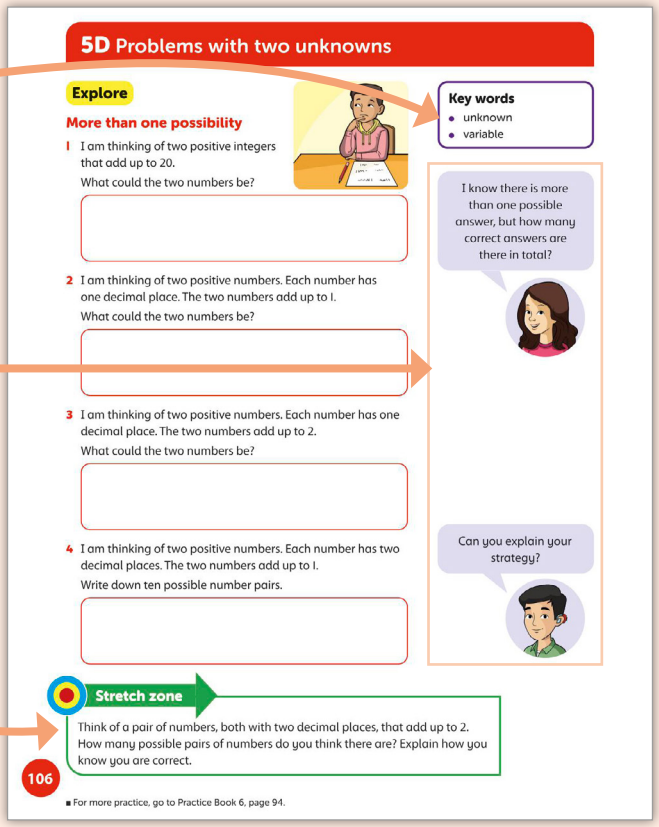
Teacher's Guide offers advice and support for whole class teaching at beginning and end of each lesson.

Mathematical language

Key words introduced in context.

Mathematical discussion and conversation encouraged.

Discussions about mathematical thinking expected.



5D Problems with two unknowns

Explore

More than one possibility

1 I am thinking of two positive integers that add up to 20.
What could the two numbers be?

2 I am thinking of two positive numbers. Each number has one decimal place. The two numbers add up to 1.
What could the two numbers be?

3 I am thinking of two positive numbers. Each number has one decimal place. The two numbers add up to 2.
What could the two numbers be?

4 I am thinking of two positive numbers. Each number has two decimal places. The two numbers add up to 1.
Write down ten possible number pairs.

Key words
- unknown
- variable

I know there is more than one possible answer, but how many correct answers are there in total?

Can you explain your strategy?

Stretch zone

Think of a pair of numbers, both with two decimal places, that add up to 2. How many possible pairs of numbers do you think there are? Explain how you know you are correct.

106

For more practice, go to Practice Book 6, page 94.