Lesson 3 Using fractions

Objectives

Order fractions … and position them on a number line (Y6)

Vocabulary

gauge, litre

numerator, denominator

order

Resources

OHT 3.1

individual whiteboards (optional)

Oral and mental starter 15 minutes

Show **OHT 3.1**. Ask pupils to read the question.

Wait a few minutes then take responses.

Q How did you work out the answer?

Some pupils may consider the gauge to be a 0 to 60 'number line' and work out 45. Others may say that the tank is three-quarters full, and then calculate $\frac{3}{4}$ of 60.

Repeat for tanks of different sizes.

Clarify the meaning of *a fraction as a number*, with a position on a number line, and *a fraction as an operator* – a fraction of a quantity.

On the board draw a 0 to 1 number line and ask a pupil to estimate where $\frac{1}{8}$ lies on it. Repeat for other unitary fractions (numerator = 1) and then fractions such as $\frac{5}{8}$, $\frac{7}{10}$. You may prefer pupils to do this individually, displaying their answers on whiteboards.

Using a 0 to 10 number line, repeat the process with examples of fractions greater than 1 (e.g. $2\frac{1}{4}$, $3\frac{2}{5}$).

Main teaching 35 minutes

Objectives

Calculate simple fractions of quantities and measurements (Y7)

Order fractions (Y6)

Use names and abbreviations of units of measurement (Y7)

Vocabulary

kilogram kg, gram g

kilometre km

hour h, minute min

order

Resources

OHT 3.2

Springboard 7 Unit 13

OHT 3.3 (Plenary)

Begin by chanting fractions:

$\frac{1}{3}$ of 1 = $\frac{1}{3}$	$\frac{1}{3}$ of 2 = $\frac{2}{3}$	$\frac{1}{3}$ of 3 = 1	$\frac{1}{3}$ of 4 = $1\frac{1}{3}$
$\frac{1}{3}$ of 5 = $1\frac{2}{3}$	$\frac{1}{3}$ of 6 = 2	$\frac{1}{3}$ of 7 = $2\frac{1}{3}$	$\frac{1}{3}$ of 8 = $2\frac{2}{3}$
$\frac{1}{3}$ of 9 = 3	$\frac{1}{3}$ of 10 = $3\frac{1}{3}$	$\frac{1}{3}$ of 11 = $3\frac{2}{3}$	$\frac{1}{3}$ of 12 = 4

Explain how to find a fraction of a quantity.

Q Find $\frac{4}{5}$ of 20 litres.

Q Find $\frac{7}{10}$ of 200 metres.

Take pupils' suggestions. Check that they have a reliable method for calculation, for example find $\frac{1}{5}$ of 20, then multiply by 4; to find $\frac{7}{10}$ of 200, find $\frac{1}{10}$ of 200, then multiply by 7, or find $\frac{7}{10}$ of 100, then multiply by 2.

Emphasise that the answer should be expressed in the correct units.

OHT 3.2 contains a set of similar questions.

Emphasise the need to calculate the numerical answer and state the appropriate units.

Discuss which are mental calculations and which require some written working.

Explain the difference between the question types: *find [fraction] of …* and *what fraction of ... is ...?*

Springboard 7 Unit 13 pages 425–426 provide further examples involving money, time and measures.

Plenary 10 minutes

By the end of the lesson

pupils should be able to:

- order simple fractions;
- work out fractions of quantities and measurements.

Framework supplement of examples pages 66–69

Level 4

Use the test question on **OHT 3.3**.

Ask pupils to order the fractions, starting with the smallest.

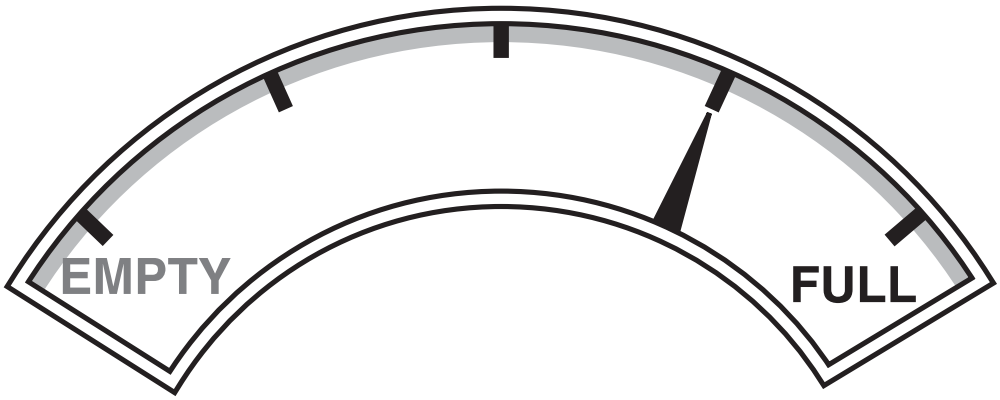
Rectify any errors, distinguishing between careless errors and misconceptions.

A common misconception is for pupils to order the denominators ignoring the numerators. Use a list of fractions with the same denominator but different numerators to check pupils' understanding.

Ask pupils to draw a picture to explain that $\frac{1}{2}$ of $\frac{1}{4}$ is $\frac{1}{8}$. Share their explanations.

Fractions

A car's petrol tank holds 60 litres when it is full.



How much petrol is in the tank now?

More fractions

1 What is $\frac{3}{10}$ of 600 m?

2 What is $\frac{3}{10}$ of 5 m? Give your answer in centimetres.

3 What fraction of a leap year is 1 week?

4 What is $\frac{4}{5}$ of 6 litres?

5 What is $\frac{3}{4}$ of 12 m?

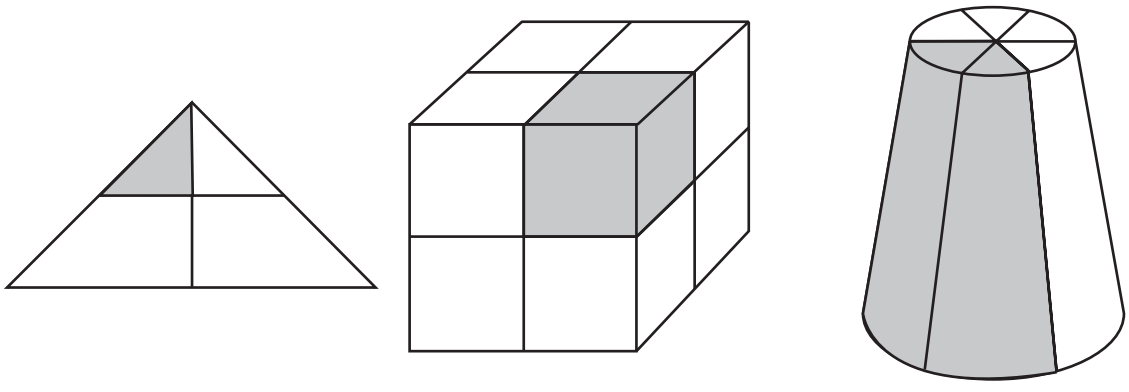
6 What fraction of 1 kilogram is 400 grams?

7 What is $\frac{3}{8}$ of £8.80?

8 Find $\frac{7}{9}$ of 90.

9 $\frac{2}{3} \times 24$

10 What fractions of these shapes are shaded?



a b c

Ordering fractions

Put these fractions in order.

Explain your reasoning.

$\frac{5}{8}$ $\frac{1}{2}$ $\frac{3}{8}$ $\frac{5}{16}$ $\frac{1}{4}$

Lesson 4 Fractions and decimals

Oral and mental starter 15 minutes

Objectives

Reduce a fraction to its simplest form by cancelling common factors in the numerator and denominator (Y6)

Recognise the equivalence between decimal and fraction forms (Y6)

Vocabulary

fraction, equivalent,

numerator, denominator

Resources

OHT 4.1

Show **OHT 4.1** with $\frac{3}{4}$ written in the centre. Ask pupils to suggest equivalent fractions to $\frac{3}{4}$. Through a series of questions lead pupils to the idea of a multiplier for both numerator and denominator to obtain equivalent fractions.

Q How do you get from $\frac{3}{4}$ to $\frac{9}{12}$?

Q If the numerator is 15, what will the denominator be? How do you know?

Extend so that pupils see the equivalence between fraction and decimal forms.

Q Can you write $\frac{3}{4}$ in another way? … as a decimal? (0.75)

Repeat with 0.1 written in the centre of **OHT 4.1**, looking for fraction equivalents. Ensure pupils see that 0.1 is equivalent to $\frac{1}{10}$ and $\frac{10}{100}$.

Ask pupils, working in pairs, to do the same with $\frac{24}{60}$.

Draw this together and show that the key equivalent fractions are $\frac{2}{5}$ and 0.4.

Discuss how pupils arrived at these.

Check that pupils can obtain equivalent fractions by dividing numerator and denominator by the same divisor.

Main teaching 35 minutes

Objectives

Recognise the equivalence between decimal and fraction forms (Y6)

Vocabulary

fraction, equivalent, numerator, denominator

Resources

4 counting sticks

Springboard 7 Unit 5

OHTs 4.2 and 4.3 (Plenary)

Use three counting sticks divided into ten sections.

Ask pupils to arrange the following sets of fractions on separate sticks.

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

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

0, 0.2, 0.4, 0.6, 0.8, 1

Compare the counting sticks by aligning them beneath each other.

Q What do you notice about $\frac{4}{10}$ and 0.4?

Q Is any other fraction the same as 0.4?

Q What do you notice about $\frac{3}{10}$? Between which two values does it lie?

Q What is the decimal equivalent of $\frac{3}{10}$?

Repeat for other values.

Ask a pupil to place the numbers 0, $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, 1 on a fourth counting stick.

Line up this stick with the others.

Q Which values are the same as $\frac{1}{2}$?

Q Between which two decimal values does a quarter lie?

Q What is the decimal equivalent of $\frac{1}{4}$? ... of $\frac{3}{4}$?

Ask pupils to imagine a 0 to 1 number line with 100 divisions.

Count from 0 to 0.12 together (0, 0.01, 0.02 ... 0.12).

Q What is the first number after zero on the line? (0.01)

Q What is the middle number? (0.5)

Q What is the number on the line immediately before the middle? (0.49)

Q Where would $\frac{19}{100}$ be?

Q Where would $\frac{7}{10}$ be?

Repeat for other fractions.

Springboard 7 Unit 5 pages 189 and 190 provide further practice examples.

By the end of the lesson

pupils should be able to:

- find equivalent fractions;
- convert between decimals and fractions.

Framework supplement of examples pages 60–65

Level 4

Plenary 10 minutes

Use **OHT 4.2** to make connections between equivalent fractions.

Pupils should learn key conversions and order simple fractions.

Use **OHT 4.3**, which is based on a test question on equivalent fractions.

Ask pupils to answer the questions, then discuss their responses.

What errors did pupils make?

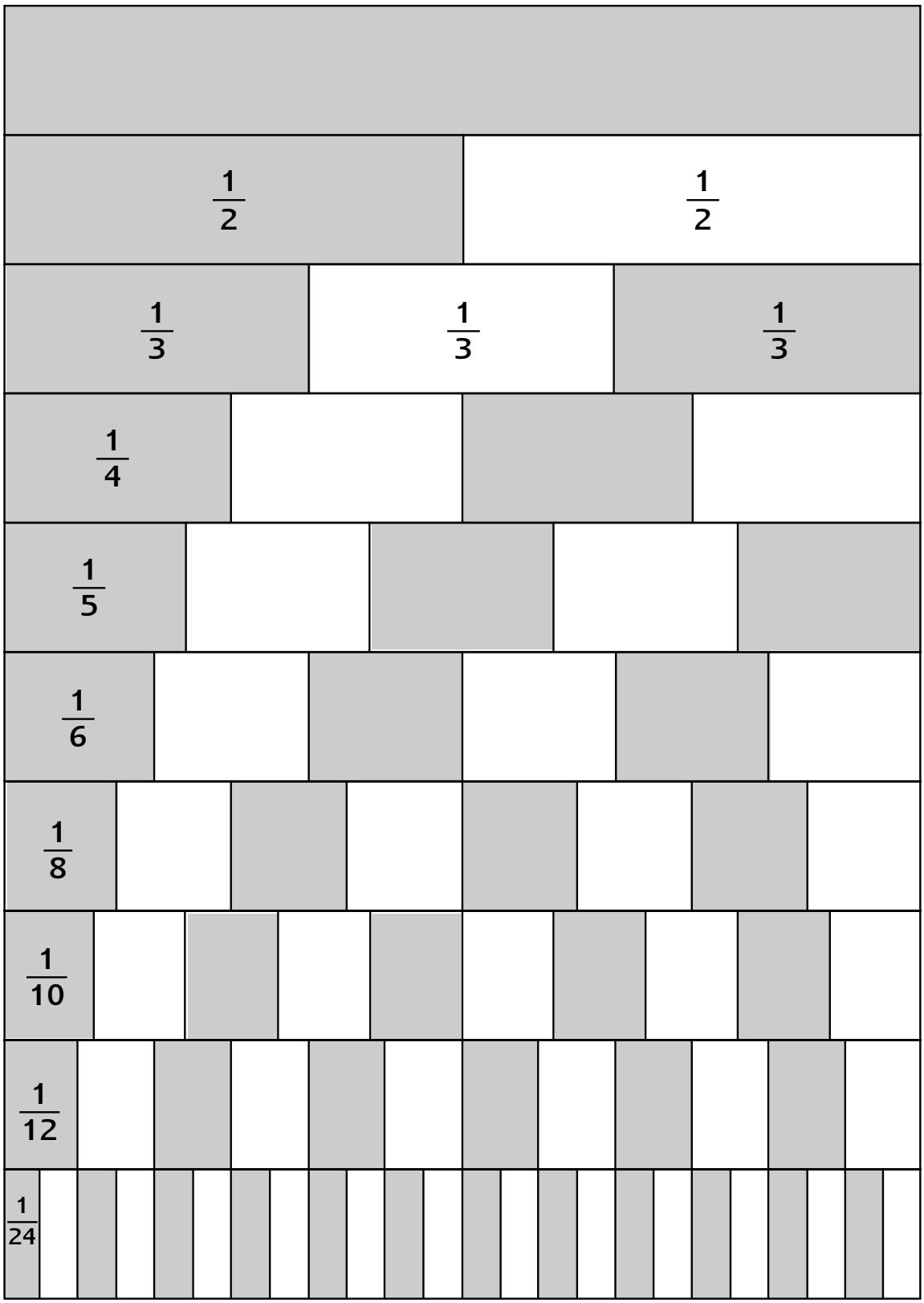
Correct any misconceptions.

Equivalent fractions

OHT 4.1

OHT 4.2

More equivalent fractions



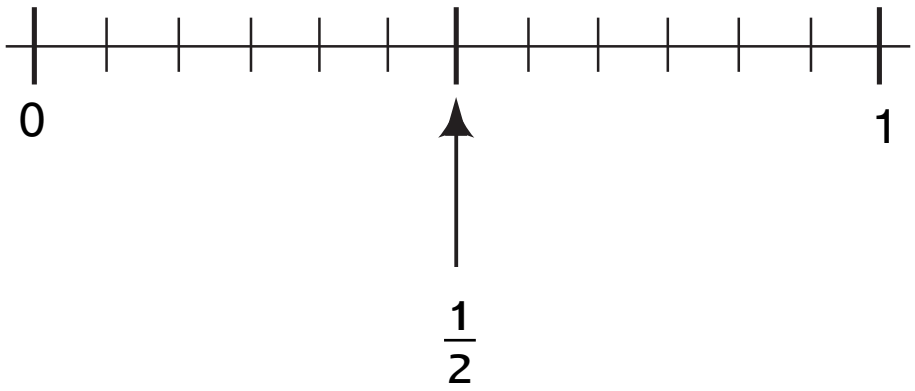
Fraction problems

1 Look at these fractions.

$\frac{1}{2}$ $\frac{1}{3}$ $\frac{5}{6}$

Mark each fraction on the number line.
The first one is done for you.

The first one is done for you.



1 mark

2 Fill in the missing numbers in the boxes.

$\frac{2}{12} = \frac{\square}{6}$

$\frac{1}{2} = \frac{12}{\square}$

$\frac{1}{\square} = \frac{6}{24}$

2 marks

Lesson 5 Probability

Oral and mental starter — 15 minutes

Objectives

Use vocabulary and ideas of probability drawing on experience (Y7)

Vocabulary

certain, uncertain,
good chance, no chance
impossible, even chance
equally likely, possible
likely, unlikely, not likely, fair
unfair, random, risk

Resources

Resource sheet 5.1a–d, possibly made into word cards

You may want to cut out the words on **Resource sheet 5.1a–d** or enlarge and mount them on card.

Show pupils one of the words. In pairs, invite them to prepare an explanation or example to illustrate the meaning of the word.

Discuss pupils' suggestions.

Explore, clarify and consolidate the meaning of each word.

Ideally you should build up this vocabulary through a series of small inputs before the lesson. You can then use this starter to revise the vocabulary and meanings.

Main teaching — 40 minutes

Objectives

Use vocabulary and ideas of probability drawing on experience (Y7)

Vocabulary

as above

Resources

OHTs 5.2a and b and 5.3

Springboard 7 Unit 7

Introduce **OHT 5.2a *Cards***, which has been adapted from a test question and builds on the vocabulary and explanations in the starter.

Pupils might attempt the question individually.

Encourage pupils to read each part and produce clear written explanations.

Discuss the written explanations in pairs, and consider how to improve them; emphasise that marks are awarded for giving clear written explanations.

Explain and clarify any issues that arise.

Explore the common misconception of 'equally likely events' through discussion of this example:

- John says: *"To throw a six or not to throw a six, each has a probability of $\frac{1}{2}$ as either you do it or you don't."*

Q Is he correct?

Ask pupils to explain their answer.

OHT 5.3 *Tokens* develops this understanding.

Encourage pupils to produce clear written explanations.

Springboard 7 Unit 7 pages 253–254 provide further examples.

Plenary — 5 minutes

By the end of the lesson

pupils should:

- understand equally likely events;
- be able to use correctly the vocabulary of probability.

Framework supplement of examples pages 276–277

Level 4

Ask pupils to give examples of:

- events that are equally likely;
- events that are not equally likely.

Q Is it equally likely that the next baby born in the local hospital is a boy or girl?

Discuss the question and answer.

You might go on to use these ideas in simple probability calculations.

Springboard 7 Unit 7 page 255 introduces the probability scale.

Probability words

certain

uncertain

good chance

no chance

Probability words

impossible

even chance

equally likely

possible

Probability words

likely

unlikely

not likely

fair

Probability words

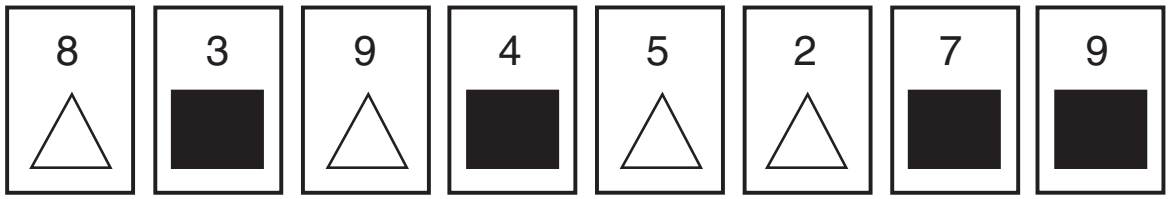
unfair

random

risk

Cards

(a) Joe has these cards:



Sara takes a card without looking.

Joe says:

Explain why Joe is **wrong**. 1 mark

(b) Here are some words and phrases:

impossible	not likely	certain	likely

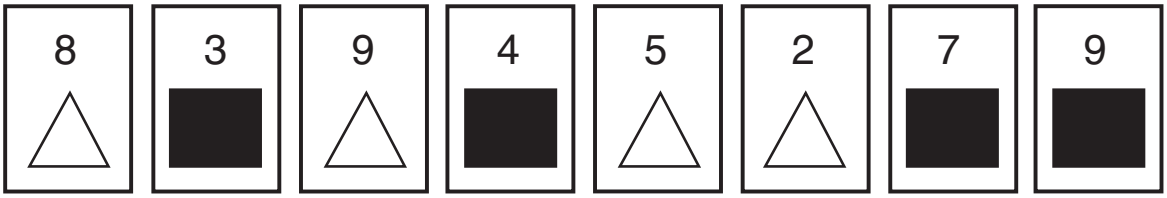
Choose a word or a phrase to fill in the gaps below.

It is ..... that the number on Sara's card will be **smaller than 10**. 1 mark

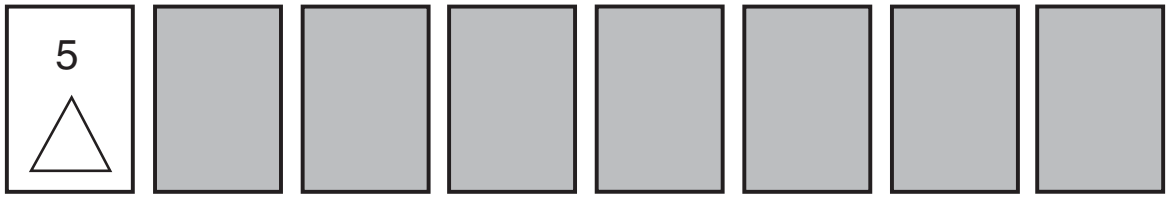
It is ..... that the number on Sara's card will be an **odd number**. 1 mark

Cards

(c) Joe still has these cards:



Joe mixes them up and puts them face down on the table.
He turns over the first card, like this:



Joe is going to turn the next card over.
Complete this sentence:

On the next card, ... is **less likely** than ..... 1 mark

The number on the next card could be higher than 5 or lower than 5.

Which is **more likely**? Tick the correct box.

☐ higher than 5 ☐ lower than 5 ☐ cannot tell

Explain your answer. 1 mark

Tokens

A class has some gold tokens and some silver tokens.
The tokens are all the same size.

(a) The teacher puts **four gold tokens** and **one silver token** in a bag.

Leah is going to take one token out of the bag without looking.

She says:

> There are two colours, so it is **just as likely** that I will get a gold token as a silver token.

Explain why Leah is wrong. 1 mark

(b) How many more silver tokens should the teacher put in the bag to make it just as likely that Leah will get a gold token as a silver token? 1 mark

(c) Jack has a different bag with 8 tokens in it.

It is more likely that Jack will take a gold token than a silver token from his bag.

How many gold tokens might there be in Jack's bag? 1 mark

Lesson 6 Calculators

Oral and mental starter 10 minutes

Objectives

Round positive whole numbers to the nearest 10, 100 or 1000 (Y7)

Check a result by considering whether it is of the right order of magnitude (Y7)

Vocabulary

approximate, rounding, estimate

Resources

OHT 6.1

Show the grid on **OHT 6.1**. Ask pupils to round the numbers on the first row to the nearest 10.

Q How did you arrive at your answer?

Repeat by asking pupils to round the numbers on the second row to the nearest 100 and those on the third row to the nearest 1000. Each time ask pupils to explain their answers.

Extend the activity by rounding any of the numbers to the nearest 10. Ensure pupils understand which are the critical values when rounding to the nearest multiple of 10, and that they do not get confused when rounding 149 to the nearest 100, or 25 to the nearest 10. (Pupils may round 149 to 150 and then 200.)

Main teaching 40 minutes

Objectives

Enter numbers in a calculator, and interpret the display in different contexts (Y7)

Carry out calculations with more than one step (Y7)

Vocabulary

display, recurring decimal

Resources

OHTs 6.2 and 6.3

OHP calculator

class set of calculators

Springboard 7 Units 2, 10 and 15

Introduce the grid on **OHT 6.2**. Ask pupils to approximate the numbers to get an estimate for the calculation. Use this to decide which of the questions have the correct answer and which are wrong. Ask pupils to explain their reasons.

Use the OHP calculator to check the answers.

For each of the problems on **OHT 6.3** ask pupils to:

- read the question;
- write down the calculation;
- decide if it is appropriate to use a calculator;
- use the correct key sequence;
- write down the answer to the question.

Ask pupils to give you their answers.

Do each calculation on an OHP calculator.

Make sure pupils can interpret the result.

Discuss any points needed to support pupils' methods and use of the calculator.

Further consolidation can be found in Springboard 7 Unit 2 Star challenge 11 page 93, Unit 10 page 351 and Unit 15 pages 485 and 486.

Plenary 10 minutes

By the end of the lesson

pupils should be able to:

- use a calculator efficiently;
- interpret the display in a variety of contexts and match the answer to the original problem.

Framework supplement of examples pages 108–109

Level 4

Select examples from Springboard Unit 15 page 491.

For each question ask pupils to:

- write down their calculation;
- explain their method of calculation;
- give their answer;
- explain how they would check to make sure the answer is correct.

Use pupils' responses to rectify misconceptions and to re-emphasise the key points.

Remind pupils always to ask: 'Can I do the calculation in my head?'

Rounding numbers

OHT 6.1

	78	184	996	224
	1176	3436	7149	9056
	3456	75 621	809 023	142 499

Estimating

OHT 6.2

32×49 1568	$8990 \div 31$ 29	98×123 1205.4
$3950 \div 79$ 500	65×312 2028	$\sqrt{3600}$ 600

Problems to solve

1 Janine buys 18 books at £4.95 each.
Work out the total cost.

2 Gareth has £456.25 in his bank.
He withdraws £654.32.
What is his bank balance now?

3 Start with 41.
Divide by 7 and then multiply your answer by 35.
What is the final answer?

4 I have 60 bags each containing 24 sweets.
The sweets are shared equally among 36 people.
How many sweets would each person get?

5 Indra buys five bulbs at 85p each, three plugs at £1.05 each and an adaptor at £5.20.
How much change does she get from a £20 note?

