Summer
Scheme of learning
Year 3

#MathsEveryoneCan

White Rose Maths

The **White Rose Maths** schemes of learning

Teaching for mastery

Our research-based schemes of learning are designed to support a mastery approach to teaching and learning and are consistent with the aims and objectives of the National Curriculum.

Putting number first

Our schemes have number at their heart.
A significant amount of time is spent reinforcing number in order to build competency and ensure children can confidently access the rest of the curriculum.

Depth before breadth

Our easy-to-follow schemes support teachers to stay within the required key stage so that children acquire depth of knowledge in each topic. Opportunities to revisit previously learned skills are built into later blocks.

Working together

Children can progress through the schemes as a whole group, encouraging students of all abilities to support each other in their learning.

Fluency, reasoning and problem solving

Our schemes develop all three key areas of the National Curriculum, giving children the knowledge and skills they need to become confident mathematicians.

Concrete – Pictorial – Abstract (CPA)

Research shows that all children, when introduced to a new concept, should have the opportunity to build competency by following the CPA approach. This features throughout our schemes of learning.

Concrete

Children should have the opportunity to work with physical objects/concrete resources, in order to bring the maths to life and to build understanding of what they are doing.

Pictorial

Alongside concrete resources, children should work with pictorial representations, making links to the concrete.
Visualising a problem in this way can help children to reason and to solve problems.

Abstract

With the support of both the concrete and pictorial representations, children can develop their understanding of abstract methods.

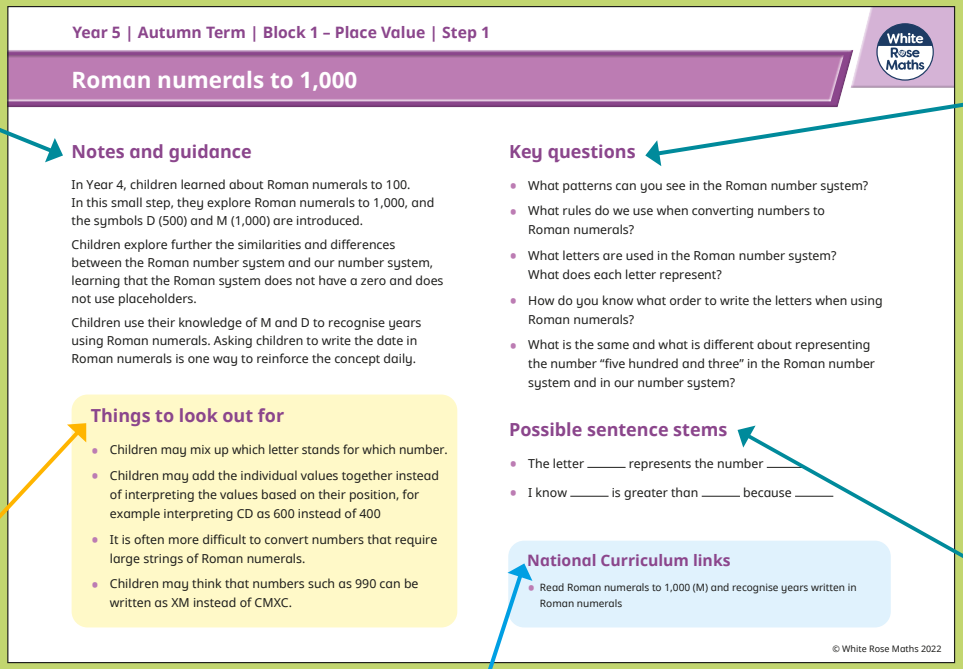
$$5 + 7$$

If you have questions about this approach and would like to consider appropriate CPD, please visit www.whiterosemaths.com to find a course that's right for you.

Teacher guidance

Every block in our schemes of learning is broken down into manageable small steps, and we provide comprehensive teacher guidance for each one. Here are the features included in each step.

Notes and guidance that provide an overview of the content of the step and ideas for teaching, along with advice on progression and where a topic fits within the curriculum.



Year 5 | Autumn Term | Block 1 – Place Value | Step 1

Roman numerals to 1,000

Notes and guidance

In Year 4, children learned about Roman numerals to 100. In this small step, they explore Roman numerals to 1,000, and the symbols D (500) and M (1,000) are introduced.

Children explore further the similarities and differences between the Roman number system and our number system, learning that the Roman system does not have a zero and does not use placeholders.

Children use their knowledge of M and D to recognise years using Roman numerals. Asking children to write the date in Roman numerals is one way to reinforce the concept daily.

Key questions

- What patterns can you see in the Roman number system?
- What rules do we use when converting numbers to Roman numerals?
- What letters are used in the Roman number system? What does each letter represent?
- How do you know what order to write the letters when using Roman numerals?
- What is the same and what is different about representing the number "five hundred and three" in the Roman number system and in our number system?

Things to look out for

- Children may mix up which letter stands for which number.
- Children may add the individual values together instead of interpreting the values based on their position, for example interpreting CD as 600 instead of 400
- It is often more difficult to convert numbers that require large strings of Roman numerals.
- Children may think that numbers such as 990 can be written as XM instead of CMXC.

Possible sentence stems

- The letter _____ represents the number _____
- I know _____ is greater than _____ because _____

National Curriculum links

- Read Roman numerals to 1,000 (M) and recognise years written in Roman numerals

Key questions that can be posed to children to develop their mathematical vocabulary and reasoning skills, digging deeper into the content.

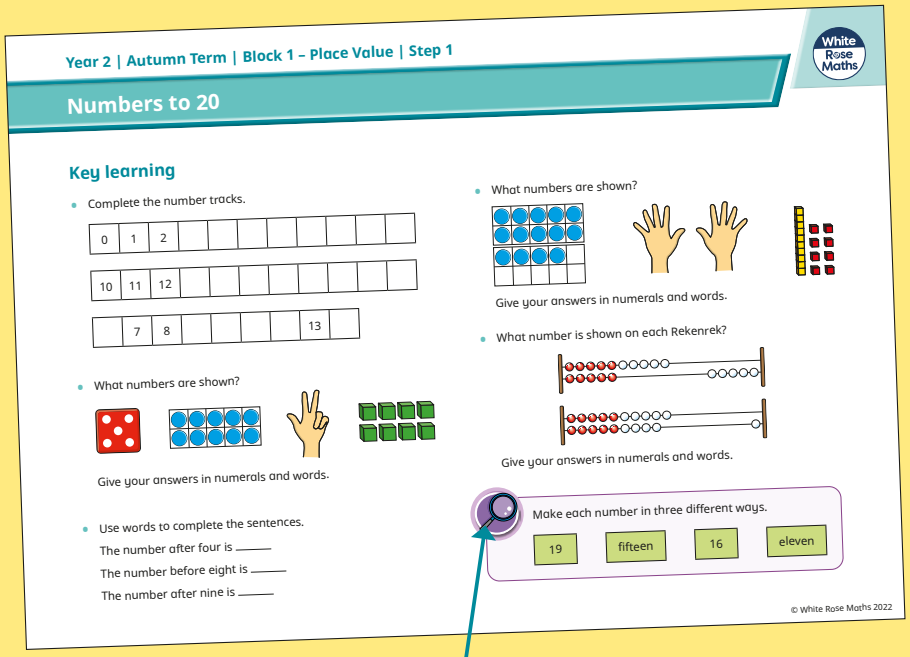
Things to look out for, which highlights common mistakes, misconceptions and areas that may require additional support.

National Curriculum links to indicate the objective(s) being addressed by the step.

Possible sentence stems to further support children's mathematical language and to develop their reasoning skills.

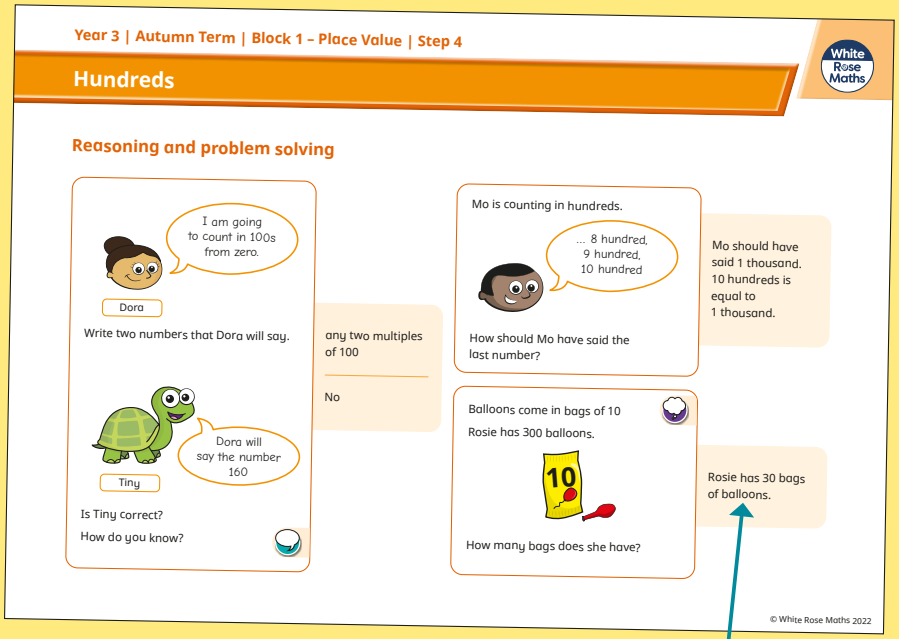
Teacher guidance

A **Key learning** section, which provides plenty of exemplar questions that can be used when teaching the topic.



Activity symbols that indicate an idea can be explored practically

Reasoning and problem-solving activities and questions that can be used in class to provide further challenge and to encourage deeper understanding of each topic.



Answers provided where appropriate

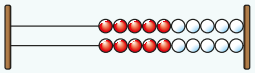
Activities and symbols

Key Stage 1 activities

Key Stage 1 includes more hands-on activities alongside questions.

An activity to be led by the teacher

Use a Rekenrek in the ready position.



Ask children to show a number on their Rekenrek.

An outside activity or one that uses resources from nature

Find some seeds and leaves to represent Autumn.

Ask children to sort the objects in three different ways and then compare their answers with a partner.

An activity introduced by a reading from an appropriate fiction or non-fiction book

Read *The Button Box* by M Reid.

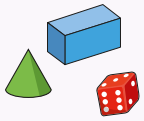
Give children a selection of buttons and ask them to sort the buttons in as many different ways as they can.

Encourage them to think about size, shape, colour and number of holes.

An investigation

Give children a selection of 3D shapes.

Ask children to sort the objects into two groups and then challenge a partner to say how the objects have been sorted.



Key Stage 1 and 2 symbols

The following symbols are used to indicate:

concrete resources might be useful to help answer the question

a bar model might be useful to help answer the question

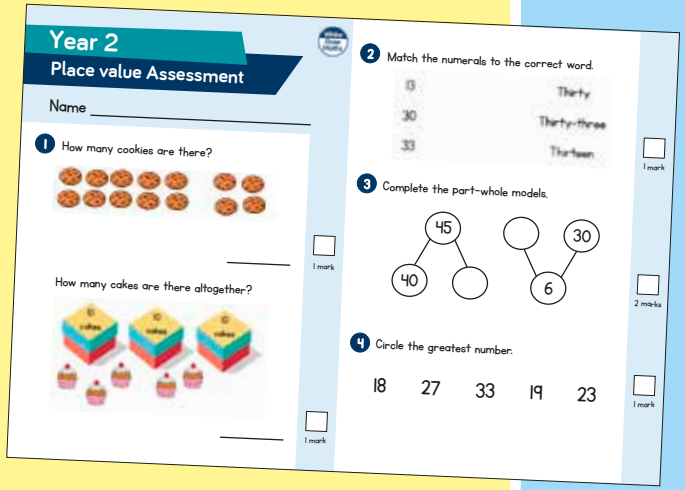
drawing a picture might help children to answer the question

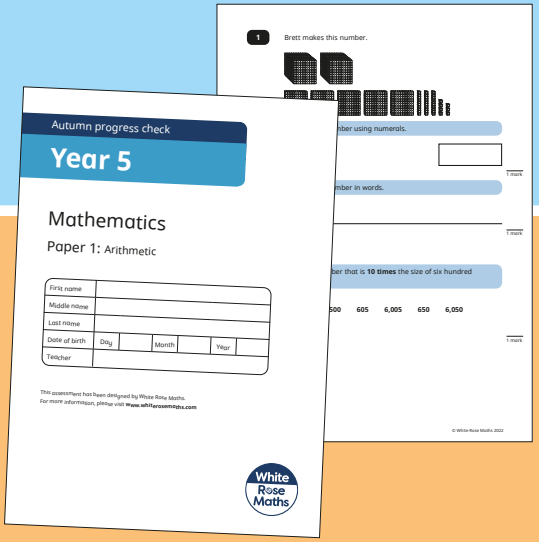
children talk about and compare their answers and reasoning

a question that should really make children think. The question may be structured differently or require a different approach from others and/or tease out common misconceptions.

Free supporting materials

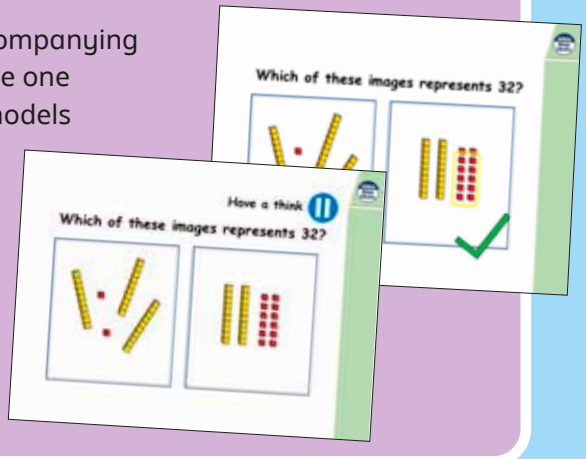
End-of-block assessments to check progress and identify gaps in knowledge and understanding.



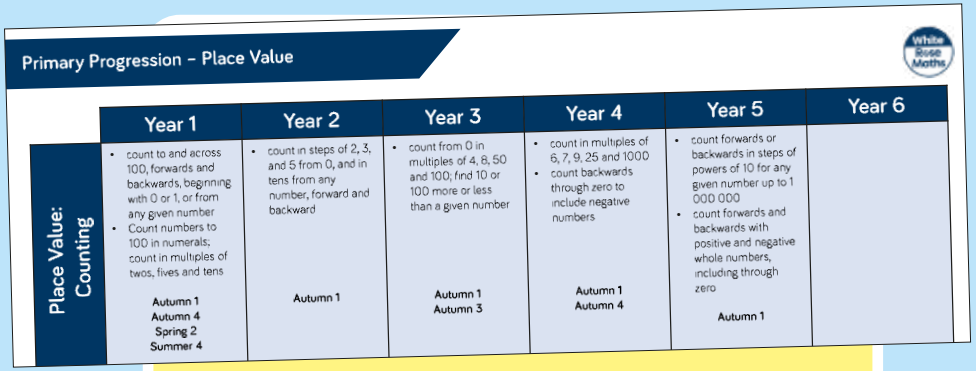


End-of-term assessments for a more summative view of where children are succeeding and where they may need more support.

Each small step has an accompanying **home learning video** where one of our team of specialists models the learning in the step. These can also be used to support students who are absent or who need to catch up content from earlier blocks or years.



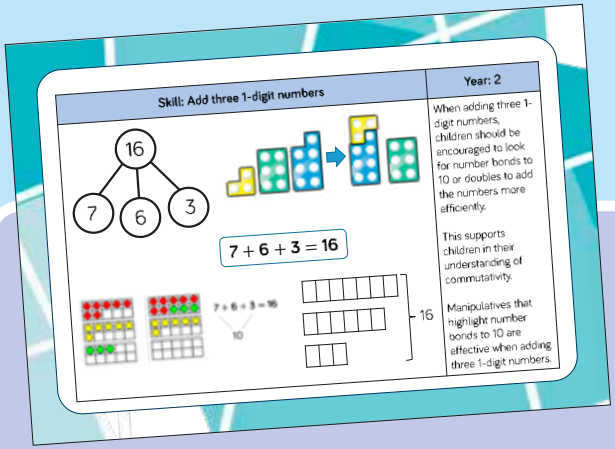
Free supporting materials



Primary Progression – Place Value

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Place Value: Counting	• count to and across 100, forwards and backwards, beginning with 0 or 1, or from any given number • Count numbers to 100 in numerals; count in multiples of twos, fives and tens Autumn 1 Autumn 4 Spring 2 Summer 4	• count in steps of 2, 3, and 5 from 0, and in tens from any number, forward and backward Autumn 1	• count from 0 in multiples of 4, 8, 50 and 100; find 10 or 100 more or less than a given number Autumn 1 Autumn 3	• count in multiples of 6, 7, 9, 25 and 1000 • count backwards through zero to include negative numbers Autumn 1 Autumn 4	• count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000 • count forwards and backwards with positive and negative whole numbers, including through zero Autumn 1	

National Curriculum progression to indicate how the schemes of learning fit into the wider picture and how learning progresses within and between year groups.



Skill: Add three 1-digit numbers

Year: 2

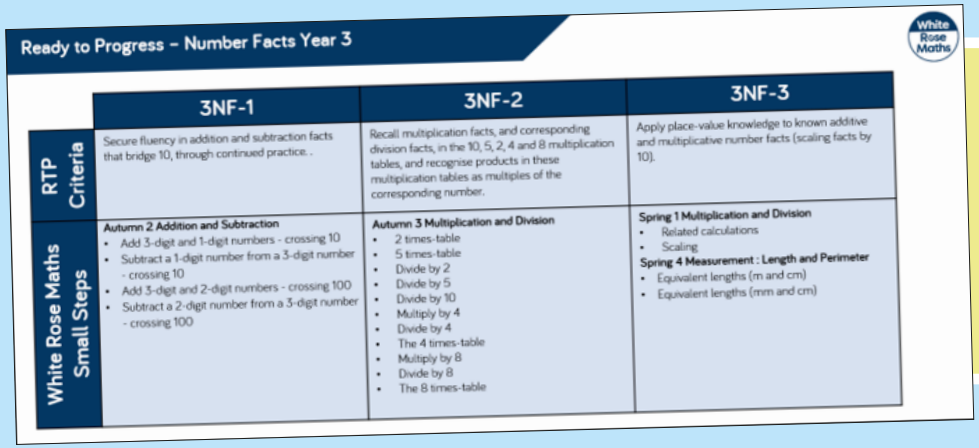
When adding three 1-digit numbers, children should be encouraged to look for number bonds to 10 or doubles to add the numbers more efficiently.

This supports children in their understanding of commutativity.

Manipulatives that highlight number bonds to 10 are effective when adding three 1-digit numbers.

$7 + 6 + 3 = 16$

Calculation policies that show how key approaches develop from Year 1 to Year 6.



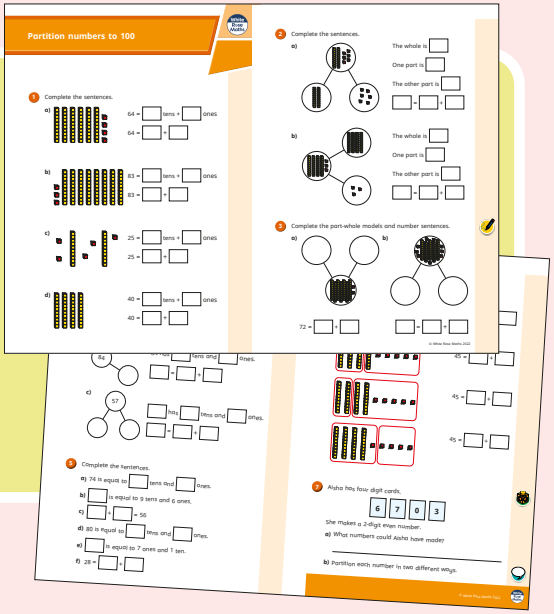
Ready to Progress – Number Facts Year 3

	3NF-1	3NF-2	3NF-3
RTP Criteria	Secure fluency in addition and subtraction facts that bridge 10, through continued practice. .	Recall multiplication facts, and corresponding division facts, in the 10, 5, 2, 4 and 8 multiplication tables, and recognise products in these multiplication tables as multiples of the corresponding number.	Apply place-value knowledge to known additive and multiplicative number facts (scaling facts by 10).
White Rose Maths Small Steps	**Autumn 2 Addition and Subtraction** • Add 3-digit and 1-digit numbers - crossing 10 • Subtract a 1-digit number from a 3-digit number - crossing 10 • Add 3-digit and 2-digit numbers - crossing 100 • Subtract a 2-digit number from a 3-digit number - crossing 100	**Autumn 3 Multiplication and Division** • 2 times-table • 5 times-table • Divide by 2 • Divide by 5 • Divide by 10 • Multiply by 4 • Divide by 4 • The 4 times-table • Multiply by 8 • Divide by 8 • The 8 times-table	**Spring 1 Multiplication and Division** • Related calculations • Scaling **Spring 4 Measurement : Length and Perimeter** • Equivalent lengths (m and cm) • Equivalent lengths (mm and cm)

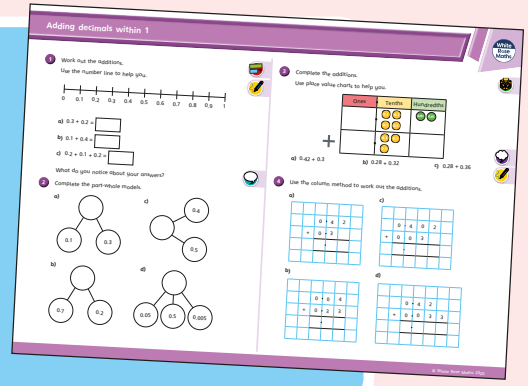
Ready to progress mapping that shows how the schemes of learning link to curriculum prioritisation.

Premium supporting materials

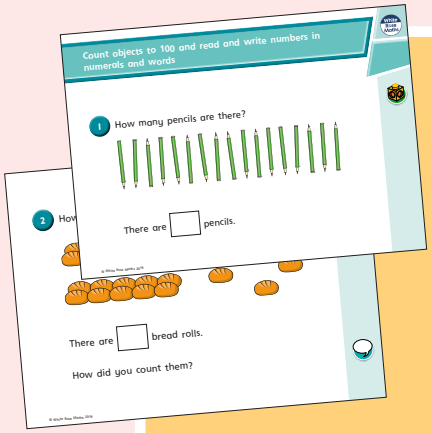
Worksheets to accompany every small step, providing relevant practice questions for each topic that will reinforce learning at every stage.



Display versions of the worksheet questions for front of class/whole class teaching.

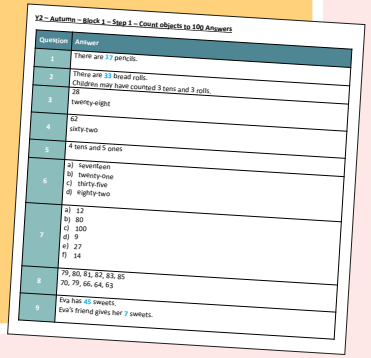


Also available as printed **workbooks**, per block.



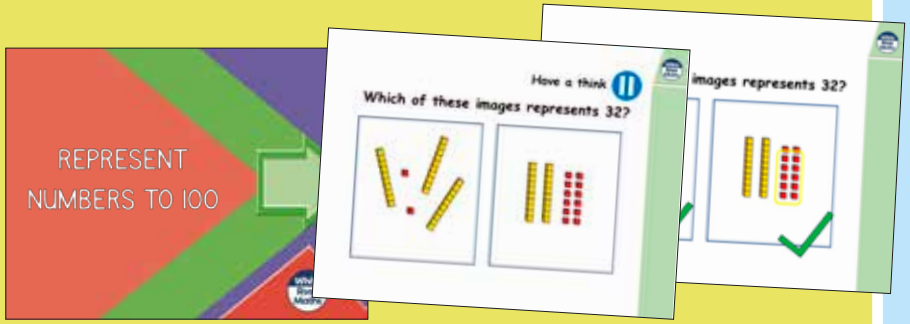
PowerPoint™ versions of the worksheet questions to incorporate them into lesson planning.

Answers to all the worksheet questions.

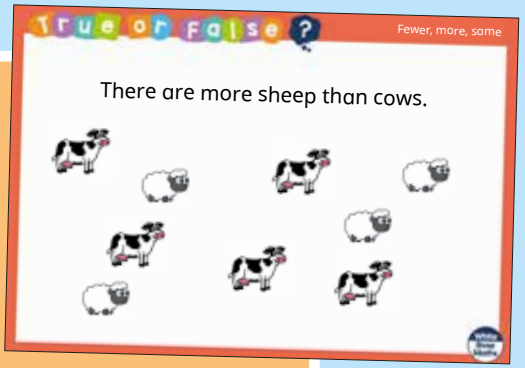


Premium supporting materials

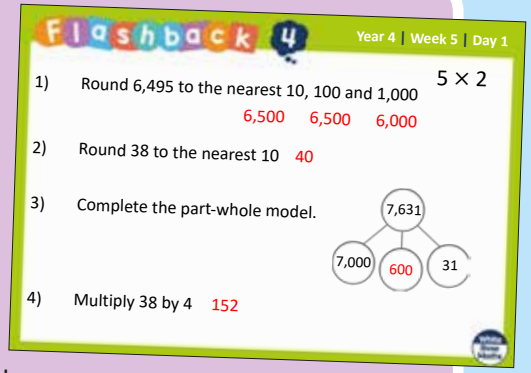
Teaching slides that mirror the content of our home learning videos for each step. These are fully animated and editable, so can be adapted to the needs of any class.

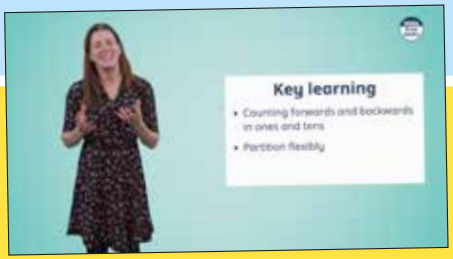


A **true or false** question for every small step in the scheme of learning. These can be used to support new learning or as another tool for revisiting knowledge at a later date.



Flashback 4 starter activities to improve retention.
Q1 is from the last lesson;
Q2 is from last week;
Q3 is from 2 to 3 weeks ago;
Q4 is from last term/year.
There is also a bonus question on each one to recap topics such as telling the time, times-tables and Roman numerals.





Topic-based CPD videos
As part of our on-demand CPD package, our maths specialists provide helpful hints and guidance on teaching topics for every block in our schemes of learning.

Meet the characters

Our class of characters bring the schemes to life, and will be sure to engage learners of all ages and abilities. Follow the children and their class pet, Tiny the tortoise, as they explore new mathematical concepts and ideas.

Yearly overview

The yearly overview provides suggested timings for each block of learning, which can be adapted to suit different term dates or other requirements.

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Autumn	Number **Place value**			Number **Addition and subtraction**					Number **Multiplication and division A**			
Spring	Number **Multiplication and division B**			Measurement **Length and perimeter**			Number **Fractions A**			Measurement **Mass and capacity**		
Summer	Number **Fractions B**			Measurement **Money**			Measurement **Time**		Geometry **Shape**	**Statistics**		Consolidation

Summer Block 1

Fractions B

Small steps

Step 1	Add fractions
Step 2	Subtract fractions
Step 3	Partition the whole
Step 4	Unit fractions of a set of objects
Step 5	Non-unit fractions of a set of objects
Step 6	Reasoning with fractions of an amount

Add fractions

Notes and guidance

In this small step, children build on their understanding of numerators and denominators to unitise fractions and add them together. They read calculations such as $\frac{1}{5} + \frac{2}{5}$ as "1 fifth plus 2 fifths" and unitise the fifth to work out that the answer is 3 fifths, or $\frac{3}{5}$. They should recognise that adding unit fractions with the same denominator creates a non-unit fraction.

Throughout the step, the meaning of the numerator and denominator is emphasised to support understanding. All the additions are of two or more fractions where the total is less than or equal to 1

Encourage children to explore fractions through the use of pictorial representations and manipulatives, for example paper strips or bar models.

Things to look out for

- Children may add both the numerators and denominators, for example $\frac{3}{4} + \frac{1}{4} = \frac{4}{8}$
- Children may not have a clear understanding of the relationship of the denominator to the whole.

Key questions

- How many equal parts is the whole divided into?
- How many parts are you adding?
- Why do you add the numerators, but not the denominators?
- What do you notice about the numerators?
- What do you notice about the denominators?
- How can you use a bar model to add these fractions?
- How many quarters/fifths/sixths do you have altogether?

Possible sentence stems

- _____ tenths plus _____ more tenths is equal to _____ tenths altogether.

  _____ + _____ = _____
- When adding fractions with the same _____, I only add the _____

National Curriculum links

- Add and subtract fractions with the same denominator within one whole

Add fractions

Key learning

- Take a strip of paper. Fold it into four equal parts.

  Colour one part red and two parts blue.

  - Use your strip of paper to compete the sentences.

    _____ quarter is red.

    _____ quarters are blue.

    _____ quarters are coloured in total.

  - Complete the number sentence. $\frac{\square}{4} + \frac{\square}{4} = \frac{\square}{4}$

- Complete the sentences.

  - 1 + 2 = _____
  - 1 egg + 2 eggs = _____ eggs
  - 1 ten + 2 tens = _____ tens
  - 1 fifth + 2 fifths = _____ fifths
  - $\frac{1}{5} + \frac{2}{5}$ = _____

  What do you notice?

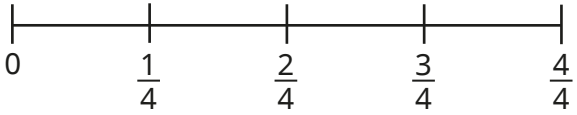
- Draw bar models to help complete the number sentences.

  - $\frac{1}{5} + \frac{2}{5} = \frac{\square}{5}$
  - $\frac{2}{7} + \frac{3}{7} + \frac{1}{7} = \frac{\square}{\square}$
  - $\frac{7}{10} + \frac{\square}{\square} = \frac{9}{10}$

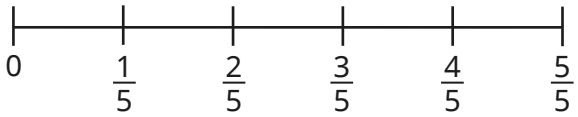
- The number line shows $\frac{2}{5} + \frac{1}{5} = \frac{3}{5}$

  Colour the number lines to show the additions.

  - $\frac{1}{4} + \frac{3}{4} = 1$



  - $\frac{1}{5} + \frac{1}{5} + \frac{2}{5} = \frac{4}{5}$



- Brett and Tom are sharing a pizza.

  Brett eats $\frac{5}{12}$ of the pizza and Tom eats $\frac{1}{12}$ of the pizza.

  What fraction of the pizza do they eat altogether?

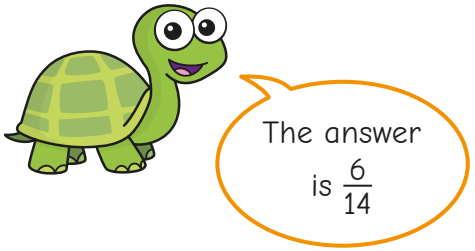
- Fill in the missing numerators.

  - $\frac{1}{5} + \frac{1}{5} + \frac{1}{5} = \frac{\square}{5}$
  - $\frac{1}{7} + \frac{4}{7} = \frac{\square}{7}$
  - $\frac{4}{7} = \frac{1}{7} + \frac{\square}{7}$
  - $\frac{2}{5} + \frac{1}{5} = \frac{\square}{5}$
  - $\frac{1}{7} + \frac{\square}{7} = \frac{6}{7}$
  - $\frac{3}{7} = \frac{1}{7} + \frac{\square}{7}$

Add fractions

Reasoning and problem solving

Tiny is working out $\frac{4}{7} + \frac{2}{7}$



Do you agree with Tiny?

Explain your answer.

No

Complete the number sentence.

$$\frac{9}{9} = \frac{\square}{9} + \frac{\square}{9} + \frac{\square}{9}$$

Can you do it another way?

How do you know that you have found all the possible ways?

multiple possible answers, e.g.

$\frac{9}{9} = \frac{1}{9} + \frac{2}{9} + \frac{6}{9}$

Mo and Eva share these chocolates.

They both eat an odd number of chocolates.

Complete the number sentence to show what fraction of the chocolates they each could have eaten.

$$\frac{\square}{\square} + \frac{\square}{\square} = \frac{12}{12}$$

in either order:

$\frac{1}{12} + \frac{11}{12}$

$\frac{3}{12} + \frac{9}{12}$

$\frac{5}{12} + \frac{7}{12}$

Subtract fractions

Notes and guidance

In this small step, children use what they have learnt about unitising denominators to subtract fractions. In particular, they should recognise that when subtracting fractions with the same denominator, they only subtract the numerators and the denominator stays the same.

Children explore three structures of subtraction and how each one applies to subtracting fractions. They look at subtraction by reduction (taking away), by partitioning and by finding the difference. All the questions require children to subtract from a fraction that is less than or equal to 1 whole.

Encourage children to explore fractions through the use of models, pictorial representations and manipulatives, for example paper strips or bar models.

Things to look out for

- Children may subtract both the numerators and denominators, for example $\frac{3}{4} - \frac{1}{4} = \frac{2}{0}$
- Children may find some representations of fractions harder to understand than others.
- Children may not have a clear understanding of the relationship of the denominator to the whole.

Key questions

- What fraction are you starting with?
  What fraction are you subtracting?
  What fraction is left?
- Which models show taking away?
- Which models show finding the difference?
- Which models show partitioning?
- How many ways can you partition $\frac{9}{11}$?
- Why do you subtract the numerators, but not the denominators?

Possible sentence stems

- I know that _____ – _____ = _____, so $\frac{\square}{9} - \frac{\square}{9} = \frac{\square}{9}$
- When subtracting fractions with the same _____, I only subtract the _____

National Curriculum links

- Add and subtract fractions with the same denominator within one whole

Subtract fractions

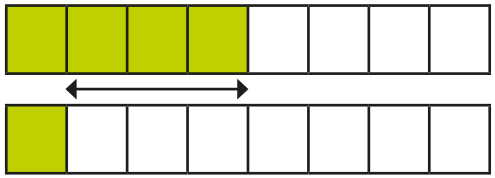
Key learning

- Complete the sentences.
  - 4 – 1 = _____
  - 4 fifths – 1 fifth = _____ fifths
  - £4 – £1 = £ _____
  - $\frac{4}{5} - \frac{1}{5}$ = _____
  - 4 eggs – 1 egg = _____ eggs

  What do you notice?

- Work out the subtractions.

7 – 1	8 – 3	10 – 9
7 eighths – 1 eighth	8 ninths – 3 ninths	10 tenths – 9 tenths
$\frac{7}{8} - \frac{1}{8}$	$\frac{8}{9} - \frac{3}{9}$	$\frac{10}{10} - \frac{9}{10}$

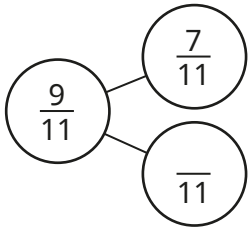
- Use the models to complete the calculations.
  - 
  - 
  - 

$\frac{5}{7} - \frac{\square}{7} = \frac{\square}{7}$

$\frac{\square}{9} - \frac{\square}{9} = \frac{4}{9}$

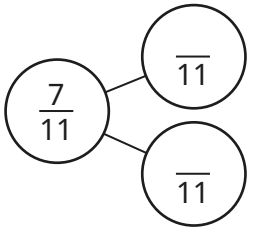
$\frac{4}{8} - \frac{\square}{8} = \frac{\square}{8}$

- Complete the part-whole models and write the subtraction facts for each one.



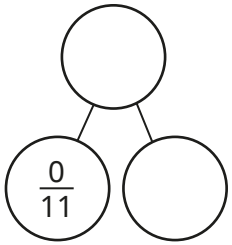
$\frac{9}{11} - \frac{7}{11} = \frac{\square}{11}$

$\frac{9}{11} - \frac{\square}{11} = \frac{7}{11}$



$\frac{7}{11} - \frac{\square}{11} = \frac{\square}{11}$

$\frac{7}{11} - \frac{\square}{11} = \frac{\square}{11}$



$\frac{\square}{11} - \frac{0}{11} = \frac{\square}{11}$

$\frac{\square}{11} - \frac{\square}{11} = \frac{0}{11}$

Is there more than one way to complete each part-whole model?

- Fill in the missing numbers.
  - $\frac{6}{7} - \frac{2}{7} = \frac{\square}{7}$
  - $\frac{6}{7} - \frac{3}{7} = \frac{\square}{7}$
  - $\frac{6}{7} - \frac{4}{7} = \frac{\square}{7}$
  - $\frac{7}{8} - \frac{2}{8} = \frac{\square}{8}$
  - $\frac{7}{8} - \frac{\square}{8} = \frac{3}{8}$
  - $\frac{7}{8} - \frac{7}{8} = \frac{\square}{\square}$

- Huan has a pizza.

  He eats $\frac{3}{8}$ of the pizza.

  What fraction of the pizza is left?

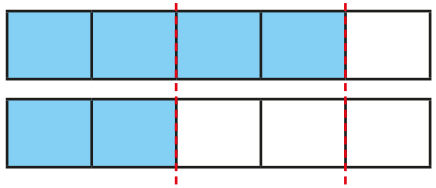
Subtract fractions

Reasoning and problem solving

Scott and Dani are working out $\frac{4}{5} - \frac{2}{5}$

Scott

Dani



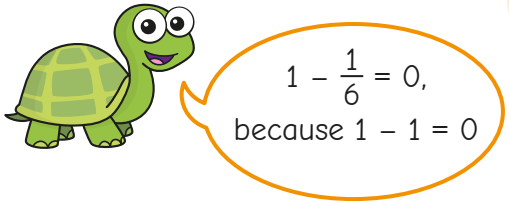
They both say that the answer is $\frac{2}{5}$

They are both correct.

Explain how they each worked it out.

Scott took $\frac{2}{5}$ away.

Dani found the difference between $\frac{4}{5}$ and $\frac{2}{5}$



Explain why Tiny is wrong.

$1 = \frac{6}{6}$,

so $1 - \frac{1}{6} = \frac{6}{6} - \frac{1}{6} = \frac{5}{6}$

The children are subtracting fractions.

Ron $1 - \frac{2}{9} = \frac{7}{9}$

Dexter $\frac{9}{12} - \frac{2}{12} = \frac{7}{0}$

Annie $\frac{5}{9} - \frac{2}{9} - \frac{1}{9} = \frac{3}{9}$

Dora $\frac{5}{6} - \frac{5}{6} = 0$

Which children are correct?

Which children are incorrect?

Explain your answers.

Ron and Dora are correct.

Dexter and Annie are incorrect.

Partition the whole

Notes and guidance

Although it may have been explored briefly in previous steps, children deepen their understanding of the whole and splitting a whole into unit fractions and non-unit fractions. Throughout the step, there is an emphasis on the meaning of the denominator and numerator and this is explored through the use of pictorial representations of shapes, objects and number lines.

Children use their knowledge of number bonds to explore the different ways a whole can be partitioned, for example $1 = \frac{0}{5} + \frac{5}{5} = \frac{1}{5} + \frac{4}{5} = \frac{2}{5} + \frac{3}{5}$. They begin to see connections between the sum of the numerators and the common denominator and find how to derive complements to 1 whole, solving problems of the form $\frac{3}{7} + \frac{\square}{7} = 1$

Things to look out for

- As fractions split wholes into equal parts, children may assume that the complementary fraction is the same fraction again, for example $\frac{3}{7}$ and $\frac{3}{7}$ together are equal to 1 whole.
- Children who are not secure with their number bonds may need visual support to find complements.

Key questions

- How many equal parts is the whole split into?
- What can you say about a fraction if its numerator and denominator are the same?
- What fraction of the bar model is shaded?
  What fraction of the bar model is not shaded?
- What do you notice about the total of the numerators of the fractions?
- If you have _____ fifths, how many more fifths do you need to make a whole?

Possible sentence stems

- When the _____ and the _____ are the same, the fraction is equal to 1 whole.
  $\frac{\square}{\square} = 1$
- I have _____ fifths, so I need _____ more fifths to make a whole.

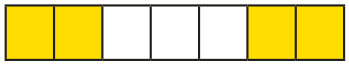
National Curriculum links

- Add and subtract fractions with the same denominator within one whole

Partition the whole

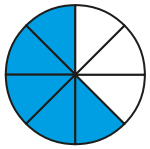
Key learning

- Complete the sentences.



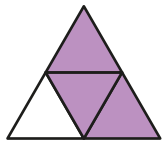
$\frac{4}{7}$ of the shape is shaded.

$\frac{\square}{7}$ of the shape is not shaded.



$\frac{\square}{8}$ of the shape is shaded.

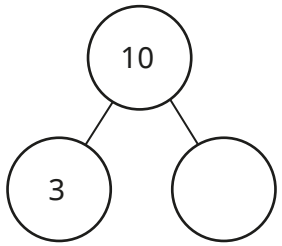
$\frac{\square}{\square}$ of the shape is not shaded.

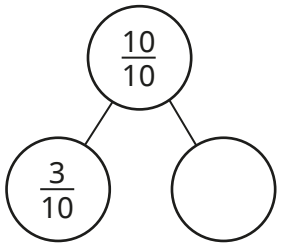


$\frac{\square}{\square}$ of the shape is shaded.

$\frac{\square}{\square}$ of the shape is not shaded.

- Complete the part-whole models.

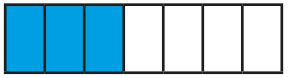




- Use the bar models to complete the number sentences.

$\frac{1}{3} + \_\_\_\_ = 1$

$\frac{3}{4} + \_\_\_\_ = 1$



$\frac{3}{7} + \_\_\_\_ = 1$

- Draw bar models to show the number sentences.

$\frac{2}{5} + \frac{3}{5} = 1$

$\frac{4}{10} + \frac{6}{10} = 1$

$\frac{1}{6} + \frac{5}{6} = 1$

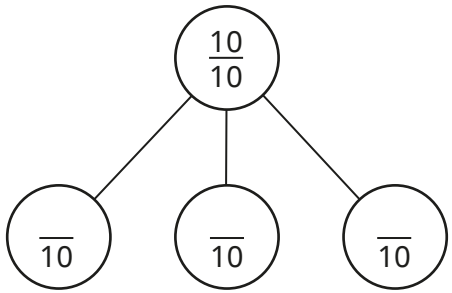
- Complete the number sentences.

- $\frac{1}{10} + \frac{\square}{10} = 1$
- $\frac{5}{7} + \frac{\square}{7} = 1$
- $\frac{\square}{5} + \frac{1}{5} = 1$
- $\frac{\square}{8} + \frac{3}{8} = 1$
- $\frac{\square}{5} + \frac{1}{5} + \frac{3}{5} = 1$
- $\frac{\square}{9} + \frac{1}{9} + \frac{2}{9} = 1$
- $\frac{\square}{15} + \frac{1}{15} + \frac{7}{15} = 1$
- $1 = \frac{\square}{23} + \frac{\square}{23} + \frac{2}{23}$
- $\frac{\square}{5} + \frac{\square}{5} + \frac{\square}{5} = 1$

Partition the whole

Reasoning and problem solving

Complete the part-whole model.



How many ways can you find?

multiple possible answers, e.g.
$\frac{1}{10} + \frac{1}{10} + \frac{8}{10}$
There are eight possible combinations.

Nijah has a pizza.

She cuts the pizza into two equal parts.

She cuts one of the two parts into two smaller equal parts.

Then she cuts one of these smaller parts into two equal slices.

What fraction of the whole pizza is each of these slices worth?

$\frac{1}{8}$

Is the statement true or false?

> If the numerator of a fraction is equal to its denominator, then the fraction is equal to 1

Explain your answer.

True

Teddy has a packet of 11 cards.

He gives 3 cards to Filip.

What fraction of the cards does he give to Filip?

What fraction of the cards does Teddy have left?

$\frac{3}{11}$

$\frac{8}{11}$

Unit fractions of a set of objects

Notes and guidance

In the previous steps, children gained an understanding of fractions as numbers and as parts of a whole. In this small step, they learn about fractions as operators.

Children learn how to find unit fractions of a set of objects, and connect this to what they already know about dividing quantities into equal parts using known division facts. For example, 20 ÷ 4 = 5, so $\frac{1}{4}$ of 20 = 5. So far, children have learnt the 2, 3, 4, 5, 8 and 10 times-tables, so in this small step children find $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{1}{8}$ and $\frac{1}{10}$. This allows them to focus on the underlying concepts instead of on calculations.

Concrete resources and pictorial representations, such as bar models and place value counters, can be used to support understanding.

Non-unit fractions are covered in the next step.

Things to look out for

- Children may not be confident enough with times-tables to support them with finding fractions of amounts.
- Children may not make the link between division and finding a fraction of a set of objects.

Key questions

- What is the whole?
- How many equal parts has the whole been divided into?
- How many _____ are there in each equal part?
- How many equal parts do you need to split your bar model into?
- Which operation should you use to find a fraction of an amount?
- What does each part of the fraction tell you?
- How can you use place value counters or base 10 to help you?

Possible sentence stems

- The whole is divided into _____ equal parts.

  Each part is _____ of the whole.

- When _____ objects are divided into _____ equal parts, there are _____ objects in each part.

  $\frac{1}{\square}$ of _____ = _____

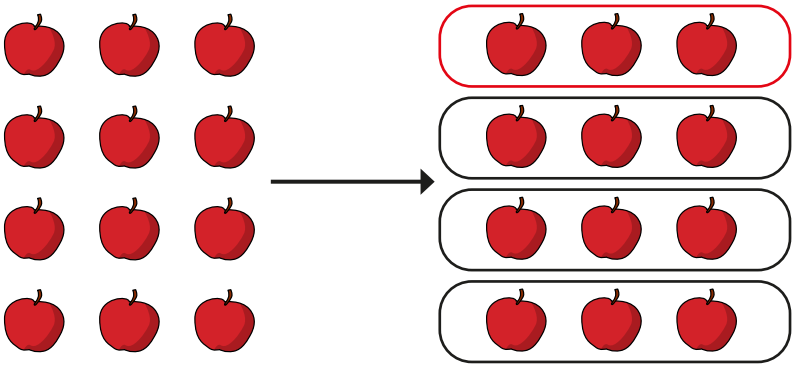
National Curriculum links

- Recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators

Unit fractions of a set of objects

Key learning

- Use the picture to complete the sentences.



The whole is 12 apples.

The whole is divided into _____ equal parts.

Each part is _____ of the whole.

$\frac{1}{4}$ of _____ apples is _____ apples.

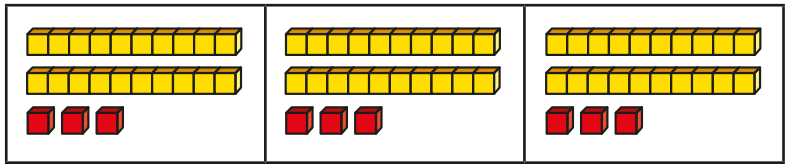
- Complete the sentences to find $\frac{1}{5}$ of the marbles.

I have divided the marbles into _____ equal groups.

There are _____ marbles in each group.

$\frac{1}{5}$ of _____ marbles is _____ marbles.

- Amir uses a bar model and base 10 to find $\frac{1}{3}$ of 69



Use Amir's method to find the fractions of the amounts.

$\frac{1}{2}$ of 60	$\frac{1}{3}$ of 36	$\frac{1}{3}$ of 96
$\frac{1}{4}$ of 60	$\frac{1}{3}$ of 72	$\frac{1}{8}$ of 96

- Tommy saves £60

He spends $\frac{1}{4}$ of this money on a toy.

How much does he spend?

- Alex has 36 chocolates.

She gives $\frac{1}{3}$ of the chocolates to her friends.

How many chocolates does she have left?

Unit fractions of a set of objects

Reasoning and problem solving

Kim has 12 sweets.

- On Friday, she eats $\frac{1}{4}$ of her sweets and gives one to her mum.
- On Saturday, she eats $\frac{1}{2}$ of her remaining sweets and gives one to her brother.
- On Sunday, she eats $\frac{1}{3}$ of her remaining sweets.

How many sweets does Kim have left?

2

Here is $\frac{1}{5}$ of Jack's stickers.

How many stickers does Jack have altogether?

20

Write unit fractions to make the statements correct.

$\frac{1}{\square}$ of 24 < 12

$\frac{1}{\square}$ of 24 = 12

How many different answers can you find for each statement?

$\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{6}$, $\frac{1}{8}$ or $\frac{1}{12}$

$\frac{1}{2}$

Work out the missing numbers.

$\frac{1}{3}$ of 60 = $\frac{1}{4}$ of ____

$\frac{1}{\square}$ of 50 = $\frac{1}{5}$ of 25

80

10

Non-unit fractions of a set of objects

Notes and guidance

In this small step, children progress to finding non-unit fractions of a set of objects.

Children use their knowledge that the denominator tells them how many equal parts the whole is divided into and the numerator tells them how many parts of the whole there are. For example, to find $\frac{3}{4}$ of an amount means dividing the whole into 4 equal parts, then finding the total of 3 of these parts. Bar models are very useful to model this process, as children can label each part and see how to find the total for the number of parts they need.

As with the previous step, this step only involves finding fractions of amounts that use the 2, 3, 4, 5, 8 and 10 times-tables.

Things to look out for

- Children may not be confident enough with times-tables to support them with finding fractions of amounts.
- Children may only complete the first step of dividing by the denominator and forget to then multiply by the numerator.
- Children may try to divide the number by the numerator and multiply by the denominator instead of the other way round.

Key questions

- What is the whole?
- How many equal parts are there?
- What does the denominator tell you?
- What does the numerator tell you?
- How do you find a unit fraction of the whole?
  How can you use the unit fraction to find other fractions of the whole?
- How can you use a bar model to help you?
- If you know one-fifth of the whole, how can you work out three-fifths?

Possible sentence stems

- The whole is divided into _____ equal parts.
- Each part is one _____ of the whole.
- $\frac{1}{\square}$ of _____ is _____, so $\frac{2}{\square}$ of _____ is 2 × _____ = _____

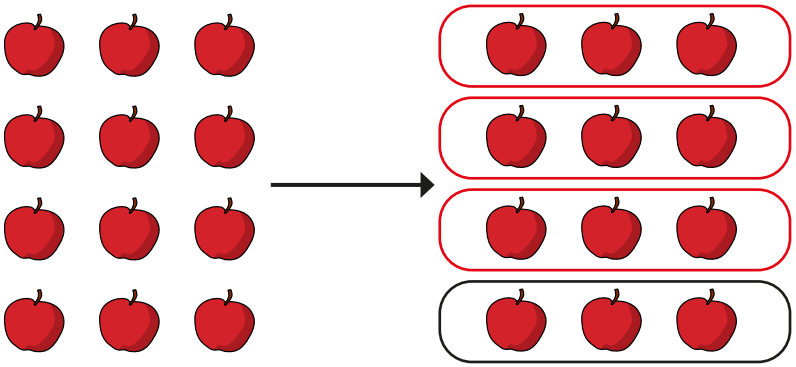
National Curriculum links

- Recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators

Non-unit fractions of a set of objects

Key learning

- Use the picture to complete the sentences.



The whole is _____ apples.

The whole is divided into _____ equal parts.

Each part is _____ of the whole.

$\frac{3}{4}$ of _____ apples is _____ apples.

- Complete the sentences to find $\frac{2}{5}$ of the marbles.

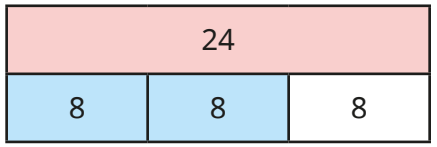
I have divided the marbles into _____ equal groups.

There are _____ marbles in each group.

There are _____ marbles in two groups.

$\frac{2}{5}$ of _____ marbles is _____ marbles.

- Sam uses a bar model to find $\frac{2}{3}$ of 24



$24 \div 3 = 8$

$\frac{1}{3}$ of $24 = 8$

$8 \times 2 = 16$

$\frac{2}{3}$ of $24 = 16$

Use Sam's method to find the fractions of the amounts.

$\frac{3}{4}$ of 24	$\frac{2}{3}$ of 12	$\frac{2}{3}$ of 18	$\frac{4}{5}$ of 45

- Rosie saves £52

She spends $\frac{3}{4}$ of this money on a toy.

How much does she spend?

- Tom has 95 chocolates.

He gives $\frac{3}{5}$ of the chocolates to his friends.

How many chocolates does he have left?

Non-unit fractions of a set of objects

Reasoning and problem solving

The mass of a bag of potatoes is 400 g.

$\frac{3}{8}$ of the potatoes are used to make lunch.

Two-fifths of the remaining potatoes are used to make dinner.

What is the mass of the potatoes that are left in the bag?

150 g

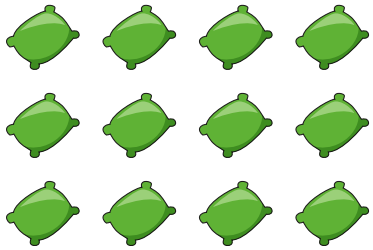
Huan has £28

- On Friday, he spends $\frac{1}{4}$ of his money.
- On Saturday, he spends $\frac{2}{3}$ of his remaining money and gives £2 to his sister.
- On Sunday, he spends $\frac{1}{5}$ of his remaining money.

How much money does Huan have left?

£4

This is $\frac{3}{4}$ of a set of bean bags.



How many bean bags are there in the whole set?

16

Whitney has a strip of paper.

She cuts off $\frac{2}{5}$ of the strip.

Then she cuts off $\frac{1}{2}$ of the remaining strip of paper.

The strip is now 9 cm long.

How long was Whitney's strip of paper at the start?

30 cm

Reasoning with fractions of an amount

Notes and guidance

In this small step, children build on their knowledge of fractions and finding a fraction of an amount and apply this to a range of contexts, including multi-step calculations.

Encourage children to demonstrate their understanding through clear explanations and reasoning. They can explore alternative methods, for example, to find $\frac{5}{6}$ of a number, they could subtract $\frac{1}{6}$ from the whole, rather than multiplying $\frac{1}{6}$ by 5

The use of contextual examples also provides an opportunity to revisit previous concepts, particularly measures such as time, money, mass, capacity, length and perimeter.

Things to look out for

- Children may just follow procedures without considering alternative methods.
- Children may be unfamiliar with some of the contexts.
- Children may need to recap some of the units, for example how many minutes there are in an hour.
- Children may need support to set out multi-step calculations such as $\frac{1}{3}$ of 60 + $\frac{2}{3}$ of 30

Key questions

- What is the whole?
- What does the denominator/numerator tell you?
- How do you find a unit fraction of the whole?

  How can you use the unit fraction to find other fractions of the whole?
- How can you use a bar model to help you?
- What do you need to do first? How do you know?

  What do you need to do after that?

  How else could you have worked this out?

Possible sentence stems

- _____ ÷ _____ = _____, so $\frac{1}{\square}$ of _____ = _____
- $\frac{1}{\square}$ of _____ is _____, so $\frac{3}{\square}$ of _____ is 3 × _____ = _____

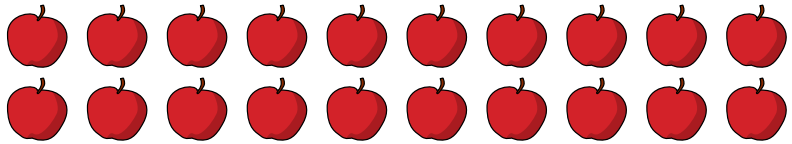
National Curriculum links

- Recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators

Reasoning with fractions of an amount

Key learning

- Complete the sentences to describe the apples.



  - _____ apples = $\frac{1}{2}$ of the apples
  - $\frac{3}{4}$ of the apples = _____ apples
  - $\frac{1}{5}$ of the apples = _____ apples
  - 8 apples = $\frac{\square}{\square}$ of the apples

- Ron collects 30 shells.

  Dexter collects 20 shells.

  They each give $\frac{1}{5}$ of their shells to Scott.

  How many shells does Scott get?

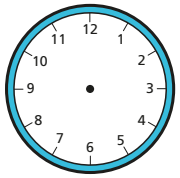
- A bag contains 24 sweets.

  Eva eats a quarter of the sweets and Dani eats two-thirds of the remaining sweets.

  How many sweets are left in the bag?

- Find $\frac{2}{3}$ of an hour.

  Use the clock face and sentences to help you.



  1 hour = _____ minutes

  $\frac{1}{3}$ of _____ minutes = _____ minutes

  $\frac{2}{3}$ of _____ minutes = _____ minutes

- Aisha has 30 counters, Teddy has 20 counters and Dora has 10 counters.

  Work out:

  A $\frac{1}{2}$ of Aisha and Dora's counters

  B $\frac{1}{5}$ of Teddy and Dora's counters

  C $\frac{2}{5}$ of Aisha and Teddy's counters

  D $\frac{2}{3}$ of Aisha, Teddy and Dora's counters

  Which is the greatest number of counters, A, B, C or D?

- Complete the calculations.

$\frac{1}{3}$ of £60 + $\frac{2}{5}$ of £30	$\frac{1}{4}$ of 28 cm – $\frac{1}{10}$ of 20 cm	$\frac{1}{5}$ of £60 × $\frac{2}{3}$ of 6

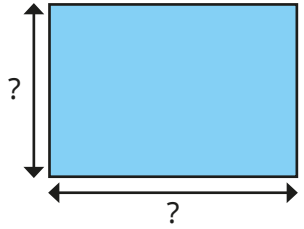
Reasoning with fractions of an amount

Reasoning and problem solving

Which amount is greater?

$\frac{1}{3}$ of £60 | $\frac{2}{3}$ of £30

They are equal.



The sides of the rectangle are whole numbers of centimetres.

The length is less than 20 cm.

The width is $\frac{2}{3}$ of the length.

What measurements could the rectangle have?

How many answers can you find?

3 cm by 2 cm
6 cm by 4 cm
9 cm by 6 cm
12 cm by 8 cm
15 cm by 10 cm
18 cm by 12 cm

Annie and Filip share a bottle of juice.

Annie drinks $\frac{3}{5}$ of the juice.

Filip drinks 200 ml of the juice.

One-fifth of the juice is left in the bottle.

How much did Annie drink?

What fraction of the juice did Filip drink?

How much juice is left in the bottle?

600 ml

$\frac{1}{5}$

200 ml

To find $\frac{9}{10}$ of 180, I am going to find $\frac{1}{10}$ of 180 and multiply my answer by 9

Find an easier way to work out $\frac{9}{10}$ of 180

Find $\frac{1}{10}$ of 180 and subtract it from 180

Summer Block 2

Money

Small steps

Step 1	Pounds and pence
Step 2	Convert pounds and pence
Step 3	Add money
Step 4	Subtract money
Step 5	Find change

Pounds and pence

Notes and guidance

In this small step, children consolidate their knowledge of notes and coins from previous years. They use £ and p notation and read monetary values as, for example, 5 pounds and 10 pence. Decimal notation for money is not introduced until children meet decimals in Year 4

In Year 2, children found that different combinations of coins could equal the same amount. This idea is explored further in this step.

A deeper understanding of place value is encouraged by comparing amounts using <, > and =. In this step, the number of pence does not exceed 100, to prevent the need to exchange groups of 100p for pounds. This is covered in the next step.

Things to look out for

- Children may assume that more coins always have a greater value than fewer coins.
- Children may look at the numbers rather than the units, for example thinking 50p has a greater value than £10
- Children may simply add the number on each note or coin without considering its value, for example thinking that £10 and 5p makes either £15 or 15p.

Key questions

- What is the value of this coin/note?
- What does "£" mean?
- What does "p" mean?
- Is the amount the same or different?
- How many pounds do you have?
  How many pence do you have?
  How much do you have altogether?

Possible sentence stems

- There are _____ pounds.
- There are _____ pence.
- There are _____ pounds and _____ pence.

  There is £_____ and _____p.

National Curriculum links

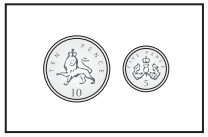
- Add and subtract amounts of money to give change, using both £ and p in practical contexts

Pounds and pence

Key learning

- Match the coins and notes to the amounts.



fifteen pounds	fifteen pence	fifty pounds	fifty pence

- How much money is there in the jar?

There is £ _____ and _____ p.

- How much money does each person have?

Dexter

Annie

Eva

Ron

- Here are some notes and coins.

Choose the fewest number of notes and coins needed to make each amount.

£15 and 75p	38p	£7 and 80p	£55 and 70p

- Write <, > or = to compare the amounts.

Pounds and pence

Reasoning and problem solving

Aisha has £17.50

Scott has £12.27

Who can make their amount with the fewest number of notes and coins?

Explain your answer.

Aisha

Aisha: £10, £5, £2 and 50p

Scott: £10, £2, 20p, 5p and 2p

Amir has five different coins.

What is the greatest amount of money he could have?

What is the least amount of money he could have?

£3 and 80p

38p

Rosie has five silver coins.

She can make 40p with three of the coins.

She can also make 75p with three of the coins.

Which coins does Rosie have?

50p, 20p, 2 × 10p, 5p

Tom and Sam each have two different silver coins.

What coins could Tom and Sam have?

Tom: 5p and 10p

Sam: 10p and 20p

or

Tom: 10p and 20p

Sam: 10p and 50p

Convert pounds and pence

Notes and guidance

In this small step, children use their knowledge of the value of each note and coin to convert pence into pounds and pence. A key learning point is to recognise that 100p = £1, and children should become accustomed to counting pence in groups of 100 and converting to pounds. A strong understanding of place value is helpful, as is a good knowledge of number bonds to 100

Physical and pictorial representations of notes and coins are useful to support children's understanding and allow them to make the conversions effectively.

In this step, the focus is on converting single amounts of pence to pounds and pence. Calculations involving addition and subtraction of amounts of money are covered in the next steps.

Things to look out for

- Children may assume that more coins always have a greater value than fewer coins, regardless of the values of the individual coins.
- Children may not recognise the value of pounds and pence, and see 50p as having a greater value than £48
- Children may make errors with their number bonds to 100

Key questions

- How many pence are there in £1?
  How can you use this to convert £2 to pence?
- How many pence do you have?
- How many groups of 100 can you make?
  How many pounds is this equal to?
  How many pence are remaining?
- How many whole pounds are there in 235p?
- How can you use the fact that £1 = 100p to help you to convert between pounds and pence?

Possible sentence stems

- There are _____ p in £ _____
- _____ p = £ _____ and _____ p
- £ _____ and _____ p = _____ p

National Curriculum links

- Add and subtract amounts of money to give change, using both £ and p in practical contexts

Convert pounds and pence

Key learning

- Here are some coins.

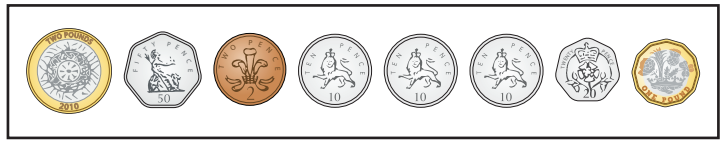
How many groups of 100 pence are there?

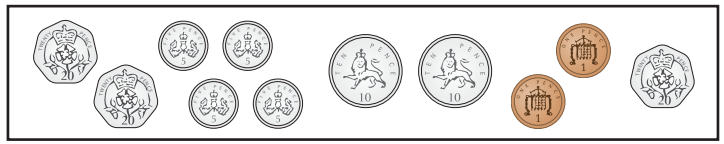
How many pounds do you have?

How many pence are left?

There is £ _____ and _____ p.

- Write the amounts of money in pounds and pence.





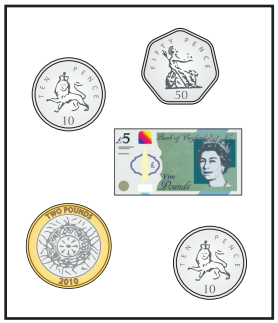
- Write each amount in pounds and pence.

165p	204p	199p	12p	516p

- Match the amounts.

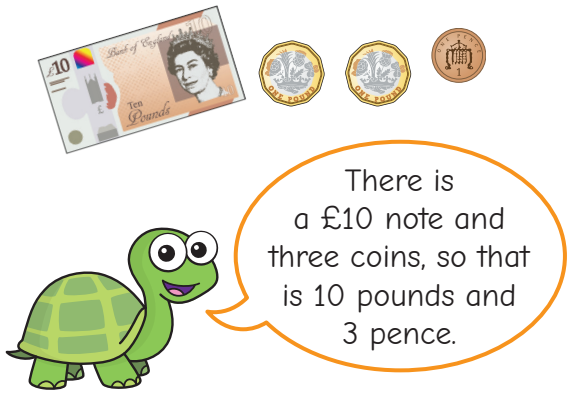
£4 and 20p	42p
£0 and 42p	402p
£2 and 40p	204p
£4 and 2p	420p
£2 and 4p	240p

- How many pence are shown in each amount?



Convert pounds and pence

Reasoning and problem solving



Is Tiny correct?

Explain your answer.

No

Huan and Jack each have the same amount of money.

Huan only has 50p coins.

Jack only has 20p coins.

How much money could they each have?

any number of whole pounds

The children have some coins.

- Esther has five coins.
- Kim has four coins.
- Brett has three coins.
- Nijah has two coins.

They each have 202p.

Which coins could they have?

Esther: £1, 2 × 50p, 2 × 1p or 4 × 50p, 2p

Kim: 2 × £1, 2 × 1p or £1, 2 × 50p, 2p

Brett: 2 × £1, 2p or £2, 2 × 1p

Nijah: £2, 2p

Alex has a £2 coin, a 20p coin and a 2p coin.

What amounts of money could Alex make using one, two or three of her coins?

Write the amounts in pence.

three coins: 222p

two coins: 220p, 202p, 22p

one coin: 200p, 20p, 2p

Add money

Notes and guidance

In this small step, children continue to build on their understanding of pounds and pence by adding money.

Children explore different representations to add money. They begin by using physical notes and coins to add two amounts. They then move on to more abstract representations such as part-whole models and bar models.

Encourage children to add the pounds first and then add the pence. Initially, totals do not cross 100p, but later in the step they need to use their knowledge of converting money to exchange 100p for £1

Children also consider strategies such as adding 99p by adding £1, then subtracting 1p.

Things to look out for

- Children may not exchange 100p for £1 when adding the pounds and pence separately, for example £3 and 40p + £4 and 80p = £7 and 120p instead of £8 and 20p.
- Children may mix up pounds and pence when adding them together, for example £2 and 75p + £3 = £2 and 78p.

Key questions

- Which coins do you need to add together?
- Which coins can you group to make a pound?
- How can an estimate help you to add the amounts?
- How many pounds are there altogether?
- How many pence are there altogether?
- Why is adding 99p the same as adding £1 and subtracting 1p?
- Which method do you prefer? Why?

Possible sentence stems

- £ _____ + £ _____ = £ _____
- _____ p + _____ p = _____ p
- _____ p is equal to £ _____ and _____ p.
- £ _____ and _____ p + £ _____ and _____ p
  = £ _____ and _____ p

National Curriculum links

- Add and subtract amounts of money to give change, using both £ and p in practical contexts

Add money

Key learning

- Mo has £3 and 30p.

Sam has £2 and 10p.

Complete the sentences to work out how much money they have altogether.

£3 + £2 = £ _____

30p + 10p = _____ p

£ _____ + _____ p = £ _____ and _____ p

- Jack has £3 and 50p.

Dora has £5 and 60p.

Complete the sentences to work out how much money they have altogether.

£ _____ + £ _____ = £ _____

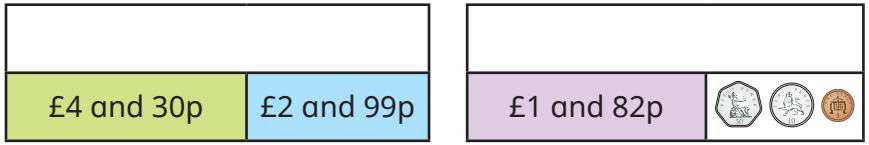
_____ p + _____ p = _____ p

_____ p = £ _____ and _____ p

£ _____ + £ _____ + _____ p = £ _____ and _____ p

- Complete the number sentences.
  - £4 and 14p + £2 and 83p = £ _____ and _____ p
  - £3 and 20p + £4 and 80p = £ _____ and _____ p
  - £8 and 40p + £6 and 80p = £ _____ and _____ p
  - £12 and 39p + £8 and 83p = £ _____ and _____ p

- Complete the bar models.



- A book costs £5 and 99p.

  A magazine costs £1 and 75p.

  How much do the book and magazine cost altogether?

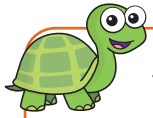
- Whitney has £5 to spend.

  She wants to buy a T-shirt and a hat.

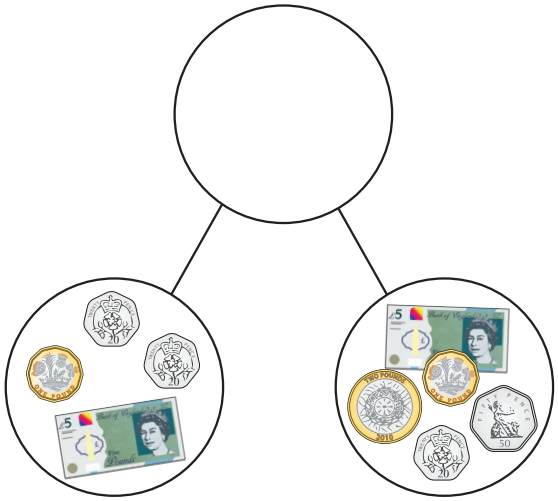
  Does Whitney have enough money?

Add money

Reasoning and problem solving



Tiny is working out the total.



£6 + £8 = £14

40p + 70p = 110p

The total is £14 and 110p.

Do you agree with Tiny?

Explain your answer.

No

Tiny has not converted 110p to £1 and 10p.

The total is £15 and 10p.

Eva has £5

Does she have enough money to buy a toy car and two apples?

Eva wants to buy three items.

What combinations of items could she buy with £5?

No

1 car and 2 balloons

1 car, 1 apple and 1 balloon

1 comic and 2 apples

1 comic and 2 balloons

1 comic, 1 apple and 1 balloon

Subtract money

Notes and guidance

In this small step, children continue to build on their understanding of pounds and pence by subtracting money.

Children explore different representations to subtract money. They begin by using notes and coins to subtract pounds and pence separately, including examples where they exchange coins to help them subtract. For example, when working out £4 and 50p subtract £2 and 10p, they can exchange one 50p coin for five 10p coins, so that they can physically remove £2 and 10p.

Children then move on to using number lines to count on or back to calculate the difference between two amounts. These include examples where they need to use their knowledge of converting money to exchange £1 for 100p.

Things to look out for

- When subtracting the pence separately, children may subtract the greater amount first instead of exchanging from the pounds. For example, when working out £4 and 20p subtract £1 and 50p, children may do 50p – 20p = 30p.
- Number bonds to 100 can be tricky and children may include an extra ten, for example 100 – 37 = 73

Key questions

- Which notes/coins do you need to subtract?
- How can you make _____ in a different way to make it easier to subtract _____?
- Are you going to count back on the number line or count on? Why?
- Do you need to exchange any pounds for pence?
- Which method do you prefer? Why?

Possible sentence stems

- £_____ – £_____ = £_____
- _____p – _____p = _____p
- The whole is £_____ and _____p.

  One part is £_____ and _____p and the other part is £_____ and _____p.

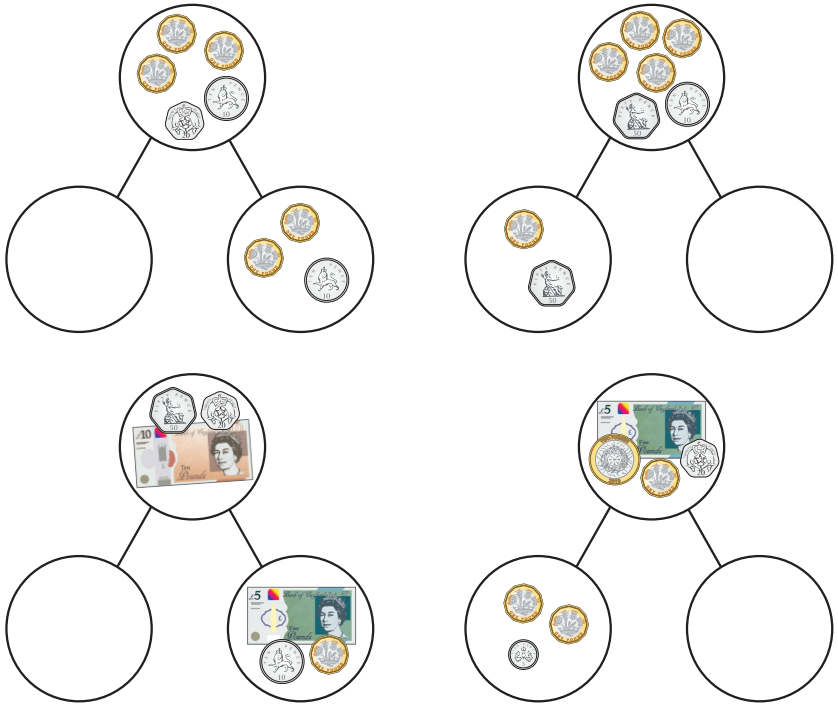
National Curriculum links

- Add and subtract amounts of money to give change, using both £ and p in practical contexts

Subtract money

Key learning

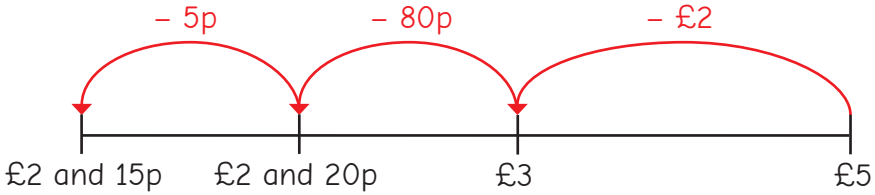
- Complete the part-whole models.



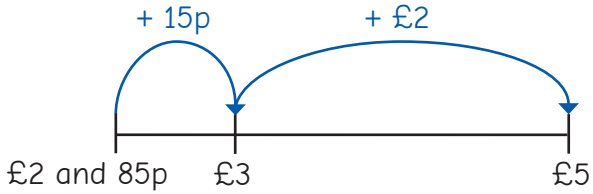
- Complete the subtractions.
  - £5 and 30p – £1 and 10p
  - £8 and 75p – £4 and 45p
  - £6 and 80p – £5 and 32p
  - £12 and 99p – £12 and 84p

- Huan and Rosie are subtracting £2 and 85p from £5

  Huan counts back from £5



  Rosie counts on from £2 and 85p.



  They both get the answer £2 and 15p.

  Use one of their methods to work out the subtractions.

£10 – £6 and 55p	£4 and 30p – £1 and 90p

- Dora has £7 and 50p.

  She gives £4 and 80p to her sister.

  How much money does Dora have left?

Subtract money

Reasoning and problem solving

Tiny is working out
£8 and 20p – £5 and 30p.

£8 – £5 = £3

30p – 20p = 10p

£8 and 20p – £5 and 30p = £3 and 10p

Do you agree with Tiny?

Explain your answer.

No

Ron uses a number line to subtract money.

What subtraction is Ron working out?

What is the answer?

£4 and 20p – £1 and 50p

£2 and 70p

Tom is using a number line to work out £2 and 15p – £1 and 80p.

Should he count on from £1 and 80p or count back from £2 and 15p?

Which method do you prefer?

Explain your answer.

Compare methods as a class.

A box of crayons costs £3 and 10p

A box of crayons costs £1 and 65p more than a notebook.

A notebook costs 48p more than a pen.

How much does a pen cost?

97p

Find change

Notes and guidance

In this small step, children build on their understanding of subtracting money to find change.

Use notes and coins to model what happens when change is needed. It is important to encourage role-play, so that children understand the context of giving and receiving change.

Children use number lines and part-whole models to subtract to find change. They can explore both counting on and counting back as methods of finding the difference to find change.

For some questions, children need to use their knowledge of converting money to exchange £1 for 100p. In other questions, they are given the amount of change and need to find the total amount of a set of items.

Things to look out for

- Children may not be confident with converting money. They need to know that they can exchange £1 for 100p to support them finding the correct amount of change.
- Children may confuse the verb and noun for "change", so it is important to ensure they understand that "change" in this context is the amount of money they are left with.

Key questions

- When talking about money, what does "change" mean?
- How can you partition _____ to make it easier to find the amount of change needed?
- Are you going to count back on the number line or count on? Why?
- Do you need to exchange any pounds for pence?
- Which method do you prefer?
- How does the part-whole model help to solve the problem?

Possible sentence stems

- £_____ subtract £_____ is equal to £_____
- _____p subtract _____p is equal to _____p.
- The difference between _____ and _____ is _____, so I will get _____ change.

National Curriculum links

- Add and subtract amounts of money to give change, using both £ and p in practical contexts

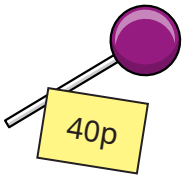
Find change

Key learning

- A lollipop costs 40p.

  Brett pays for one lollipop with a £1 coin.

  How much change will he receive?

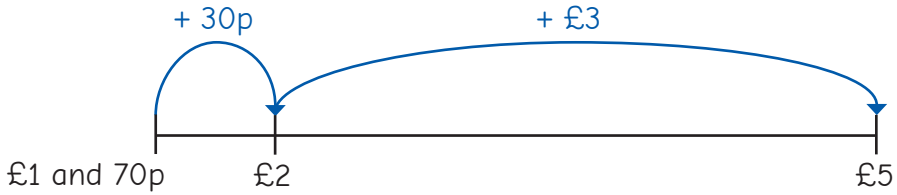


- A teddy costs £1 and 70p.

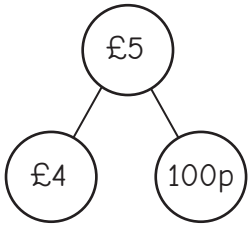
  Rosie pays with a £5 note.

  Mo and Tommy are working out how much change Rosie will get.

  Mo uses a number line.



  Tommy uses a part-whole model.



£4 – £1 = £3

100p – 70p = 30p

  They both get the answer £3 and 30p.

  Which method do you prefer? Why?

- An ice cream costs £1 and 60p.

  Esther pays with a £5 note.

  How much change will she receive?

- Nijah buys a bottle of water for £1 and 20p.

  She pays with a £2 coin.

  How much change does she get?

- Dora buys a bag of pears.

  She pays with a £2 coin and gets this change.

  How much do the pears cost?

- Annie buys a hat for £6 and 35p.

  She pays with a £10 note.

  How much change does she get?

  Explain your method to a partner.

Find change

Reasoning and problem solving

A sticker book costs £4 and 60p.

A football costs £3 and 45p.

Teddy buys a sticker book and a football.

He pays with a £10 note.

How much change does he get?

£1 and 95p

Aisha spends £7 and 76p on a birthday cake.

She pays with a £10 note.

How much change does she get?

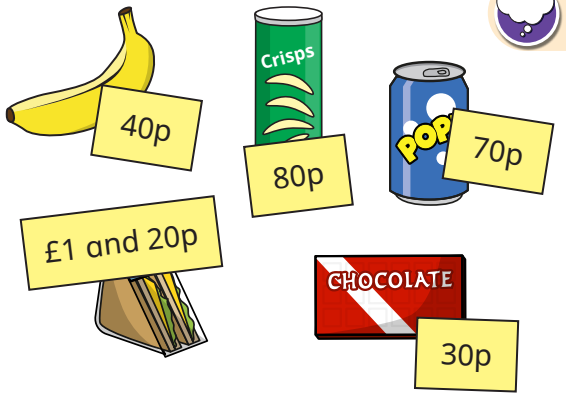
She gets six coins for her change.

What coins could they be?

£2 and 24p

multiple possible answers, e.g.

2 × £1, 2 × 10p, 2 × 2p



Amir buys three items and pays with this money.

He receives this change.

What items could he have bought?

Is there more than one possibility?

two possibilities:

sandwich, banana and drink

sandwich, crisps and chocolate

Summer Block 3

Time

Small steps

Step 1	Roman numerals to 12
Step 2	Tell the time to 5 minutes
Step 3	Tell the time to the minute
Step 4	Read time on a digital clock
Step 5	Use am and pm
Step 6	Years, months and days
Step 7	Days and hours
Step 8	Hours and minutes – use start and end times

Small steps

Step 9	Hours and minutes - use durations
Step 10	Minutes and seconds
Step 11	Units of time
Step 12	Solve problems with time

Roman numerals to 12

Notes and guidance

This small step introduces children to Roman numerals and the Roman number system. They focus only on Roman numerals for numbers 1 to 12, using the context of a clock face.

By the end of this step, children should understand that numbers in the Roman number system follow these principles: letters are not usually written four times (for example, 4 is written as IV, instead of IIII); if a lower value digit is written to the left of a higher value digit, it is subtracted (for example, IV = 5 – 1) and if it is written to the right, it is added (for example, VI = 5 + 1).

Children recap how to read and write "o'clock" and "half past" the hour. Give them the opportunity to create times using individual clocks with moveable hands.

Things to look out for

- Children may write 4 as IIII or 9 as VIIII.
- Children may add numerals, instead of interpreting the values based on their position, for example interpreting IX as 11, rather than 9
- When marking the hour hand on a clock to show half past 7, children may draw the hand pointing to 7, rather than halfway between 7 and 8

Key questions

- Where have you seen Roman numerals before?
- What is the same/different about representing the numbers 2 and 12 as Roman numerals?
- What is the same/different about writing 4 and 6 as Roman numerals?
- What are the rules of the Roman number system?
- Which is the hour/minute hand?
- Where will the minute hand be at _____ o'clock?
- Where will the minute hand be at half past _____?

Possible sentence stems

- The letter _____ represents the number _____
- On the hour, the minute hand points to _____
- At half past the hour, the minute hand points to _____

National Curriculum links

- Tell and write the time from an analogue clock, including using Roman numerals from I to XII, and 12-hour and 24-hour clocks

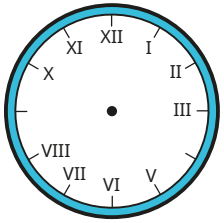
Roman numerals to 12

Key learning

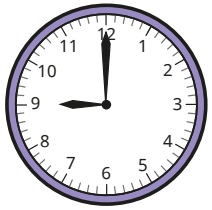
- Match the numbers to the Roman numerals.

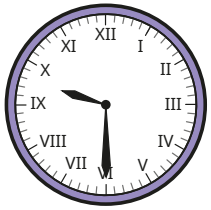
1	2	3	4	5	6	10	12
III	V	XII	X	II	IV	I	VI

- Write Roman numerals to complete the clock face.



- Here are two clocks.

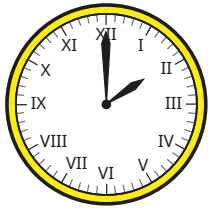


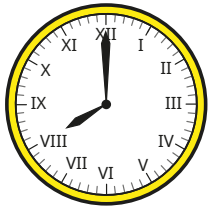


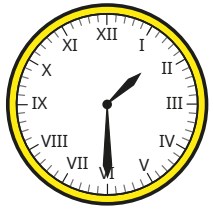
What is the same about the clocks?

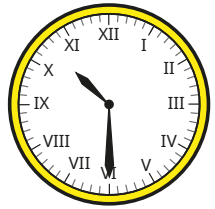
What is different?

- Write the times shown on the clocks.

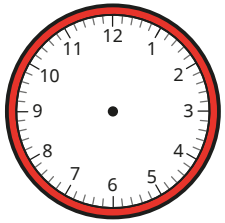




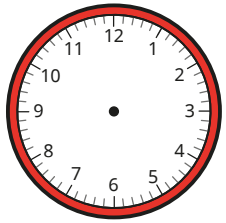




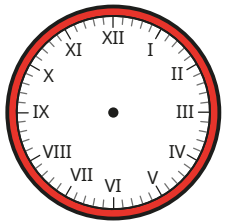
- Draw hands to show the time on each clock.



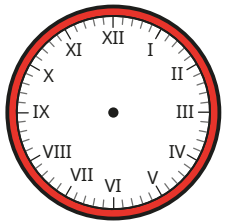
3 o'clock



half past 4



11 o'clock



half past 5

Compare answers with a partner.

Roman numerals to 12

Reasoning and problem solving

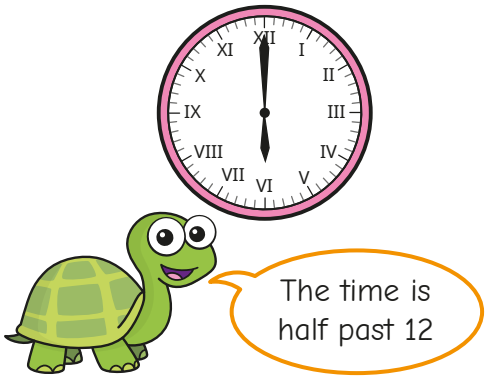
Amir writes the number 9 in Roman numerals.

VIIII

Explain Amir's mistake.

Write 9 in Roman numerals.

IX



Do you agree with Tiny?

Explain your answer.

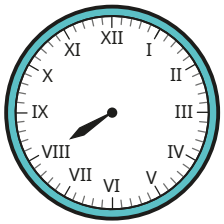
No

Tiny has mixed up the hour and minute hands.

Is Alex correct?

Explain your answer.

No



The clock has lost its minute hand.

What time could it be?

Explain your answer.

8 o'clock, because the hour hand is pointing at 8

Tell the time to 5 minutes

Notes and guidance

In this small step, children use analogue clocks to tell the time to 5 minutes, building on their learning in Year 2

To begin with, children recap how many minutes there are in an hour. With this knowledge, encourage them to identify why quarters of an hour are equal to 15 minutes and why the 12 intervals around a clock face are each equal to 5 minutes. Partitioning the clock vertically from 12 to 6 may visually support children to recognise whether a time is past or to the hour. As in the previous step, children can physically make times on analogue clocks with moveable hands.

Children may need to practise their 5 times-table to ensure that they can fluently tell the time to 5 minutes.

Things to look out for

- Children may not relate the numbers on the clock face to minutes. For example, when the minute hand is pointing to 4, they may say that it is 4 minutes past the hour.
- Children may confuse times past and times to the hour.
- If children are not secure in their 5 times-table, they may struggle to fluently identify the number of minutes past or to the hour.

Key questions

- Which is the minute/hour hand?
- Is the minute hand in the first half or second half of the hour?
- If the minute hand is pointing at _____, how many minutes is it past the hour?
- If the minute hand is pointing at _____, how many minutes is it to the hour?
- How else could you say 15 minutes past/to?
- Would you ever say 60 minutes past _____? Why/why not?

Possible sentence stems

- The minute hand is pointing to the _____

  This means that the time is said as past/to.

- _____ × 5 = _____, so the time is _____ past/to _____

National Curriculum links

- Tell and write the time from an analogue clock, including using Roman numerals from I to XII, and 12-hour and 24-hour clocks

Tell the time to 5 minutes

Key learning

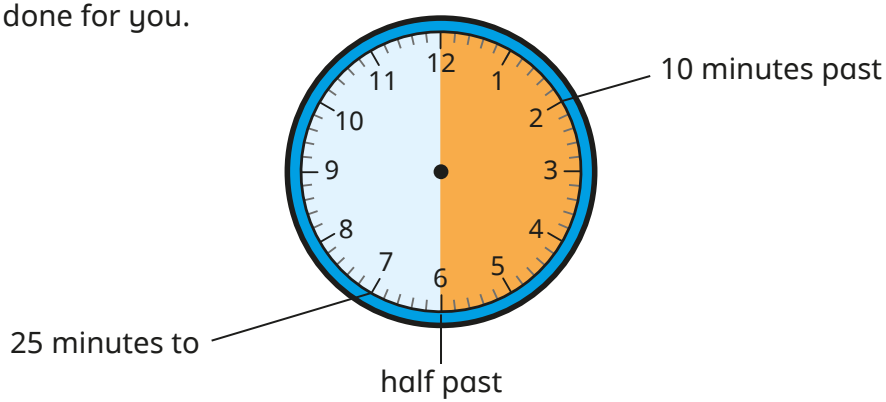
- Complete the sentences.

  There are _____ minutes in one hour.

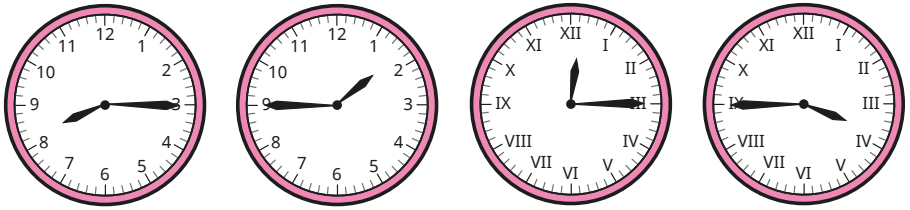
  There are _____ minutes in half an hour.

  There are _____ minutes in quarter of an hour.

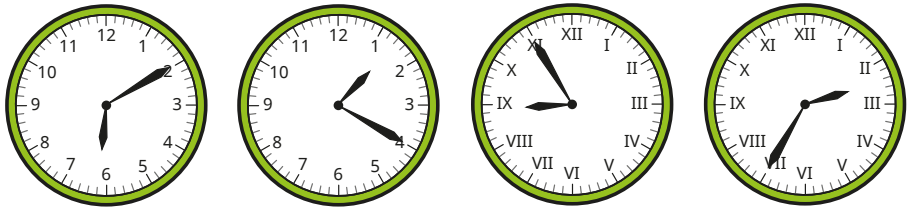
- Label the clock to show what time would be shown if the minute hand was pointing to each interval. Some have been done for you.



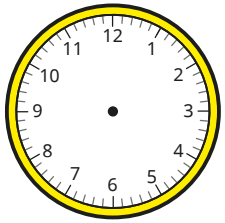
- What time is shown on each clock?



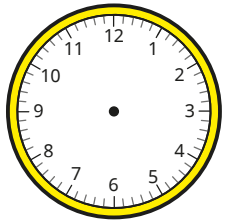
- What time is shown on each clock?



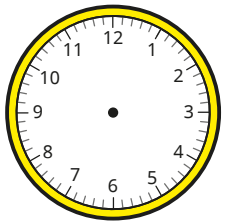
- Draw hands to show the time on each clock.



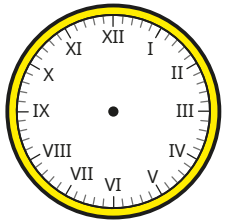
5 minutes past 5



20 minutes to 12



quarter to 6

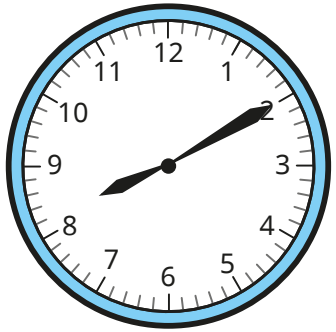


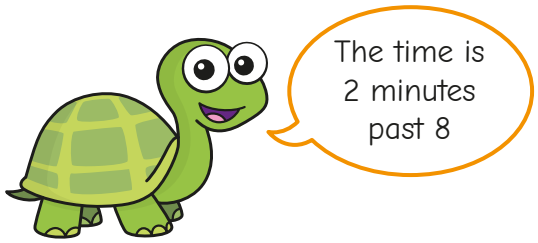
25 minutes past 10

Tell the time to 5 minutes

Reasoning and problem solving

Tiny is telling the time.



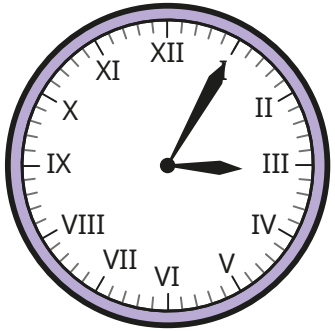


Do you agree with Tiny?

Explain your answer.

No

Teddy is telling the time.



Is Teddy correct?

Explain your answer.

Yes

There are 55 minutes until 4 o'clock.

Teddy should say it is 5 minutes past 3

Tell the time to the minute

Notes and guidance

In this small step, children build on their previous learning to tell the time to the nearest minute.

This is a good opportunity to reinforce the convention that if the minute hand is pointing before 6, we use the phrase "past the hour" and if it is pointing after 6, we use the phrase "to the hour". To find out how many minutes past/to the hour a time is, children should identify the 5-minute interval before, then count individual minutes after the multiple of 5. For example, to tell the time on an analogue clock showing 23 minutes past 4, children should recognise that this is $4 \times 5 = 20$, then $+ 3$

To support children when telling the time to the hour, a part-whole model can help them to see the number bond to 60

Things to look out for

- Children may count individual minutes until they reach the minute hand, instead of finding the 5-minute interval before the minute hand and counting on.
- When telling times that are "_____ minutes to the hour", there are several steps in the process, so children may make errors.

Key questions

- Which is the minute/hour hand?
- Would you say the time shown is "past the hour" or "to the hour"? Why?
- What do you add to _____ to reach 60?
- How many minutes is it past the hour/to the next hour?
- What method can you use to find the number of minutes past?

Possible sentence stems

- _____ × 5 = _____

  _____ + _____ = _____, so the clock is showing _____ minutes past/to _____
- _____ + _____ = 60

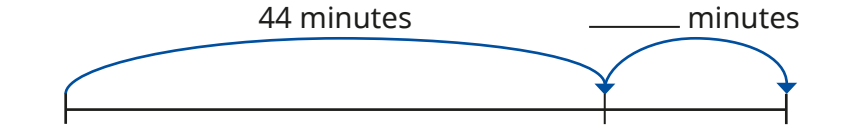
National Curriculum links

- Tell and write the time from an analogue clock, including using Roman numerals from I to XII, and 12-hour and 24-hour clocks
- Estimate and read time with increasing accuracy to the nearest minute; record and compare time in terms of seconds, minutes and hours; use vocabulary such as o'clock, am/pm, morning, afternoon, noon and midnight

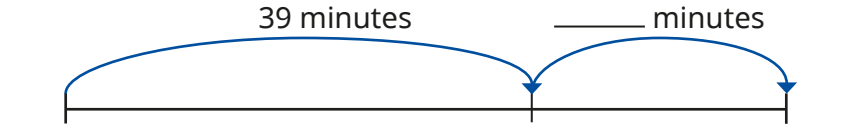
Tell the time to the minute

Key learning

- Complete the number lines and sentences.

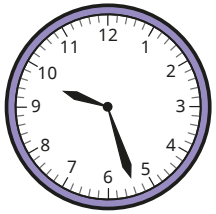


44 minutes past 3 is the same as _____ minutes to 4



39 minutes past 3 is the same as _____ minutes to 4

- Max is working out what time it is.



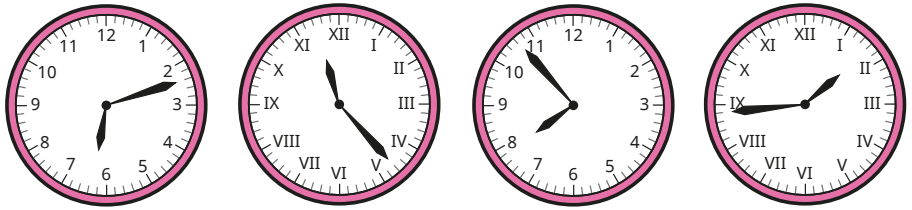
$5 \times 5 = 25$

$25 + 2 = 27$

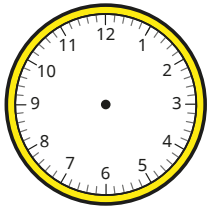
So the time is 27 minutes past 9

Use Max's method to work out the times shown.

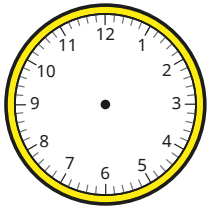
- Write the times shown on each clock.



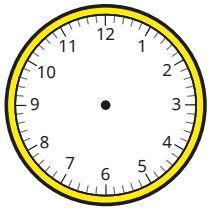
- Draw the hands on the clocks to show the times.



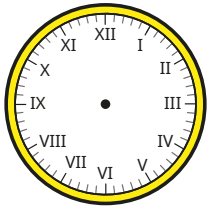
8 minutes past 12



4 minutes to 4



17 minutes past 5

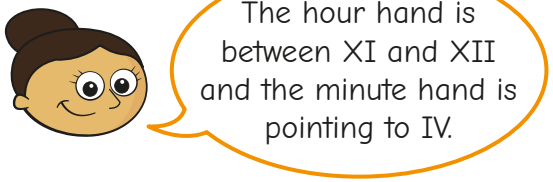


2 minutes to 9

Tell the time to the minute

Reasoning and problem solving

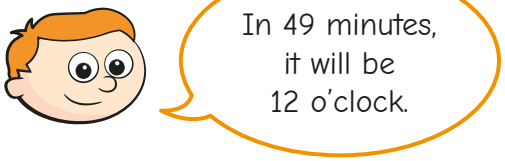
Dora is telling the time using an analogue clock.



What time is it?

20 minutes past 11

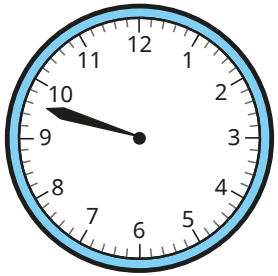
Ron is telling the time.



What time is it?

11 minutes past 11

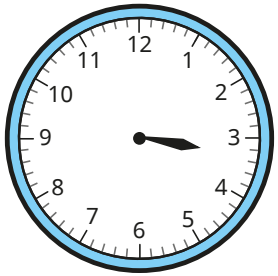
The clock has lost its hour hand.



What time could it be?

approximately 12 minutes to any hour

The clock has lost its minute hand.



What time could it be?

any time between quarter past 3 and half past 3

Compare answers with a partner.

Read time on a digital clock

Notes and guidance

This small step is the first time that children are formally introduced to the 12-hour digital clock, but they may already have experience of this from outside school.

Children continue to use the phrases "_____ minutes past/to" the hour to tell the time on a digital clock. This step is important because it highlights the convention that we say "20 minutes to 4" to describe the time displayed on a digital clock as "3:40", not "40 minutes past 3". This builds on the learning from the previous step where children converted times past the hour to times to the hour.

Ensure children record the time using a colon, not a decimal point, as this could lead to confusion in later learning when they look at decimals.

Things to look out for

- Children may write times with a decimal point, rather than using a colon to separate hours and minutes.
- Children may rely on reading times exactly as they appear, rather than converting them, for example saying "two forty-seven" rather than "thirteen minutes to three".
- Children may think there are 100 minutes in an hour and hence think 50 minutes past 3 is 50 minutes to 4

Key questions

- Where have you seen a digital clock before?
- What is the same/different about analogue and digital clocks?
- How could you show the time _____ on a digital clock?
- What do you add to _____ to make 60?
- Is the time _____ past the hour or to the hour?
- How do you know when to describe a time as past or to the hour?

Possible sentence stems

- _____ minutes past _____ is the same as _____ minutes to _____
- 60 – _____ = _____, so the time is _____ to _____

National Curriculum links

- Tell and write the time from an analogue clock, including using Roman numerals from I to XII, and 12-hour and 24-hour clocks
- Estimate and read time with increasing accuracy to the nearest minute; record and compare time in terms of seconds, minutes and hours; use vocabulary such as o'clock, am/pm, morning, afternoon, noon and midnight

Read time on a digital clock

Key learning

- What is the same about the clocks? What is different?

11:10

- Match the analogue clocks to the digital clocks.

2:00

4:30

11:25

6:45

- Complete the times shown on each clock.

6:20

_____ minutes past 6

6:23

_____ minutes past _____

3:40

_____ minutes past _____

_____ minutes to _____

3:50

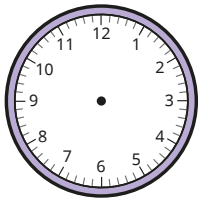
_____ minutes past _____

_____ minutes to _____

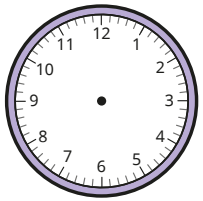
Which is the best way to describe the time on each clock?

- Draw hands on the clocks to show each time.

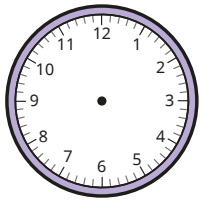
9:25



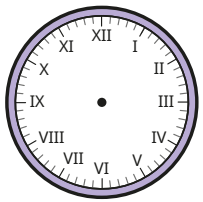
1:00



5:40



8:55



Read time on a digital clock

Reasoning and problem solving

Annie and Tommy are telling the time.

Who is correct?

Explain your answer.

Tommy

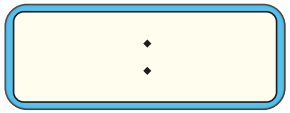
Brett records the time 4 minutes past 7 on a digital clock.

Explain Brett's mistake.

Write the correct time.

Brett has not recorded the 0 as a placeholder before the 4

7:04



On a digital clock, how many times will 9 be shown between 1:00 and 2:00?

On a digital clock, how many times will have a 5 in them between 1:00 and 2:00?

Explain the difference.

6

15

Use am and pm

Notes and guidance

In this small step, children's understanding of time is developed further, as they are introduced to the terms "am" and "pm" to describe times before 12 noon and after 12 noon respectively. Notice that at 12 noon and 12 midnight, am and pm are not used.

Discussing familiar daily activities, such as getting out of bed and going to bed, will help children to understand the concept. Support them to recognise that the 24 hours in a day are split into 12 hours before noon and 12 hours after noon. They will see that the difference between how times before and after noon are recorded is only shown by am and pm and otherwise the times look the same.

Children use both analogue clocks and digital clocks that show am and pm. The 24-hour clock is not covered until Year 4

Things to look out for

- Children may confuse am and pm, for example thinking 1 am should be 1 pm, because it is late.
- Children may need support to understand that times occur twice each day.
- Children may not be familiar with the terms "noon" and "midnight".

Key questions

- What time does a new day start?
- What time of the day does _____ happen?
- Could _____ take place at an am time and a pm time?
- Is _____ am/pm earlier or later than _____ am/pm?
- How do you know whether a time is in the morning or in the afternoon?
- What is the same/different about 6 am on an analogue clock and a digital clock?

Possible sentence stems

- _____ takes place in the morning/afternoon.
- 12 o'clock is either called _____ or _____

National Curriculum links

- Tell and write the time from an analogue clock, including using Roman numerals from I to XII, and 12-hour and 24-hour clocks
- Estimate and read time with increasing accuracy to the nearest minute; record and compare time in terms of seconds, minutes and hours; use vocabulary such as o'clock, am/pm, morning, afternoon, noon and midnight

Use am and pm

Key learning

- Use your class timetable to complete the sentences.
  - Maths takes place in the _____
  - _____ takes place in the morning.
  - _____ takes place in the afternoon.
  - Home time takes place in the _____

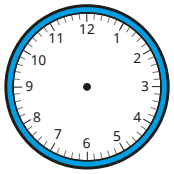
- Sort the events into the table to show the time of day that they are likely to happen.

wake up	leave school	eat breakfast
after-school club	break time	go to bed

Morning (am)	Afternoon (pm)

Compare answers with a partner.

- Dani starts school at 10 minutes past 9 in the morning.
  - Write this time using am or pm.
  - Show this time on both clocks.



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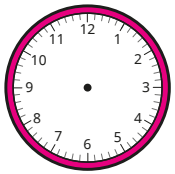
- Rosie plays netball at 20 minutes past 4 in the afternoon.
  - Write this time using am or pm.
  - Show this time on both clocks.



:

- Which is the earliest time in each list?

10:34 am	8:56 am	5:12 am	11:00 am
8:49 pm	1:15 pm	6:05 pm	12:40 pm
6:31 pm	2:00 am	12:27 pm	5:45 am

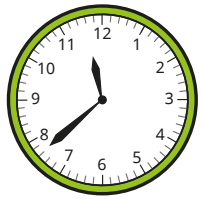
- Which is the latest time in each list?

4:51 pm	9:11 pm	3:20 pm	11:42 pm
10:18 am	11:33 am	7:54 am	9:10 am
10:59 am	6:30 pm	3:32 pm	8:14 am

Use am and pm

Reasoning and problem solving

Esther arrives at the station at this time in the morning.



The timetable shows the times the trains leave.

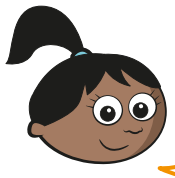
10:56 am	11:26 am	12:10 pm	12:43 pm

Which trains have already left?

Which is the first train that Esther could get?

10:56 am, 11:26 am

12:10 pm



12:46 pm is later than 6:32 pm, because 12 is greater than 6

Do you agree with Sam?

Explain your answer.

No

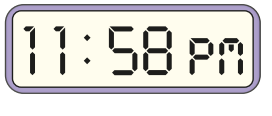
Tiny records the sunset and sunrise over two days.

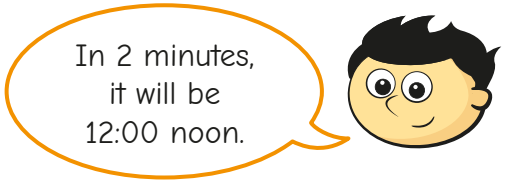
Sunrise	Sunset
6:22 pm	6:09 am
6:20 pm	6:10 am

What mistake has Tiny made?

Tiny has mixed up am and pm.

The sun rises in the morning (am) and sets in the evening (pm).





Do you agree with Jack?

Explain your answer.

No

The time will be 12 midnight.

Years, months and days

Notes and guidance

In this small step, children develop their understanding of days, weeks, months and years.

Children explore years by using calendars to investigate the number of days in each month. Rhymes or songs could help them to remember the number of days in each month, as will regular revisiting during the school year when the months change. They are also introduced to the concept of leap years and how these differ from non-leap years.

Whole class discussions could involve ordering children's birthdays or festivals, starting with the earliest. Discuss the differences between a calendar year and the school year.

By the end of this step, children should know the number of days in a week, and days and months in a year.

Things to look out for

- Children may mix up the number of days in leap years and non-leap years.
- Children may think that there are exactly 4 weeks in a month.
- Children may need to revisit the number of days in each month regularly before these facts are secure.

Key questions

- Which month comes before _____?
- Which month comes after _____?
- In which month is your birthday?
- Which month changes when there is a leap year?
- How often is there a leap year?
- How many _____ are there in a _____?

Possible sentence stems

- There are _____ days in a week, so there are _____ × _____ = _____ days in _____ weeks.
- There are _____ months in a year.
- There are _____ days in a non-leap year/leap year.

National Curriculum links

- Know the number of seconds in a minute and the number of days in each month, year and leap year

Years, months and days

Key learning

- Complete the sentences.

  There are _____ days in a week.

  There are _____ months in a year.

  There are _____ days in a non-leap year.

  There are _____ days in a leap year.

  Leap years happen every _____ years.

- Use a calendar to help you answer the question.

  How many days are in each month in a normal calendar year?

January	May	September
February	June	October
March	July	November
April	August	December

  What do you notice?

- Record five people's birthdays in the table.

Name	Date

  Order the dates from earliest to latest in the year.

- Here is part of a calendar from 2021

July						
Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

  - What day of the week was 9 July?
  - The summer holidays started on 23 July.
    What day did the summer holidays start?
  - How many Mondays were there in July 2021?
  - What was the date on the last Wednesday in July 2021?
  - What day of the week was 30 June?

- Write <, > or = to complete the statements.

  6 days ◯ 1 week

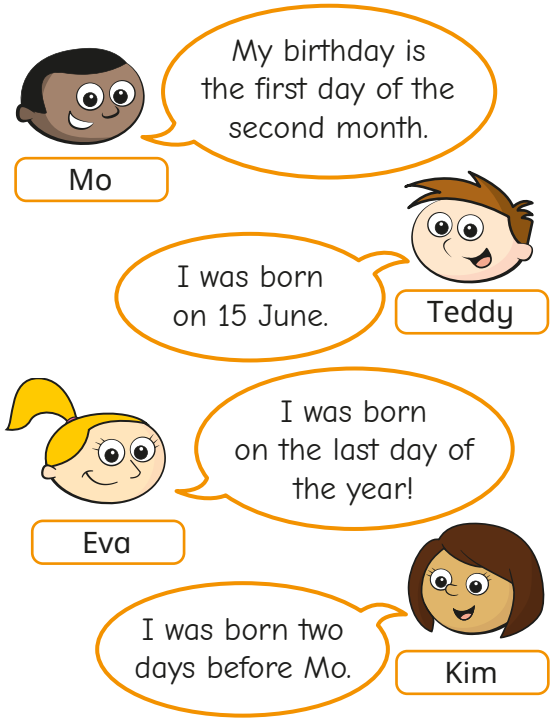
  6 weeks ◯ 1 month

  12 months ◯ 1 year

Years, months and days

Reasoning and problem solving

Four children describe their birthdays.



Work out the children's birthdays.

Write them in order, starting with the earliest in the year.

Kim: 30 January

Mo: 1 February

Teddy: 15 June

Eva: 31 December

Here is a page from a calendar.

Mon	Tues	Wed	Thur	Fri	Sat	Sun
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

Which months could it be showing?

If you also know that there are no school holidays in the month, which months could it be now?

January, March, May, July, August, October, December

Is the statement always true, sometimes true or never true?

There are exactly 365 days in a year.

Explain your answer.

sometimes true

Days and hours

Notes and guidance

In this small step, children continue to develop their understanding of days, weeks, months and years, looking at the key relationships of 1 week = 7 days and 1 day = 24 hours.

Children explore the difference between the number of days in a school week and the number of days in an actual week. They use related number facts, repeated addition or informal multiplication of 2-digit numbers by a 1-digit number to work out how many hours there are in a given number of days or the number of days in a given number of weeks. Using real calendars, children consider how the number of school days in a month may change depending on what day of the week the month starts and on school holidays.

Things to look out for

- Calculation errors may occur, and as children do not yet know the 7 times-table, they will need support to model any calculations with weeks and days.
- Children may think that there are exactly 4 weeks in a month.
- Children may need to revisit the number of days in each month regularly before these facts are secure.

Key questions

- How many days are there in one week?
- How many days are spent at school in one week?
- How many days are not spent at school in one week?
- How many hours are there in one day?
  How can you use this fact to work out how many hours there are in _____ days?
- How many hours do you spend at school in a day/week?

Possible sentence stems

- There are _____ hours in a day, so there are _____ × _____ = _____ hours in _____ days.
- There are _____ days in a week.

National Curriculum links

- Estimate and read time with increasing accuracy to the nearest minute; record and compare time in terms of seconds, minutes and hours; use vocabulary such as o'clock, am/pm, morning, afternoon, noon and midnight
- Know the number of seconds in a minute and the number of days in each month, year and leap year

Days and hours

Key learning

- Complete the sentences.

  There are _____ days in a week.

  There are _____ days in a school week.

  There are _____ hours in a day.

- Here is part of a calendar from 2021

December						
Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

  - How many days in this month are at the weekend?
  - How many days in this month are weekdays?

- Complete the sentences.

  There are _____ hours in a day.

  There are _____ hours in two days.

  There are _____ hours in half a day.

- Write <, > or = to complete the statements.

  days in a month ◯ hours in a day

  hours in a day ◯ months in a year

  months in two years ◯ hours in a day

- Use the fact to work out the missing numbers.

  1 week = 7 days

  - _____ week = 14 days
  - _____ weeks = 84 days
  - 4 weeks = _____ days
  - 16 weeks = _____ days

- Use the fact to work out the missing numbers.

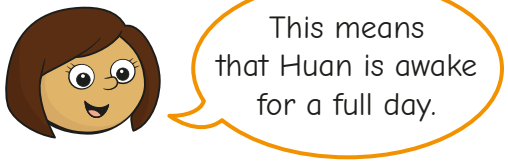
  1 day = 24 hours

  - _____ days = 48 hours
  - 10 days = _____ hours
  - 4 days = _____ hours
  - 14 days = _____ hours

Days and hours

Reasoning and problem solving

Huan gets up at 7 o'clock in the morning and goes to bed at 7 o'clock at night.



Explain Kim's mistake.

How long is Huan awake for?

12 hours

Is the statement always true, sometimes true or never true?

> Children go to school 5 days a week, so they go to school 20 days in one month.

Explain your answer.

sometimes true

Dexter and Jo go to school for 6 hours a day.

Dexter

We will spend 180 hours at school in September.

We will spend less than 180 hours at school in September.

Jo

Who is correct?

Explain your answer.

Jo

Hours and minutes – use start and end times

Notes and guidance

In this small step, children find durations of time between given start and end times.

Give children opportunities to practically work out durations of time under an hour using clocks with moveable hands. To help secure their understanding of both representations, children need to work out the durations using both analogue and 12-hour digital clocks.

Children explore using a number line showing start and end times. Encourage them to use different methods of finding durations that cross over hours, including moving hands around an analogue clock and using bonds to find the number of minutes until the next hour.

A recap of how many minutes there are in one hour, and the number bonds to 60, may be needed.

Things to look out for

- Children may think that an event that ends at a later time must have a longer duration.
- Children may attempt to calculate duration using column subtraction, taking away the start time from the end time, which will lead to problems when hours are crossed.

Key questions

- How many minutes are there in one hour?
- What times should the number line start and end at?
- How many minutes are there to the next hour?
- How can you find the total duration of the event?
- Do you find it easier to work out duration using an analogue clock or a digital clock?

Possible sentence stems

- The number bond to 60 of _____ is _____
- From _____ to _____ o'clock is _____ minutes.

  From _____ o'clock to _____ is _____ minutes.

  The total time taken is _____ minutes.

National Curriculum links

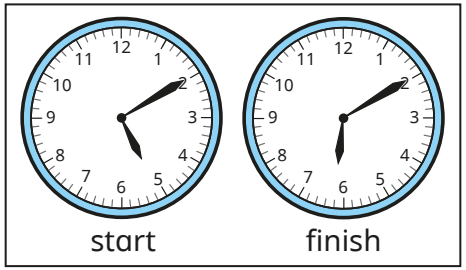
- Tell and write the time from an analogue clock, including using Roman numerals from I to XII, and 12-hour and 24-hour clocks
- Compare durations of events

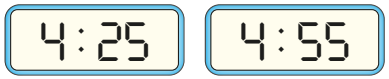
Hours and minutes – use start and end times

Key learning

- The clocks show the start and finish times of some activities.

  Work out the duration of each activity.





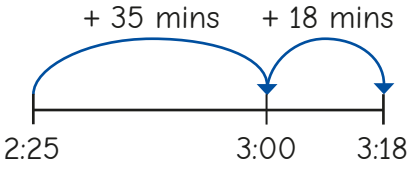
- Complete the table.

Programme	Start time	Finish time	Duration
Pals	6:30 am	7:30 am	
Dennis the Scientist	3:15 pm	6:15 pm	
The Football Show	1:00 pm	3:00 pm	
An Adventure	10:40 am	12:40 pm	

- Write **is shorter than**, **is longer than** or **is the same as** to compare the durations.
  - 2:00 pm–6:00 pm _____ 8:00 am–11:00 am.
  - 5:30 pm–7:30pm _____ 4:15 am–7:15 am.
  - 10:30 am–12:30 pm _____ 11:40 pm–1:40 am.

- Alex played football from 2:25 to 3:18

  She uses a number line to work out how long she played football.

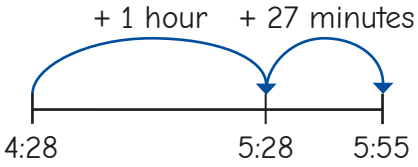


  Use Alex's method to find the durations in minutes.
  - 10:48 to 11:35
  - 7:15 to 8:24
  - 9:50 to 10:23

- Amir started watching a TV programme at 4:28 pm.

  The programme finished at 5:55 pm.

  Amir uses a number line to work out how long he watched TV for.



  Use Amir's method to find the durations.
  - 11:37 am to 12:51 pm
  - 5:12 am to 6:49 am
  - 1:56 pm to 3:17 pm
  - 11:56 pm to 1:08 am

Hours and minutes – use start and end times

Reasoning and problem solving

Scott gets on a bus at 3:23 pm.

He gets off the bus at 4:24 pm.

How long was his bus journey?

Compare methods with a partner.

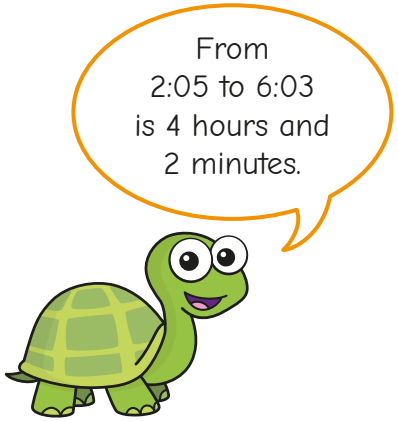
1 hour and 1 minute

A car park charges £2 for every 30 minutes of parking.

Mr Trent parks his car in the car park from 1:22 pm to 3:52 pm.

How much does he pay for parking?

£10

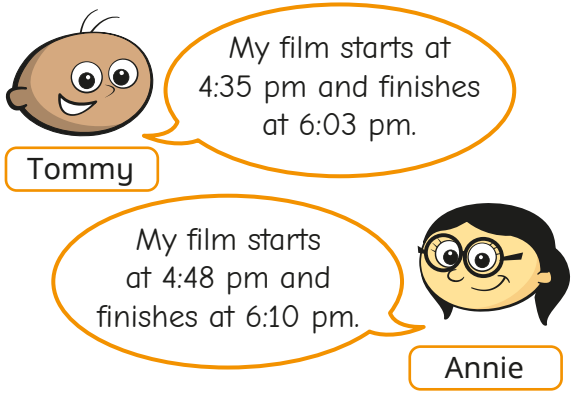


Do you agree with Tiny?

Explain your answer.

No

Tommy and Annie are watching different films at the cinema.



How long was each film?

Whose film was longer?

Tommy: 1 hour and 28 minutes

Annie: 1 hour and 22 minutes

Tommy's

Hours and minutes – use durations

Notes and guidance

Building on the previous step, children use a given duration to count forward to find an end time, or count back to find a start time. Times are given using both analogue and digital clocks to reinforce children's familiarity with both forms.

Start with durations of minutes only, before moving on to examples that involve hours and minutes. Children can use clocks with moveable hands to count forwards or backwards with time. A number line is an important representation to support children when counting on or back to find start and end times. A part-whole model could support them to partition longer durations of time.

Things to look out for

- Children may need support if an hour boundary is crossed.
- Children may count the time in the wrong direction.
- Children may try to use formal methods of addition and subtraction which will give incorrect answers if they work in 100s rather than 60s.

Key questions

- Why is it important to be able to work out how long something lasts?
- How many minutes are there in one hour?
- How can you partition the duration? Is there more than one way?
- How do you know whether to move the minute hand clockwise or anticlockwise?
- Are you being asked to find the start or end time of the activity?
- What strategy can you use to find the start/end time?
- What time does the number line start/end at?

Possible sentence stems

- To work out the start time, I need to _____ minutes from _____
- To work out the end time, I need to _____ hours and _____ minutes to _____

National Curriculum links

- Tell and write the time from an analogue clock, including using Roman numerals from I to XII, and 12-hour and 24-hour clocks
- Compare durations of events

Hours and minutes – use durations

Key learning

- Break time starts at 10:25 am.

  It lasts for 20 minutes.

  What time does break time finish?

- After-school club finishes at 4:45 pm.

  It lasts for 30 minutes.

  What time does after-school club start?

- A rugby match lasts 80 minutes.

  How long is this in hours and minutes?

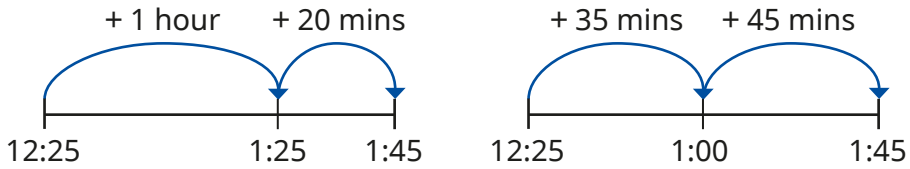
  The match kicks off at 5:00 pm.

  What time does the match finish?

- A train journey lasts 1 hour and 20 minutes.

  The train leaves at 12:25 pm.

  The number lines show two ways to work out the arrival time.



  How do the methods work? Is there a different way?

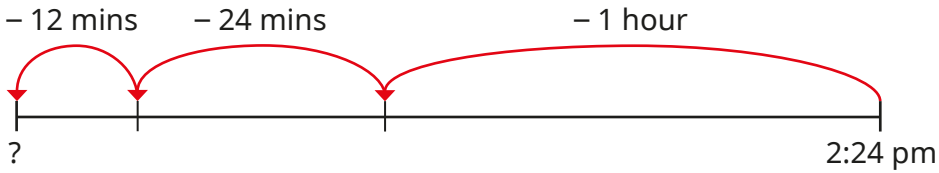
- Work out the arrival times of trains A and B.

Train	Train leaves	Duration
A	4:43 pm	1 hour and 15 minutes
B	5:16 pm	55 minutes

- A film is 1 hour and 36 minutes long.

  It finishes at 2:24 pm.

  Use the number line to work out what time the film starts.



  Another film is 2 hours and 17 minutes long.

  It finishes at 3:08 pm.

  What time does it start?

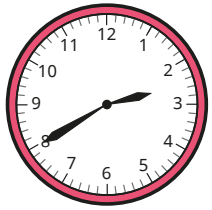
Hours and minutes – use durations

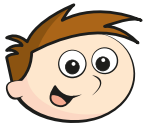
Reasoning and problem solving

Here is the time now.

School ends in 45 minutes.

What time will it be?





School ends at 5 minutes to 2

Teddy

School ends at 25 minutes past 3

Max

School ends at 2:85

Whitney

Who do you agree with?

Explain your answer.

Max

Nijah is going on holiday.

Her plane will take off at 3:48 pm.

She needs to be at the airport $2\frac{1}{2}$ hours before take-off.

What is the latest time she can arrive at the airport?

The flight lasts for 3 hours and 14 minutes.

What time will she arrive at her destination?

1:18 pm

7:02 pm

A TV programme lasts 59 minutes.

It starts at 3:15 pm.

What time will it finish?

Compare methods with a partner.

4:14 pm

Minutes and seconds

Notes and guidance

In this small step, children extend their understanding of the units of time to include minutes and seconds.

Children could use a stopwatch to compare counting 10 seconds, 30 seconds or 1 minute in their head with the actual timed duration. Additionally, they could use a stopwatch to find the length of time it takes in seconds to complete different tasks, for example run across the hall/playground, do ten star jumps, write their name and so on.

This small step helps children to recognise that there are 60 seconds in 1 minute and to use this to write durations of time in different ways. They can use various calculation strategies to work out how many seconds there are in several minutes.

Things to look out for

- Children may think that there are 100 seconds in a minute, which is similar to the base 10 number system or their experience of 100 pence in a pound.
- Children may confuse the positions of minutes and seconds on a stopwatch.
- Children may confuse hours, minutes and seconds.

Key questions

- How many seconds are there in one minute?
- What can you use to measure time in seconds accurately?
- What activity takes 10 seconds/30 seconds/1 minute?
- Which task took the longest/shortest time to complete?
- How can you change a length of time in seconds into minutes and seconds?

Possible sentence stems

- There are ____ seconds in a minute.
- ____ minutes and ____ seconds = ____ × 60 + ____ seconds
  = ____ seconds

National Curriculum links

- Know the number of seconds in a minute and the number of days in each month, year and leap year
- Compare durations of events
- Estimate and read time with increasing accuracy to the nearest minute; record and compare time in terms of seconds, minutes and hours; use vocabulary such as o'clock, am/pm, morning, afternoon, noon and midnight

Minutes and seconds

Key learning

- Use a stopwatch to record how many seconds it takes to do each activity.

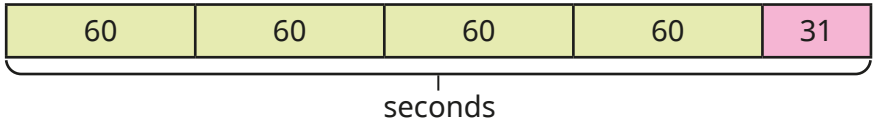
1 lap around the playground	10 star jumps
write your name backwards	

- Complete the statements.
  - ____ seconds = 1 minute
  - ____ seconds = 2 minutes
  - ____ seconds = $\frac{1}{2}$ minute
  - 240 seconds = ____ minutes
  - ____ seconds = 6 minutes
  - 600 seconds = ____ minutes

- Match the times in words to the times shown on the stopwatches.

one hundred and fifty seconds	00:02:05
two minutes and five seconds	00:01:50
two minutes and fifty seconds	00:02:50
one hundred and ten seconds	00:02:30

- Aisha draws a bar model to help her convert 4 minutes and 31 seconds into seconds.



$4 \times 60 = 240$
$240 + 31 = 271$ seconds
4 minutes and 31 seconds = 271 seconds

Use Aisha's method to complete the statements.
  - 3 minutes and 19 seconds = ____ seconds
  - 7 minutes and 42 seconds = ____ seconds

- Complete the statements.
  - 5 minutes and ____ seconds = 324 seconds
  - ____ minutes and ____ seconds = 499 seconds

- Write <, > or = to compare the times.

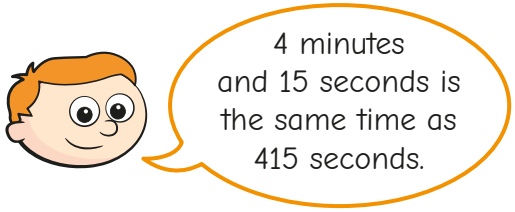
1 minute and 15 seconds ◯ 80 seconds

2 minutes ◯ 200 seconds

2 minutes and 35 seconds ◯ 155 seconds

Minutes and seconds

Reasoning and problem solving



What mistake has Ron made?

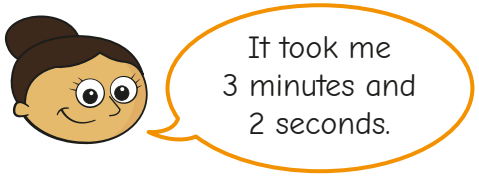
How many seconds are there in 4 minutes and 15 seconds?

Ron thinks that there are 100 seconds in a minute.

255 seconds

Dora times herself running around the playground.

Her stopwatch looks like this.



Do you agree with Dora?

No

1 minute and 20 seconds < ☐ seconds < 100 seconds

What could the missing number be?

Complete the sentences.

It must be _____

It could be _____

It cannot be _____

Compare answers with a partner.

between 81 and 99 seconds

multiple possible answers, e.g. 90 seconds

multiple possible answers, e.g. 79 seconds

Units of time

Notes and guidance

In this small step, children extend their understanding of when to use different units of time and compare lengths of time written using different units.

Children consider how long familiar activities take to complete, and this can be supported by completing practical activities and measuring with a stopwatch or other timer. An activity such as "Put your hand up when you think (1 minute/40 seconds) has passed" can be very useful to gauge children's estimation skills when working with time. Children should explore whether it would be more appropriate to measure the time taken to complete a task in seconds, minutes or hours.

By the end of this step, children should have developed a realistic sense of how long it takes to complete a familiar task.

Things to look out for

- Children may find it difficult to choose the correct units for different events/activities.
- When estimating, children often count seconds in their head too quickly.
- Children may compare numbers without reference to the units, for example thinking 30 seconds is longer than 20 minutes because 30 > 20

Key questions

- How long would it take to _____?
- What activity takes 10 seconds/30 seconds/1 minute/over an hour?
- Which task took the longest/shortest time to complete?
- What might you measure in seconds/minutes/hours? Why?
- How can you put times in different units in order of size?
- Which is longer, 5 minutes or 200 seconds?

Possible sentence stems

- To measure the time taken to _____, I would use seconds/minutes/hours.
- I know that _____ is longer/shorter than _____ because ...

National Curriculum links

- Know the number of seconds in a minute and the number of days in each month, year and leap year
- Compare durations of events
- Estimate and read time with increasing accuracy to the nearest minute; record and compare time in terms of seconds, minutes and hours; use vocabulary such as o'clock, am/pm, morning, afternoon, noon and midnight

Units of time

Key learning

- Complete the sentences using the most likely unit of time.

seconds | minutes | hours

  - It takes 20 _____ to walk 1 mile.
  - It takes 5 _____ to write my name.
  - It takes 4 _____ to drive from London to Leeds.

- Complete the sentences using the most likely unit of time.

seconds | minutes | hours

  - It will take 5 _____ to wash the dishes.
  - It will take 30 _____ to blow up a balloon.
  - It will take 20 _____ to get to school.

- Write <, > or = to compare the times.

10 seconds ◯ 10 minutes ◯ 10 hours

1 hour ◯ 1 minute ◯ 50 seconds

- What numbers could go in the spaces?
  - _____ seconds < _____ minutes < 1 hour
  - 600 seconds < _____ minutes < _____ hours

- Choose the correct word for each sentence.

longer | shorter

  - Filling a bucket with water will take a _____ amount of time than a filling a bath with water.
  - The 100-metre sprint record is _____ than the 400-metre record.
  - In summer, days are lighter for a _____ amount of time compared to winter.

- Complete the table to describe how long it takes you to complete each activity.

  Record the time in seconds, minutes or hours.

Activity	Duration
brushing teeth	
eating lunch	
a night's sleep	
maths lesson	
writing your name	

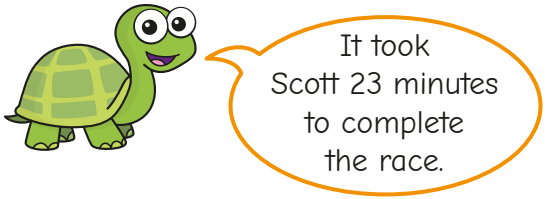
Compare answers with a partner.

Units of time

Reasoning and problem solving

Scott takes part in the 50-metre race on Sports Day.

Here is his time.



Do you agree with Tiny?

Explain your answer.

No

Put the times in order, starting with the shortest.

80 seconds

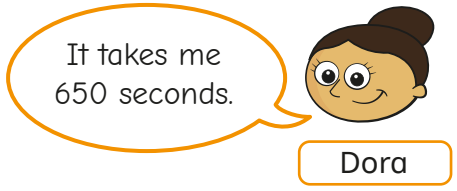
95 seconds

6 minutes

2 minutes

80 seconds,
95 seconds,
2 minutes,
6 minutes

Mo and Dora time how long it takes them to get to school.



Who spends longer travelling to school?

How much longer?

How did you work it out?

Dora

2 minutes and 20 seconds

Solve problems with time

Notes and guidance

In this small step, children solve problems that draw upon many of the different aspects that they have explored throughout the block. This step offers a good opportunity to recap key learning points from the block and questions can be tailored to any areas of difficulty that may have arisen.

Remind children of the number of seconds in a minute, minutes in an hour, hours in a day, days in a week and days in different months. In particular, explore the idea that the shorter the time, the faster it is, meaning that in a race it is the shorter time that wins.

Encourage children to discuss the strategy or representation that they use to solve each problem, in order to help them find the most efficient way to solve problems involving time.

Things to look out for

- Children may mix up units and misremember conversions.
- Children may look at the values and assume that a greater number (slower time) beats a lower number (faster time).
- Children may find it hard to compare times given in multiple units.

Key questions

- How many _____ are there in a _____?
- Which of these times is the quickest/slowest?
- How can you order these times from slowest to fastest?
- Which months have 31 days?

Possible sentence stems

- There are _____ seconds in _____ minutes.
- There are _____ hours in _____ days.
- There are _____ days in _____ weeks.

National Curriculum links

- Tell and write the time from an analogue clock, including using Roman numerals from I to XII, and 12-hour and 24-hour clocks
- Know the number of seconds in a minute and the number of days in each month, year and leap year
- Compare durations of events
- Estimate and read time with increasing accuracy to the nearest minute; record and compare time in terms of seconds, minutes and hours; use vocabulary such as o'clock, am/pm, morning, afternoon, noon and midnight

Solve problems with time

Key learning

- 

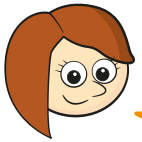
  Of the numbers 1 to 12 in Roman numerals, 12 has the most letters because it is the greatest number.

  Do you agree with Amir?

- Tommy and Rosie time themselves running a lap of the playground.

  Tommy completes the lap in 86 seconds.

  Rosie completes the lap in 95 seconds.

  My time was faster, because my number is greater.

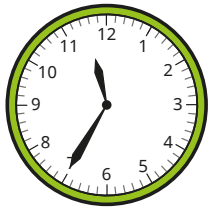
  Do you agree with Rosie?

  Explain your answer.

- Order the times from shortest to longest.

9 minutes	310 seconds	500 seconds
quarter of an hour	5 and a half minutes	

- Annie looks at this clock before she starts watching a film.

  She looks at the digital clock when the film finishes.

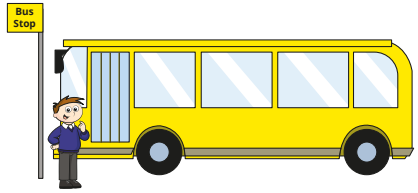
  How long did the film last?

- Teddy gets on a bus.

  He travels on the bus for 55 minutes.

  He gets off at 12:45 pm.

  What time did he get on the bus?

- Mrs Lee parks her car for 240 minutes.

  How much does she spend on parking?

Car parking

£1 for the first 3 hours

Then 50p per hour

Solve problems with time

Reasoning and problem solving

Brett, Jack and Sam all swim 25 m.

- Brett completes the swim in 39 seconds.
- Jack takes 15 seconds longer.
- Sam is 18 seconds faster than Jack.

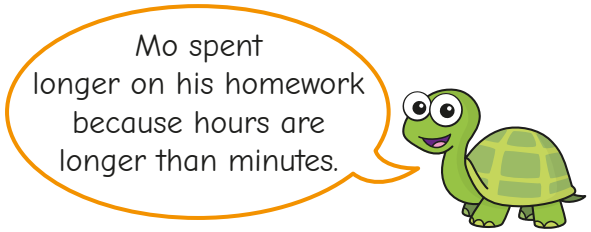
How long do the three children spend swimming in total?

Give your answer in minutes and seconds.

2 minutes and 9 seconds

Mo spends 1 hour and 3 minutes completing his homework.

Eva spends 72 minutes completing her homework.



Do you agree with Tiny?

Explain your answer.

No

It is the 27th day of the month.

In 7 days' time, it will be the 3rd day of the month.

What month could it be?

Explain your answer.

any month with 31 days

Kim starts watching a 2-hour film at 11:45 am.

Teddy finishes watching a 3-hour film at 4:30 pm.

For how long were Kim and Teddy watching a film at the same time?

15 minutes

Summer Block 4

Shape

Small steps

Step 1	Turns and angles
Step 2	Right angles
Step 3	Compare angles
Step 4	Measure and draw accurately
Step 5	Horizontal and vertical
Step 6	Parallel and perpendicular
Step 7	Recognise and describe 2-D shapes
Step 8	Draw polygons

Small steps

Step 9	Recognise and describe 3-D shapes
Step 10	Make 3-D shapes

Turns and angles

Notes and guidance

In this small step, children are introduced to the concept of angles for the first time. In Year 2, they described turns as quarter, half, three-quarter and full turns. They will now recognise angles as describing the size of a turn and understand greater angles as having made a greater turn.

Children practise making quarter, half, three-quarter and whole turns in both clockwise and anticlockwise directions and in familiar contexts such as on a clock face or the points of a compass.

Model the correct mathematical language with instructions such as "make a quarter turn anticlockwise". They can then use this mathematical language to give instructions to others.

Help children to visualise the starting and finishing points of the turn as two straight lines that meet at a point and that an angle is created at the point where these lines meet.

Things to look out for

- Children may see the size of an angle as the distance between two lines, rather than a measurement of turn.
- Children may confuse clockwise and anticlockwise.
- Children may not recognise the same angles if they are given different starting points or orientations.

Key questions

- Which direction are you facing to start?
- Which direction is clockwise/anticlockwise?
- What fraction of a turn do you need to do to face _____?
- Which direction do you need to turn?
- Is there more than one possible way?
- Where can you see angles in the classroom?

Possible sentence stems

- If I face _____ and make a _____ turn clockwise/anticlockwise,
  I am now facing _____
- My starting point is _____
  I turn _____
  My finishing point is _____
- Making a $\frac{1}{4}$ turn followed by another $\frac{1}{4}$ turn is the same as making a _____ turn.

National Curriculum links

- Recognise angles as a property of shape or a description of a turn

Turns and angles

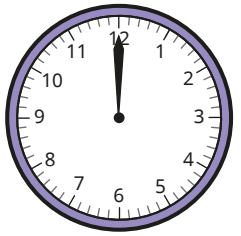
Key learning

Take children outside or into the hall where they can practise making and describing turns. Give children instructions using the mathematical vocabulary quarter, half, three-quarter and whole turns, for example: "Face the tree and make a half turn clockwise." Ask children to work in pairs or small groups giving each other instructions to follow.

Encourage children to see angles as turns in the world around them. Model the use of mathematical language such as clockwise, anticlockwise, greater turn, smaller turn, as well as quarter, half, three-quarter and whole turns, to describe what they see.

Examples could include a door opening; the hands of a clock moving; opening and closing a jar or bottle; a turn on a skateboard, bike or scooter; turning on a swivel chair.

- Look at this clock.



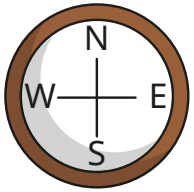
  Turn the minute hand one quarter of a turn clockwise.

  Where is the hand pointing now?

  What time could the clock show now?

  What time could the clock show if the minute hand is turned another half turn?

- Here is a compass showing the four points north, east, south and west.

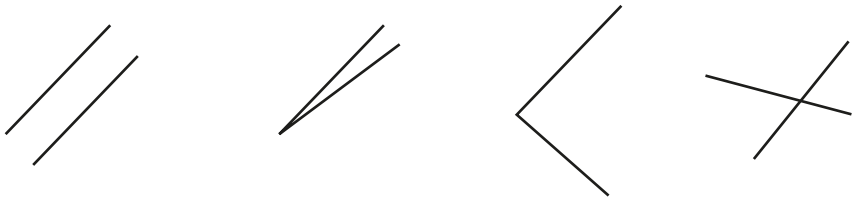


  Describe the turns clockwise from:

  - north to south
  - east to south
  - west to north
  - east to north

  How would the descriptions change if the turns were anticlockwise?

- Which pictures show at least one angle?



Turns and angles

Reasoning and problem solving

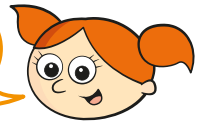
The arrow on a spinner starts in this position.

After making a turn, it ends in this position.

The arrow has moved a quarter turn anticlockwise.

Jack

The arrow has moved a three-quarter turn clockwise.



Alex

Who do you agree with?

Explain your answer.

Both children are correct.

					pet shop		book shop
start →							
gift shop							
				toy shop			
		cake shop					shoe shop

Write instructions for a partner to follow to get from the start to reach any one of the shops. They are not allowed to walk on the white squares.

Compare answers as a class.

Right angles

Notes and guidance

In this small step, children are introduced to the term "right angle" to describe a quarter turn and learn the symbol for a right angle.

As in the previous step, children make the link between quarter turns and half turns by recognising that two right angles are equal to one half turn, three right angles are equal to three-quarters of a turn and four right angles are equal to a full turn. It is important for them to see examples of right angles in different orientations so that they understand that a right angle is not just made from vertical and horizontal lines.

Children go on to recognise right angles in a range of contexts, including in the world around them and within known 2-D shapes. They use the right-angle symbol to show right angles in shapes.

Things to look out for

- Children may assume that right angles are only constructed from a vertical and horizontal line and not recognise right angles in other orientations.
- Children may need clarification over the term "right" in "right angle" to avoid confusion that all right angles point to the right.

Key questions

- How many right angles are equal to a half turn?
- How many right angles are equal to a three-quarter turn?
- How many right angles are equal to a full turn?
- Where can you see right angles in the classroom/at school?
- What shapes contain right angles?
- How many right angles are there in a _____?
- What shapes can you draw that have right angles?

Possible sentence stems

- _____ right angles = _____ turn
- There are _____ right angles in a _____

National Curriculum links

- Recognise angles as a property of shape or a description of a turn
- Identify right angles, recognise that two right angles make a half turn, three make three-quarters of a turn and four a complete turn; identify whether angles are greater than or less than a right angle

Right angles

Key learning

- Complete the sentences.

  1 right angle = a _____ turn

  _____ right angles = a half turn

  3 right angles = a _____ turn

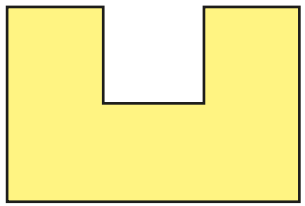
  _____ right angles = a full turn

- Create a right-angle checker like this one.

  Use your right-angle checker to find right angles in your classroom or school.

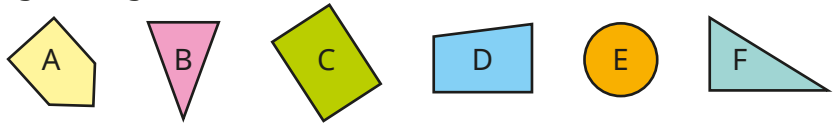
  Draw at least three right angles that you have seen.

- There are six right angles inside this shape.



  Use the symbol for a right angle to show them on the shape.

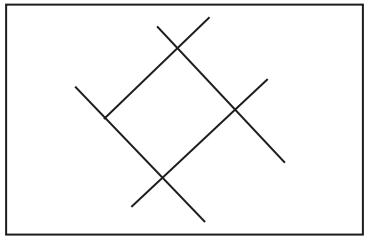
- Sort the shapes into the table based on how many right angles they have.



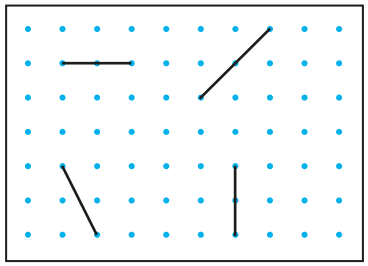
0 right angles	1 right angle	2 right angles	3 right angles	4 right angles

  Draw an extra shape in each column.

- How many right angles are there in this picture?

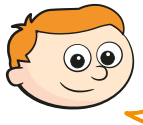


- Draw lines along the dots to make a right angle with each line.

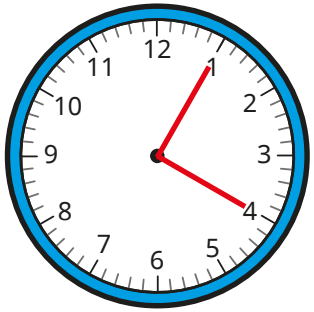


Right angles

Reasoning and problem solving



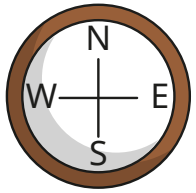
If I draw a line on a clock face from the 1 to the centre and from the 4 to the centre, where they meet will make a right angle.



Investigate how many pairs of numbers on a clock face will make a right angle.

How many possibilities are there?

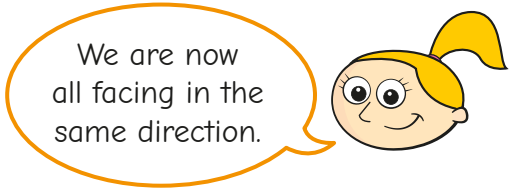
12 possibilities, e.g. 12 and 3
5 and 8



Dani is facing south and turns clockwise through 3 right angles.

Brett is facing west and turns through 2 right angles.

Eva is facing north and turns 1 right angle clockwise.



Do you agree with Eva?

Explain your answer.

Yes

Compare angles

Notes and guidance

In this small step, children explore angles that are greater than and smaller than a right angle.

Encourage children to continue to think of angles as turns and describe turning less than or more than a right angle/quarter turn. They should also compare angles in shapes and lines by measuring and comparing them to a right angle. The use of a right-angle checker is a great way to support this activity.

Children are introduced to the terms "acute" and "obtuse" to describe the angles. Explain that acute angles are less than a right angle, and obtuse angles are greater than 1 but less than 2 right angles. These terms are in the non-statutory guidance for Year 3 and will be revisited in Year 4

Children use these terms to understand, label and compare angles that are less than two right angles.

Things to look out for

- Children may see the size of an angle as the size of the two lines or the distance between them rather than a measurement of turn.
- Children may not recognise the same angles if they are given different starting points or orientations.

Key questions

- How can you check if this is a right angle?
- Is the angle greater than or less than a right angle?
- Which angle is greater?
- What is an acute angle?
- What is an obtuse angle?
- Where can you see an acute/obtuse angle in the classroom?

Possible sentence stems

- Angle A is _____ than angle B.
- The angle is _____ than a right angle.
- An angle less than a right angle is an _____ angle.
- An angle greater than one right angle but less than two right angles is an _____ angle.

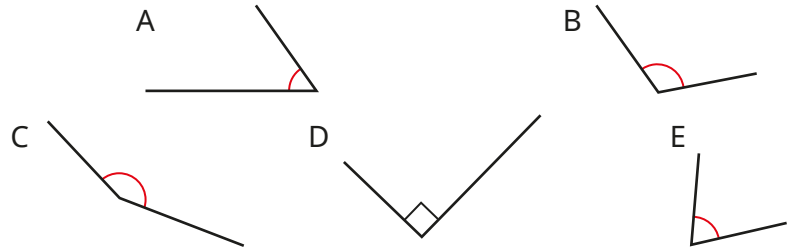
National Curriculum links

- Recognise angles as a property of shape or a description of a turn
- Identify right angles, recognise that two right angles make a half turn, three make three-quarters of a turn and four a complete turn; identify whether angles are greater than or less than a right angle

Compare angles

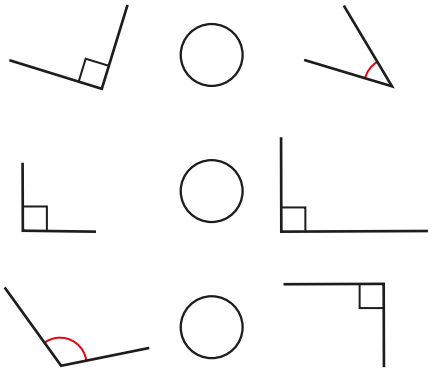
Key learning

- Sort the angles into the table.



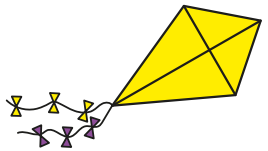
Less than a right angle	Equal to a right angle	Greater than a right angle

- Write <, > or = to compare the angles.



- Use a right-angle checker to find three acute angles and three obtuse angles in the classroom.

- Label the acute and obtuse angles in these pictures.


- In the table, draw two acute angles, two obtuse angles and two right angles.

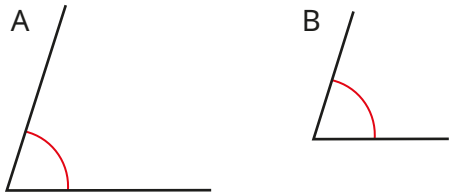
Acute angle	Right angle	Obtuse angle

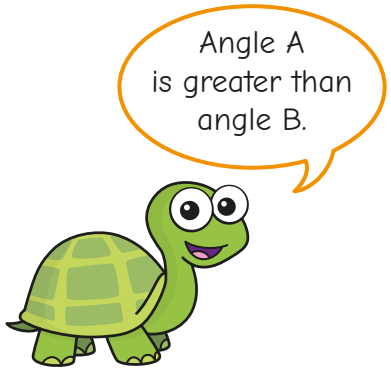
- Draw a hexagon that has:
  - at least one obtuse angle
  - no acute angles
  - exactly two right angles

Compare angles

Reasoning and problem solving

Tiny is comparing angles.

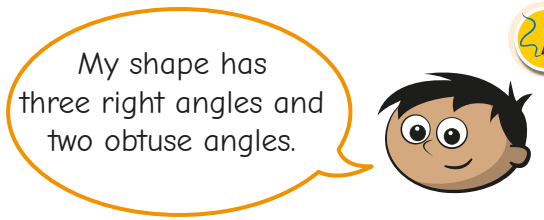




Explain why Tiny is wrong.

Both angles show the same amount of turn.

Amir has drawn a shape.

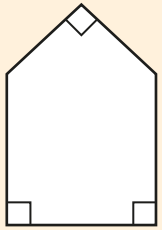


What could Amir's shape look like?

Describe the angles in a shape to a partner.

Can your partner draw the shape?

multiple possible answers, e.g.



Is the statement always true, sometimes true or never true?

> A shape with four sides has four right angles.

Explain your answer.

sometimes true

Measure and draw accurately

Notes and guidance

In this small step children measure and draw straight lines accurately in centimetres and millimetres.

Children start by using a ruler to measure lines from zero. Encourage them to spread out their fingers to ensure a secure grip on the ruler when measuring and drawing straight lines. When they are familiar with measuring from zero, they could explore measuring from other numbers and finding the difference between the start and end points.

Children initially measure in whole centimetres before exploring measurements made up of centimetres and millimetres. They may also start to describe lengths to the nearest whole centimetre, for example 8 cm and 3 mm to the nearest whole centimetre is 8 cm.

Children then embed their measuring skills by using a ruler to draw lines and 2-D shapes accurately.

Things to look out for

- Children may need support on to how to hold a ruler.
- When measuring, children may assume that the number on the ruler at the end of the line is equal to the length of the line, without checking that they are measuring from zero each time.

Key questions

- How can you hold the ruler to ensure that it does not slip?
- Where should you start measuring from?
- Where should you measure to?
- How long is the line in centimetres?
- How long is the line in millimetres?
- What is the length to the nearest whole centimetre? How do you know?

Possible sentence stems

- 1 cm = _____ mm, so

  _____ cm = _____ × _____ mm = _____ mm
- The length of the line is _____ cm and _____ mm.

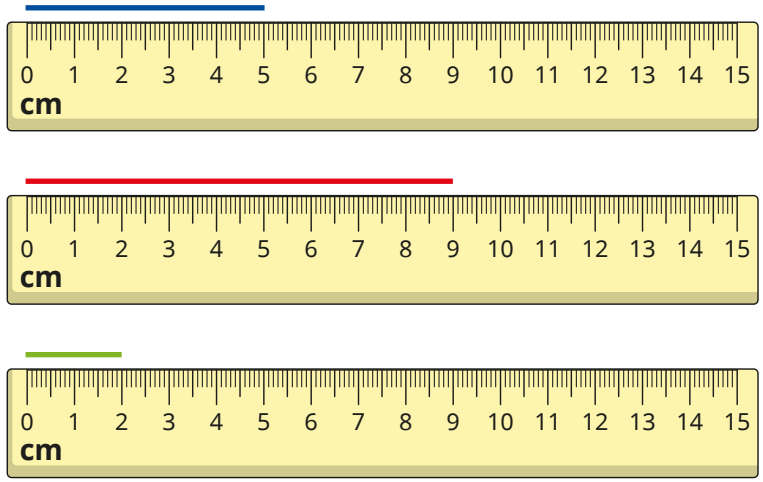
National Curriculum links

- Measure the perimeter of simple 2-D shapes
- Draw 2-D shapes and make 3-D shapes using modelling materials; recognise 3-D shapes in different orientations and describe them
- Measure, compare, add and subtract: lengths (m/cm/mm); mass (kg/g); volume/capacity (l/ml)

Measure and draw accurately

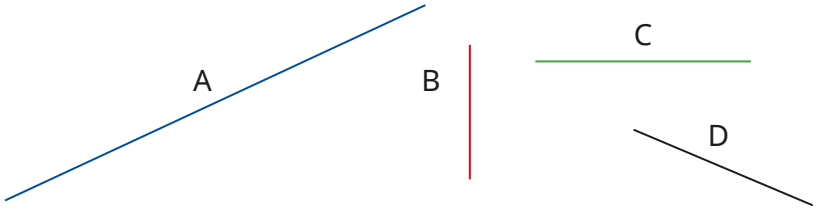
Key learning

- How long is each line?



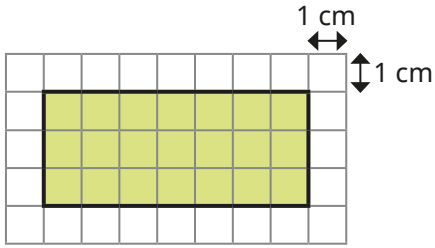
- Measure the lines carefully with a ruler.

  Complete the sentence for each line.



Line _____ is _____ cm _____ mm long.

- Here is a rectangle.

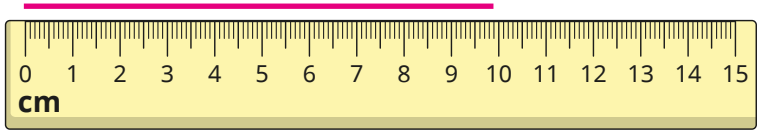


  - What is the length of each side?
  - What is the perimeter of the rectangle?

- Use a ruler to draw lines of these lengths.

5 cm	60 mm	7 cm 5 mm	75 mm

- The line is 9 cm 9 mm long. Complete the sentence.



The line measures _____ cm to the nearest cm.

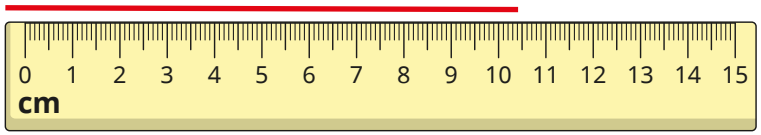
- Draw a line for each measurement.

5 cm 2 mm	0 cm 9 mm	13 cm 8 mm	10 cm 3 mm

What does each line measure to the nearest centimetre?

Measure and draw accurately

Reasoning and problem solving



Is Tiny correct?

Explain your answer.

No

The sides of a rectangle are all a whole number of centimetres.

Its perimeter is 16 cm.

What could the rectangle look like?

Use centimetre squared paper.

Draw as many possible rectangles as you can.

1 cm × 7 cm

2 cm × 6 cm

3 cm × 5 cm

4 cm × 4 cm

A shape has 5 sides.

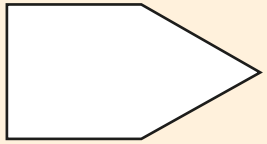
Each side measures 5 cm.

The shape has 2 right angles, 2 obtuse angles and 1 acute angle.

What could the shape look like?

Draw a possible shape on plain paper.

multiple possible answers, e.g.



Horizontal and vertical

Notes and guidance

In this small step, children learn to recognise and draw horizontal and vertical lines in a range of contexts.

Children begin by finding horizontal and vertical lines in the classroom and the world around them. This could be related to the horizon as a means of remembering which term relates to which line. Care should be taken to ensure that all lines have a distinct orientation and could not be perceived as sloping.

Once children are confident recognising horizontal and vertical lines, they can embed this understanding by drawing horizontal and vertical lines. As before, a range of examples can be used, including individual lines and lines within shapes.

Children then build on their knowledge of symmetry from Year 2, by identifying horizontal and vertical lines of symmetry in familiar shapes.

Things to look out for

- Children may mix up the terms "horizontal" and "vertical".
- Children may not recognise that horizontal and vertical lines are directly related to their orientation, and that a horizontal line does not continue to be horizontal if the line is shown in a different orientation.

Key questions

- What is the same and what is different about horizontal and vertical lines?
- Where can you see horizontal and vertical lines?
- How could you describe a vertical/horizontal line without using the word "vertical"/"horizontal"?
- What could you use to help you remember what the words horizontal and vertical mean?
- What do you call a line that is neither horizontal nor vertical?

Possible sentence stems

- A line drawn across the page is called a _____ line.
- A line drawn down the page is called a _____ line.
- The horizon is a _____ line.

National Curriculum links

- Identify horizontal and vertical lines and pairs of perpendicular and parallel lines

Horizontal and vertical

Key learning

- Complete the sentences.

  A line drawn across the page is called a _____ line.

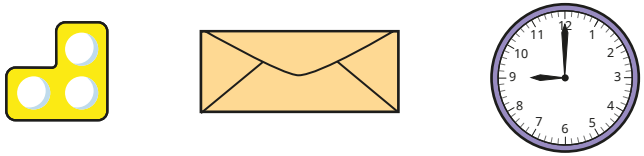
  A line drawn down the page is called a _____ line.

- Find three horizontal lines and three vertical lines in the classroom.

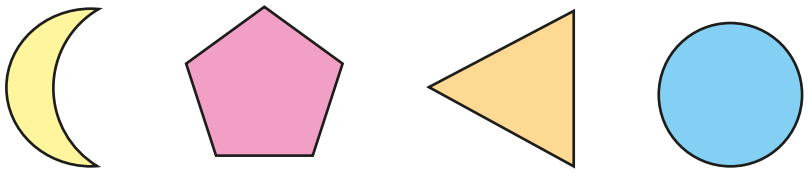
  Record them in the table.

Horizontal	Vertical

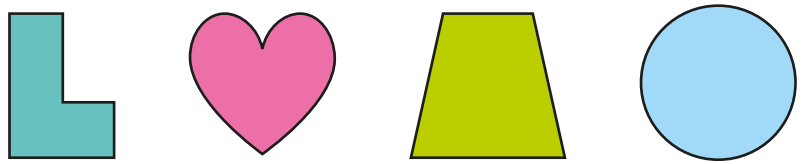
- Label the vertical and horizontal lines in the pictures.



- Draw horizontal lines to show the shapes that have a horizontal line of symmetry.



- Draw vertical lines to show the shapes that have a vertical line of symmetry.



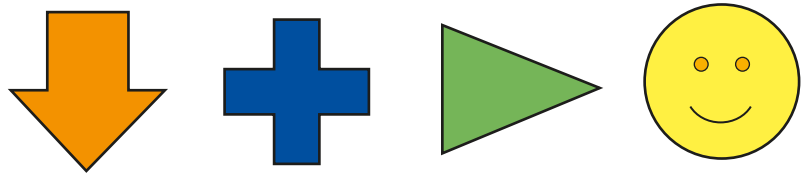
- Draw shapes to match the descriptions.
  - 2 horizontal lines and 2 vertical lines
  - 1 horizontal line and no vertical lines
  - 2 horizontal lines and no vertical lines
  - no horizontal lines and 2 vertical lines

- Draw a horizontal line measuring 70 mm.

  Draw a vertical line measuring 5 cm.

  Draw a line measuring 65 mm that is neither horizontal nor vertical.

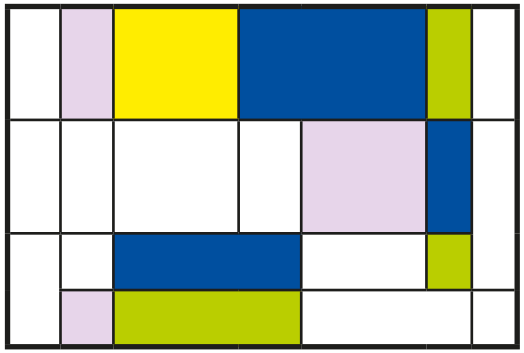
- Draw and label horizontal and/or vertical lines of symmetry on the shapes.



Horizontal and vertical

Reasoning and problem solving

How many horizontal and vertical lines can you see in this picture?



5 horizontal lines

8 vertical lines

Is the statement always true, sometimes true or never true?

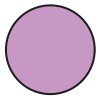
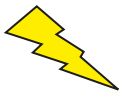
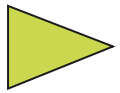
> A square has two horizontal lines and two vertical lines.

Explain your answer.

sometimes true

Does each shape have horizontal and/or vertical lines of symmetry?

Write **yes** or **no** to complete the table.

Shape	Horizontal line of symmetry?	Vertical line of symmetry?
		
		
		
		
		

no yes

yes yes

yes yes

no no

yes no

Parallel and perpendicular

Notes and guidance

In this small step, children find and identify parallel and perpendicular lines in a range of practical contexts.

Children learn that parallel lines stay the same distance apart and never meet, whereas perpendicular lines meet at a right angle. Give them the opportunity to think about where they may find parallel and perpendicular lines in the world around them.

Children are exposed to examples and non-examples of parallel and perpendicular lines to support their understanding. They learnt about horizontal and vertical lines in the previous step, but ensure that they are also presented with lines that are not horizontal and vertical to avoid any potential misconceptions.

Children are introduced to the arrow notation to represent parallel lines and use the right-angle symbol to show perpendicular lines. They may need to use a right-angle checker to help them decide if lines are perpendicular.

Things to look out for

- Children may assume that parallel lines must be the same length.
- Children may not recognise parallel and perpendicular lines if they are not presented horizontally/vertically.

Key questions

- What are parallel lines?
- Are these pairs of lines parallel? Why/why not?
- What are perpendicular lines?
- Are these pairs of lines perpendicular? Why/why not?
- Where might you see sets of parallel lines in the world around you?
- Where can you see sets of parallel and perpendicular lines in the classroom?

Possible sentence stems

- Lines that stay the same distance apart and never meet are called _____ lines.
- Straight lines that meet at a right angle are called _____ lines.
- These lines are parallel/perpendicular because ...

National Curriculum links

- Identify horizontal and vertical lines and pairs of perpendicular and parallel lines

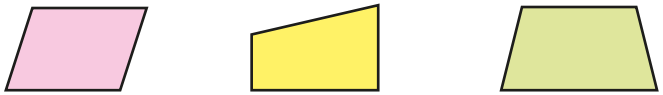
Parallel and perpendicular

Key learning

- Which pairs of lines are parallel?

- Draw a line that is parallel to this one.

- Use arrows to show the parallel lines in the shapes.



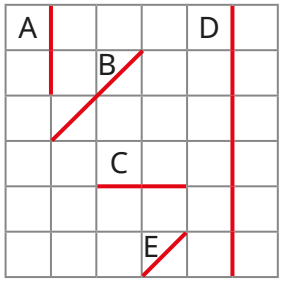
- Which pairs of lines are perpendicular?

- Draw a line that is perpendicular to this one.

- Draw the right-angle symbol to show the perpendicular lines in the shapes.

- Find three sets of parallel lines and three sets of perpendicular lines in the classroom.

- Some lines are drawn on a squared grid.

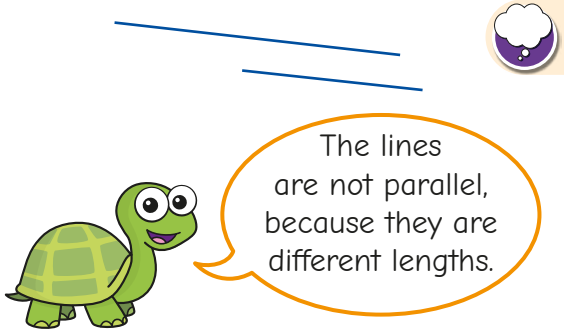


Which two pairs of lines are parallel?

Which two pairs of lines are perpendicular?

Parallel and perpendicular

Reasoning and problem solving



Do you agree with Tiny?

Explain your answer.

No

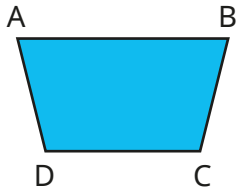
Here is a flag.

Mark three sets of parallel lines and three sets of perpendicular lines.

Draw your own flag with parallel and perpendicular lines.

Compare answers as a class.

Are the statements about shape ABCD true or false?



The line from A to B is parallel to the line from C to D.

The line from A to C is parallel to the line from B to D.

The line from A to D is perpendicular to the line from C to D.

True

False

False

Recognise and describe 2-D shapes

Notes and guidance

In this small step, children revisit their understanding of 2-D shapes from Year 2, recognising and naming a variety of 2-D shapes before using their knowledge from the previous steps in this block to describe them.

Children describe the properties of shapes, including types of angles, lines, symmetry and lengths of sides. Give them opportunities to identify a shape from a description and to describe a shape for a partner to identify.

It is important for children to recognise that 2-D shapes are flat and that the manipulatives they may handle in class are representations of the shapes.

Ensure that children are exposed to standard and non-standard examples of 2-D shapes to support their understanding that not all shapes with the same number of sides/vertices look the same.

Things to look out for

- Children may make errors when presented with irregular or non-standard variations of shapes.
- There is a large amount of vocabulary and children may mix up the names of 2-D shapes.

Key questions

- What is the name of this shape? How do you know?
- What are the properties of a _____?
- Does a _____ always look like this? Give some examples.
- How many angles does a _____ have?
- How many lines of symmetry does a _____ have?
- What types of lines are in a _____?
- How can you describe this shape?
- What types of angles can you see on the shape?

Possible sentence stems

- A _____ has _____ angles/sides.
- This _____ has _____ lines of symmetry.
- This _____ has _____ pairs of parallel/perpendicular lines.

National Curriculum links

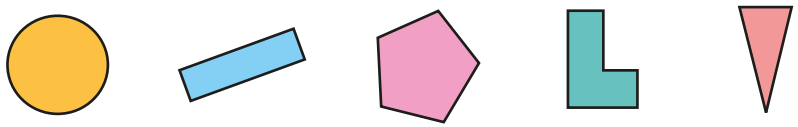
- Draw 2-D shapes and make 3-D shapes using modelling materials; recognise 3-D shapes in different orientations and describe them

Recognise and describe 2-D shapes

Key learning

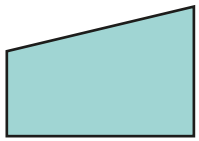
- Match the labels to the shapes.

triangle | pentagon | circle | rectangle | hexagon



- Name the shapes.

- Complete the sentences to describe this shape.



It has _____ angles.

It has _____ right angles.

It has _____ obtuse angle.

It has _____ acute angle.

It has _____ lines of symmetry.

- Draw the shape that is being described.

  - It is a quadrilateral.
  - It has equal sides.
  - The opposite sides are parallel.
  - There are no sets of perpendicular lines.
  - It has 2 obtuse angles and 2 acute angles.

- What is the same and what is different about the two shapes?

- Choose one of the 2-D shapes and describe it to a partner.

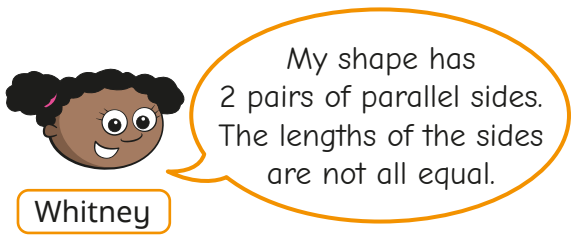
  Think about the angles, the types of lines it is made up of and whether it has any lines of symmetry.

  Can your partner identify the shape from your description?

Recognise and describe 2-D shapes

Reasoning and problem solving

Whitney is describing a 2-D shape.



Is Mo correct?

Explain your answer.

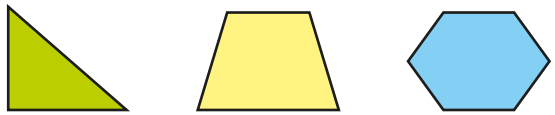
What shape could Whitney be thinking of?

No

The lengths of the sides in a square are equal.

rectangle, parallelogram

What is the same and what is different about the shapes?



Same: at least one line of symmetry
a vertical line of symmetry

Different: different number of angles/sides
triangle has a pair of perpendicular lines

Write the name of at least one shape in each part of the table.

	At least 1 right angle	No right angles
4 sides		
Not 4 sides		

Draw the shapes.

multiple possible answers, e.g. top row: square, rhombus; bottom row: right-angled triangle, pentagon

Draw polygons

Notes and guidance

Building on the previous steps in this block, children use their knowledge of the properties of shapes to accurately create and draw 2-D shapes.

Building on learning from Year 2, children begin by using geoboards and elastic bands to explore how to make shapes, before using dotted paper to draw them using a pencil and a ruler. They then move on to drawing shapes accurately with a ruler when given the measurement for each length. Children should use their knowledge of vertices and sides to ensure that their drawings are accurate.

Children should recognise that there is more than one way to draw a shape, for example a hexagon can be any enclosed shape that has 6 straight sides and 6 vertices.

Things to look out for

- When drawing accurately, children may measure from the very start of the ruler or from 1 cm on the ruler instead of from zero.
- Children may not draw shapes with straight sides.
- Children may not start a new side at a vertex, which could mean that they draw an extra side/vertex.

Key questions

- What equipment do you need to draw a polygon?
- How can you tell if a shape is a polygon or not?
- Where will you draw the final vertex on the dotted paper?
- How can you accurately draw a _____?
- How do you know that you have drawn a _____?
- Is there more than one way to draw a _____?
- Can you draw a polygon without a ruler? Why/why not?

Possible sentence stems

- I know that I have drawn a _____, because it has _____ sides and _____ vertices.

National Curriculum links

- Draw 2-D shapes and make 3-D shapes using modelling materials; recognise 3-D shapes in different orientations and describe them

Draw polygons

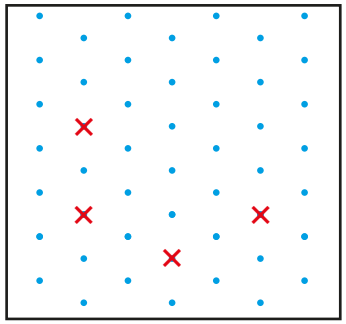
Key learning

- Use a geoboard to make a square, a rectangle and a triangle.

  What other shapes can you make?

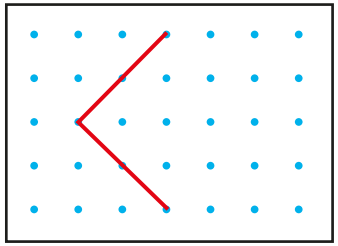
- Here are four vertices of a pentagon.

  Mark the fifth vertex and join the points to draw the pentagon.

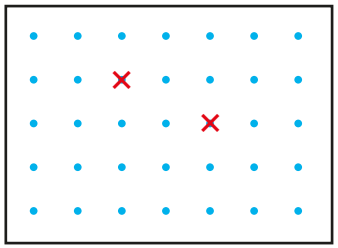


  Compare answers with a partner.

- Here are two sides of a square. Complete the square.



- Mark the missing vertices of this quadrilateral so that there is one set of parallel lines.



  Compare answers with a partner.

  Is there more than one way to do it?

- Draw each shape on dotted paper.
  - a square with sides measuring 2 cm
  - a square that is larger than the one you have just drawn
  - a rectangle with sides measuring 4 cm and 6 cm
  - a triangle with two sides of equal length

- Draw a 6-sided shape.

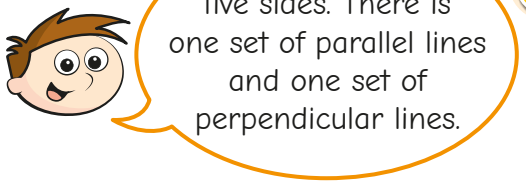
  Compare shapes with a partner.

  What is the same about the shapes? What is different?

Draw polygons

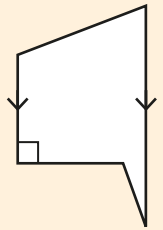
Reasoning and problem solving

Teddy is drawing a 2-D shape.

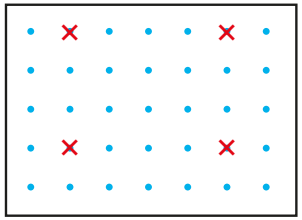


Draw what Teddy's shape could look like.

multiple possible answers, e.g.



Tiny thinks the vertices of a square are marked.



Is Tiny correct?

Explain your answer.

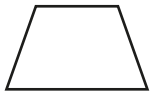
No

Draw at least one shape in each section of the table.

	At least 1 pair of parallel lines	No pairs of parallel lines
4 sides		
Not 4 sides		

Compare answers with a partner.

multiple possible answers, e.g.

	At least 1 pair of parallel lines	No pairs of parallel lines
4 sides		
Not 4 sides		

Recognise and describe 3-D shapes

Notes and guidance

In this small step, children recap their understanding of 3-D shapes from Year 2 and describe shapes in terms of their properties.

Children recognise and name a variety of 3-D shapes in different orientations. They then use mathematical language to describe shapes by identifying the number of faces, edges and vertices. Provide children with the opportunity to handle 3-D shapes to help them identify and remember the shape's properties.

Where a shape has a curved surface, children should know that this is not a face. For example, a cylinder has two flat circular faces and one curved surface.

Give children opportunities to identify a shape from a description and to describe a shape for a partner to identify.

Things to look out for

- Children may not recall the names of all 3-D shapes.
- Children may confuse the names of 3-D shapes with the names of the 2-D faces, for example calling a cube a square.

Key questions

- What is the name of this shape?
- What are the properties of a _____?
- What words could you use to describe 3-D shapes?
- How many edges/faces/vertices/curved surfaces does a _____ have?
- How can you describe this shape?
- What is the same and what is different about the shapes?

Possible sentence stems

- A _____ has _____ flat faces.
- A _____ has a curved surface.
- A _____ has _____ vertices.
- A _____ has _____ edges.

National Curriculum links

- Draw 2-D shapes and make 3-D shapes using modelling materials; recognise 3-D shapes in different orientations and describe them

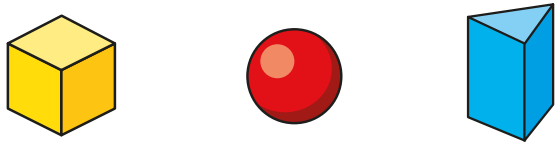
Recognise and describe 3-D shapes

Key learning

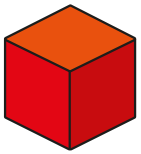
- Match the shapes to the labels.

square-based pyramid	cuboid	cone	cylinder

- What is the mathematical name of each shape?



- Complete the sentences to describe the 3-D shape.



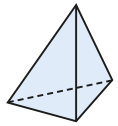
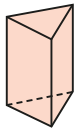
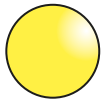
This shape is a _____

It has _____ faces.

It has _____ edges.

It has _____ vertices.

- Complete the table.

3-D shape	Number of edges	Number of faces	Number of vertices	Number of curved surfaces
				
				
				

- Choose one of these 3-D shapes.

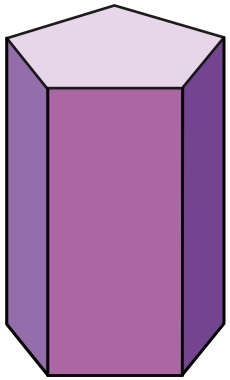
Describe the shape's properties to a partner.

Can they identify the shape from your description?

Recognise and describe 3-D shapes

Reasoning and problem solving

This shape is a pentagonal prism.



Complete the sentences to describe the shape.

It has _____ faces.

_____ of the faces are rectangles.

It has _____ edges.

It has _____ vertices.

What do you notice about the face of each end of the prism and the number of rectangular faces?

7

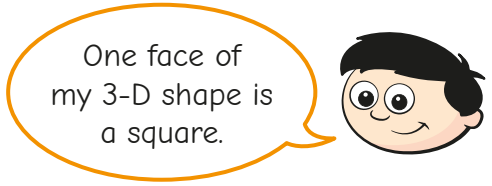
5

15

10

The number of edges on the face of each end of the prism is equal to the number of rectangular faces.

Dexter has a 3-D shape.



What could Dexter's shape be?

multiple possible answers, e.g. cube, cuboid, square-based pyramid

Sort a selection of 3-D shapes into the table.

	At least one triangular face	No triangular faces
Prism		
Not a prism		

Change the headings in the table and sort your shapes again.

Compare answers as a class.

Make 3-D shapes

Notes and guidance

In this small step, children embed the understanding from the previous step by building 3-D shapes from a range of construction materials such as cubes, straws, marshmallows and modelling clay.

Children make shapes such as cubes, cuboids, prisms and pyramids. Cylinders and other shapes with curved surfaces are more challenging, but rolling up rectangular sheets of paper is a good starting point. Nets could be provided for children to cut out and fold up; these are explored formally in upper Key Stage 2

Encourage children to continue to use mathematical language to describe the shapes they have made to help reinforce their earlier learning. Examples of mathematical language should include: edges, faces, vertices, curved surfaces, parallel, perpendicular, horizontal, vertical and the names of 2-D shapes that are faces of 3-D shapes.

Things to look out for

- Children may be familiar with a shape in one orientation and not recognise the same shape in a different orientation.
- There is a large amount of vocabulary and children may confuse the terminology.

Key questions

- How is a 3-D shape different from a 2-D shape?
- How many edges/faces/vertices/curved surfaces does the shape have?
- What is the same and what is different about these shapes?
- Does the shape look the same or different if you look at it from different places?

Possible sentence stems

- The shape has _____ edges.
- The shape has _____ faces.
- The shape has _____ vertices.
- The shape has _____ curved surface.
- The faces of a _____ are the 2-D shapes _____ and _____

National Curriculum links

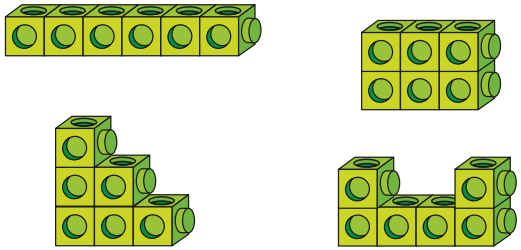
- Draw 2-D shapes and make 3-D shapes using modelling materials; recognise 3-D shapes in different orientations and describe them

Make 3-D shapes

Key learning

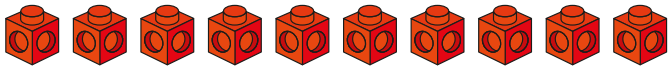
- Take six cubes.

  Make the 3-D shapes.



  What is the same about the shapes? What is different?

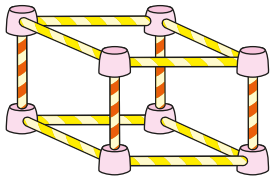
- How many different 3-D shapes can you make using ten cubes?



- Aisha has made a cuboid using straws and marshmallows.
  - What did she use to make the edges of the cuboid?

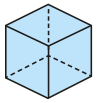
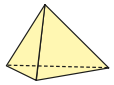
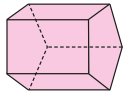
    How many edges does the cuboid have?
  - What did she use to make the vertices of the cuboid?

    How many vertices does the cuboid have?



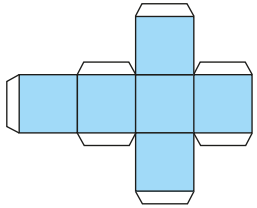
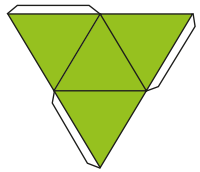
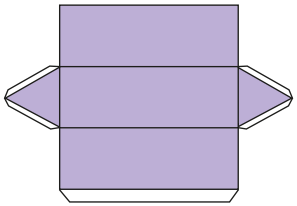
- Use straws and modelling clay to make the shapes.

  How many straws and pieces of clay do you need?

3-D shape	Number of straws (edges)	Number of pieces of clay (vertices)
		
		
		

  What other 3-D shapes can you make?

- Cut and fold the nets to make 3-D shapes.

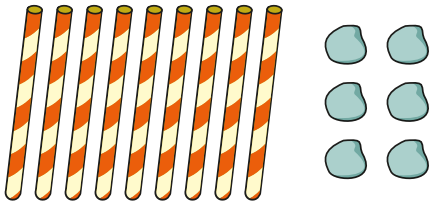




  What 3-D shapes have you made?

Make 3-D shapes

Reasoning and problem solving

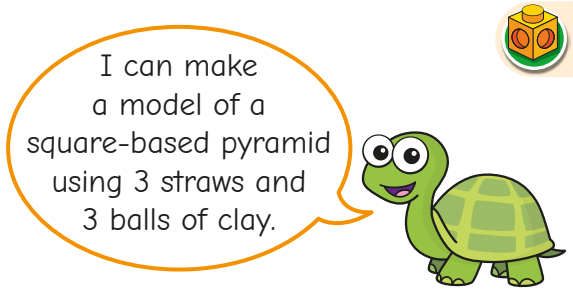
Max has 9 straws and 6 balls of clay.



What 3-D shape can Max make using all of the straws and clay?

Use straws and clay to make the shape.

triangular prism



Explain the mistake that Tiny has made.

How many straws and balls of clay do you need to make a square-based pyramid?

Tiny has only considered one triangular face of the pyramid.

8 straws and 5 balls of clay

Is the statement true or false?

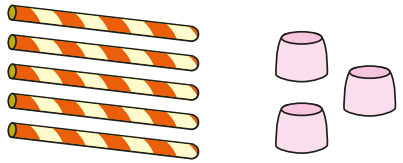
> You can cut out some circles and rectangles and make a 3-D shape from them.

Explain your answer.

True

A cylinder can be made.

Is there enough equipment to make a triangular-based pyramid?



Explain your answer.

No

Summer Block 5

Statistics

Small steps

Step 1	Interpret pictograms
Step 2	Draw pictograms
Step 3	Interpret bar charts
Step 4	Draw bar charts
Step 5	Collect and represent data
Step 6	Two-way tables

Interpret pictograms

Notes and guidance

In this small step, children learn to read and interpret information presented in pictograms, building on their learning from Year 2

Children ask and answer questions about information presented in both horizontal and vertical pictograms. Encourage them to think carefully about why a particular symbol has been chosen and its relationship to the data being presented. It is important that children understand the value of each symbol and what it means when a half, quarter or three-quarter symbol is used. An understanding of the key is therefore a crucial element of understanding the data.

Children revisit and extend their knowledge of constructing their own pictograms in the next step.

Things to look out for

- Children may use one-to-one correspondence between the number of symbols in the pictogram and the value of the data without considering the value of each symbol as presented in the key.
- Similarly, children may count half symbols as $\frac{1}{2}$ rather than as half the value of a full symbol.

Key questions

- What information is shown in the pictogram?
- What symbols are used in the pictogram?
- What does the key tell you?
- What is the value of each symbol?
- What is the value of half/quarter of a symbol?
- What is the value of the symbols for _____?
- Why do the symbols need to be the same size?

Possible sentence stems

- One symbol is equal to _____, so _____ symbols are equal to _____
- If one symbol is equal to _____, then half a symbol is equal to _____

National Curriculum links

- Interpret and present data using bar charts, pictograms and tables
- Solve one-step and two-step questions using information presented in scaled bar charts and pictograms and tables

Interpret pictograms

Key learning

- Dani draws a pictogram to show the fruit that the children in her class eat at break time.

Fruit	Number of children
apple	●●●●●●●●●●
pear	●●●●●●
orange	●●●●
banana	●●●●●●●●●

Key

● = 1 child

What can you tell by looking at the pictogram?

Talk about it with a partner.

- Four classes are recording how many books they read in a week.

Here are the results from last week.

Class	Books read
Class 1	■■■■
Class 2	■■■
Class 3	■■■■
Class 4	■■■■■

Key

■ = 5 books

- Which class read the most books?
- Which class read the fewest books?
- How many more books did Class 4 read than Class 2?

What other questions could you ask about the pictogram?

- Amir and Brett are looking for different kinds of flowers in the park.

Here is what they found.

Flower	Number found
dandelion	✿✿✿✿
rose	✿
tulip	✿✿
daisy	✿✿✿

Key

✿ = 4 flowers

Use the pictogram to answer the questions.

- What kind of flower did they find the most of?
- How many more daisies did they find than roses?
- Which kind of flower did they find 14 of?
- How many tulips did they find?
- Is the statement true or false? How do you know?

> Amir and Brett found the same number of tulips as daisies.

What can you tell by looking at the pictogram?

What could you find out?

Interpret pictograms

Reasoning and problem solving

Whitney draws a pictogram to show how many chocolate eggs each class won at the school fair.

Key = 5 eggs

Class	Number of eggs
1	
2	
3	
4	
5	
6	

Tom shows the same information in another pictogram.

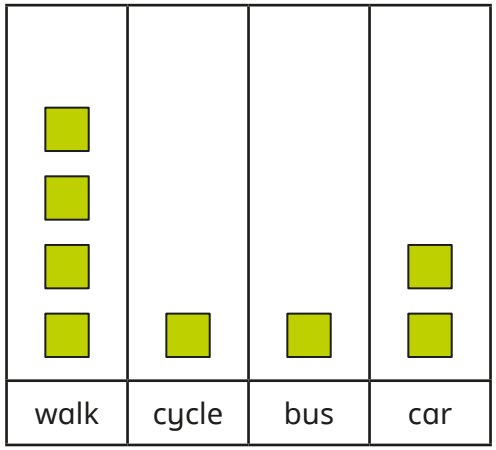
In his key, he uses a picture of one egg to represent 10 eggs.

How many eggs does Tom need to draw for Class 6?

3 and a half

There are 32 children in Class 3

The pictogram shows how the children of Class 3 get to school.



How many children walk to school?

Write some questions about the pictogram for a partner to answer.

16

Draw pictograms

Notes and guidance

In this small step, children construct their own pictograms using given data on a range of topics.

Children need to think carefully about how the data could be presented using a pictogram. Initially, it may be beneficial for children to use counters and printed grids to present data before moving on to choose their own appropriate symbols to match the topic of the data. They need to select a symbol that is easily replicated and be able to divide it into half, quarter and three-quarter symbols. Remind them that they always need to show the numerical value of a full symbol in a key. Children should practise presenting data both horizontally and vertically.

Things to look out for

- Children may always want to use a symbol to represent one item, rather than reducing the number of symbols by using multiples.
- Children may choose a symbol that is not easily shown as a half or quarter.
- Children may draw larger symbols for greater numbers, rather than keeping the symbols a consistent size.

Key questions

- What is this data about? How could you represent it?
- What symbol are you going to use? Why?
- What value will each symbol have?
- Can you use half a symbol? What value would this have?
- Why do you need to include a key?

Possible sentence stems

- One symbol represents _____ items, so _____ symbols represents _____ × _____ = _____ items.
- One symbol represents _____ items, so half a symbol represents _____ ÷ _____ = _____ items.
- I will make one symbol represent _____ items because ...

National Curriculum links

- Interpret and present data using bar charts, pictograms and tables
- Solve one-step and two-step questions using information presented in scaled bar charts and pictograms and tables

Draw pictograms

Key learning

- Class 3A have been finding out people's favourite crisp flavour.

  The table shows what they found.

Flavour	salt and vinegar	ready salted	roast chicken	prawn cocktail	tangy cheese
Number	6	8	8	2	4

  - Use the data and counters to create a pictogram where 1 counter = 1 child.
  - Create a second pictogram where 1 counter = 2 children.

- Complete the pictogram using the information.
  - Group 2 collected 40 apples.
  - Group 4 collected half as many apples as group 1

Group	Apples
1	●●●●
2	
3	●◖
4	

Key

● = 8 apples

  - How many apples did each group collect?
  - How many apples did they collect altogether?

- Class 3B are recording the weather during the summer term.

Weather	sunny	cloudy	rainy	windy	snowy
Number of days	12	16	8	6	0

  Draw a vertical pictogram for the data.

  Use one symbol to represent 4 days.

- Class 3C are counting the colours of cars that pass the school.

Colour	red	blue	black	silver	white	other
Number	12	6	14	10	14	2

  Draw a pictogram to show their findings.

- Eva has carried out a survey in the playground, asking children their favourite sport.

  The table shows her results.

Sport	basketball	running	football	tennis	do not like sport
Number	12	24	32	4	16

  Eva draws 1 circle to represent 8 people.

  How many circles does she need to draw for each category?

Draw pictograms

Reasoning and problem solving

The pictogram shows the goals scored in six football matches.

Match	Number of goals
1	
2	⚽⚽⚽
3	⚽
4	
5	⚽⚽⚽⚽
6	⚽

Key ⚽ = 2 goals

Some paint has spilt on the pictogram.

Use the clues to complete the pictogram.

- Match 1 had 1 more goal than match 3
- Match 6 had 1 less goal than match 2
- Match 4 had twice as many goals as match 3

match 1: $1\frac{1}{2}$ balls

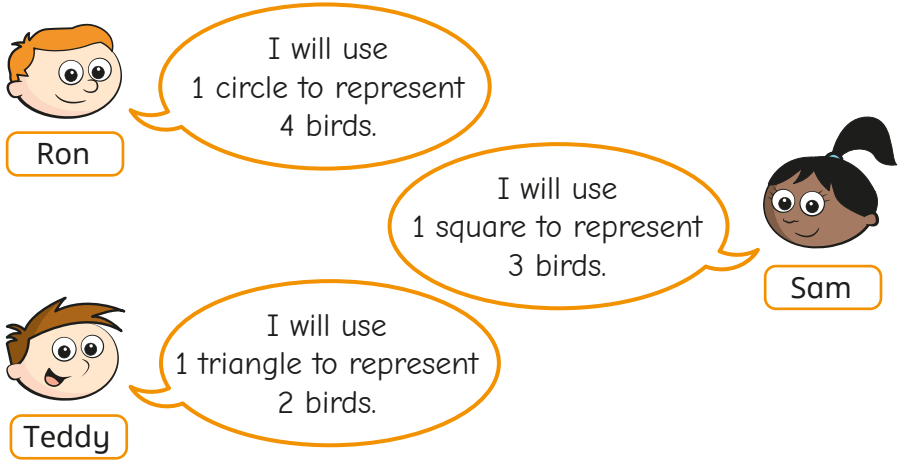
match 4: 2 balls

match 6: $2\frac{1}{2}$ balls

The table shows the number of birds spotted in the school playground.

Type of bird	robin	crow	sparrow	pigeon
Number	8	6	10	12

Ron, Sam and Teddy are designing pictograms to show the data.



Whose idea is the best?

Discuss as a class.

Interpret bar charts

Notes and guidance

In this small step, children learn to interpret bar charts, making links to their knowledge of pictograms.

Although children encountered block diagrams in Year 2, this is the first time that they have been introduced to bar charts and care should be taken to ensure that children understand the scales. Use the links to pictograms and number lines to support children's understanding of bar charts, with scales limited to steps of 1, 2, 5 and 10

Spend some time closely examining bar charts before asking specific questions. Discuss what children can see, what they know and what they could find out, before considering specific questions that require reading the data more precisely.

The focus in this step is on reading and interpreting the data, before moving on to constructing bar charts in the next step.

Things to look out for

- Children may need support to interpret the value of the scale when it is labelled in multiples other than one.
- Children may misinterpret the axis scale when a value falls between two labelled values.

Key questions

- What can you see on the bar chart?
- What could you find out?
- What is the same about a pictogram and a bar chart? What is different?
- What do the labels on each axis of the bar chart tell you?
- What scale is being used on the axis?
- Where do you measure from?
- If the bar is halfway between two values on the axis, how can you work out the value of the bar?

Possible sentence stems

- The most/least popular item is _____
- The scale shows that 1 square is equal to _____ items.

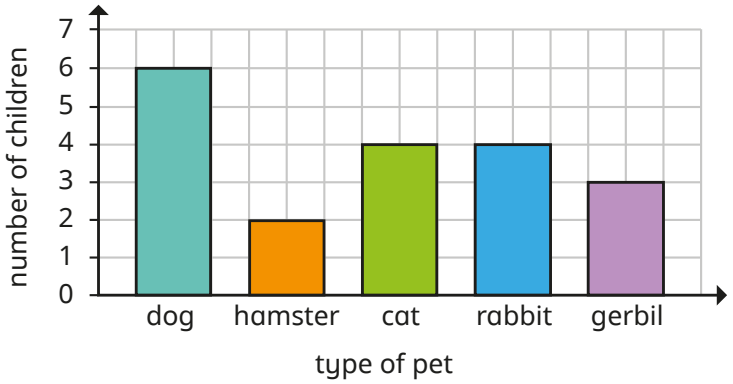
National Curriculum links

- Interpret and present data using bar charts, pictograms and tables
- Solve one-step and two-step questions using information presented in scaled bar charts and pictograms and tables

Interpret bar charts

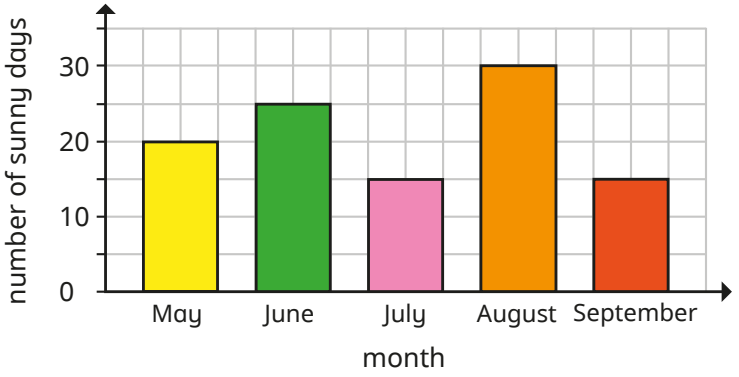
Key learning

- Here is a bar chart that shows the number of children who have different pets.



  - How many children have a dog?
  - How many children have a hamster?
  - What do you notice about the number of children who have a cat and the number of children who have a rabbit?
  - How many children have a gerbil or a rabbit?
  - How many more children have a dog than have a hamster?
  - Is it possible to work out how many children in total have a pet?
  - What else can you work out from the bar chart?

- The bar chart shows the number of sunny days between May and September.



  - Which month had the greatest number of sunny days?
  - There were 25 sunny days in June. How do you know?
  - How many sunny days were there in July?
  - How many more sunny days were there in August than in September?
  - How many sunny days were there in total in May and June?
  - Were there more sunny days between May and July or between August and September? How do you know?

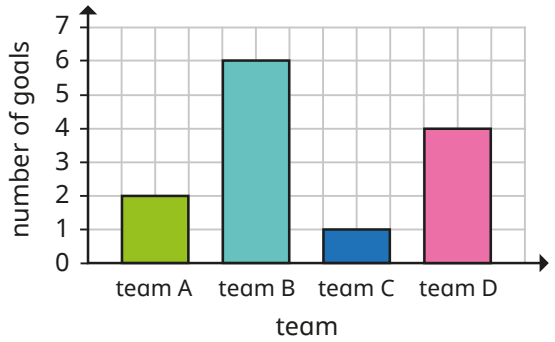
Interpret bar charts

Reasoning and problem solving

The pictogram and the bar chart show the number of goals scored by four football teams.

Team	Number of goals
team A	⚽
team B	⚽⚽⚽
team C	⚽
team D	⚽⚽

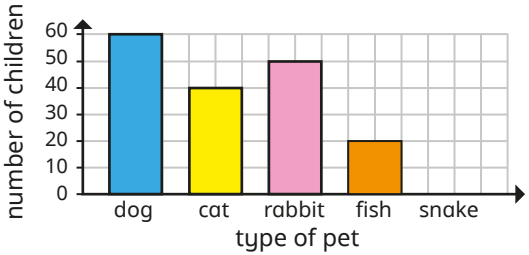
Key ⚽ = 2 goals

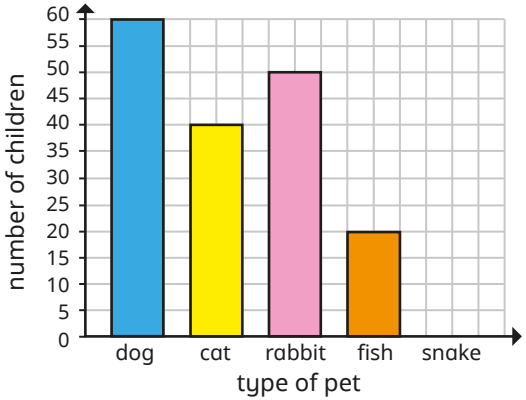


What is the same and what is different about the two charts?

Encourage children to notice that the same information is shown in different forms.

The bar charts show how many people have pets.





Do the bar charts show the same information?

Explain your answer.

Yes

Draw bar charts

Notes and guidance

In this small step, children use information from tally charts, pictograms and tables to construct bar charts.

Children can use their knowledge of drawing pictograms to make comparisons with drawing bar charts, noting how they are the same and how they are different. They have the opportunity to draw bar charts using scales of 1, 2, 5 and 10, initially by being directed to the most appropriate scale and then by choosing the scale for themselves. Some children may benefit from having pre-drawn axes to work from.

Children need to label their bar charts accurately and align the top of each bar carefully. In this step, they use data given to them, focusing on how best to construct the bar chart. They will have the opportunity to collect and present their own data in the next step.

Things to look out for

- Children may not label their bar charts fully.
- Children may struggle to draw bars that lie between two values on a scale.
- Children may need support to choose an appropriate scale.

Key questions

- What is the same and what is different about a pictogram and a bar chart?
- What is the data showing?
- What equipment do you need to draw a bar chart?
- Which set of data are you going to put on the vertical/ horizontal axis?
- What scale do you think is best to use?
- How can you work out the height of each bar?
- How are you going to ensure that your chart is accurate?

Possible sentence stems

- The greatest value is _____

  I will mark the vertical axis in _____s.
- The top of the bar should line up with _____

National Curriculum links

- Interpret and present data using bar charts, pictograms and tables
- Solve one-step and two-step questions using information presented in scaled bar charts and pictograms and tables

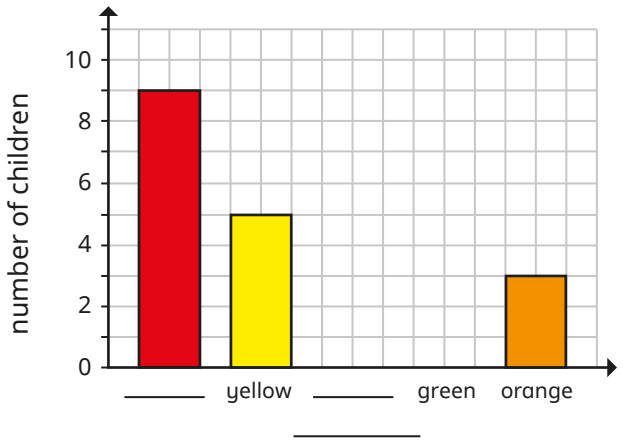
Draw bar charts

Key learning

- The table shows children's favourite colours.

Colour	red	yellow	pink	green	orange
Number	9	5	7	4	3

Complete the bar chart to show the information in the table.



- Use the information from the pictogram to draw a bar chart.

Group	Number of cupcakes eaten
1	
2	
3	
4	

Key

= 5 cupcakes

- The table shows how children in Year 3 travel to school.

Transport	walk	car	bus	bicycle	train
Number	18	10	13	9	2

Draw a bar chart to show the information.

Put the type of transport on the horizontal axis and the number of children on the vertical axis.

Use a scale of 0 to 20 going up in 2s.

- The tally chart shows the number of children in each sports club.

Sport	Tally	Total
football	𝍸 𝍸 𝍸	15
tennis	𝍸 𝍸 ||||	
rugby	𝍸 𝍸 𝍸 |||	
cricket	𝍸 𝍸 ||	
basketball	𝍸 |||	

Draw a bar chart to show the data.

Draw bar charts

Reasoning and problem solving

The table shows how many skips some children did in 30 seconds.

Child	Number of skips in 30 seconds
Aisha	12
Huan	15
Scott	17
Esther	8

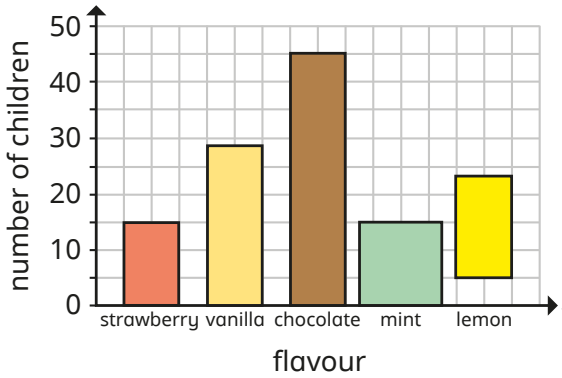
Would it be more suitable to show this information using a bar chart or a pictogram?

Explain your choice.

Discuss as a class.

Tiny has drawn a bar chart to show the information in the table.

Favourite ice cream flavour	Number
strawberry	20
vanilla	28
chocolate	38
mint	15
lemon	18



What mistakes has Tiny made?

Compare answers as a class.

Collect and represent data

Notes and guidance

In this small step, children are encouraged to propose possible topics to investigate, carry out their own data collection and use the data to construct pictograms and bar charts. They need to consider what question(s) they will ask and how they will record responses (for example, using tallies) before representing the data as bar charts or pictograms.

When constructing pictograms, children need to think carefully about the key they are going to use, based on the numbers in their data collection. They then need to choose a suitable symbol that is easy to replicate and can be used to show fractions if necessary.

When constructing bar charts, children need to think carefully about the range of data collected and the appropriate scale to use.

Further challenge could be added by asking children to write accompanying questions for a partner to answer.

Things to look out for

- Children may need a reminder of how to use tallies.
- When constructing pictograms and bar charts, children may need reminders of all the features, such as key, symbols and scales.

Key questions

- What are you collecting data about?
- Who are you going to ask?
- What question(s) are you going to ask?
- How can you record the answers to your questions?
- How do you use tally marks?
- What type of chart could you draw?
- What can you find out from the information you have collected?

Possible sentence stems

- The greatest value is _____

  I will mark the vertical axis in _____s.
- One symbol represents _____ items, so _____ symbols represent _____ items.

National Curriculum links

- Interpret and present data using bar charts, pictograms and tables
- Solve one-step and two-step questions using information presented in scaled bar charts and pictograms and tables

Collect and represent data

Key learning

- Use the tally chart to collect information about how children in your class get to school.

Travel to school	Tally	Total
walk		
car		
bus		
bicycle		
other		

Show your results as a pictogram.

- Use the tally chart to collect information about people's favourite fruit.

Fruit	Tally	Total
apple		
orange		
banana		
grapes		
other		

How could you show your results as a bar chart?

Investigate surveys that involve counting amounts of things.

Examples could include but are not limited to:

- the number of cars, lorries, vans or buses that pass the window every 1/2/5/10 minutes
- the number of goals different teams score

Ask children to collect the data in a table and then choose the best way to represent the data.

Investigate surveys that involve asking for preferences, for example sport, types of film or ice cream flavours.

Ask children to collect the data in a table and then choose the best way to represent the data.

Ask children to suggest other topics that they could collect and represent information about.

Collect and represent data

Reasoning and problem solving

Max and Jo are gathering data to draw a bar chart.

They have decided to ask the children in their class how old they are.

Why might this not be a suitable question to draw a bar chart?

What would be a better way to compare children's ages?

Ask the month of their birthday.

Children work in pairs to collect data on a topic of their choice.

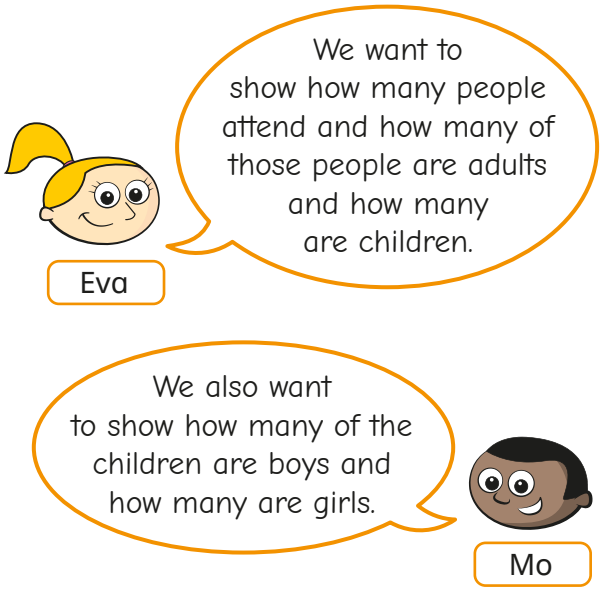
One partner shows the information in a bar chart and the other draws a pictogram.

Ask children which is the better representation for this data?

Would it be different if they collected data about a different topic?

Compare answers as a class.

Eva and Mo have been investigating how many people attend the park run each Saturday at their local park.



How could they show this information?

For example, they could have separate bar charts for adults and children, and for boys and girls.

Two-way tables

Notes and guidance

In this small step, children interpret information from simple two-way tables.

It is useful for children to spend time understanding how this type of table works, considering each row and column in turn, before answering specific questions about it. As with the previous steps on reading pictograms and bar charts, time spent asking, "What can you see?", "What do you know already?" and "What could you find out?" supports children's understanding of the context in greater depth.

Once they are confident in how the tables work and can identify which cell shows what information, children progress to using their calculation skills and understanding of the context to answer one- and two-step problems. Encourage children to pose additional questions of the form "How many more/fewer...?"

Things to look out for

- Children may confuse the information shown in the rows and the columns of the table.
- Children may add all the values in the cells together to find the overall total, which will lead to an incorrect answer that is double the actual total.

Key questions

- What is the information in the table showing?
- What is shown in the rows?
- What is shown in the columns?
- What can you find out from the table?
- Which cell shows you the number of _____?
- If you want to know how many more/fewer _____, which cells do you need to look at?

  What calculation do you need to do?
- How can you find the total number of _____?

Possible sentence stems

- The information in the rows tells me ...
- The information in the columns tells me ...
- Where the rows and columns meet tells me ...

National Curriculum links

- Interpret and present data using bar charts, pictograms and tables
- Solve one-step and two-step questions using information presented in scaled bar charts and pictograms and tables

Two-way tables

Key learning

- Here is a two-way table showing children's ages in Year 3

	Girls	Boys
Age 7	8	5
Age 8	10	7

  - How many girls are 8 years old?
  - How many boys are 7 years old?
  - How many children are 8 years old?
  - How many boys are there?
  - How many more girls are there than boys?

  What other questions could you ask?

  Create a table showing the ages of the children in your class.

- Complete the two-way table.

	Girls	Boys	Total
Glasses	12	9	
No glasses	15	14	
Total			

  How did you work out the total number of children?

- Children in Year 3 and Year 4 were asked if they preferred strawberry- or chocolate-flavoured ice cream.

  The table shows the results.

	Year 3	Year 4
Strawberry	17	12
Chocolate	10	15

  - How many Year 3 children prefer chocolate?
  - Which year group likes chocolate more?
  - How many children are there in Year 4?
  - How many children altogether prefer strawberry?
  - How many fewer children altogether prefer chocolate to strawberry?

- The table shows how many children in two classes prefer football or tennis.

	Class 3A	Class 3B
Football	25	15
Tennis	5	12

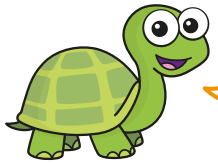
  What can you find out?

Two-way tables

Reasoning and problem solving

Tiny creates a table to show how many boys and girls took part in after-school clubs last week.

	Boys	Girls
Monday	1	9
Tuesday	8	2
Wednesday	3	1
Thursday	8	8
Friday	9	7



112 children took part in after-school clubs last week.

Is Tiny correct?

Explain your answer.

No

Jo and Max are playing a game.

They each have two turns at the game and record their scores in a table.

	1st turn	2nd turn
Jo		
Max	34	

Jo

I scored 43 points on my second turn.

I scored 7 points more than Jo on my first turn.

Max

Altogether, Jo and Max scored 140 points.

Complete the table.

Jo: 27, 43

Max: 34, 36