

This guide is for parents/carers and any adult working with the child.

The Year 5 homework book is aimed to support children's in-class learning. There are ten pieces of homework, each linked to the units of work in the Year 5 programme of study. The tasks provided complement the work done in class and aim to provide opportunities for children to practise and consolidate their understanding of key concepts relevant to the Year 5 curriculum. Each piece of homework should take no more than 30 minutes to complete.

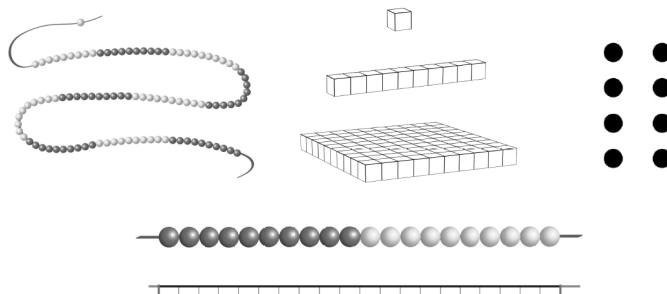
In order to support your child with the tasks, each piece of homework is accompanied by parental guidance. The guidance also aims to provide an opportunity for you to understand the methods your child is being taught, which may differ from methods you are familiar with. The methods used correspond to the expectations of the National Curriculum 2014 and are the expected methods that children are required to demonstrate understanding of. For additional support, there is also a glossary of key words at the end of the book.

## What is 'Mastery'?

The 'mastery approach' to teaching mathematics is the underlying principle of Mathematics Mastery. Instead of learning mathematical procedures by rote, we want your child to build a deep understanding of concepts which will enable them to apply their learning in different situations. We do this by using three key principles:

### Conceptual understanding

Your child will use multiple concrete and pictorial representations and make connections between them. A key part of a 'deep understanding' in maths is being able to represent ideas in lots of different ways.



$$34\,864 - 25\,423 = 9441$$

This is an **equation**

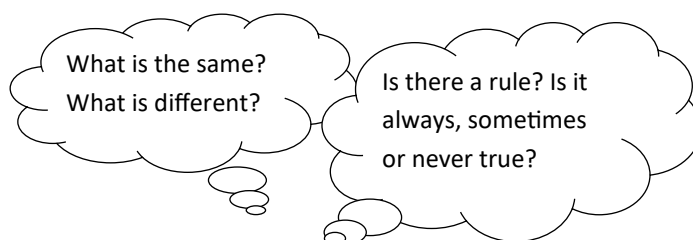
We don't round a number 'up' or 'down', we round it to the **nearest multiple** of 10, 100, 1000 etc.

### Mathematical language

When asked to explain, justify and prove their ideas, your child is deepening their understanding of a concept. The correct mathematical vocabulary is taught from the outset and communication and discussions are encouraged.



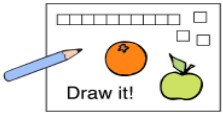
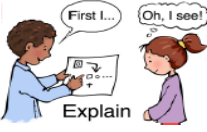
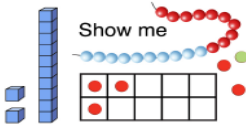
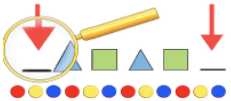


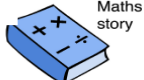

### Mathematical thinking

Lots of opportunities are planned for your child to investigate open questions that require them to sort and compare, seek patterns and look for rules. Good questioning, both for and from your child, build a deeper understanding of maths.



## Ideas for Depth

At the end of each homework piece there is a 'Next Step for Depth' question or activity for your child to engage with which will provide further challenge to deepen their understanding of a concept. Children should use the blank pages at the back of the book to record their answers. These challenges may be open-ended, involve discussion and/or application to real life situations and you should encourage your child to apply their learning to each task. All next step challenges support the development of at least one of the principles of mastery. The ideas can also be used outside of maths homework tasks in day to day discussions to allow opportunities for your child to see maths in everyday situations. The table below explains the Next Step for Depth ideas.

	<p><b>'What's the question?'</b> If this is the answer, what could the question have been? This could be an equation or a word problem.</p>
	<p><b>'What's wrong with this?'</b> Can you explain what is wrong with this and correct the error?</p>
	<p><b>'Draw it'</b> Draw a picture to explain or demonstrate what you have worked out.</p>
	<p><b>'Reason it'</b> Explain how you know.</p>
	<p><b>'Show me!'</b> Convince me that you are right.</p>
	<p><b>Find a pattern'</b> Can you see a pattern (in the numbers)? Can you see a pattern in the answers? Continuing this pattern, what would happen if...? What came before? What comes next? Explain how you know.</p>
<p>What's the same?</p>  <p>What's different?</p>	<p><b>'What's the same? What's different?'</b> Can you find anything that is the same about these two numbers/shapes/calculations? Now can you find something that is different?</p>
	<p><b>Have you found all possibilities?'</b> Is there more than one way of completing this? Is there more than one answer? Have you found them all?</p>
	<p><b>Maths story'</b> Make up a real-life story using your equation/numbers or shapes.</p>
<p>Odd one out</p> 	<p><b>'Odd one out'</b> Find an odd one out and explain why it doesn't fit. Could another one be the odd one out? Why?</p>

## Parental guidance

**Unit 7: Fractions and decimals (week 1 of 3)**

**Parental Guidance**

The first week of this unit revises the different ways in which fractions can be presented with a focus on fractions of a whole using area models (e.g. shading in equal sections in shapes) and fractions as numbers, positioning them on number lines. Pupils identify equivalent fractions and compare and order fractions.

**Prior learning**  
In previous years, pupils began to learn about how fractions can be numbers in their own right, and how they can also be operators (you can find a fraction of something). In Year 3 and 4, pupils began to recognise and show, using diagrams, families of common equivalent fractions.

**Future learning**  
They will learn about percentage. More in Year 6.

**Worked examples**

**What is a fraction?**  
Fractions are complex and cover a range of concepts. Ask yourself, "what is a fraction? When are fractions used?" and you will have lots of different answers.

A fraction can describe part of a whole

A fraction is a number

A fraction can be a part of a set or an amount

A fraction is the result of division

**How to write a fraction**

- First draw the vinculum to show that it is a fraction (the vinculum is the horizontal line separating the numerator from the denominator)
- Then write the denominator to show how many equal parts make up the whole
- Finally, write the numerator to show how many of those equal parts we are counting or are referring to.

← Unit number and unit title

← Key learning

← Prior and future learning: where this objective fits into the sequence of learning over time.

← A worked example and key points to support your child.

On every parental guidance page the unit title is located at the top, followed by an overview of the key learning. In addition, you will see where the key learning fits in with what your child has previously learnt, along with where the learning will be taken in subsequent units and years of study. It is important to understand that the principle of mastery does not encourage acceleration and remember that depth of understanding is key to your child becoming a confident mathematician who can think flexibly.

## Additional information

### Language use

For some homework tasks there is guidance on specific vocabulary or phrases that you and your child should use. E.g.

The word 'sum' should only be used for calculations involving addition, e.g. the sum of 23 plus 24 is equal to 47.  $45 - 32 =$ ,  $12 \times 4 =$ ,  $240 \div 4 =$  are NOT 'sums' they are '**equations**' or '**calculations**'.

The way that pupils speak and write about mathematics has been shown to have an impact on their success in mathematics (Morgan, 1995; Gergen, 1995). Therefore, there is a carefully sequenced, structured approach to introducing and reinforcing mathematical vocabulary throughout maths tasks. You may find some terminology different to that which you are used to.

### How to say decimal numbers

The digits after the decimal place are said as separate digits. For example, 0.42 is said "zero point four two" and not "zero point forty two" as this can cause place value confusion, thinking that 0.42 is greater than 0.5 because 42 is greater than 5.

You can find further information about the Mathematics Mastery programme online at [www.mathematicsmastery.org](http://www.mathematicsmastery.org). If you have any questions regarding this homework book please speak with your child's class teacher.

## Unit 6: Fractions and decimals (week 1 of 3)

### Parental Guidance

The first week of this unit revises the different ways in which fractions can be presented with a focus on fractions of a whole using area models (e.g. shading in equal sections in shapes) and fractions as numbers, positioning them on number lines. Pupils identify equivalent fractions and compare and order fractions.

#### Prior learning

In previous years, pupils began to learn about how fractions can be numbers in their own right, and how they can also be operators (you can find a fraction **of** something). In Year 3 and 4, pupils began to recognise and show, using diagrams, families of common equivalent fractions.

#### Future learning


They will learn about percentage. More in Year 6.

### Worked examples

#### What is a fraction?


Fractions are complex and cover a range of concepts. Ask yourself, "what is a fraction? When are fractions used?" and you will have lots of different answers.

One quarter of the area of the shape is shaded

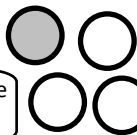


A fraction can describe part of a whole

I want to eat a quarter of the whole pizza




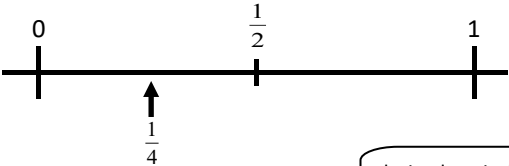
One quarter of the counters are grey



A fraction can be a part of a set or an amount

One quarter of £4 is equal to £1





A fraction is a number

$$\frac{1}{4} = 1 \div 4$$

A fraction is the result of division

decimal equivalents will be explored later

$$\begin{array}{r} 0.25 \\ 4 \overline{)1.100} \end{array}$$

#### How to write a fraction

The traditional way of writing fraction (starting with the numerator and working down) doesn't look like a fraction until the last digit. Teachers and pupils are encouraged to record a fraction in the following way:

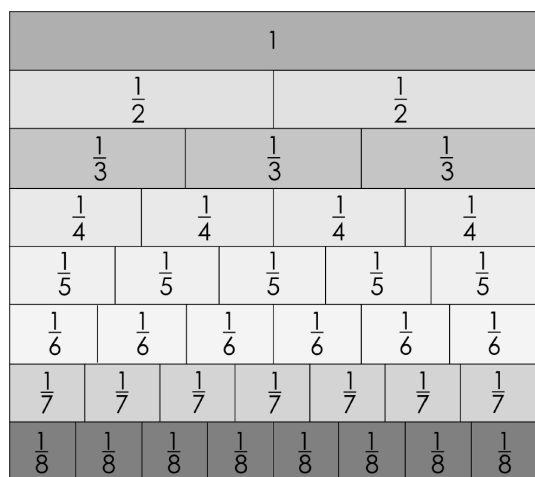
- First draw the vinculum to show that it is a fraction (the vinculum is the horizontal line separating the numerator from the denominator)
- Then write the denominator to show how many equal parts **make up** the whole
- Finally, write the numerator to show how many of those equal parts we are counting or are referring to.

$$\begin{array}{r} 3 \\ \hline 5 \end{array}$$

← numerator

← vinculum

← denominator



#### Equivalent fractions

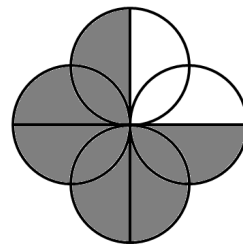
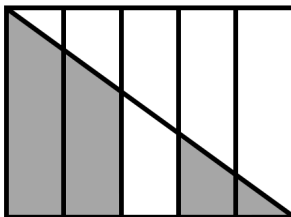
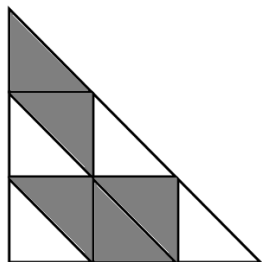
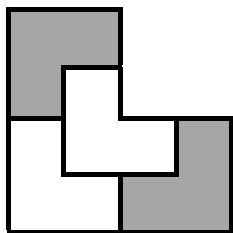
Fraction walls are a useful way to build understanding of equivalent fractions. Looking at the bars in the fraction wall, we can see, for example, that two quarters is the same as one half and is also equal to four eights.

$$\frac{1}{2} = \frac{2}{4} = \frac{4}{8}$$

Through lots of experience, pupils understanding that any fraction can be written in many different ways.

## Pupil tasks

- 1) What fraction of each shape is shaded?



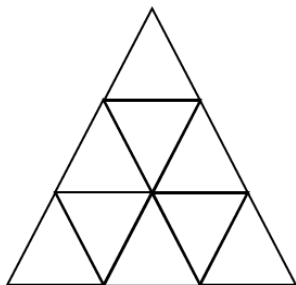
\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

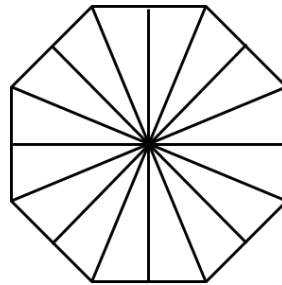
- 2) Shade in the given fraction of the area of each shape.



$$\frac{1}{3}$$



$$\frac{3}{5}$$

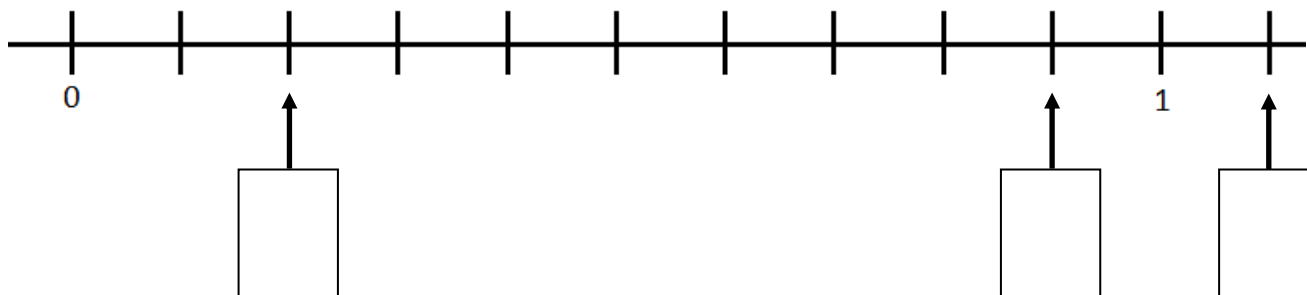


$$\frac{3}{4}$$

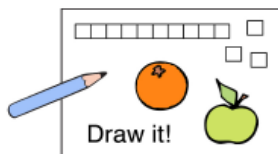
- 3) Identify the fraction that each arrow points to and place these fractions on the number line.

$\frac{3}{5}$	$\frac{3}{4}$	$\frac{3}{10}$	$\frac{4}{8}$
---------------	---------------	----------------	---------------

Can you place any other fractions?



## Next Step for Depth



How many different ways can you represent this fraction?

How will you explain each representation?

$$\frac{3}{8}$$

## Unit 6: Fractions and decimals (week 2 of 3)

### Parental Guidance

The focus of this week is the equivalence of fractions and decimals as they are different representations of the same thing and should not be seen as separate. Children represent fractions and decimal numbers in a variety of ways and write decimal numbers as fractions. This week introduces children to numbers with up to three decimal places, extending to thousandths for the first time. They develop an understanding of the relationships between ones, tenths, hundredths and thousandths.

#### Prior learning

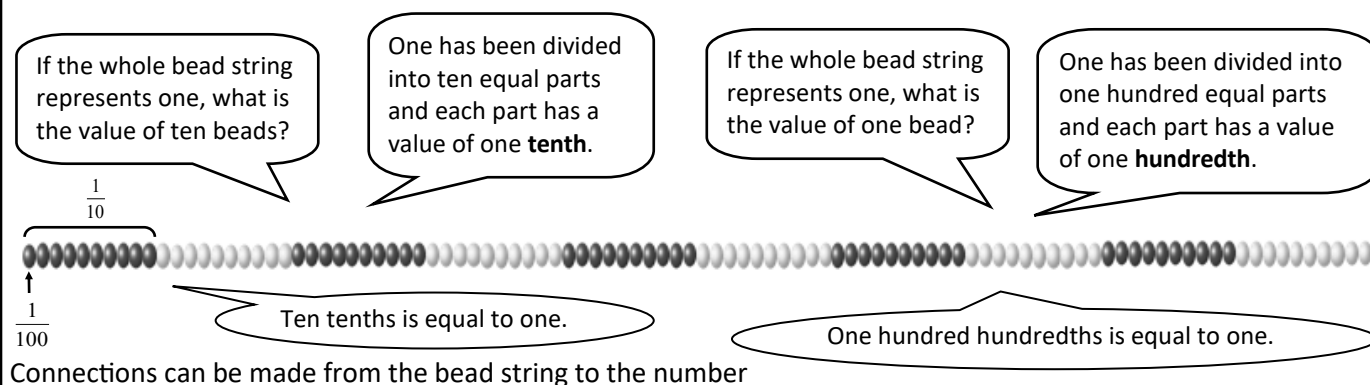
Decimal notation was introduced in Year 4 and pupils worked with tenths and hundredths.

#### Future learning

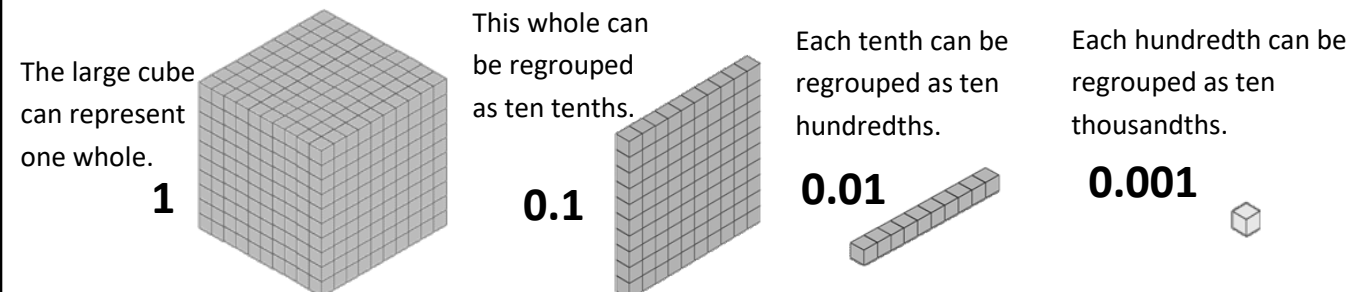
Later in Year 5 pupils extend calculation strategies and methods to include decimal number and use all four operations to solve problems involving decimals and fractions.

#### Worked examples

Pupils write decimal numbers as fractions, recognising and understanding the relationship between tenths, hundredths and thousandths. They represent decimal numbers in a variety of different ways using a variety of different equipment. A bead string with 100 beads is a useful way to represent the relationship between ones, tenths and hundredths.



Dienes blocks are used to build an understanding of the relationship between ones, tenths, hundredths and thousandths.



ones	tenths	hundredths	thousandths
	0.1	0.01 0.01	0.001 0.001 0.001 0.001 0.001

Decimal numbers can be represented with place value counters on a place value chart or by drawing dots.

0.125 has one tenth, two hundredths and 5 thousandths.

The digits after the decimal place are said as separate digits. For example, 0.25 is said "zero point two five" and not "zero point twenty five" as this can cause place value confusion, thinking that 0.25 is greater than 0.3 because 25 is greater than 3.

## Pupil tasks

- 1) Label each diagram showing the value as a fraction and as a decimal.
- a) If the whole bead string represents 1, what is the value of twenty three beads?

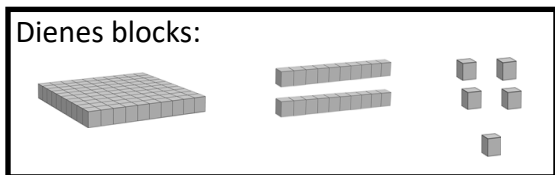


- b) If the whole bead string represents 1, what is the value of seventy five beads?



- 2) Represent the number **0.125** in a variety of ways.

Dienes blocks:



Counters:

Ones	tenths	hundredths	thousandths

There is **one** tenth, \_\_\_\_\_ hundredths and \_\_\_\_\_ thousandths.

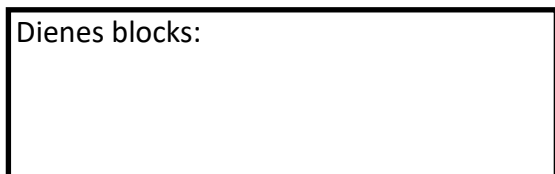
The number is said as **zero point** \_\_\_\_\_.

$$0. \boxed{\phantom{00}} = \boxed{\phantom{00}} + \mathbf{0.02} + \boxed{\phantom{00}}$$

$$\boxed{\frac{\phantom{00}}{10}} + \boxed{\frac{\phantom{00}}{100}} + \boxed{\frac{\phantom{00}}{1000}} = \boxed{\phantom{00}}$$

- 3) Represent the number **0.405** in a variety of ways.

Dienes blocks:



Counters:

Ones	tenths	hundredths	thousandths

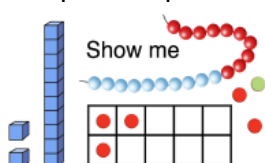
There are \_\_\_\_\_ tenths and \_\_\_\_\_ thousandths. There is a place holder in the \_\_\_\_\_ place.

The number is said as **zero point** \_\_\_\_\_.

$$0. \boxed{\phantom{00}} = \boxed{\phantom{00}} + \boxed{\phantom{00}}$$

$$\boxed{\frac{\phantom{00}}{10}} + \boxed{\frac{\phantom{00}}{1000}} = \boxed{\phantom{00}}$$

## Next Step for Depth



Choose your own decimal numbers and represent them in as many different ways as you can.

What do the different representations show you about the number?

## Unit 6: Fractions and decimals (week 3 of 3)

### Parental Guidance

This week pupils order and compare decimals and develop their understanding of the relative size of these numbers relating this to strategies used when ordering whole numbers. They then apply their understanding of equivalent decimals and fractions to compare and order decimals and fractions. A sense of the relative size of fractions and decimals is further developed through tasks requiring pupils to place numbers on number lines.

#### Prior learning

Pupils have strategies in place for ordering whole numbers and have spent time considering the relative size of fractions. In Year 4 they ordered and compared decimals with up to two decimal places. Pupils will draw on their understanding of equivalent fractions and decimals, as well as place value understanding.

#### Future learning

Pupils continue to develop an understanding of the relative size of fractions and decimals. This work will relate to understanding of percentages.

### Worked examples

#### Comparing and ordering decimals

1) Order the numbers 0.542, 0.5 and 0.54

An understanding of place value is key to reasoning about the relative size of decimal numbers. Representing the numbers on a place value chart can support this.

Possible statements that could be said:

542 is greater than 54 so 0.542 must be greater than 0.54

There are more digits in 0.542 so it must be the largest number

0.54 and 0.542 both have five tenths and four hundredths and so both are greater than 0.5

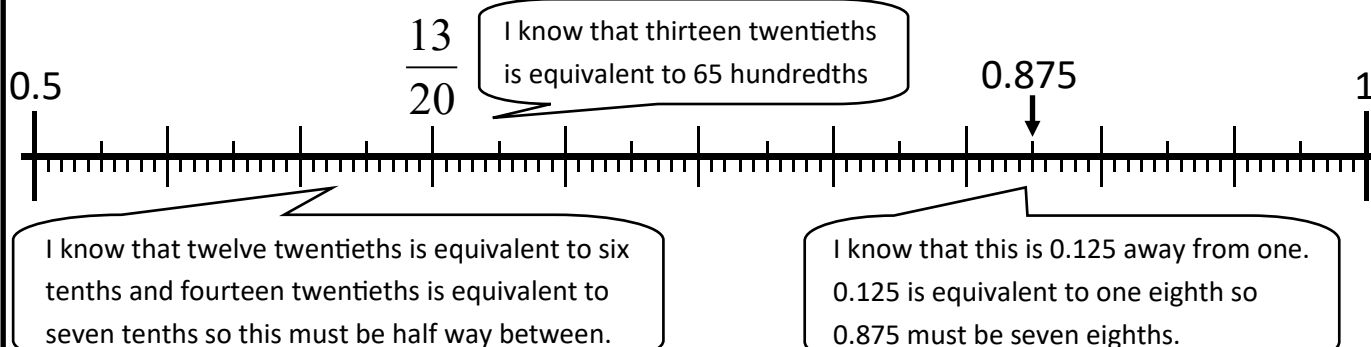
All of the numbers have five tenths

0.542 has two thousandths more than 0.54 and so is greater

ones	tenths	hundredths	thousandths
	0.1 0.1 0.1 0.1 0.1	0.01 0.01 0.01 0.01	0.001 0.001
	0.1 0.1 0.1 0.1 0.1		
	0.1 0.1 0.1 0.1 0.1	0.01 0.01 0.01 0.01	

#### Ordering decimals and fractions on a number line

Pupils should draw on their multiple representations of fractions and decimals to support decision making when ordering. Pupils will use a range of number lines with different values at the start and end and should consider the value of each marking. When deciding how to order, finding a decimal equivalent of a fraction or converting all into fractions with the same denominator are useful strategies. The focus should be on explaining their reasons.



## Pupil tasks

- 1) Choose a symbol to make each statement correct.

>

is greater than

<

is less than

=

is equal to

$0.32 \bigcirc 0.324$

$0.761 \bigcirc 0.716$

$0.053 \bigcirc 0.05$

- 2) Choose a symbol to make each statement correct.

>

is greater than

<

is less than

=

is equal to

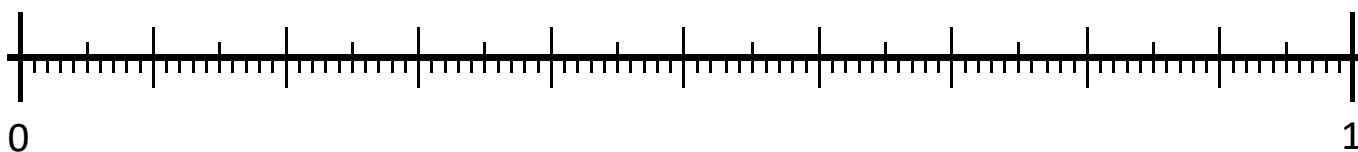
$\frac{5}{6} \bigcirc 0.625$

$0.405 \bigcirc \frac{2}{5}$

$\frac{373}{1000} \bigcirc 0.373$

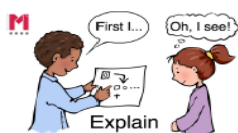
- 3) Place these fractions and decimals on the number line

$0.3 \quad \frac{3}{20} \quad 0.825 \quad \frac{65}{100}$



Choose some interesting fractions and decimals to place on the number line.

## Next Step for Depth



Clearly explain your answers to question 2 using representations of the decimals and fractions to support you decisions.

## Unit 7: Angles (week 1 of 2)

### Parental Guidance

Pupils revise their understanding of angles including acute and obtuse angles and are introduced to reflex angles as those greater than  $180^\circ$ . They use this knowledge to identify and compare angles in a range of situations. Pupils will learn to use a protractor to measure and draw angles in degrees. Pupils identify that angles at a point total  $360^\circ$  and angles at a point on a straight line total  $180^\circ$ .

#### Prior learning

In Year 3 pupils were introduced to right angles and identified right angles in shapes and in every day life. This was built upon in Year 4 where pupils compared and ordered angles as well as beginning to investigate angles within shapes

#### Future learning

Pupils continue to develop their accuracy when measuring and drawing angles. In Year 6, pupils explore angles within triangles and use protractors to construct two dimensional shapes.

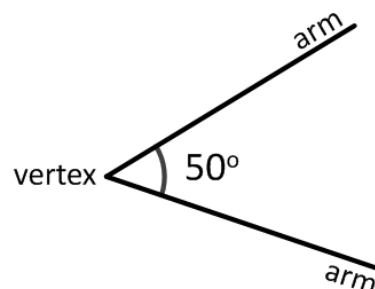
#### Worked example

Pupils have been introduced to angles as a measure of the amount of the *rotation*. They can experience this by standing and rotating various amounts (e.g. quarter turn clockwise, half turn anti-clockwise) and connecting to their knowledge of direction and compass points. Imagining lines showing the direction they are pointing before and after they have rotated allows them to visualise the angles they are working with drawn on a page.

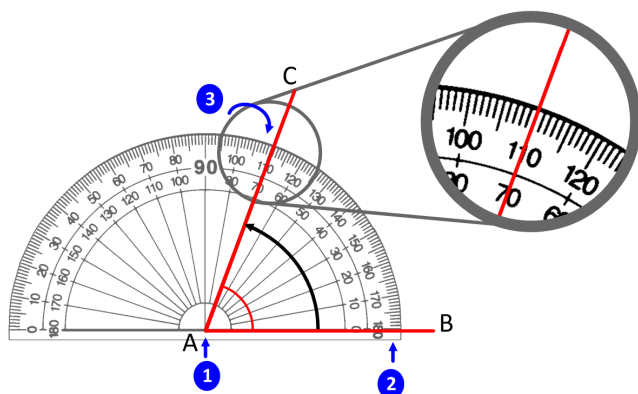
The angle is *the amount of turn* between each arm.

A common mistake made is thinking that longer lines mean a larger angle.

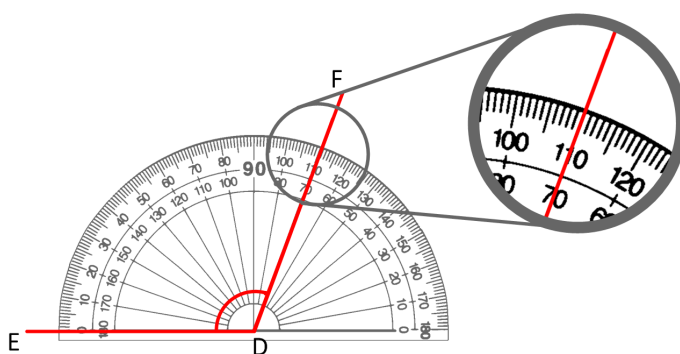
Children identify, compare and classify acute, obtuse or reflex angles and definitions of these terms are in the glossary at the back.



A **protractor** can be used to measure degrees accurately. More often than not a protractor has two scales (one clockwise and one anti-clockwise) going from 0 to 180 degrees.



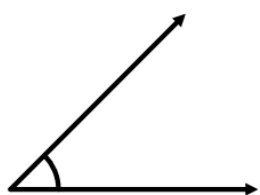
- 1 Place the centre of the protractor on the vertex
- 2 Line up one arm with the "0" on the scale (decide which scale to follow at this stage)
- 3 Follow your chosen scale to the other arm and read the angle



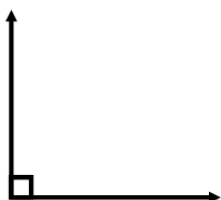
The most common mistakes are misaligning the centre of the protractor and following the wrong scale. Encourage children to estimate the angle prior to measuring it, reducing the risk of using the wrong scale.

## Pupil tasks

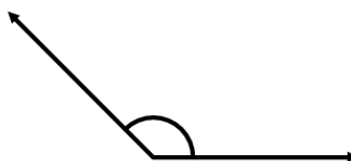
- 1) Complete the descriptions of each type of angle.



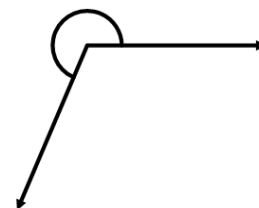
An **acute** angle is  
less than \_\_\_\_\_



A **right** angle  
is equal to \_\_\_\_\_



An **obtuse** angle is between  
\_\_\_\_\_ and \_\_\_\_\_



A **reflex** angle is  
greater than \_\_\_\_\_

- 2) For each angle, match them to the correct size.

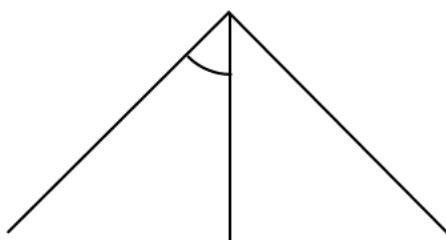
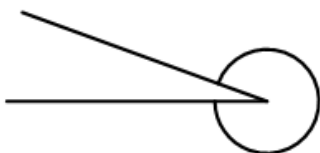
10°

100°

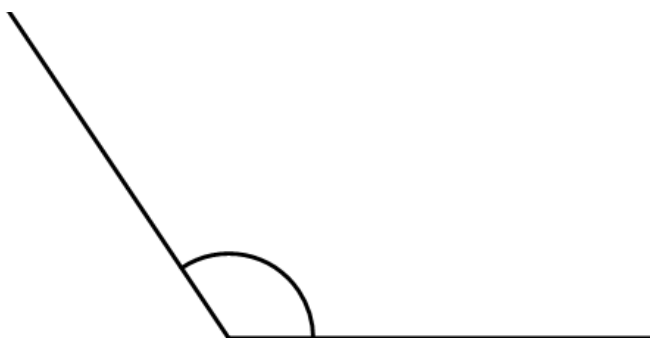
340°

45°

160°

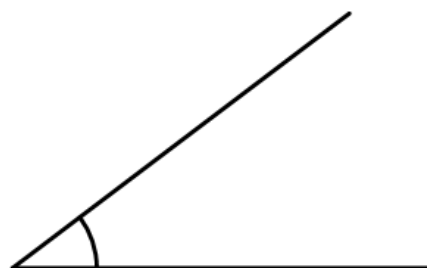


- 3) Estimate each angle and then use a protractor to measure and check your estimate.



Estimate of angle \_\_\_\_\_

Measurement of angle \_\_\_\_\_



Estimate of angle \_\_\_\_\_

Measurement of angle \_\_\_\_\_

## Next Step for Depth



Make a poster warning against all the possible mistakes that can easily be made when using a protractor. Include Top Tips for accurate measuring with a protractor.

## Unit 7: Angles (week 2 of 2)

### Parental Guidance

Pupils continue to identify and compare acute, obtuse and reflex angles as well as angles that are multiples of  $90^\circ$ . Through continued practice pupils increase accuracy when measuring angles and explore drawing angles using a ruler and a protractor. Pupils use their knowledge that a whole turn is  $360^\circ$  and half a turn is  $180^\circ$  to explore angles that meet at a point and on a straight line.

Encourage pupils to explore angles in real life for example looking at patterns or architecture.

#### Prior learning

See previous week

#### Future learning

See previous week

### Worked example

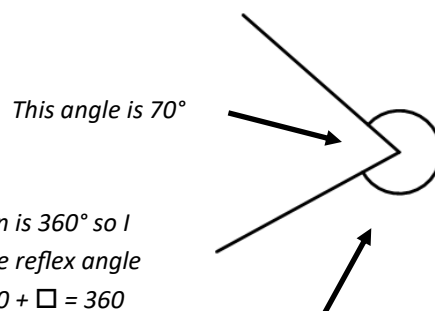
#### Measuring reflex angles

How can you use a semi-circular protractor to measure a reflex angle? It isn't big enough! The angle is larger than the scale on the protractor. The reflex angle can be worked out by measuring the other angle and subtracting that from 360.

*I know a full turn is  $360^\circ$  so I can work out the reflex angle by calculating  $70 + \square = 360$*

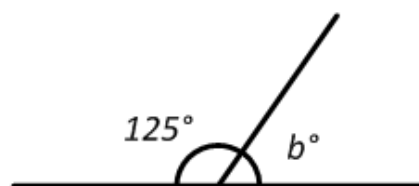
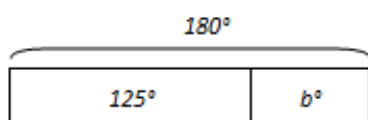
$$360 - 70 = 290$$

*So this angle must be  $290^\circ$*



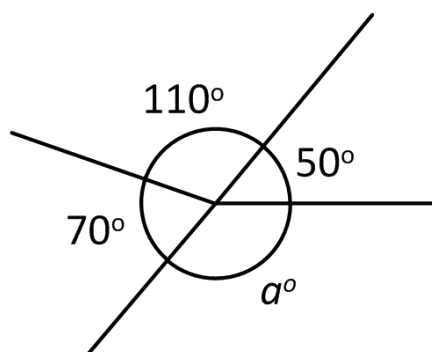
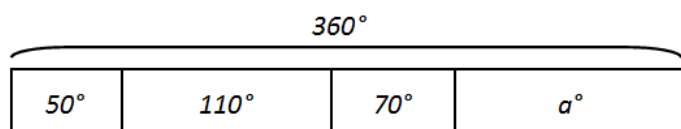
#### Angles on a straight line add up to $180^\circ$

To work out the size of angle b, without measuring, you can find the value that makes both angles sum to 180. A bar model can be used to represent this.



#### Angles at a point add up to $360^\circ$

To work out the size of angle a, without measuring, you can find the value that makes all the angles total a value of 360. This can be represented with this bar model.



When measuring angles drawn like this, think carefully about what is being measured as there is more than one angle as well as more than one scale on the protractor and it is easy to make an error.

Some suggested questions you could explore to review the learning across this unit:

"What is an angle?"

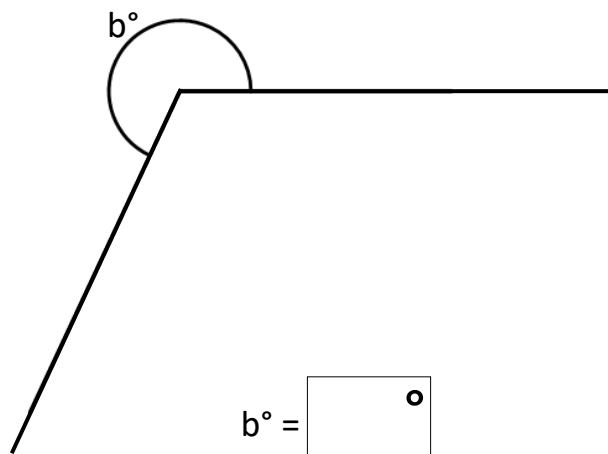
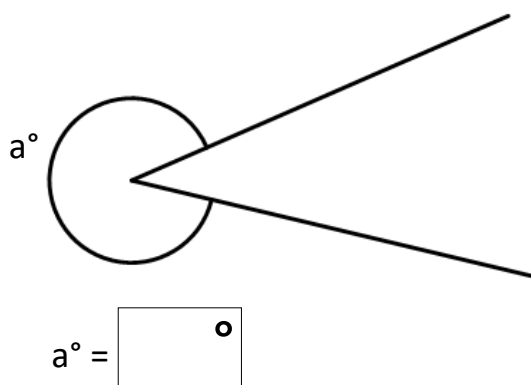
"What unit of measure do we use for angles?"

"When is one angle 'bigger' than another?"

"What is the same and what's different?"

## Pupil tasks

- 1) Work out the size of each of these reflex angles.



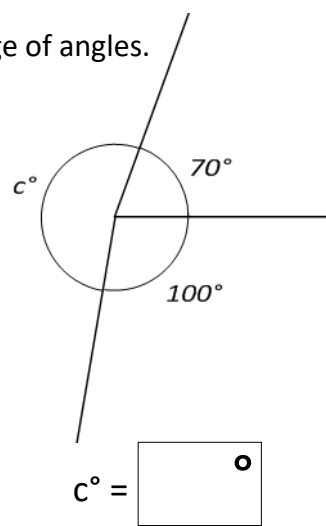
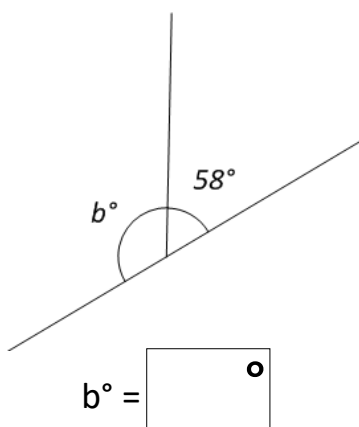
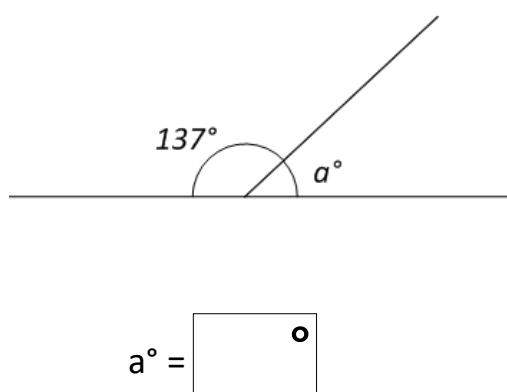
- 2) Draw and label the following (use the notes page at the back if there is not enough room).

a) an angle of  $27^\circ$

b) an angle of  $132^\circ$

c) an angle of  $250^\circ$

- 3) Work out the missing angles. Do not measure, instead use your knowledge of angles.



### Next Step for Depth

●	●	●	1 2 3
●	●	●	1 3 2
●	●	●	2 1 3
●	●	●	2 3 1
●	●	●	3 1 2
●	●	●	3 2 1

There are three angles on a straight line.  
One of them is a right angle.  
Another is a multiple of 5.

What are possible values of the three angles? Draw them at the back of the book.

How many different answers can you find? Can you find them all?

## Unit 8: Fractions, decimals and percentages (week 1 of 3)

### Parental Guidance

Pupils calculate with fractions and decimals. They start with addition and subtraction of fractions with the same denominator, and then fractions with denominators that are multiples of the same number. They multiply fractions by a whole number and connect this to finding fractions of an amount.

#### Prior learning

In Year 3 and 4, pupils added fractions with the same denominator. They developed an understanding of equivalent fractions.

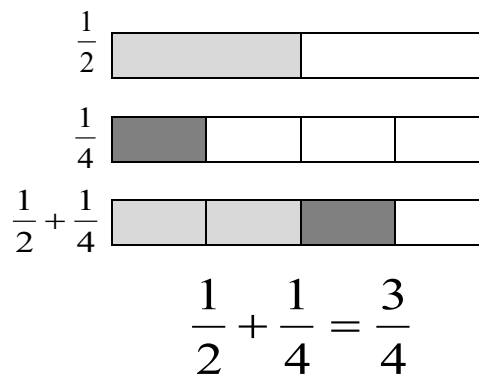
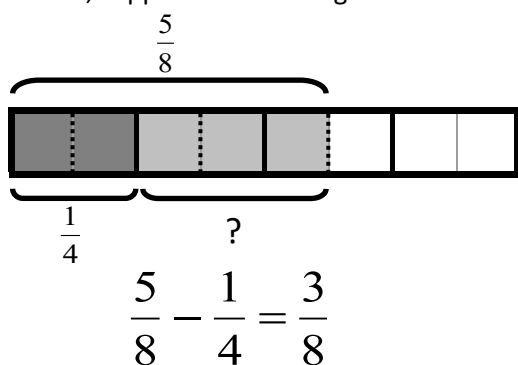
#### Future learning

Pupils continue to calculate with fractions and decimals in a range of contexts throughout Years 5 and 6.

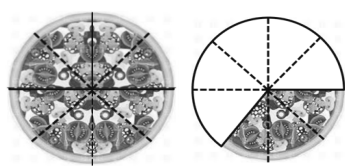
### Worked example

#### Adding and subtracting fractions

Pupils add and subtract fractions starting with fractions with the same denominator. Pupils then add and subtract fractions where the denominator of one fraction is a multiple of the other (e.g. half add eighths) by identifying equivalent fractions with the same denominator. They become fluent through a variety of increasingly complex problems, supported with images and concrete equipment.



#### Improper fractions and mixed numbers



$$\frac{11}{8} = 1 \frac{3}{8}$$

Fractions can be greater than one.

An improper fraction has a numerator that is greater than the denominator.

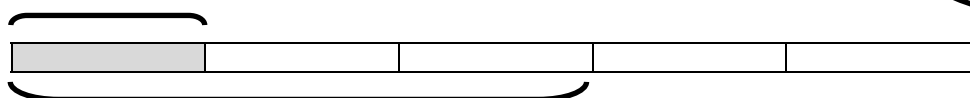
A mixed number is a whole number and a fraction.

Pupils will add and subtract fractions, including improper fractions and mixed numbers, be expected to record an improper fraction as a mixed number and the other way around.

#### Multiplying a fraction by a whole number



I used  $\frac{1}{5}$  of the ribbon.



$$\frac{1}{5} \times 3 = \frac{3}{5}$$

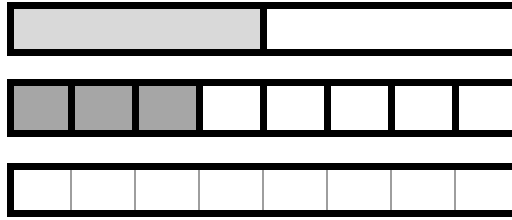
I used three times as much.



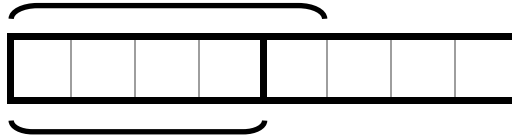
## Pupil tasks

- 1) Use the bar models to show the answer to each calculation.

$$\frac{1}{2} + \frac{3}{8} =$$



$$\frac{5}{8} - \frac{1}{2} =$$

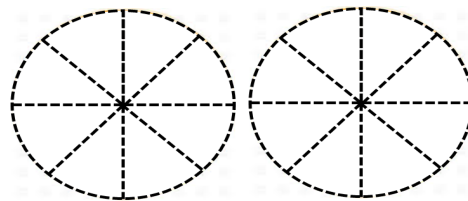
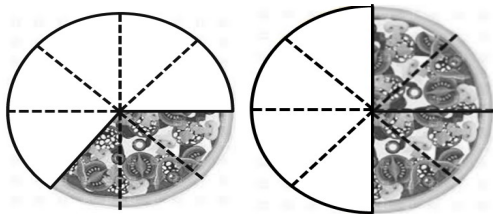


- 2) Doris eats five eighths of one pizza and half of another pizza.

This diagram shows what was left after she'd eaten:

**How much pizza did she eat altogether?**

Show on this diagram:



Record as an **improper fraction**:

Record as a **mixed number**:

Doris ate  of the pizza.

Doris ate  of the pizza.

- 3) A mug holds  $\frac{1}{4}$  of a litre. How much will seven mugs hold?

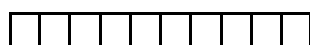
Record as an improper fraction and a mixed number.

## Next Step for Depth

What's the same?



What's different?



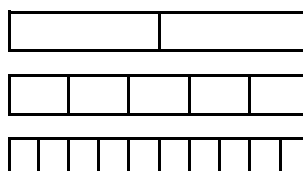
$$\frac{1}{10} \times 7$$

four fifths less than one and a half

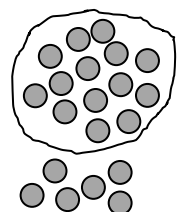
$$1\frac{1}{2} - \frac{4}{5}$$



one half plus one fifth



fourteen out of 20 objects



## Unit 8: Fractions, decimals and percentages (week 2 of 3)

### Parental Guidance

This week pupils think about fractions as an operator (you can find a fraction *of* something) as well as thinking of a fraction as the result of division. They connect this to their understanding of multiplication and explore a range of contexts in which they multiply a fraction by a whole number.

#### Prior learning

Pupils have been doubling and halving numbers since Year 1 and have connected this to an understanding of fractions as operators. This is extended to finding other unit fractions and then non-unit fractions of amounts.

#### Future learning

Pupils continue to calculate with fractions and decimals and develop an understanding of percentages in a range of contexts throughout Years 5 and 6.

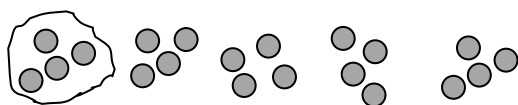
### Worked examples

#### Fractions of an amount

Fractions can be seen as an operator and you can find a fraction of an amount. This is introduced through doubling and halving; developing an understanding that finding half of an amount is the same as dividing the amount by two. Through plenty of experience with concrete materials and pictorial representations, pupils find fractions of an amount, connecting this to their understanding of multiplication.

? **There are 20 people on a bus and one fifth of them are children. How many children are there on the bus?**

Represent as part of the set of people:

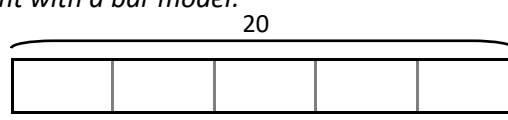


$\frac{1}{5}$

$$\frac{1}{5} \text{ of } 20 = 4$$

$$20 \div 5 = 4$$

Represent with a bar model:



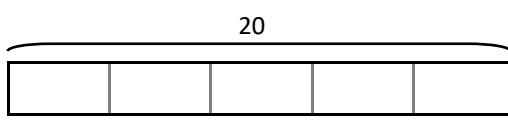
$\frac{1}{5}$

$$\frac{1}{5} \times 20 = 4$$

Having found one fifth, pupils can extend to finding non unit fraction e.g. two fifths or three fifths. To find a non-unit fraction of an amount, find the unit fraction with the same denominator and multiply this amount by the numerator.

$$\frac{2}{5} \text{ of } 20 = 8$$

I know that one fifth of 20 is equal to 4 so two fifths is equal to  $4 \times 2$



$\frac{2}{5}$

$$\frac{2}{5} \times 20 = 8$$

#### Multiplying a fraction by a whole number

There are temptations to teach “tricks” (such as ‘just multiply the top number’) that are not based in conceptual understanding. Pupils should have plenty of opportunities to experience calculating with fractions in a range of contexts, to represent in a variety of ways and to explain and think carefully about what they are doing.

? **A small bottle holds  $\frac{1}{8}$  of a litre. How much liquid will six bottles hold?**

$$\frac{1}{8} \times 6 = \frac{6}{8}$$

Pupils could, initially, skip count in eighths to calculate the answer.

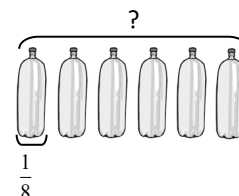
? **A bottle holds  $\frac{3}{8}$  of a litre. How much liquid will five bottles hold?**

Connecting this to understanding of calculations with integers is useful.

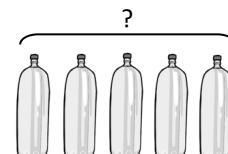
Pupils can identify that  $3 \text{ ones} \times 5 = 15 \text{ ones}$  and so  $3 \text{ eighths} \times 5 = 15 \text{ eighths}$ .

$$\frac{3}{8} \times 5 = \frac{15}{8}$$

This can then be converted from an improper fraction to a mixed number.



$\frac{1}{8}$



$\frac{3}{8}$

## Pupil tasks



1) **There are 64 apples.** Answer each question with either a fraction or a whole number:

a)  $\frac{3}{4}$  **of the apples are green and the others are red.**

How many apples are green?

What fraction of apples are red?

How many apples are red?

c)  $\frac{1}{8}$  **of the apples are rotten and the others are not.**

How many apples are rotten?

What fraction of apples are not rotten?

How many apples are not rotten?

c) **16 apples are in a basket and the others are in a box.**

What fraction of the apples are in the basket?

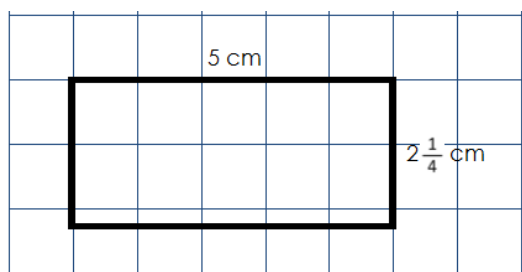
What fraction of the apples are in the box?

2) Represent each problem and then calculate the answer (use the notes page at the back is needed).

a) Amy works out that her train journey takes  $\frac{1}{12}$  of a day. She has a plane journey that is five times longer. What fraction of a day will the plane journey take?

b) A jug holds  $\frac{2}{3}$  of a litre of liquid. How much liquid can four jugs hold?

3) Calculate the area and the perimeter of this rectangle:



Area =   $\text{cm}^2$

Perimeter =  cm

## Next Step for Depth



Generate word problems involving the multiplication of a fraction by a whole number.

## Unit 8: Fractions, decimals and percentages (week 3 of 3)

### Parental Guidance

Pupils are introduced to percentage as ‘the number of parts per hundred’ and understand that fractions, decimal fractions and percentages are different representations of the same thing. They identify and calculate percentages in a range of situations.

#### Prior learning

This is the first year that pupils learn about percentage.

#### Future learning

Pupils solve problems which require knowing equivalent fractions, decimals and percentages as well as using percentage for comparison.

#### Worked example

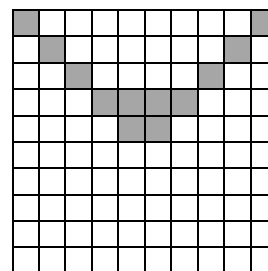
‘Per cent’ means ‘for each hundred’ and children build the understanding that the percentage relates to the number of parts per hundred.

When there are 100 equal parts, identifying percentage is straight forward.

? **What percentage of the grid is shaded?**

*12 equal parts out of 100 equal parts are shaded, so 12% of the grid is shaded.*

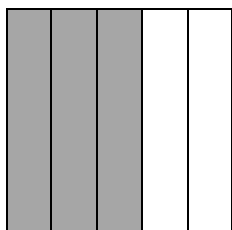
$$12\% = \frac{12}{100} = 0.12$$



When there are not 100 equal parts, use knowledge of equivalent fractions. To work out the percentage of the grid that is shaded, work out the number of parts per hundred this is equivalent to.

? **What percentage of the grid is shaded?**

$\frac{3}{5}$   
of the grid  
is shaded.



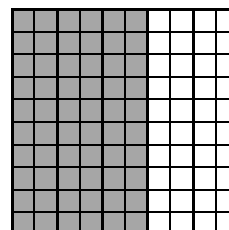
*Use equivalent fractions:*

$$\frac{3}{5} = \frac{6}{10} = \frac{60}{100}$$

*Use decimals:*

$$\frac{3}{5} = 0.6 \quad \text{Six tenths is equal to 60 hundredths}$$

*Divide the whole into 100 equal parts:*



60 equal parts out of 100 are shaded and so **60%** of the grid is shaded.

#### Finding a percentage of an amount

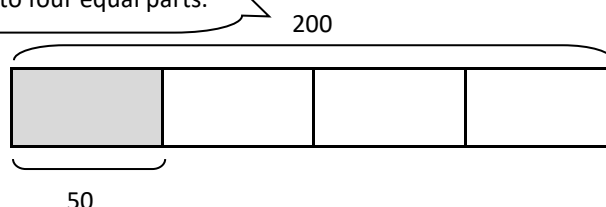
Having built an understanding of fraction, decimal and percentage equivalence, pupils use understanding of finding fractions of amounts to find percentages of amounts.

? **There are 200 athletes in a team. 25% of them compete in swimming events. How many swimmers are there on the team?**

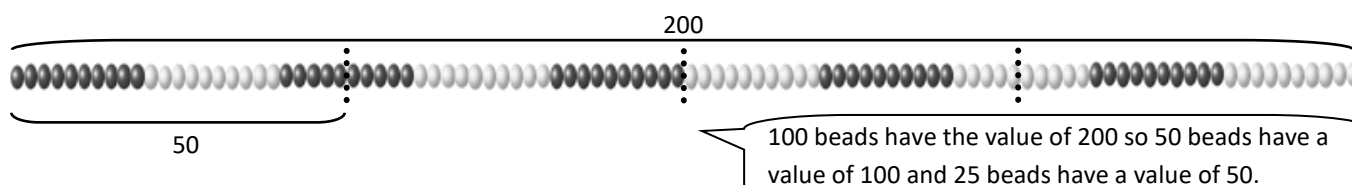
I know that 25% is the same as one quarter.

To find one quarter of 200, I divide 200 into four equal parts.

Each part has a value of 50 so 25% of 200 = 50.  
There were 50 swimmers on the team.

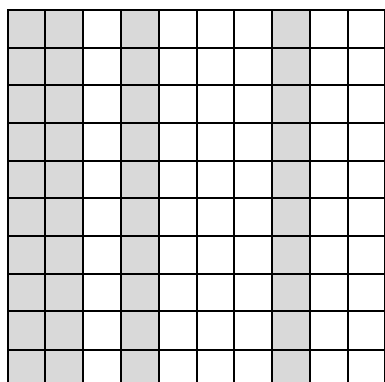


A bead string with 100 beads can be used to represent 100%. In this case, 100% is equal to 200 athletes so 100 beads has a value of 200 and we need to find the value of 25 beads.



## Pupil tasks

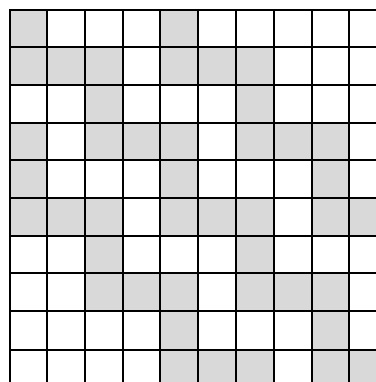
- 1) What percentage of each grid is shaded? Write each percentage as a fraction and a decimal.



Percentage shaded:

Fraction shaded:

This can represent the decimal:



Percentage shaded:

Fraction shaded:

This can represent the decimal:

- 2) Match each card to the percentage that is equivalent to the decimal or fraction. There is more than one for each percentage.

a) 2%

b) 22%

c) 20%

0.2

0.22

$\frac{2}{10}$

$\frac{2}{100}$

$\frac{22}{100}$

0.02

$\frac{20}{100}$

$\frac{1}{5}$

- 3) Find percentages of amounts. Mark the bead string and complete the statements.

a) What is 20% of 50?

20% of 50 =

50



b) What is 75% of 80?

75% of 80 =

80



Next Step for Depth

Odd one out



Which of these is the odd one out? How many different answers can you think of?

$\frac{3}{5}$

0.5

$\frac{6}{100}$

65%

## Unit 9: Transformations (week 1 of 2)

### Parental Guidance

The first week of this unit revises how to describe positions on a 2-D grid as coordinates with both positive and negative numbers. Pupils will identify, describe and represent the position of a shape following a translation and know that the shape has not changed.

#### Prior learning

In Year 4 pupils were introduced to the coordinate system and described positions that have coordinates with positive numbers. They used a variety of language to describe position and movement.

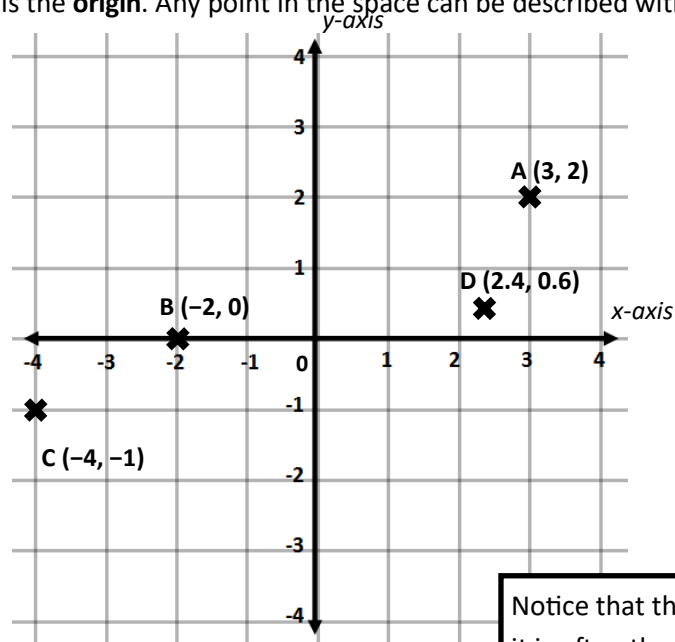
#### Future learning

Pupils will continue to use coordinates with positive and negative numbers to describe position and will explore properties of shapes.

### Worked examples

#### Coordinates

The coordinate system is a way of describing position or location in two dimensions. Two number lines lie at right angles to each other, the horizontal line is the **x-axis**, the vertical line is the **y-axis** and the point where they meet is the **origin**. Any point in the space can be described with two numbers, called its **coordinates**.



The x-coordinate is the distance moved horizontally along the x-axis and the y-coordinate is the distance moved vertically along the y-axis. For example, to reach point A we move three units along the x-axis and then two units along the y-axis. The coordinates of point A are (3, 2). **The convention is always to give the x-coordinate first and the y-coordinate second (x, y).**

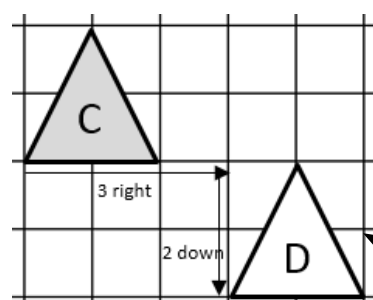
What do you notice about point D? Although decimal coordinates are not a part of the primary curriculum, it is worth highlighting that decimal numbers can be used to describe any point on the grid, not just those on the lines.

Notice that the lines are labelled. On a map it is often the spaces that are labelled.

#### Translating shapes

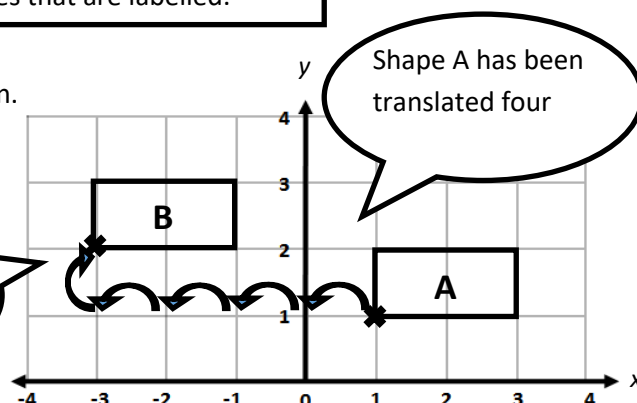
A **translation** moves a shape so that it is in a different position.

When a shape is translated it retains the same size, area, angles and line lengths and therefore the two shapes can be described as **congruent**.



Following the path of one vertex

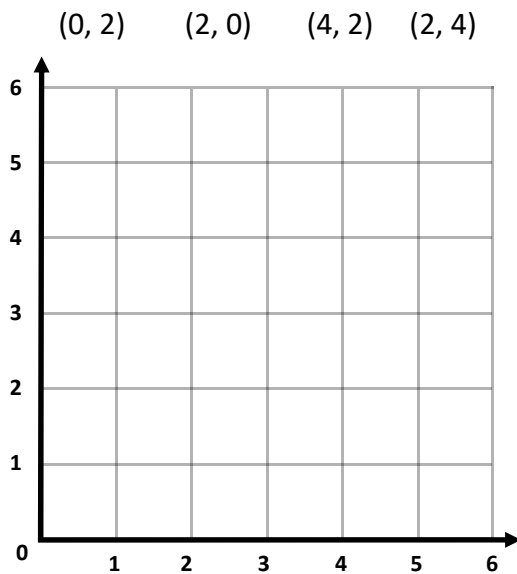
Triangle C has been translated three right and two down



A common error made is counting the points and counting the vertex of A as one leading to an incorrect answer of five.

## Pupil tasks (page 1 of 2)

- 1) Plot the given coordinates and join the points in order, with straight lines, to create a shape.

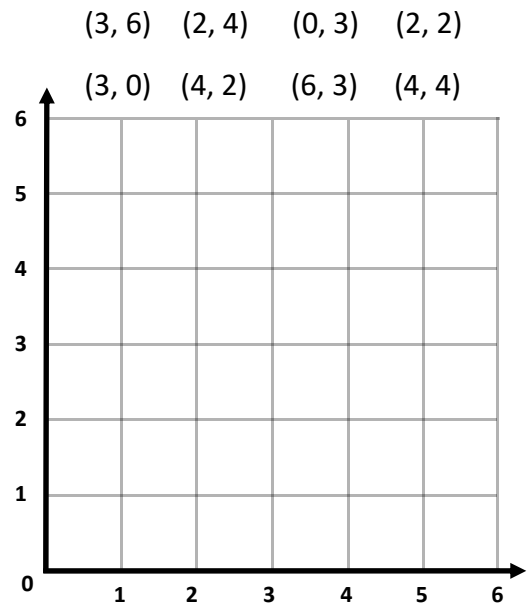


Describe the shape:

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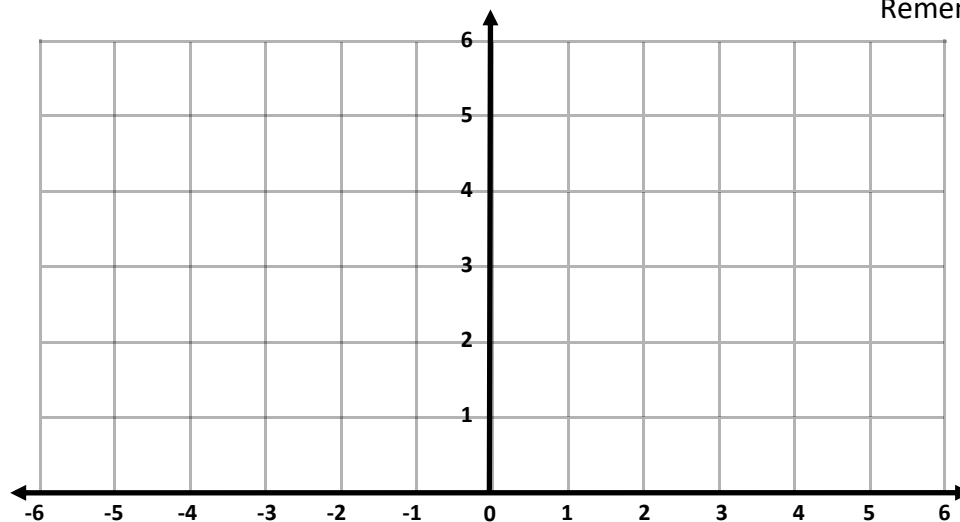
Describe the shape:

---



---

Remember to join the points in order



(4, 4)    (4, 6)    (-2, 2)

(-4, 3)    (-5, 2)    (-2, 0)

Describe the shape:

---

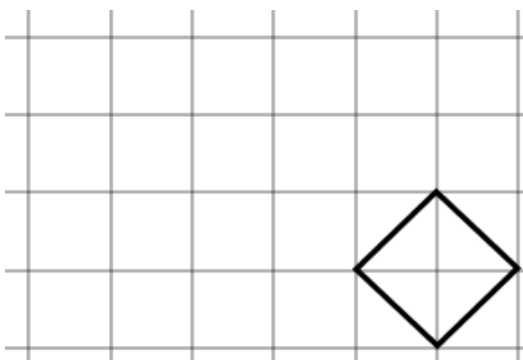


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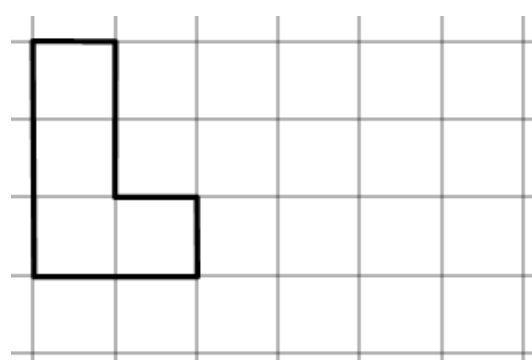


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- 2a) Translate this shape **two left** and **two up**

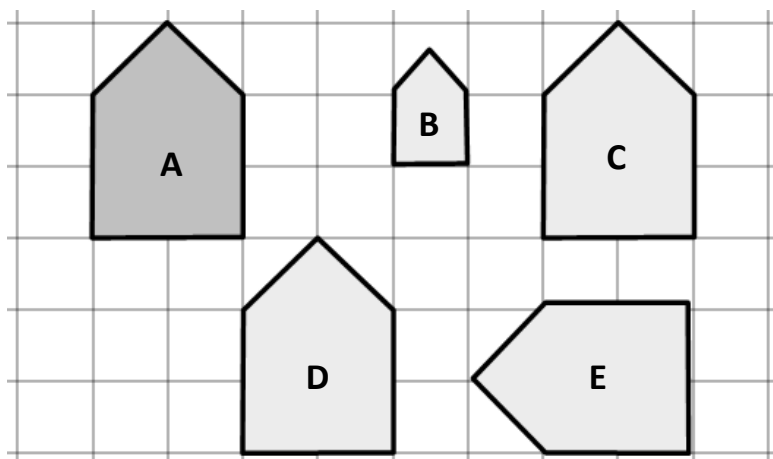


- 2b) Translate this shape **three right** and **one down**



## Pupil tasks (page 2 of 2)

- 3) Which of these shapes is a translation of shape A?



Write the letter of the shape and describe the translation.



\_\_\_\_\_

\_\_\_\_\_

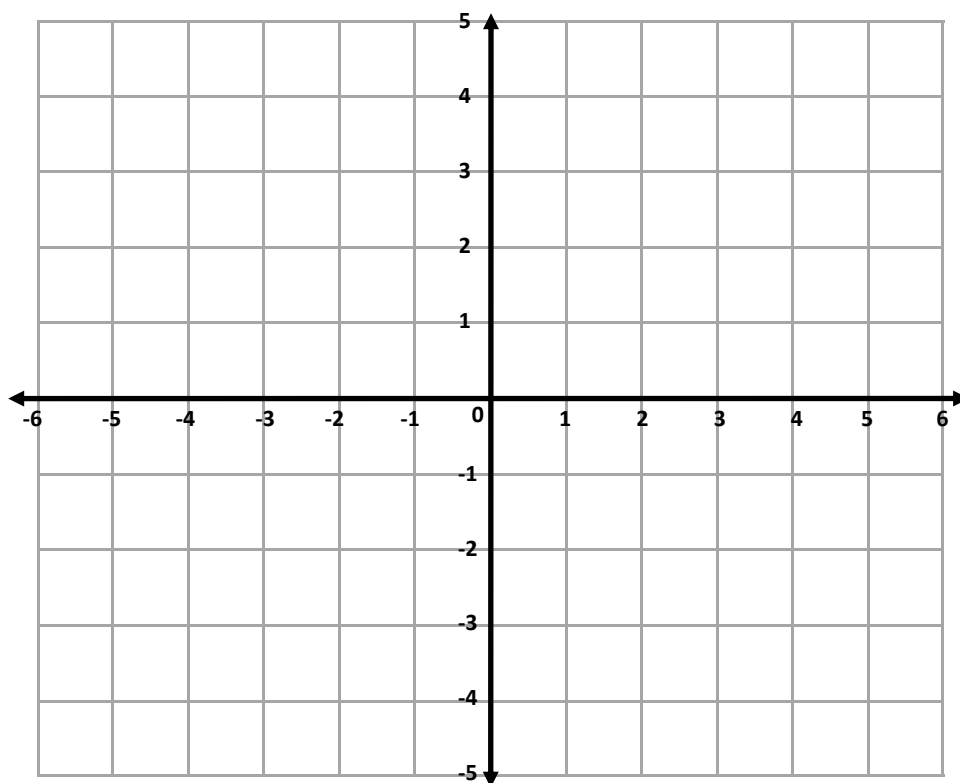


\_\_\_\_\_

\_\_\_\_\_

- 4) Plot these coordinates and join each point with a straight line segment to make a shape.

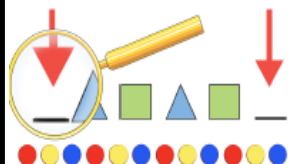
(1, 3)      (-5, 3)      (-5, -1)      (1, -1)



Then translate the shape three right and two down. Record the coordinates of each vertex:

( \_\_ , \_\_ )      ( \_\_ , \_\_ )      ( \_\_ , \_\_ )      ( \_\_ , \_\_ )

### Next Step for Depth



What pattern do you notice with the coordinates?

What is the difference between the numbers in the coordinates of the vertices of the shape before and after it has been translated?

## Unit 9: Transformations (week 2 of 2)

### Parental Guidance

The week, pupils continue to use coordinates in all four quadrants to describe position. They reflect shapes and identify, describe and represent the position of the shape and know that the shape has not changed: it is a congruent shape.

#### Prior learning

Recognising and identifying reflections is connected with previous work on symmetry and identifying lines of symmetry as well as creating symmetrical shapes and images.

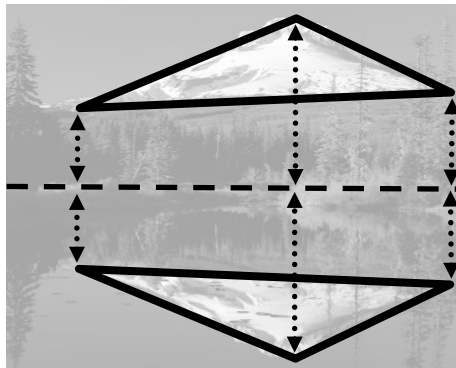
#### Future learning

Pupils reflect shapes in mirror lines that are diagonal including shapes that touch and cross the mirror line.

#### Worked examples

##### Reflection

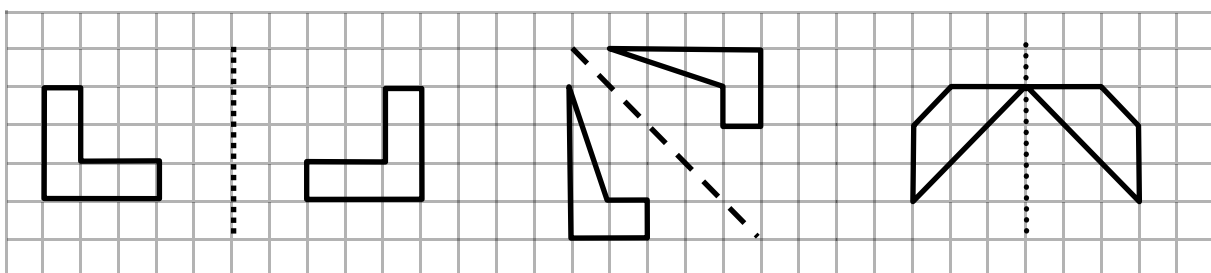
Reflections are everywhere and pupils will have experienced reflections in mirrors or water. Pupils have thought about mirror lines when they explored symmetrical shapes and patterns.



In this picture you can see the shape of the top of the mountain reflected in the water.

Every point is the same distance from the mirror line.

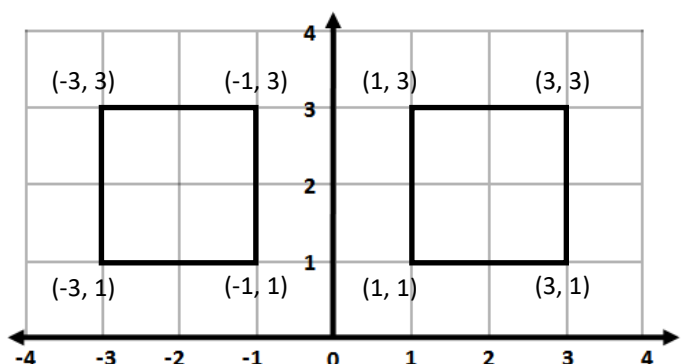
The mirror line can be horizontal or vertical. In fact, it can be in any direction as shown in the examples below. Pupils may have difficulties with shapes that touch the mirror line.



#### Pattern seeking with coordinates

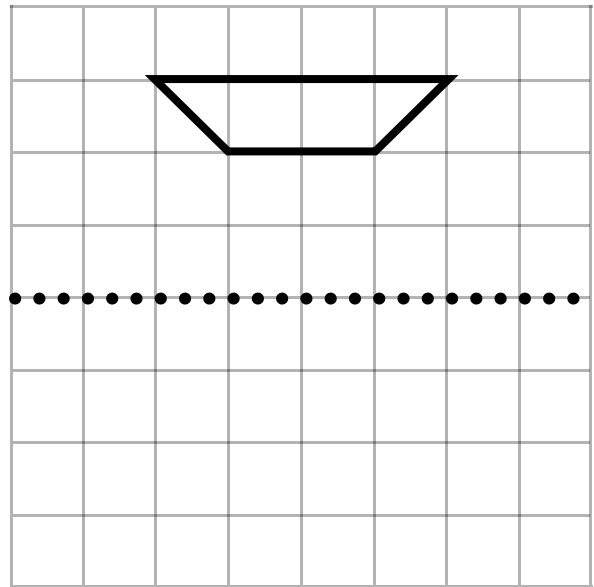
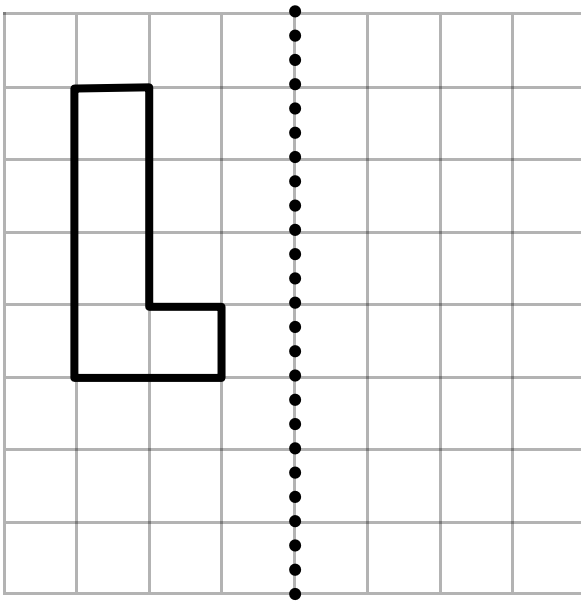
When shapes are plotted on a coordinate grid and are reflected in the x-axis or y-axis, this reinforces the fact that each point is the same distance from the mirror line. Pupils can seek patterns in the coordinates for each vertex of the shape.

? What do you notice about the coordinates of this rectangle that has been reflected in the y-axis?

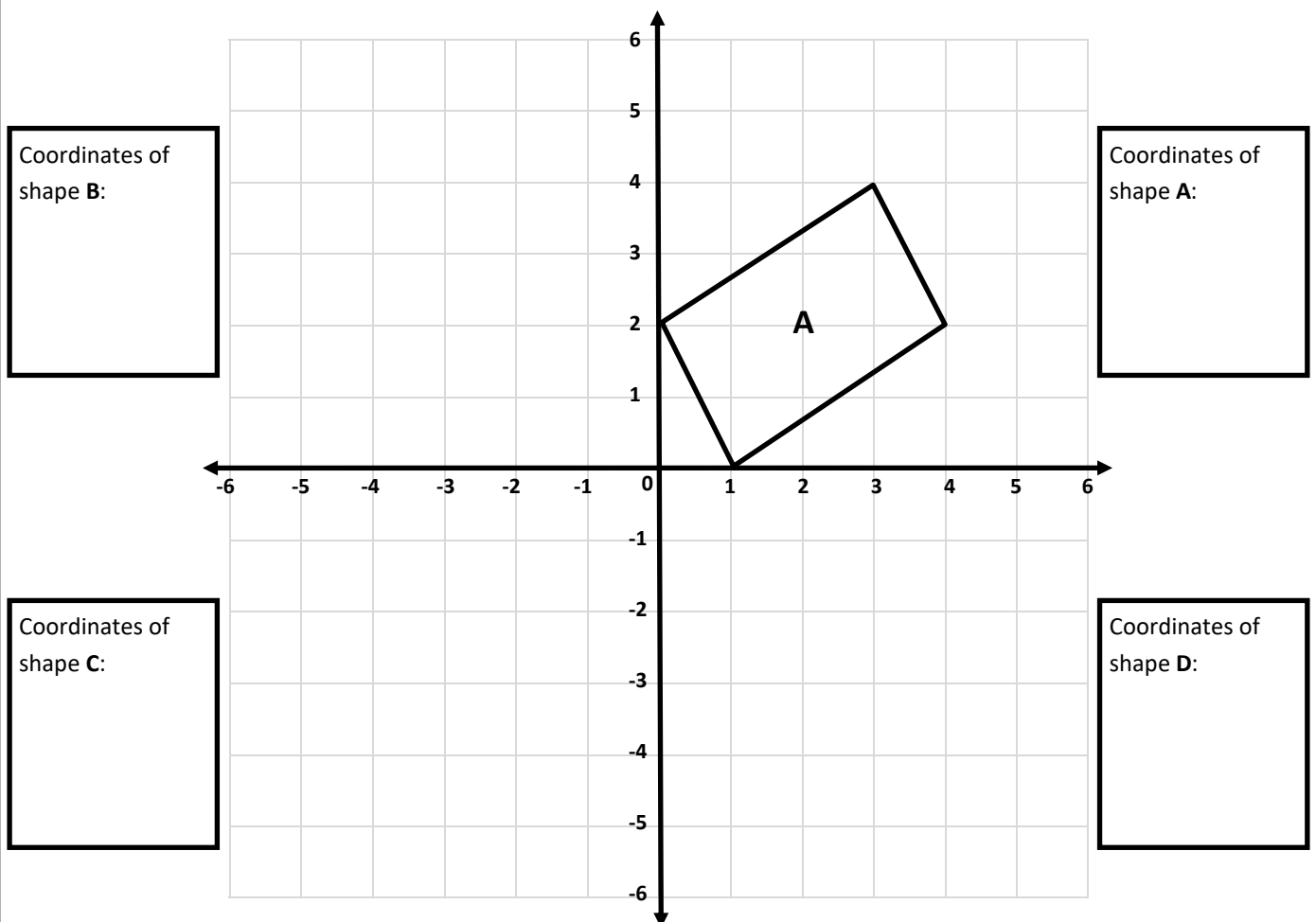


## Pupil tasks

- 1) Reflect each shape in the dotted mirror line.

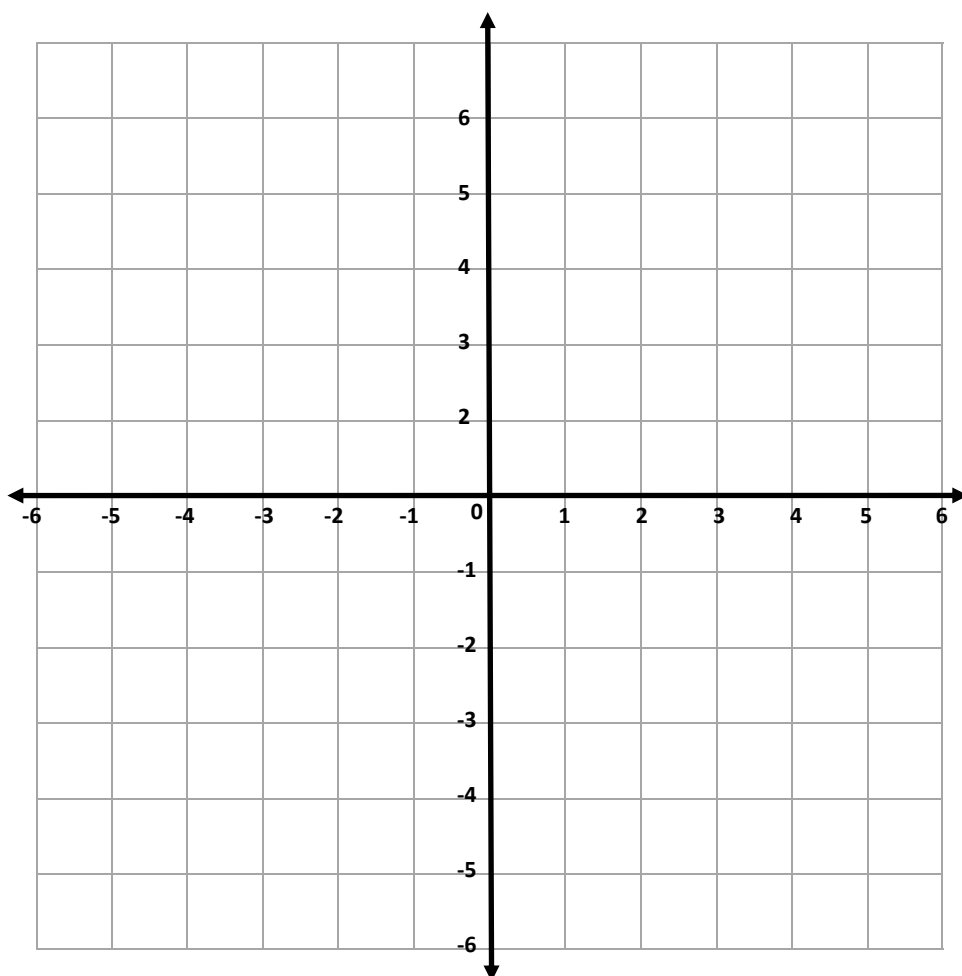


- 2) Reflect shape A in the y-axis and label it shape B. Then reflect shape A and shape B in the x-axis and label them C and D. Record the coordinates of the vertices of each shape.



## Pupil tasks

- 3) On the grid below, create a pattern by drawing a shape and translating and reflecting. In the space below, describe what you did.



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Next Step for Depth



# Answer

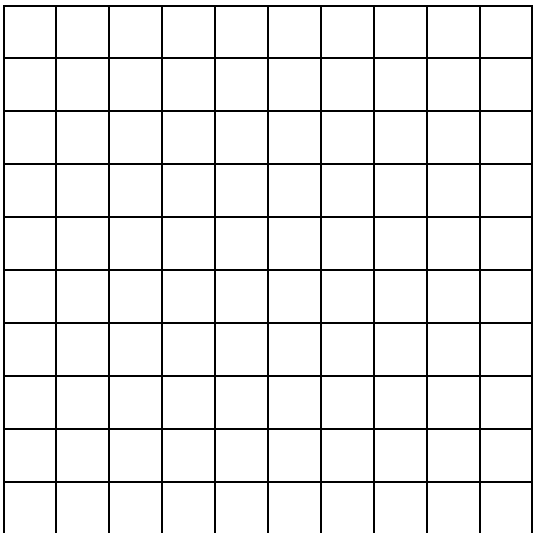
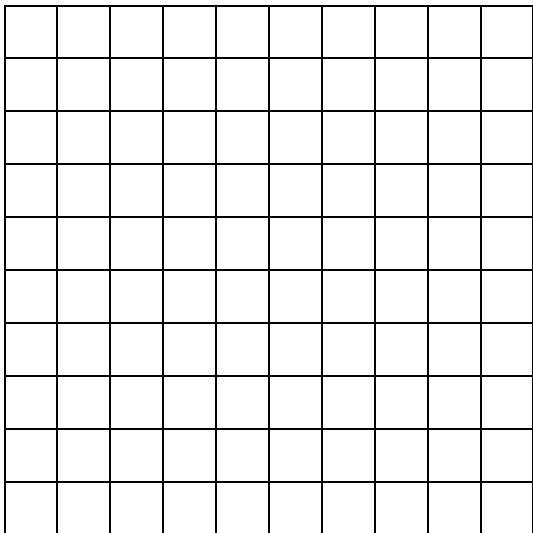
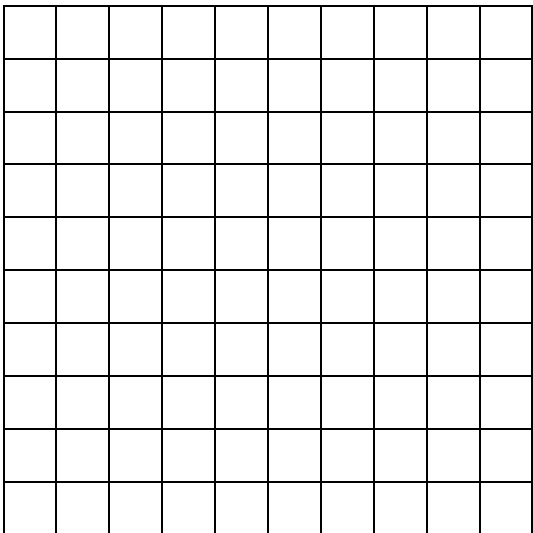
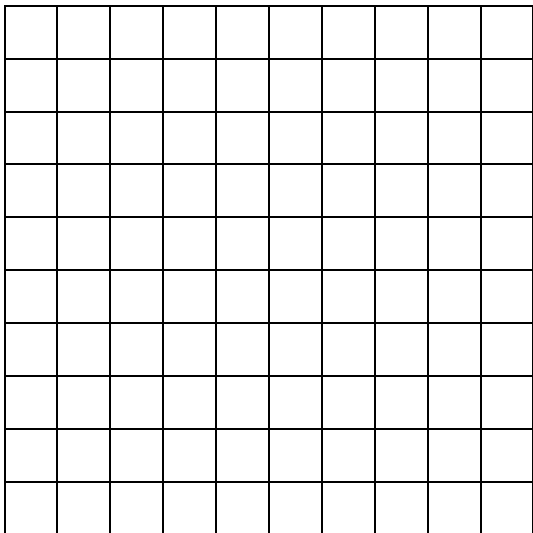
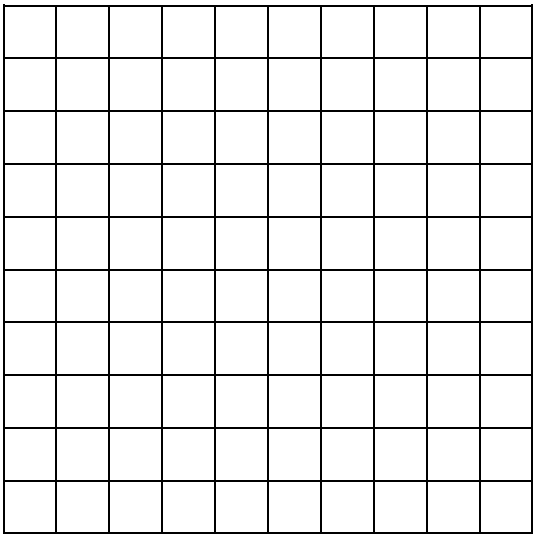
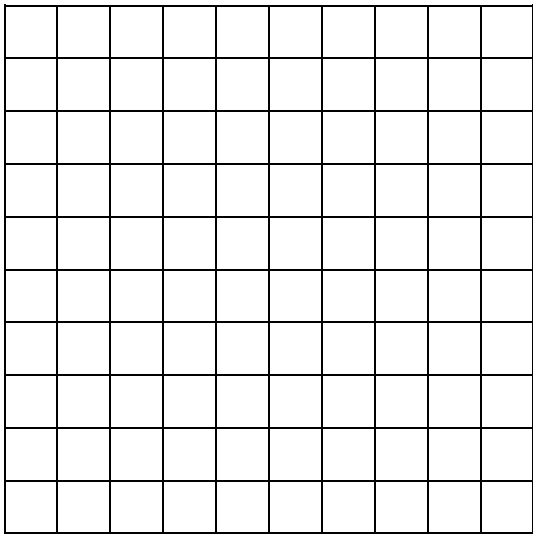
For the pattern you have created in question 3, is there a different way to create the same design?

## Notes pages

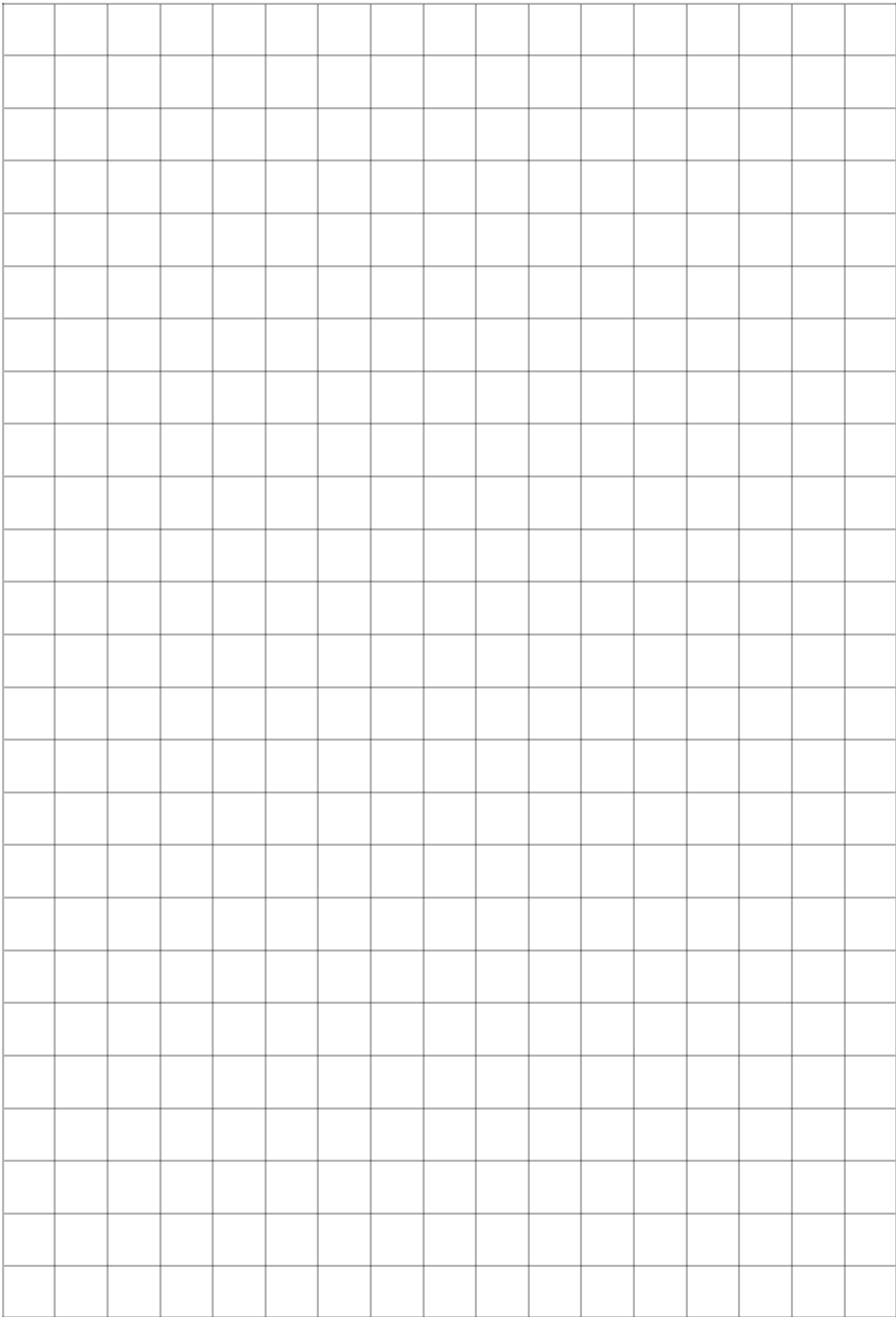
## Notes pages

Notes pages

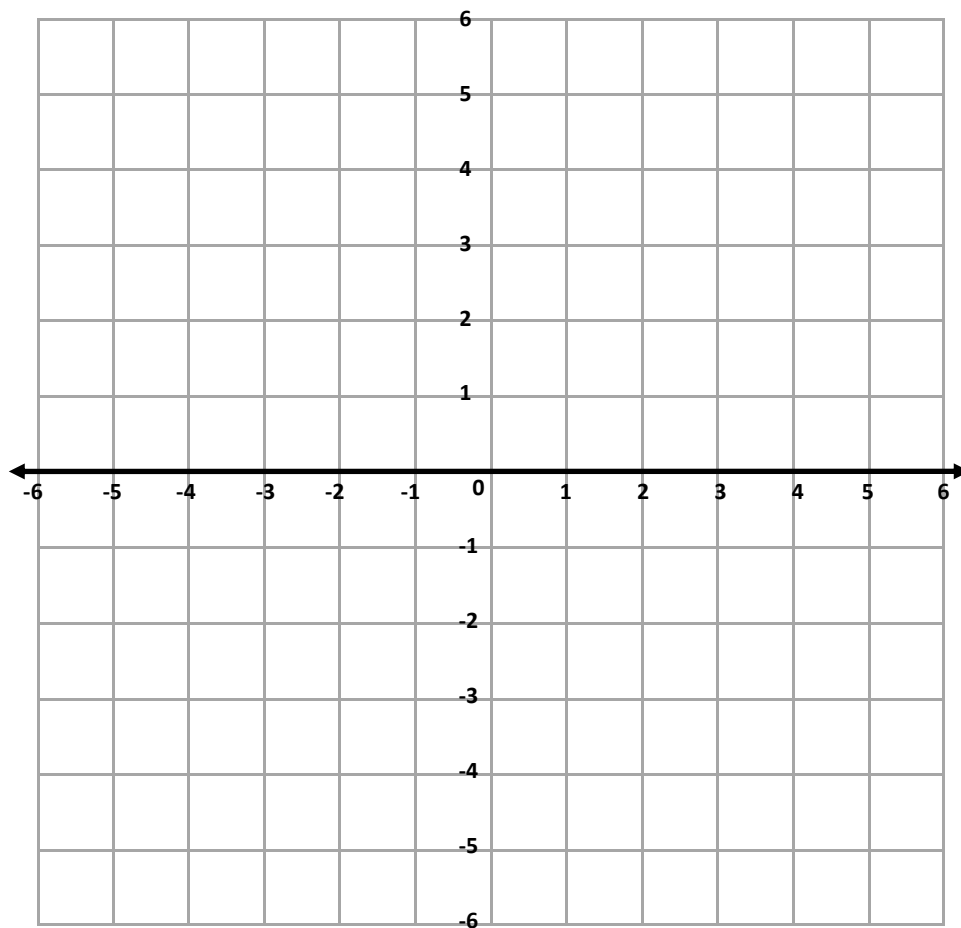
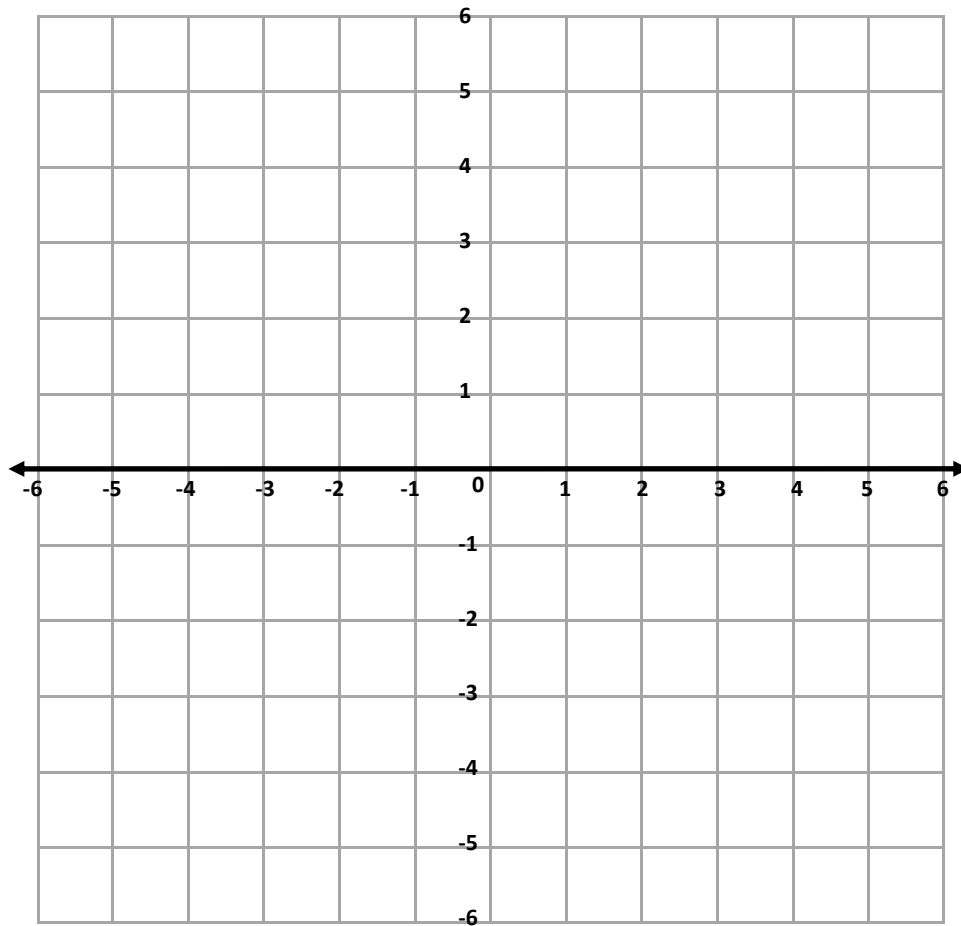
These hundred grids are useful when exploring the equivalence between fractions, decimals and percentages.



Notes pages



## Notes pages

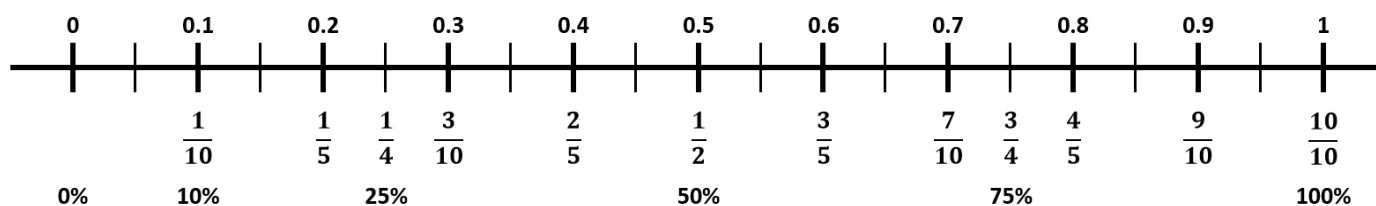


## Notes pages

## Glossary

Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones	tenths	hundredths	thousandths

Word	Definition	Example
<b>proper fraction</b>	A fraction that has a numerator smaller than the denominator	$\frac{2}{5}$ vinculum → 2 ← numerator 5 ← denominator
<b>unit fraction</b>	A fraction where the numerator is one	$\frac{1}{5}$ $\frac{1}{4}$ $\frac{1}{3}$
<b>improper fraction</b>	A fraction that has a numerator greater than the denominator.	$\frac{6}{5}$
<b>mixed number</b>	A number written as a whole number with a fraction	$\frac{6}{5} = 1 \frac{1}{5}$



Word	Definition	Example
<b>polygon</b>	2-D shapes with three or more straight sides.	
<b>regular polygon</b>	A regular polygon has all sides of equal length and all angles equal.	<i>a square is a regular rectangle and a regular triangle is an equilateral triangle.</i>
<b>angle</b>	The amount of turn between two straight lines that end at the same point (a vertex). Measured in degrees.	<i>See below</i>

