Year 4

Mastery Overview
Summer

MathsHUBS
White Rose

SOL Overview

As well as providing term by term overviews for the new National Curriculum, as a Maths Hub we are aiming to support primary schools by providing more detailed Schemes of Learning, which help teachers plan lessons on a day to day basis.

The following schemes provide exemplification for each of the objectives in our new term by term overviews, which are linked to the new National Curriculum. The schemes are broken down into fluency, reasoning and problem solving, which are the key aims of the curriculum. Each objective has with it examples of key questions, activities and resources that you can use in your classroom. These can be used in tandem with the mastery assessment materials that the NCETM have recently produced.

We hope you find them useful. If you have any comments about this document or have any suggestions please do get in touch.

Thank you for your continued support with all the work we are doing.

The White Rose Maths Hub Team

Assessment

Alongside these curriculum overviews, our aim is also to provide an assessment for each term's plan. Each assessment will be made up of two parts:

Part 1: Fluency based arithmetic practice
Part 2: Reasoning based questions

You can use these assessments to determine gaps in your students' knowledge and use them to plan support and intervention strategies.

The autumn and spring assessments are now available.

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Teaching for Mastery

These overviews are designed to support a mastery approach to teaching and learning and have been designed to support the aims and objectives of the new National Curriculum.

The overviews:

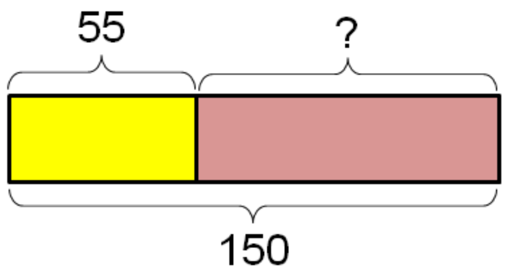
- have number at their heart. A large proportion of time is spent reinforcing number to build competency.
- ensure teachers stay in the required key stage and support the ideal of depth before breadth.
- ensure students have the opportunity to stay together as they work through the schemes as a whole group.
- provide plenty of time to build reasoning and problem solving elements into the curriculum.

Concrete – Pictorial – Abstract

As a hub we believe that all students, when introduced to a key new concept, should have the opportunity to build competency in this topic by taking this approach.

Concrete – students should have the opportunity to use concrete objects and manipulatives to help them understand what they are doing.

Pictorial – students should then build on this concrete approach by using pictorial representations. These representations can then be used to reason and solve problems.



An example of a bar modelling diagram used to solve problems.

Abstract – with the foundations firmly laid, students should be able to move to an abstract approach using numbers and key concepts with confidence.

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Frequently Asked Questions

We have bought one of the new Singapore textbooks. Can we use these curriculum plans?

Many schools are starting to make use of a mastery textbook used in Singapore and China, the schemes have been designed to work alongside these textbooks. There are some variations in sequencing, but this should not cause a large number of issues.

If we spend so much time on number work, how can we cover the rest of the curriculum?

Students who have an excellent grasp of number make better mathematicians. Spending longer on mastering key topics will build a student's confidence and help secure understanding. This should mean that less time will need to be spent on other topics.

In addition schools that have been using these schemes already have used other subjects and topic time to teach and consolidate other areas of the mathematics curriculum.

My students have completed the assessment but they have not done well.

This is your call as a school, however our recommendation is that you would spend some time with the whole group focussing on the areas of the curriculum that they do not appear to have grasped. If a couple of students have done well then these could be given rich tasks and deeper problems to build an even deeper understanding.

Can we really move straight to this curriculum plan if our students already have so many gaps in knowledge?

The simple answer is yes. You might have to pick the correct starting point for your groups. This might not be in the relevant year group and you may have to do some consolidation work before.

These schemes work incredibly well if they are introduced from Year 1 and continued into Year 2, then into Year 3 and so on.

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Year 4

Mixed Year & Reception Planning

We have been working on mixed year and reception versions of our planning documentation and guidance. These have been created by teachers from across our region and wider. Working documents can be found in the Dropbox, although we hope that the final documents will be available later on in the summer term. Please contact the Hub if you would like any more information.

Problem Solving

As a Hub we have produced a series of problems for KS1 and KS2. These can be found here.
http://tinyurl.com/zfeq8gs

We are hoping to release more in September. In addition to the schemes attached the NCETM have developed a fantastic series of problems, tasks and activities that can be used to support 'Teaching for Mastery'.

It will also give you a detailed idea of what it means to take a mastery approach across your school.
https://www.ncetm.org.uk/resources/46689

Everyone Can Succeed

As a Maths Hub we believe that all students can succeed in mathematics. We do not believe that there are individuals who can do maths and those that cannot. A positive teacher mindset and strong subject knowledge are key to student success in mathematics.

More Information

If you would like more information on 'Teaching for Mastery' you can contact the White Rose Maths Hub at mathshub@trinityacademyhalifax.org

We are offering courses on:

- Bar Modelling
- Teaching for Mastery
- Year group subject specialism intensive courses – become a Maths expert.

Our monthly newsletter also contains the latest initiatives we are involved with. We are looking to improve maths across our area and on a wider scale by working with other Maths Hubs across the country.

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Year 4 Overview

	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				Measurement: Area	
Spring	Number: Fractions				Measurement: Time	Number: Decimals				Measurement: Money		
Summer	Measurement: Perimeter and Length	Geometry: Angles	Geometry: Shape and Symmetry		Geometry: Position and Direction		Statistics		Measurement: Area and Perimeter			

Term by Term Objectives

Year 4

Year Group	Y4	Term	Summer

Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
<u>Measurement: Perimeter and Length</u> Convert between different units of measure eg kilometre to metre. Measure and calculate the perimeter of a rectilinear figure (including squares) in cm and m	<u>Geometry: Angles</u> Identify acute and obtuse angles and compare and order angles up to two right angles by size. Compare and classify geometric shapes, including quadrilaterals and triangles, based on their properties and sizes.	<u>Geometry: Shape and Symmetry</u> Identify lines of symmetry in 2D shapes presented in different orientations. Complete a simple symmetric figure with respect to a specific line of symmetry.		<u>Geometry: Position and Direction</u> Describe positions on a 2D grid as coordinates in the first quadrant. Describe movements between positions as translations of a given unit to the left/ right and up/ down. Plot specified points and draw sides to complete a given polygon.		<u>Statistics</u> Interpret and present discrete and continuous data using appropriate graphical methods, including bar charts and time graphs. Solve comparison, sum and difference problems using information presented in bar charts, pictograms, tables and other graphs.		<u>Measurement: Area and Perimeter</u> Measure and calculate the perimeter of a rectilinear figure (including squares) in centimetres and metres. Convert between different units of measure [for example, kilometre to metre] Find the area of rectilinear shapes by counting squares.			

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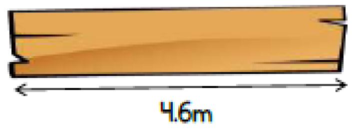
Term by Term Objectives

Year 4

	National Curriculum Statement	All Students		
		Fluency	**Reasoning**	**Problem Solving**
Measures	Convert between different units of measure e.g kilometre to metre.	• Complete the statements: 100cm = _____m 1km = ______m 1500ml = ______l 3.5kg = ________g • Use the word and number cards to complete the statements. To change from cm to mm _____ by __ To change from kg to g _____ by ____ To change from ml to l _____ by ____ multiply 10 100 divide 1000 • Are these statements true or false? 1000m = 1km 1000cm = 1m 1000ml = 1l 1000g = 1kg 1000mg = 1g	• The answer is 475 metres. What could the question be? • Hamid says 'To convert kilometres to metres, add three zero's on to the end of the number.' E.g 2km=2000m Do you agree with Hamid? Explain why. • Laura is 2.72m tall. She is 59cm taller than her sister. How tall is her sister? Give your answer in centimetres. • Put these amounts in order starting with the largest. Half of 5 litres Quarter of 8 litres 700 ml Explain your thinking.	• A plank of wood is 4.6m long.  Two lengths are cut from the wood. 350cm $2\frac{1}{4}$m How much wood is left? • James and Sita do a sponsored walk for charity. They walk 1.2km altogether. James walks double the amount that Sita walks. How far does Sita walk? They each raise 75p for every 100m they walk. How much money do they each make? James ________ Sita _________

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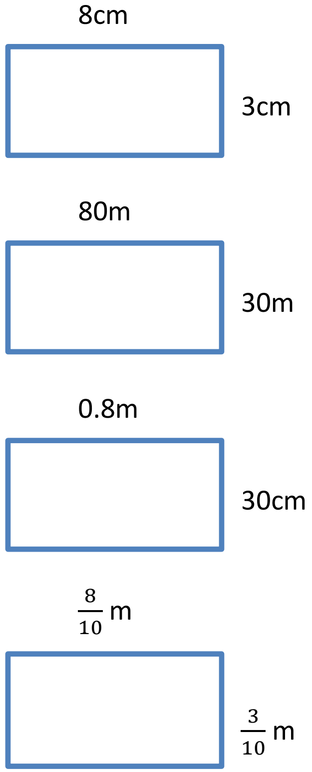
Term by Term Objectives

Year 4

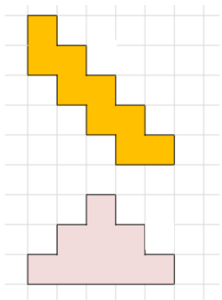
Measures

Measure and calculate the perimeter of a rectilinear figure (including squares) in cm and m

- Find the perimeter of the rectangle.

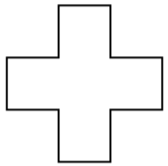


- Draw and find the perimeter of the shapes in centimetres.



- The perimeter of a square is 16cm. How long is each side?

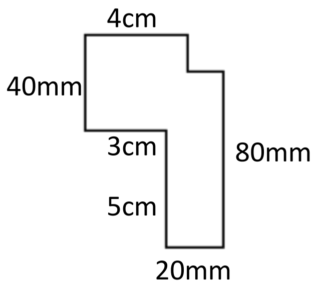
- Here is a rectilinear shape. All the sides are the same length and are a whole number of centimetres.



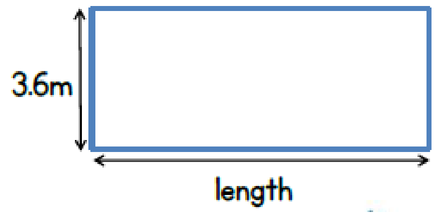
Which of these lengths could be the perimeter of the shape?

48cm 36cm 80cm 120cm 66cm

- Find the missing lengths on the shape and calculate the perimeter.



- The perimeter of the rectangle is 33m.



What is the length of the rectangle?

- The width of a rectangle is 2 metres less than the length.

The perimeter of the rectangle is between 20m and 30m.

What could the dimensions of the rectangle be?

Draw all the rectangles that fit these rules.
Use 1cm=1m.

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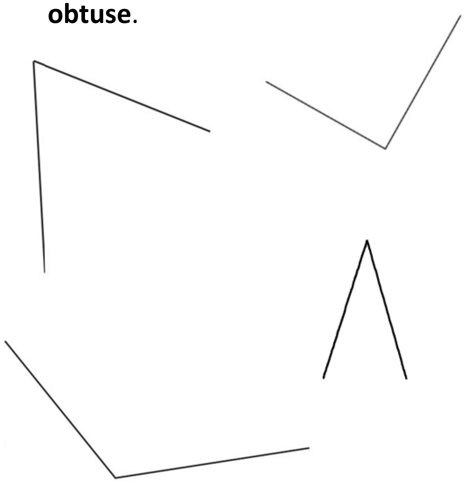
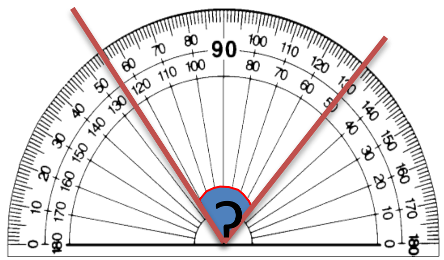
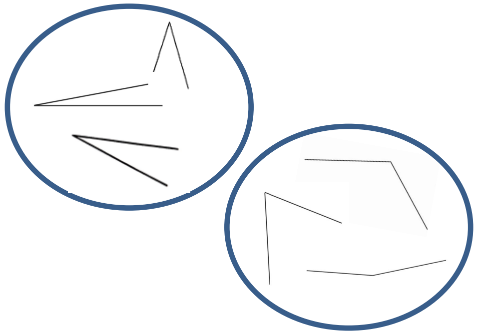
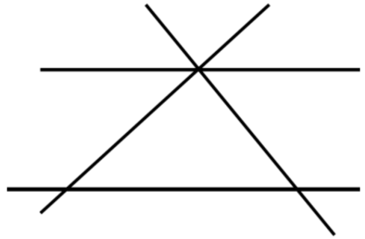
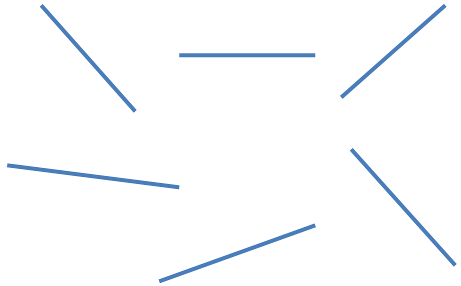
Geometry: Angles				
	Identify acute and obtuse angles and compare and order angles up to two right angles by size.	• Label the angles below as **acute, right** or **obtuse**. a)  b)  c)  • Order the angles from smallest to largest. Label them **acute**, **right** or **obtuse**. 	• Here is an angle on a protractor.  Sam says "The angle is obtuse because it is more than 90°" Gita says "The angle is acute because it is less than 90°" Who is correct? Explain your thinking. • Tim is sorting angles. Can you label the groups? Can you circle the odd one out? 	• How many acute and obtuse angles can you find in the diagram below?  Label the acute angles (a) and the obtuse angles (o). • Pair the lines below to make an acute angle, a right angle and an obtuse angle. You can't change the orientation of the lines.  Can you do it in more than one way?

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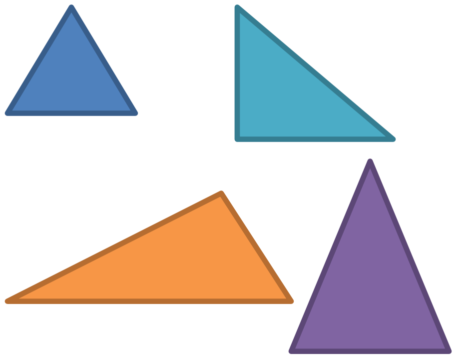
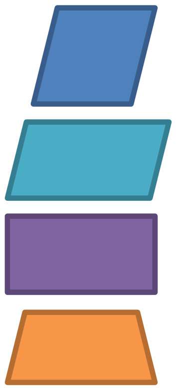
Geometry: Shapes

Compare and classify geometric shapes, including quadrilaterals and triangles, based on their properties and sizes.

- Label each of the triangles **isosceles**, **scalene** or **equilateral**.



- Match the quadrilaterals to their names.



rectangle

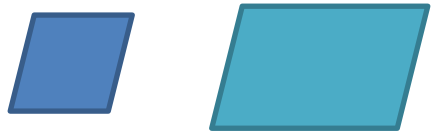
rhombus

parallelogram

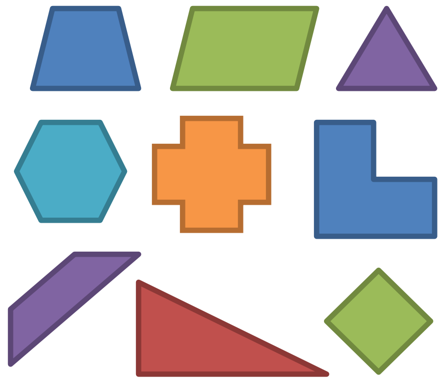
trapezium

Write down the properties of each of the shapes.

- Look at these shapes.
  What's the same? What's different?
  Can you name the shapes?



- Can you sort the shapes below into different groups?
  Ask other children to see if they can label your groups and work out how you have sorted your shapes.



Can you add one more shape to each of your groups?
Can you name each shape?
Can you sort your shapes in a different way?

- Here is a square.
  Inside the square is an equilateral triangle.
  The perimeter of the triangle is 54cm.
  Find the perimeter of the square.

- Can you fill in each of the boxes below with a different shape?

  Can you name each shape?

	Has a right angle	Has no equal sides
Has 4 or more sides		
Has three sides		
Has an obtuse angle		

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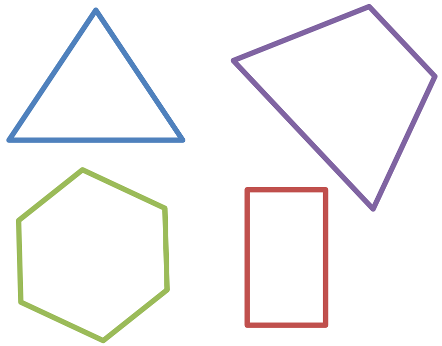
Term by Term Objectives

Year 4

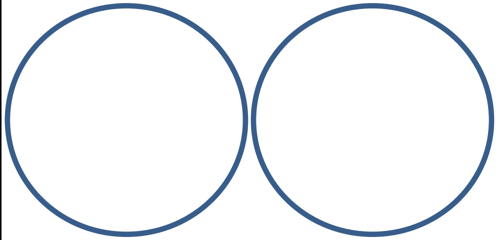
Geometry: Symmetry

Identify lines of symmetry in 2D shapes presented in different orientations.

- Find lines of symmetry in the shapes.

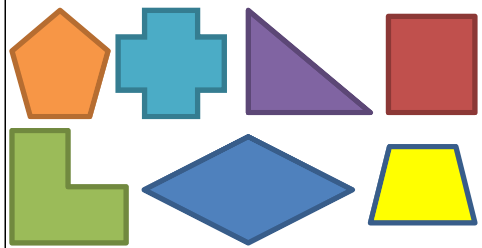


- Sort the shapes into the groups.



1 line of symmetry

2 or more lines of symmetry



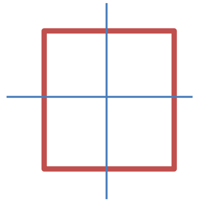
Can you add one more shape to each group?

- **Always, sometimes, never**

  Triangles have one line of symmetry.

  Prove your answer using drawings.

- Jasmine has drawn the lines of symmetry on the square.

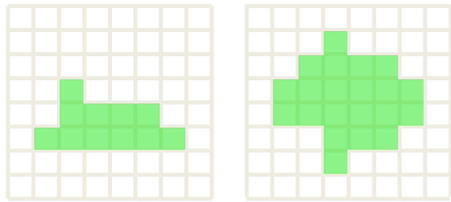


Has she found them all?
Explain how you could check.

- Hamza says 'Lines of symmetry are always straight.'

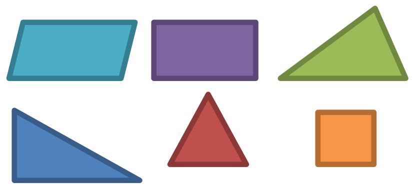
  Is Hamza right?
  Convince me.

- Colour in one more square on each pattern to create a shape with a line of symmetry.



- Can you place one shape in each of the boxes below?

	Has an acute angle	Has two or more lines of symmetry
Has 4 sides		
Has three or less sides		
Has a right angle		



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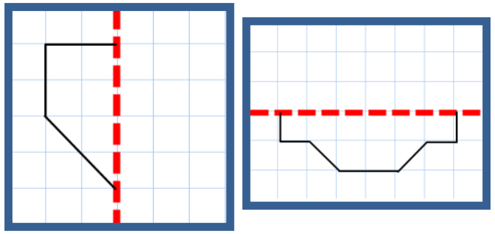
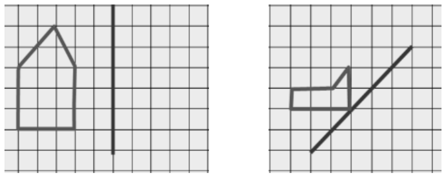
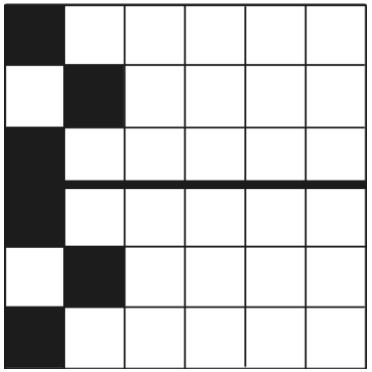
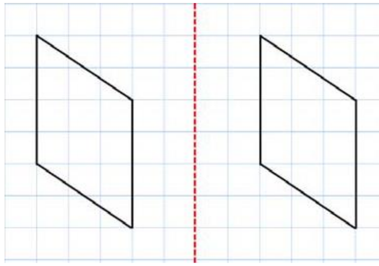
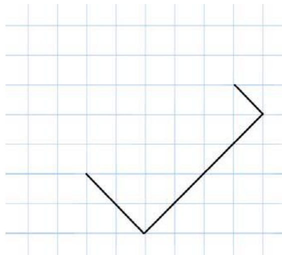
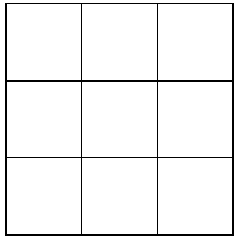
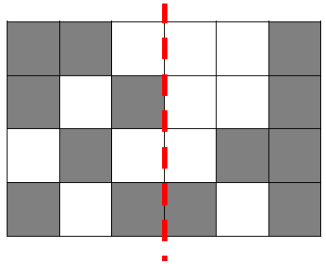
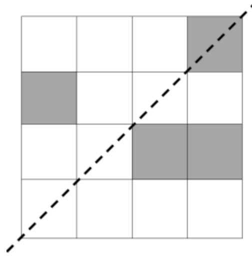
Term by Term Objectives

Year 4

Geometry: Symmetry				
	Complete a simple symmetric figure with respect to a specific line of symmetry.	• Complete the shape with respect to the line of symmetry.  • Reflect the shape in the mirror line  • Shade in the squares to complete a symmetrical pattern. 	• Prove that the shape below is not reflected correctly.  • Complete the shape to make a square and draw on the mirror line.  • Caroline thinks the shape will have 5 sides altogether when it is reflected in the mirror line.  Do you agree? Prove it.	• How many different ways can you colour the squares below to create different symmetrical designs?  • Colour in extra squares to complete a symmetrical pattern.  

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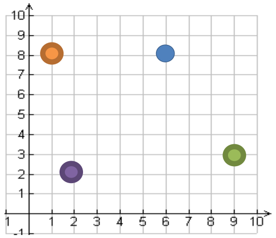
Term by Term Objectives

Year 4

Position and Direction

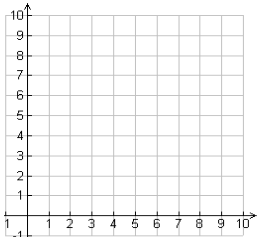
Describe positions on a 2D grid as coordinates in the first quadrant.

- Write the co-ordinates of the coloured dots.



 ___ ___ ___ _____

- Draw the shapes on the co-ordinates given.

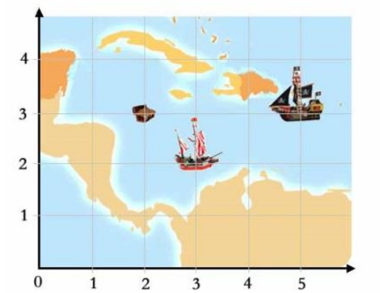


(2, 6)

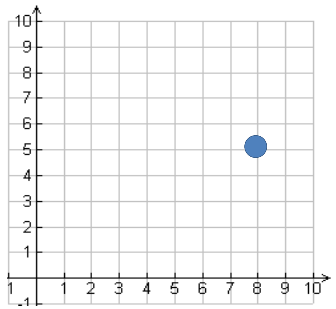
(6, 2)

(9, 0)

- Write the co-ordinates of the ships on the map.



- Point A is marked on the grid.



Henry says that point A is at (5,8)
Aisha says that point A is at (8,5)

Who is correct? Can you explain what mistake one of the children has made?

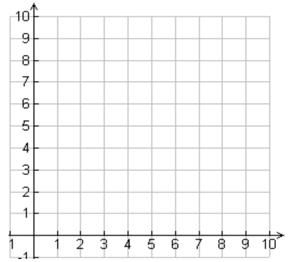
- Junaid says:

> You can say either number first in co-ordinates, it doesn't matter.

Do you agree with Junaid?

Explain why.

- Can you place the letters below on the grid by following the rules?



A	B	C	D	E
P	S	X	Y	Z

The letters at (1,1), (1,2) and (1,3) are all symmetrical about a vertical line.
The letter at (8,3) is not symmetrical and is made of straight and curved lines.
The letters at (1,1), (2,1) and (5,1) are symmetrical about a horizontal line.
The letter at (5,1) consists of just straight lines.
The letters at (5,3) and (2,0) consist of just curved lines.
The letters at (5,3), (5,2) and (5,1) are consecutive in the alphabet.
The letters at (0,2) and (1,2) are at the two ends of the alphabet.

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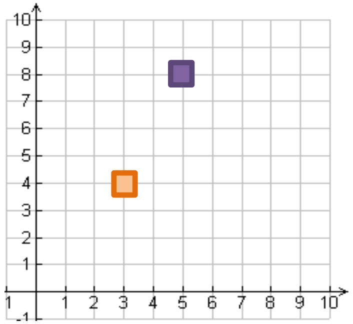
Term by Term Objectives

Year 4

Position and Direction

Describe movements between positions as translations of a given unit to the left/ right and up/ down.

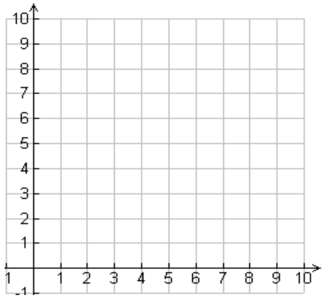
- Describe the movement of the orange square to the purple square.



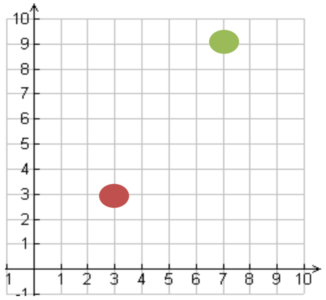
- The coordinates of point A are (3,2). Point B is 2 squares left and 7 squares up from point A.

  What are the co-ordinates of point B?

  Plot point A and point B on the grid.

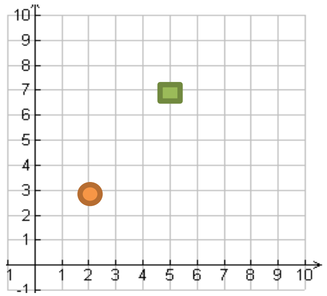


- Describe the movement from the green circle to the red circle.



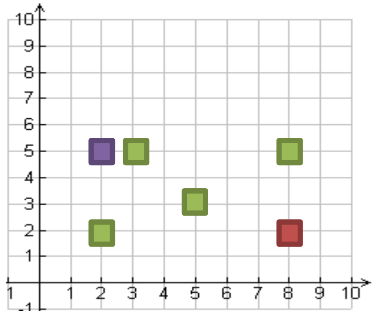
  Describe the movement from the red circle to the green circle.
  What do you notice about your descriptions?

- Keeley has described the movement of the orange circle to the green square as 3 squares to the left and 4 squares down.

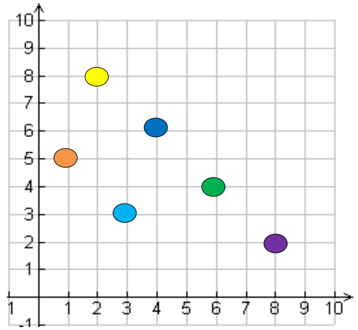


Do you agree? Explain why.

- Write a set of instructions to move the red square to the purple square without going through any green squares.



- Write a set of instructions to move from the yellow circle to the purple circle while passing through all the other coloured circles.
  Compare your instructions with a friend. How are they the same? How are they different?



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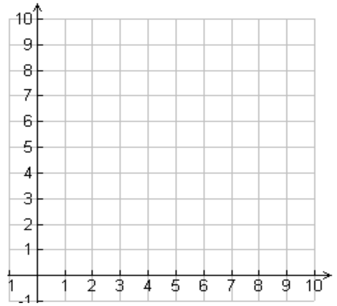
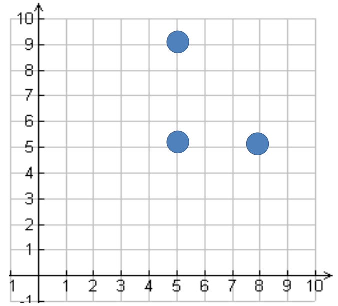
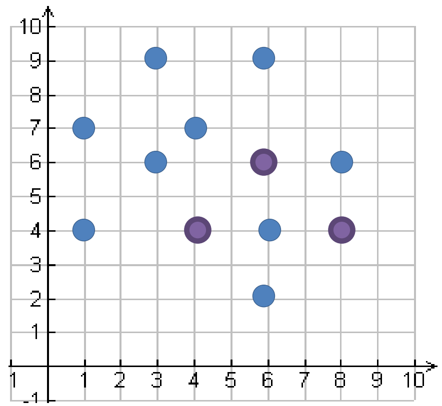
Term by Term Objectives

Year 4

Position and Direction	Plot specified points and draw sides to complete a given polygon.	• Plot the points on the grid below to make a 2d shape. (2,9) (2,2) (5,9) (5,2)  Tom draws a shape on the same grid using these co-ordinates. (2,9) (2,6) (5,9) (5,6) What is the same and what is different about your shape and Tom's shape? • Write co-ordinates for a friend to plot that make the following shapes: a) Triangle b) Trapezium c) Rhombus	• Henry plots three points on a grid. Aisha says *"You can make a square if you mark another point at (8, 9)"*  Do you agree with Aisha? Explain your answer. • Here are the co-ordinates of corners of a rectangle that has width of 4. (7, 2) and (14, 2) What are the other two co-ordinates?	• Plot the points given and join them to draw a letter of the alphabet. Start: (2, 2) → (2, 8) → (4, 8) → (4, 6) → (6, 6) → (6, 8) → (8, 8) → (8, 2) → (6, 2) → (6, 4) → (4, 4) → (?, ?) What is the final co-ordinate needed to complete the letter? • There are 12 points marked on the grid that are all corners of squares. Can you work out where the 4 squares are? The purple dots are corners of more than one square. 

MathsHUBS White Rose

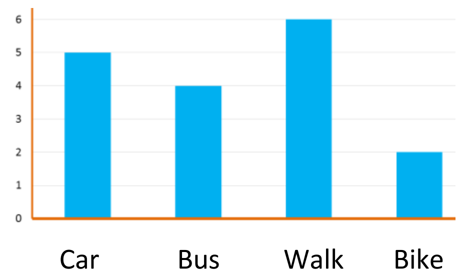
Term by Term Objectives

Year 4

Statistics

Interpret and present discrete and continuous data using appropriate graphical methods, including bar charts and time graphs.

- Here is a graph showing how a group of children travel to school.



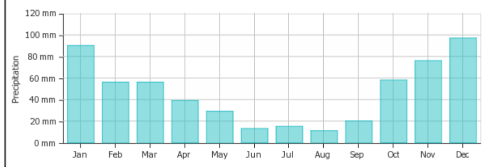
How many children get the bus to school?
What is the most/ least popular way to get to school?

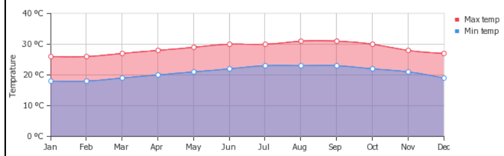
- Produce your own bar chart showing how the children in your class travel to school.

- Here is a table with data from a bakery on how many cakes they sold each day. Choose a way to represent this data.

M	T	W	Th	F	Sa	Su
34	43	46	55	72	86	76

- Here are two graphs showing the amount of precipitation and the temperature in Hawaii. What's the same and what's different?



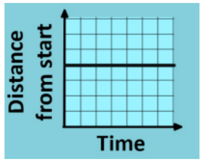


Draw a graph that has both the rainfall and the maximum temperature on it.
How could you complete the graph?
How could you place both scales on one graph?

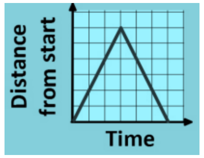
What do you notice about the different seasons in Hawaii? When is the most/least rainfall?

Choose your own place in the world and find out the rainfall and temperature. Plot it on a bar graph and time graph.

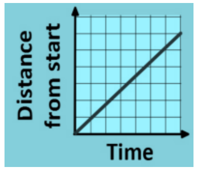
- Can you match the graph to the activity?



A bike travels away from home at a steady speed



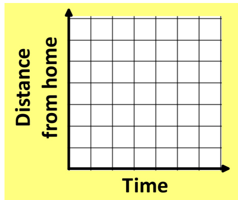
A car remains parked in a car park.



A runner runs at a steady pace to the end of a track and then runs back.

- Draw a distance time graph to show the following story.

A man goes out for a walk with his dog. He stops at the shop to buy a paper.
He walks home quickly.



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MathsHUBS White Rose

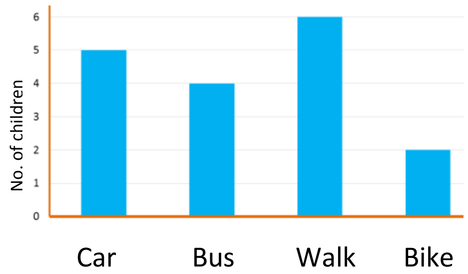
Term by Term Objectives

Year 4

Statistics

Solve comparison, sum and difference problems using information presented in bar charts, pictograms, tables and other graphs.

- Use the graph to answer the questions below.



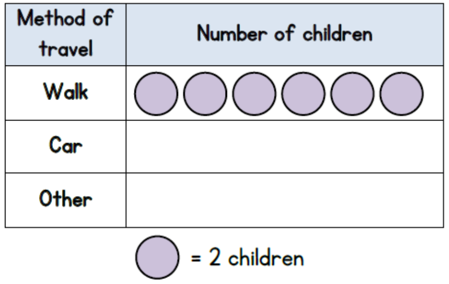
How many more children walk to school than go on a bike?
How many children were asked altogether?
How many children come to school on a car or a bus?

- Use the data in the table to answer the questions below.

Colour	Number of cars
Black	9
Red	10
Silver	7
Blue	14

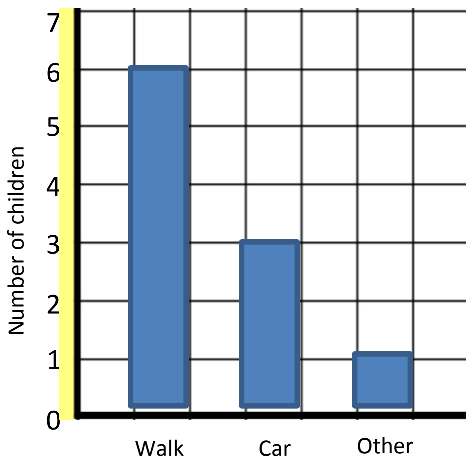
How many cars were seen altogether?
Half of the cars were _______.
7 more cars were ____ than _______.
24 cars were ______ and ________.
Three quarters of the cars were
______, _______ and ________.

- Class 2 are doing a survey.
They ask 20 children this question.
"How do you travel to school?"
Some results are shown in the pictogram.

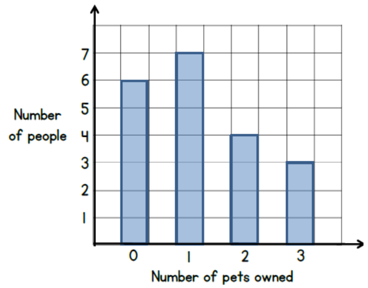


The number of children who travel by car is half the number who walk to school.
Complete the pictogram.

- Here is a bar graph showing the same data as above.
Explain what mistake has been made.

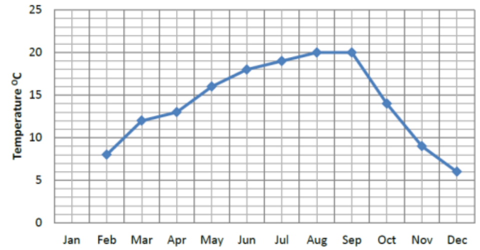


- Year 4 are doing a survey.
They ask 20 people the question
'How many pets do you own?'
The results are shown in this bar chart.



How many pets in total do these people own?

- Here is a graph with a result missing.
Use the clues to complete the graph.



1. Find the difference between the February and September temperatures.
2. Divide this by the difference between the November and March temperatures.
3. Now, add the difference between the April and October temperatures.

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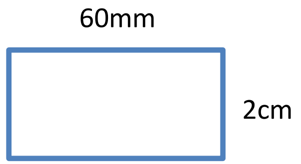
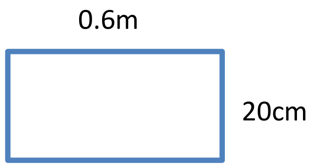
Area and Perimeter

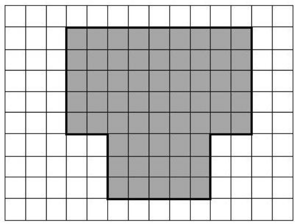
Measure and calculate the perimeter of a rectilinear figure (including squares) in centimetres and metres.

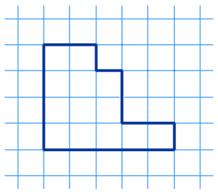
- Find the perimeter of the rectangle.



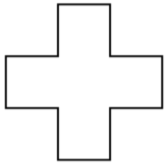


- Draw and find the perimeter of the shapes in centimetres.

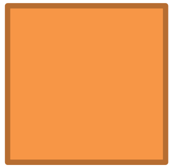




- The perimeter of this shape is 48cm.
  All the sides are equal.
  How long is each side?



- Here is a square. Each of the sides is a whole number of metres.



Which of these lengths could be the perimeter of the shape?

24m, 34m, 44m, 54m, 64m, 74m

- **Always, sometimes, never**

When all the sides of rectangle are whole odd numbers, the perimeter is even.

Prove it.

- The perimeter of the rectangle is 45m.
  The length of the rectangle is 15.5m

What is the width of the rectangle?

- The width of a rectangle is 4 metres less than the length.

The perimeter of the rectangle is between 30m and 40m.

What could the dimensions of the rectangle be?

Draw all the rectangles that fit these rules. Use 1cm=1m.

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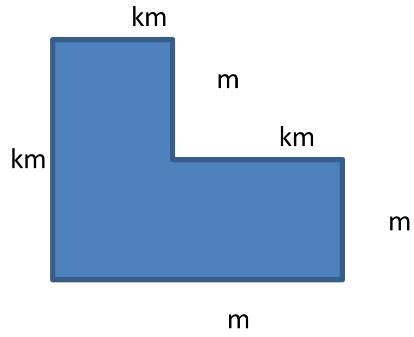
Area and Perimeter	Convert between different units of measure [for example, kilometre to metre]	• Complete the statements: ______cm = 2 metres 4km = _______m ________ml = 3.5 litres _________kg = 7500g • Convert the measures to the same unit and then complete the calculation. 3km + $\boxed{}$ = 6500m 800m – $\boxed{}$ = 0.3km • Can you draw rectangles to represent the calculations below? 4cm + 30mm + 30mm + 4cm= 85mm + 85mm + 2.5cm + 2.5cm= Complete each calculation. What have you found?	• The answer is 550 metres. What could the question be? • Tilly says ‘To convert millimetres to centimetres, take one zero off the end of the number.’ E.g 30 millimetres = 3 centimetres Will Tilly’s rule always work? • What is the same and what’s different about these measures? Half of 3000 metres Quarter of 6 kilometres 150,000 centimetres Explain your thinking.	• This shape has a perimeter of 5500m. Three of the sides are given in kilometres. Three of the sides are given in metres.  Can you fill in each measurement to make the sides add up to the correct perimeter? Can you fill in the sides in more than one way?

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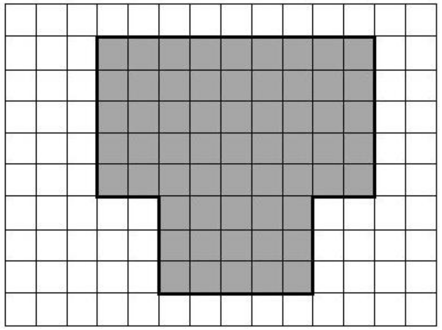
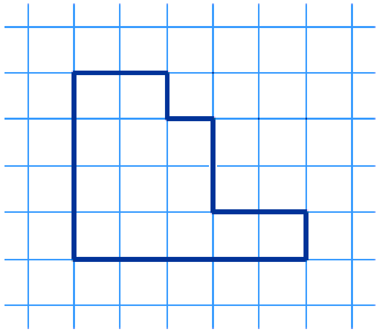
Area and Perimeter	Find the area of rectilinear shapes by counting squares.	• Find the area of these shapes:   • Draw a rectangle that is 6 centimetres long and 4 centimetres wide. What is the area of the rectangle?	• A shape has an area of $31cm^2$. Could the shape be a rectangle? Explain your answer. • **True or False?** The area of any square has an even number of squares. Prove it. • **Always, sometimes, never** The bigger the perimeter of a shape, the bigger the area. Convince me.	• A twelve sided shape has an area of nine squares. Draw the shape on squared paper. • How many shapes can you draw that have an area of 12 square centimetres? • Jack has drawn a shape that has 6 sides. All the angles are right angles. It has an area of more than 12 centimetre squares and less than 16 centimetre squares. Draw a shape that Jack could have drawn. Can you find any others?