Year 5

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.

mathshub@trinityacademyhalifax.org

MathsHUBS White Rose

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:

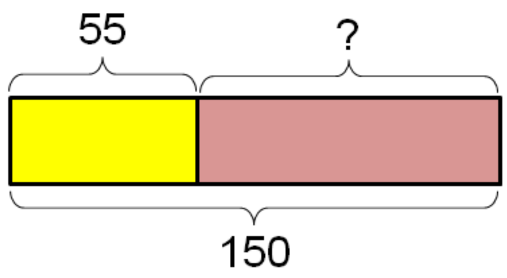
- have number at their heart. A large proportion of time is spent reinforcing number to build competency
- ensure teachers stay in the required key stage and support the ideal of depth before breadth.
- ensure students have the opportunity to stay together as they work through the schemes as a whole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

mathshub@trinityacademyhalifax.org

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 don't 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.

mathshub@trinityacademyhalifax.org

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 don't believe that there are individuals who can do maths and those that can't. 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.

MathsHUBS White Rose

Year 5 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**				**Statistics**	
Spring	**Number: Fractions**					**Number: Decimals**			**Number: Percentages**			
Summer	**Geometry: Angles**		**Geometry: Shapes**		**Geometry: Position and Direction**	**Measurement: Converting Units**		**Number: Prime Numbers**	**Perimeter and Area**	**Measures volume**		

mathshub@trinityacademyhalifax.org

Term by Term Objectives

Year 5

Year Group	Y5	Term	Summer

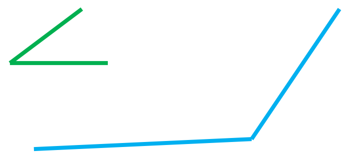
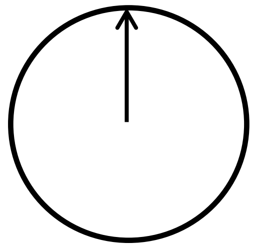
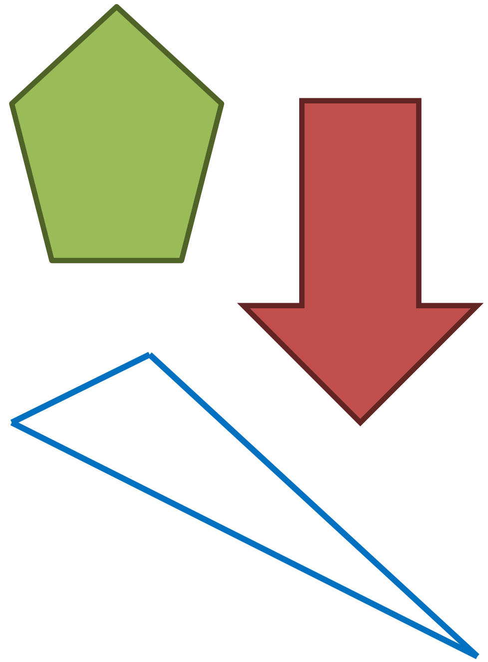
Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
<u>Geometry: Angles</u> Know angles are measured in degrees; estimate and compare acute, obtuse and reflex angles. Draw given angles and measure them in degrees (˚). Identify: angles at a point and one whole turn (total 360 ˚), angles at a point on a straight line and ½ a turn (total 180˚) other multiples of 90˚.		<u>Geometry: Shapes</u> Identify 3D shapes, including cubes and other cuboids, from 2D representations. Use the properties of rectangles to deduce related facts and find missing lengths and angles. Distinguish between regular and irregular polygons based on reasoning about equal sides and angles.		<u>Geometry: Position and Direction</u> Identify, describe and represent the position of a shape following a reflection or translation, using the appropriate language, and know that the shape has not changed.	<u>Measurement: Converting units</u> Convert between different units of metric measure (for example, km and m; cm and m; cm and mm; g and kg; l and ml). Understand and use approximate equivalences between metric units and common imperial units such as inches, pounds and pints. Solve problems involving converting between units of time.		<u>Number: Prime Numbers</u> Know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers. Establish whether a number up to 100 is prime and recall prime numbers up to 19.	<u>Perimeter and Area</u> Measure and calculate the perimeter of composite rectilinear shapes in cm and m. Calculate and compare the area of rectangles (including squares), and including using standard units, cm^2, m^2 estimate the area of irregular shapes.	<u>Measures: Volume</u> Estimate volume (for example using 1cm^3 blocks to build cuboids (including cubes) and capacity (for example, using water)). Use all four operations to solve problems involving measure.		

mathshub@trinityacademyhalifax.org

MathsHUBS White Rose

Term by Term Objectives

Year 5

	National Curriculum Statement	All Students		
		Fluency	Reasoning	Problem Solving
Angles	Know angles are measured in degrees: estimate and compare acute, obtuse and reflex angles.	• If one angle in a triangle is 38° and another is 68°, what type of angle will the third be? • Tick all the obtuse angles 47° 107° 98° 90°  • Which number is an angle? 79.4 -60 Explain why.	• **Odd one out.** 180° 45° 79° 225° Explain why. • Cut out a circle with a spinner in the centre.  Put the arrow in the starting position above. Turn over a flash card with an angle on. Estimate the given angle by moving the spinner. Check how close you are.	• Estimate and measure the angles in these shapes.  Record your results in a table. Work out how close you were. Did you notice anything or find any easier?

mathshub@trinityacademyhalifax.org

MathsHUBS White Rose

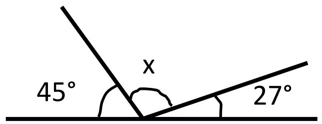
Angles	Draw given angles, and measure them in degrees (^{o})	**Complete practically** • Draw an obtuse angle that is a multiple of 5 and 3 Can your partner check it? • Draw an acute angle that has a factor of both 4 and 6 • What do the angles in a triangle add up to?	**Complete practically** • Class 5 are given one angle in an isosceles. It is 50° Carol says, The other angles are 65° because two angles are equal in an isosceles triangle. Is she correct? Explain why.	**Complete practically** • Draw a range of angles for a friend. Have them order them, before measuring, from smallest to largest and check to see if they were correct.

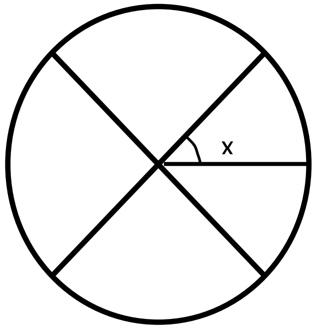
mathshub@trinityacademyhalifax.org

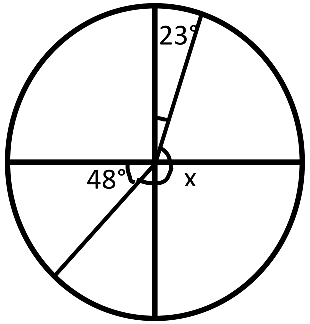
Angles

Identify: angles at a point and one whole turn (total 360°), angles at a point on a straight line and ½ a turn (total 180°) other multiples of 90°

- Work out the missing angles.





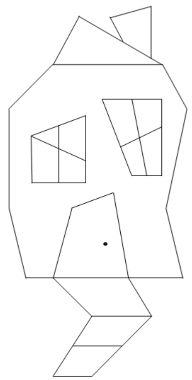


- Gary says,

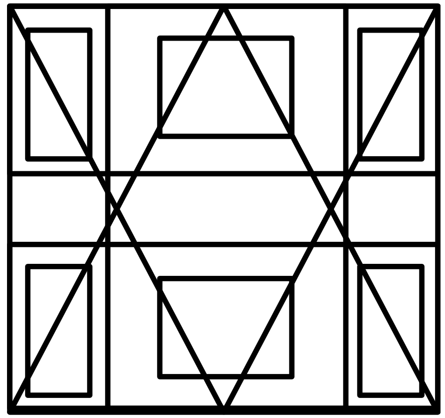
  If I turn the letter M by 180° then it looks like the letter W

  Do you agree? Prove it.

- Design a 'fun house' for children to play in. It should have 'wonky' walls, windows and doors.
  Label the angle types.
  e.g.



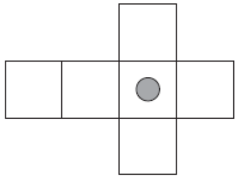
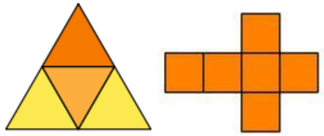
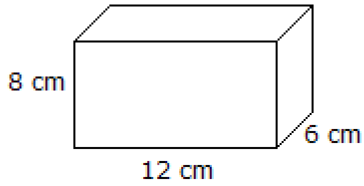
- How many right angles can you find?



- Investigate the amount of obtuse and acute angles there could be in a pentagon.
  How many different pentagons can you create?
  Record the information in a table to show different acute and obtuse angles.

- Create your own missing angles for a partner. Include information relating to quarter, half and full turns.

mathshub@trinityacademyhalifax.org

Shapes	Identify 3D shapes, including cubes and other cuboids, from 2D representations.	• **What shape am I?** a) My faces are made up of a square and four triangles. b) My faces are made up of rectangles and triangles. • Complete the sentences. A tetrahedron has ___ faces. The faces are made from ______. A cube has ___ faces. The faces are made from ______. • Draw another dot on the net of the cube below so it has a dot on the opposite face when the 3D shape is constructed. 	• Find 3 similarities between the net of a tetrahedron and the net of a cube.  Share them with a partner. Are any the same/different? • Albie says, If two 3D shapes have the same number of edges then they also have the same number of vertices. Do you agree? Explain why.	• Create cubes and cuboids by using multilink. Can you draw these on isometric paper? Which part is difficult? Would it be harder if you had to draw something other than squares or rectangles? • Here is a cuboid  Draw the net for this cuboid. • **Visualise** a) A square based pyramid is put on top of a cube so that it fits perfectly. How many 2D shapes can you now see and what are they? b) A tetrahedron and a triangular prism are fit perfectly together. How many 2D shapes can you now see and what are they?

mathshub@trinityacademyhalifax.org

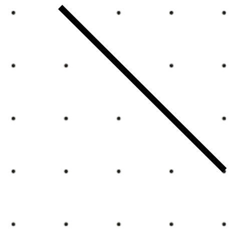
Term by Term Objectives

Year 5

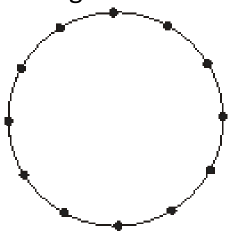
Shapes

Use the properties of rectangles to deduce related facts and find missing lengths and angles.

- Complete the rectangles on the grids below.



- Why is a square a special rectangle?
- Join 4 dots together to make a rectangle.



- The perimeter of the rectangle is 45cm.

Find the length of the rectangle.

- Here is a rectangle.

What is the sum of angles a and b?

Find angle c.

- A shape has 4 right angles.
It has 4 straight sides.
It has 2 pairs of parallel lines.
Draw what the shape could be.
Is there more than one option?

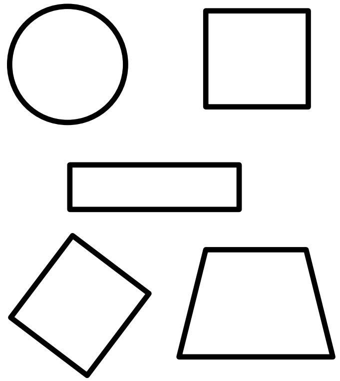
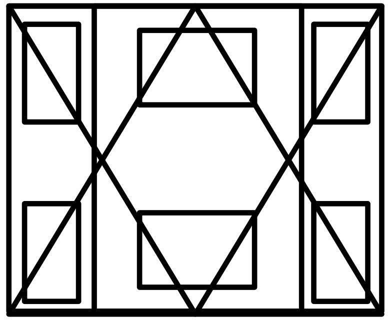
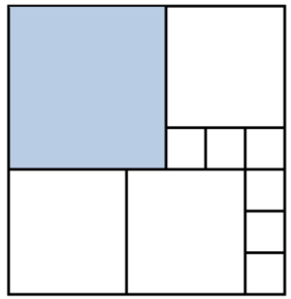
- A rectangular classroom has a perimeter between 20 and 25 cm.
What could the dimensions be?

- A rectangular classroom has an area between 20 and 25 cm.
What could the dimensions be?

- A shape is made up of a square and rectangle.

The perimeter of the shape is 70cm.
The area of the square is 121cm^2
What is the area of the rectangle?

mathshub@trinityacademyhalifax.org

Shapes	Distinguish between regular and irregular polygons based on reasoning about equal sides and angles.	• Name 4 irregular 4 sided polygons. • Name 5 regular polygons. • Draw a regular polygon and an irregular polygon on the grids below.  	• Tick the regular quadrilaterals.  Explain your choices. • **Always, sometimes, never.** The number of equal angles is the same number of equal sides in a regular polygon. • Adam says, All the angles are equal in a regular polygon so that must mean a rectangle is a regular polygon. Is Adam correct? Why?	• Cut out lots of different regular and irregular shapes. Ask children to work in pairs and sort them into groups. Once they have sorted them, can they find a different way to sort them again? • How many regular and irregular polygons can you find in this picture?  • This grid is made up of squares. How many small squares could fit inside? 

mathshub@trinityacademyhalifax.org

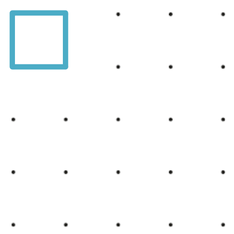
Term by Term Objectives

Year 5

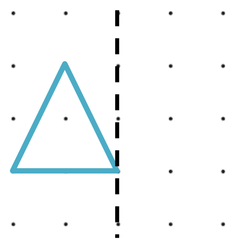
Position and Direction

Identify, describe and represent the position of a shape following a reflection or translation, using the appropriate language, and know that the shape has not changed.

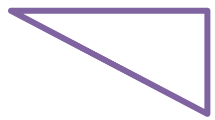
- A square is translated two dots to the right and three down. Draw the new square.



- Draw the reflection of the triangle.

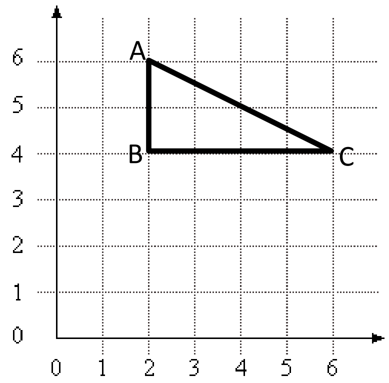


- A triangle is translated 360°.



Draw the new triangle.

- Amy draws triangle ABC on the grid.



She wants to translate the triangle so that point B becomes the co-ordinate (3,1).

Hazel says,

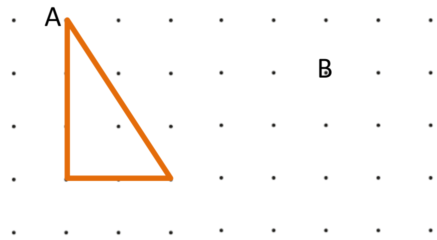
Point A will become (1,1)

Do you agree? Explain why.

- **True or false?** Reflecting a shape changes the dimensions.

- A rectangle is translated 3 squares up and two squares to the left. Three of the coordinates of the translated rectangle are: (5, 7) (10, 14) (10, 7). What are the co-ordinates of the original rectangle?

- A triangle is drawn on a grid. It is translated so that point A becomes point B. Draw the new triangle.



mathshub@trinityacademyhalifax.org

Term by Term Objectives

Year 5

Measurement

Convert between different units of metric measure (for example, km and m; cm and m; cm and mm; g and kg; l and ml)

- Use <, > or = to complete the statements below

  750g ◯ 0.8kg

  500ml ◯ Half a litre

  17mm ◯ 2cm – 5mm

- **True or false?**
  1000m = 1km
  1000cm = 1m
  1000ml = 1l
  1000g = 1kg

- Bryan is 2.68m tall.
  He is 99cm taller than his sister.
  How tall is his sister?
  Give your answer in centimetres.

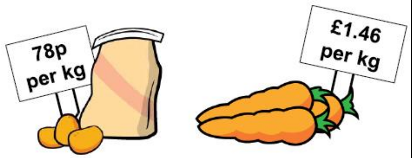
- Adam makes 2.5 litres of lemonade for a charity event.
  He pours it into 650ml glasses to sell.
  He thinks he can sell 7 glasses.
  Is he correct?
  Prove it.

- A 5p coin has a thickness of 1.6mm

  Jake makes a tower of 5p coins worth 90p.
  What is the height of the coins in cm?

- Laura buys 3500g of potatoes

  and 1500g of carrots.

  She pays with a £20 note.
  How much change does she get?

- A plank of wood is 5.8m long.

  5.8m

  Two lengths are cut from the wood.

  175cm $3\frac{4}{5}$ m

  How much wood is left?

- Cola is sold in bottles and cans.

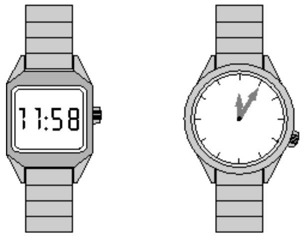
  Yasmin buys 5 cans and 3 bottles.
  She sells the cola in 100ml glasses.

  She sells all the cola.
  How many glasses does she sell?

Measurement	Understand and use approximate equivalences between metric units and common imperial units such as inches, pounds and pints.	• Fill in the missing boxes. 6 inch = ☐ cm 1 yard = ☐ feet 1 ounce = ☐ g • **True or false?** There are 16 pounds in a stone. There are 16 ounces in a pound. • Complete the statements: I would measure milk in _______. I can measure the length of my car in _______. Is there more than one option? Which is the most reasonable and why?	• Half a galleon is the answer. What's the question? • **Odd one out.** Which of these is different to the others? Explain why. Inch Pint Foot Yard	• Rita, Margret and Mable each buy some ribbon for presents from a shop. Rita buys 2 feet of ribbon. Margret buys three times as much as Rita does. Mable buys 15cm more than Margret. How many cm (approximately) of ribbon do they each buy? • Mr Smith sells apples for 40p a kilogram. Mr Brown sells apples for 24p a pound. Who sells them cheaper? • Simon travels 480 kilometres in a year. How many miles is this approximately?

mathshub@trinityacademyhalifax.org

Measurement	Solve problems involving converting between units of time.	• What is 444 minutes in hours and minutes? • Anya finishes school at twenty past three in the afternoon. Circle the 24 hour clock that is showing the time Anya finishes school. 03:20 20:03 13:20 15:20 20:15 • Patrick begins watching a film at 4:27pm for 90 minutes. What time does the film finish?	• Order these times in the evening beginning with the earliest. Half past 9 21:40 Quarter to nine 8:35pm Explain your thinking. • Order these durations beginning with the smallest. 1 min 100 secs 180 secs 3 mins Explain your thinking. • Fatima says, 100 minutes is 10 times bigger than 100 seconds Do you agree? Explain why.	• Work out how many days old a baby will be when it has lived for 1 million seconds. • During a long haul flight, Beth, Caroline and Kelsey all had a sleep. Kelsey slept four times longer than Caroline did. Beth slept 15 minutes less than Kelsey did. Beth slept for 1 hour and 45 minutes. How many minutes did Caroline sleep for? • One of these watches is 3 minutes fast and one is 4 minutes slow.  Work out the correct time.

Prime numbers	Know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers.	• What is special about these numbers? 7 17 37 47 • Put these numbers into 2 groups. Label the groups. 11 10 21 31 9 13 47 35 • Find the missing prime factors. 12: 2, [ ], 3 18: 2, [ ], 3	• Explain why 1 isn't a prime number. • Katie says, "All prime numbers have to be odd." Do you agree? Convince me. Her friend, Abdul, says, "That means 9, 27 and 45 are prime numbers." Explain Abdul's mistake and correct it. • **Always, sometimes, never** When you add 2 prime numbers together the answer will be even.	• How many square numbers can you make by either adding two prime numbers together or by subtracting one prime number from another e.g. 11 - 7 = 4 Prime numbers (11, 7) → Square number (4) • Investigate how many prime numbers are between 2 consecutive multiples of 10. Include 0 and 10. Is there a pattern?

mathshub@trinityacademyhalifax.org

Prime numbers

Establish whether a number up to 100 is prime and recall prime numbers up to 19

- Fill in the missing prime numbers

2	3		7	11	

19		13		7	5

- Find all the prime numbers between 60 and 80.

- What is the 16th prime number?

- Fill in the missing numbers so that the calculation creates a prime number.

19 – ☐ = ☐

Is this the only option?

Andy says,

I subtracted an odd number to find a prime number.

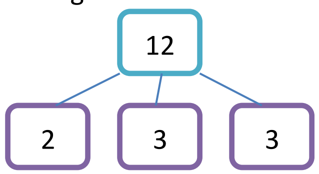
Is this possible? How many ways could he have done this?
Explain your answer.

- **What number am I?**
I am a prime number. I am a 2 digit number.
Both my digits are the same.

Explain why there is only one option.

- On a set of flashcards, write a different number on each. Ask a partner to do the same.
Shuffle them and take half each. Take turns to turn them over. Say either 'prime' or 'not prime' when a number is turned over. Whoever ends with the most cards, wins.

- Prime factors are the prime numbers that multiply together to make a number e.g.



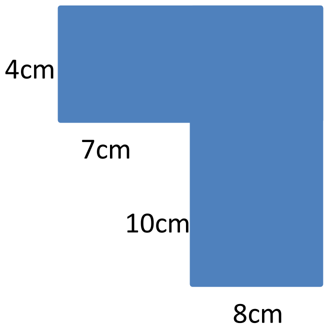
Is it possible to make every number by multiplying prime numbers together?

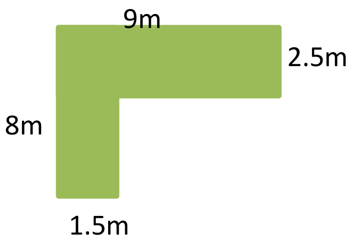
mathshub@trinityacademyhalifax.org

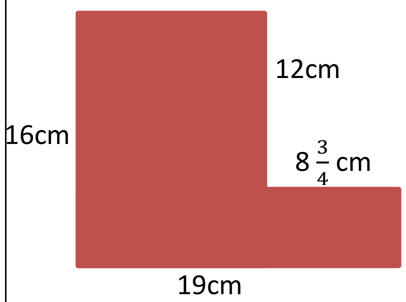
Perimeter and Area

Measure and calculate the perimeter of composite rectilinear shapes in cm and m.

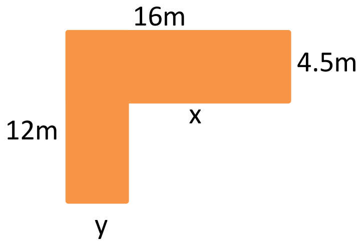
- Find the perimeter of the following shapes.



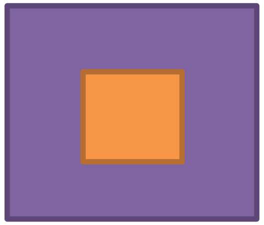




- The length labelled ‘x’ is a multiple of 1.8
  What could ‘y’ be?
  Explain to a partner why you have chosen these measurements.



- Here is a square inside another square.



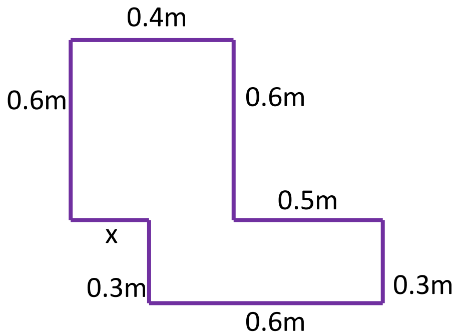
The perimeter of the inner square is 16cm.
The outer square’s perimeter is four times the size of the inner square.
What is the length of one sides of the outer square?
How do you know?
What do you notice?

- Investigate the different ways you can make composite rectilinear shapes with a perimeter of 54cm.

- Amy and Ayesha are making a collage of their favourite football team.

  They want to make a border for the canvas.

  Here is the canvas.



They have a roll of blue ribbon that is 245cm long and a roll of red ribbon that is 2.7m long.

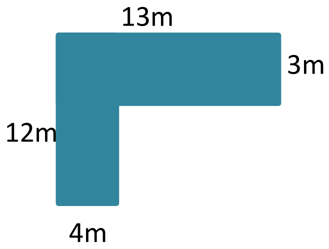
How much ribbon will they have left over?

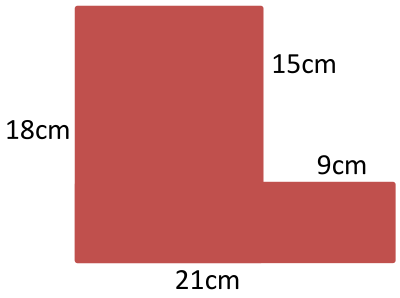
mathshub@trinityacademyhalifax.org

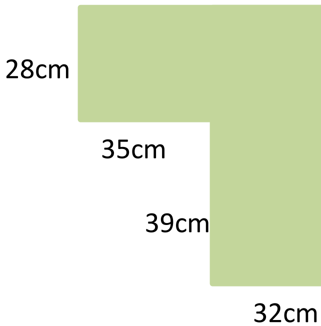
Perimeter and Area

Calculate and compare the area of rectangles (including squares), and including using standard units, cm^2, m^2 estimate the area of irregular shapes.

- Estimate and work out the area of these shapes.
  Find the unknown sides first.







Were you close?

- Put these amounts in order starting with the smallest.

  $2.7m^2$

  $27m^2$

  $27000cm^2$

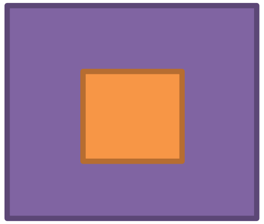
  How do you know?

- Wiktoria says,

  The area of squares and square numbers are related.

  Do you agree?
  Explain why.

- Here is a square inside another square.



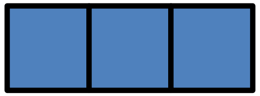
The area of the inner square is $16m^2$.
The outer square's area is four times the size of the inner square.
What is the length of one sides of the outer square?
How do you know?

- Investigate how many ways you can make different squares and rectangles with the same area of $84cm^2$.
  What strategy did you use?

mathshub@trinityacademyhalifax.org

Term by Term Objectives

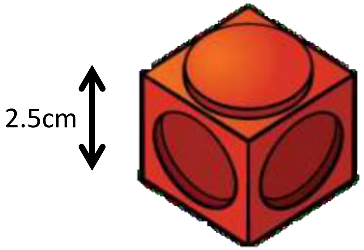
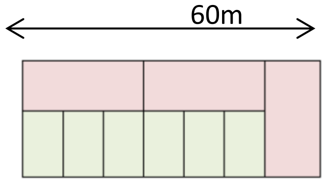
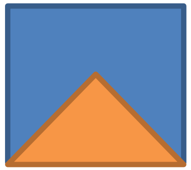
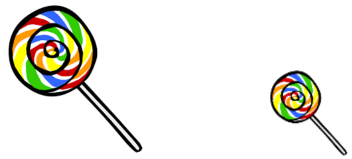
Year 5

		Complete practically	**Complete practically**	**Complete practically**
Measures- Volume	Estimate volume [for example using 1cm3 blocks to build cuboids (including cubes)] and capacity [for example, using water]	• Here is a litre jug with some water in.  Here is a glass that holds 300ml. It also has some water in.  Estimate how much liquid there is altogether.	• Here is one side of a cuboid.  What could the whole cuboid look like? Investigate the different types with a partner.	• 1 litre is approximately equal to 1 and three quarter pints. Use this information to draw and work out how many pints are in 10 litres. *(A bar model will help.)*

mathshub@trinityacademyhalifax.org

Term by Term Objectives

Year 5

Measures	Use all four operations to solve problems involving measure.	• A tower is made of red and green cubes. For every 1 red cube there are 2 green cubes. Each cube has a height of 2.5cm The tower is 30cm tall. How many green cubes are in the tower?  • The diagram is made up of two different sized rectangles.  For each large rectangle the length is double the width. The length of the diagram is 60m. Find the area of one of the small rectangles.	• The perimeter of the rectangle is 33cm.  Ajay says, Rounded to the nearest whole number the length of the rectangle is 13cm. Do you agree? Explain why. • Here is a square with a equilateral triangle inside it.  The perimeter of the triangle is 54cm Find the perimeter of the square.	• Ellie, Shauna and Megan receive their pocket money on a Friday. Shauna receives two times more than Ellie receives. Megan receives £5 more than Shauna receives. Altogether, their mum hands out £22.50 How much money do they each receive? *(A bar model will help.)* • Lollies are sold in two sizes, small and large.  Sanjay buys two small lollies for 92p Jenny buys 5 small lollies and 3 large lollies and pays with a £10 note. Jenny receives £4.16 change. How much does one large lolly cost?

mathshub@trinityacademyhalifax.org

MathsHUBS White Rose