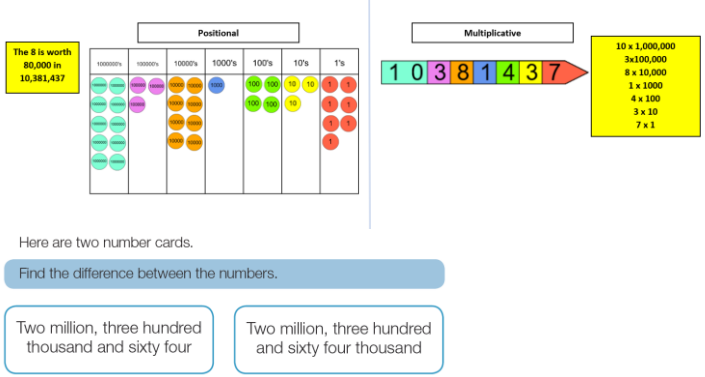
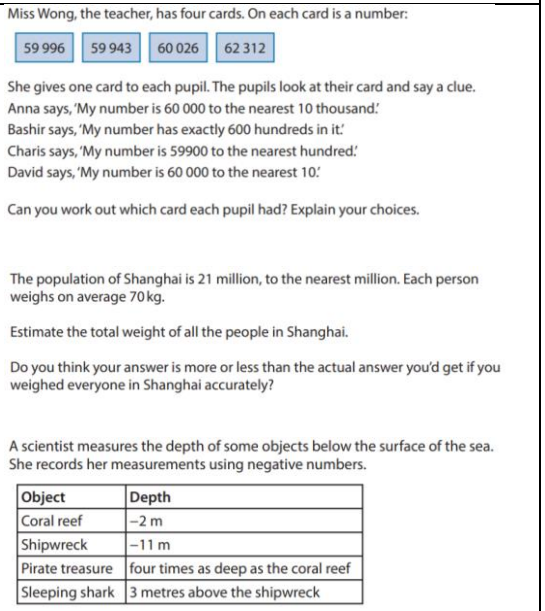
Mathematics Medium Term Planning: Summer term Y6

Mathematical aspect	**Non-negotiable end points**	**Prior knowledge for pre assessment**	**Post assessment** **Knowing more, remembering more**
Number and place value: solving problems	Knows how to use the whole number system, including saying, reading and writing numbers accurately.	Knows how to read and write numbers with up to 8 digits using the comma separator. Knows how to calculate with negative and positive numbers.	Knows how to read, write, order and compare numbers at least to 10,000,000 and determine the value of each digit. Knows how to round any whole number to a required degree of accuracy. Knows how to use negative numbers in context and calculate intervals across zero. Knows how to solve number problems and practical problems that involve all of the above.
Links to resources and policy documents: Think about the number 34 567 800. Say this number aloud. Round this number to the nearest million. What does the digit '8' represent? What does the digit '7' represent? Divide this number by 100 and say your answer aloud. Divide this number by 1000 and say your answer aloud.			

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		Here are the temperatures in four cities at midnight and at midday. **Temperature** **City** / **At midnight** / **At midday** Paris / −4°C / −2°C Oslo / −13°C / −7°C Rome / 3°C / 10°C Warsaw / −6°C / 2°C At **midnight**, how many degrees colder was Paris than Rome? **degrees** Which city was 6 degrees colder at midnight than at midday? In the daytime, the temperature reached a maximum of 8 °C in Suzie's garden. At night it fell to -4 °C. By how many degrees did the temperature fall?	
All four operations: mental methods.	Knows how to use mental calculations with increasingly large numbers and more complex calculations.	Knows efficient mental methods applying knowledge of properties of number. Knows the rules of BIDMAS.	Knows how to perform mental calculations, including with mixed operations and large numbers. Knows how to solve addition and subtraction multi-step problems in contexts, deciding which operations to use and why. Knows how to use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy.

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Links to resources and policy documents:

Calculate 36·2 + 19·8

- with a formal written column method
- with a mental method, explaining your reasoning.

What is 2 minus 0.005?

What is 5.7 added to 8.304?

12 980 + ☐ = 13125

23,111 – 47 = ☐

149 + 137 + ☐ = 650

(☐ + ☐) x ☐ = 10

To multiply by 4: *Double* and then *double* again.

To multiply by 5: *Multiply by 10* and then *halve*.

To multiply by 20: *Multiply by 10* and then *double*.

To multiply by 9: *Multiply by 10* and then *adjust*.

To multiply by 6: *Multiply by 3* and then *double*.

Calculate

$32 + 8 \times 5$

$16 \div 4 + 2 =$

$12 + 8 \div 4 =$

Can you add brackets to make this true?

$(3 \times 8) \div (2 + 4) = 4$

33,630 = 354 × 95

Use this multiplication to complete the calculations below.

354 × 9.5 = ☐

3,540 × 95 = ☐

3,363 ÷ 95 = ☐

Asim and Mike both buy **12** cans of lemonade.

pack of 4 cans
£1.20

Asim buys 3 packs of 4 cans.

pack of 6 cans
£1.70

Mike buys 2 packs of 6 cans.

Mike says to Asim,

'You paid 50p more than me'.

Is Mike correct?

Circle **Yes** or **No**. Yes / No

Explain how you know.

Common factors can be related to finding equivalent fractions.

Calculate 900 ÷ (45 × 4).

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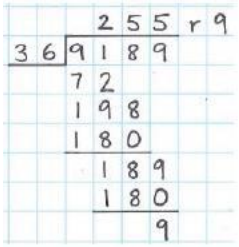
All four operations: written methods	Knows addition, subtraction, multiplication and division for larger numbers, using the formal written methods of columnar addition and subtraction, short and long multiplication, and short and long division.	Knows the efficient written algorithms for long/short multiplication and long/short division. Knows the rules of BIDMAS. Knows the compact algorithms for all four operations.	Knows how to solve problems involving addition, subtraction, multiplication and division. Knows how to use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy.
Links to resources and policy documents: Calculate 52.85 + 143.6. Calculate 8.6045 – 3.758. Alexandra Cinemas hold a film festival. They make £4148 in total. 34 people bought tickets to go to the festival. **How much did a ticket cost?** 1. A warehouse contains 24 672 boxes. There is a stack of boxes 24 boxes wide, 35 boxes deep and 12 boxes high. How many boxes are there in the warehouse that are not in this stack?	**Standard Algorithm for Multiplication** 34 x 28 = 272 + 680 = 952 **Standard Algorithm for Division** 48 R24 32 | 1560 - 128 280 - 256 24   	Choose digits to go in the empty boxes to make these number sentences true. 14 781 – 6 ☐ 53 = 8528 23·12 + 22· ☐ = 45·23 A shop sells boxes of chocolates. One box costs £3·99. A second box costs £2·60. A third box costs £6·45. What is the difference in price between the most and least expensive boxes? The shop also sells packets of sweets. One packet costs £1·39. Ramesh has a £10 note and he wants to buy the chocolates costing £2·60. How many packets of sweets can he also buy? A box of labels costs £24. There are 100 sheets in the box. There are 10 labels on each sheet. Calculate the cost of one label, in pence.	

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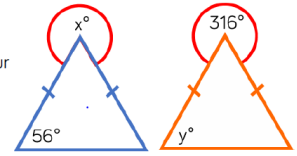
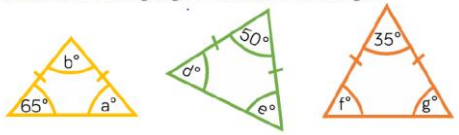
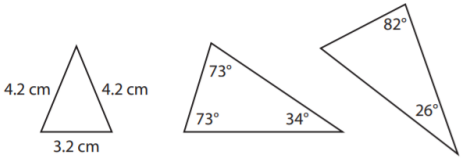
		Calculate $32 + 8 \times 5$ $16 \div 4 + 2 =$ $12 + 8 \div 4 =$ Can you add brackets to make this true? $(3 \times 8) \div (2 + 4) = 4$	
Geometry: properties of shape, including circles	Knows how to describe the properties of shapes and explain how unknown angles and lengths can be derived from known measurements.	Knows how unknown angles and lengths can be derived from known measurements. Knows the conventional markings for parallel lines, sides of equal length, angles and right angles. Knows the parts of the circle. Knows how to draw and label a pair of axes in all four quadrants with equal scaling, including the use of negative numbers. Knows how to visualise 3D shapes from nets.	Knows how to compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals, and regular polygons Knows how to illustrate and name parts of circles, including radius, diameter and circumference and knows that the diameter is twice the radius
Links to resources and policy documents:		Work out the value of x and y. Explain each step of your working.  Calculate the missing angles in the isosceles triangles. 	Which of these triangles are isosceles? Explain your decisions. 

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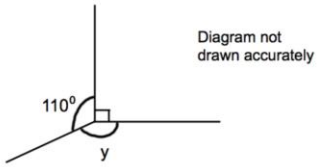


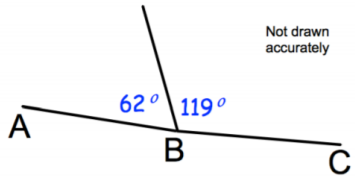
(a) (i) Work out the size of the angle marked y.

.....°

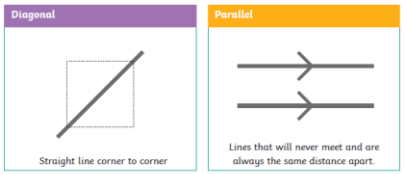
(ii) Give a reason for your answer.

.....

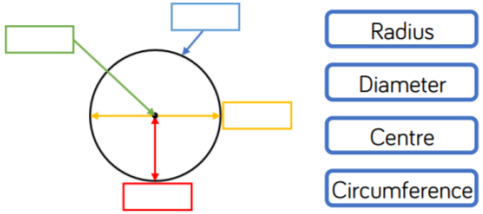
Bernard says AC is a straight line.



Is he correct?
Explain your answer.

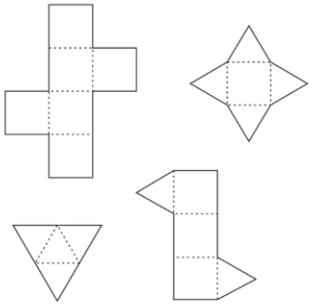


Using the labels complete the diagram:

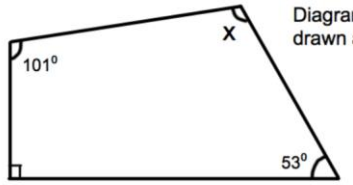


Here are some nets of shapes.

For each net, put a tick (✓) if it folds to make a **pyramid**.
Put a cross (✗) if it does not.



Shown below is a quadrilateral.



Work out the size of the angle marked x.

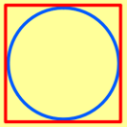
Captain Conjecture says, 'The diameter of a circle is twice the length of its radius.'

Do you agree?
Explain your answer.

Captain Conjecture says, 'All circles with a radius of 4 cm have circumferences that are the same length.'

Do you agree?
Explain your answer.

This is a 15cm square.
What is the radius of the circle?



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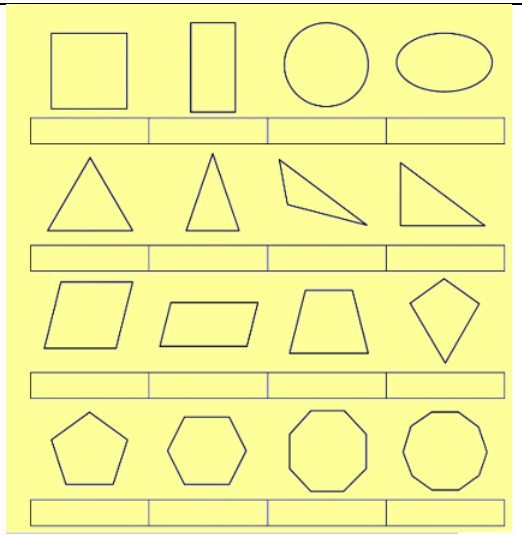
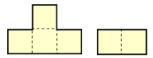
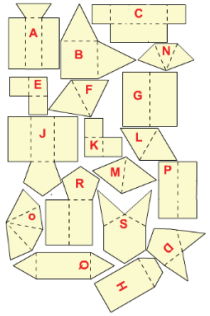
			 The net of a cube has been cut into two. It could be put together in several ways so that it could be folded into a cube.  Here are the nets of 9 solid shapes. Each one of these has been cut into 2 pieces, like the net of the cube.  Can you see which pieces go together?
Measurement: solving problems, including temperature	Knows how to connect conversion to a graphical representation as	Knows that approximately 5 miles = 8 kilometres. Knows the approximate conversions and are able to tell if an answer is sensible.	Knows how to solve problems involving the calculation and conversion of units of measure, using decimal notation up to three decimal places where appropriate.

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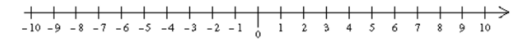
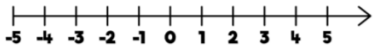
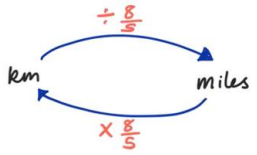
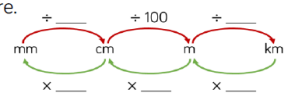
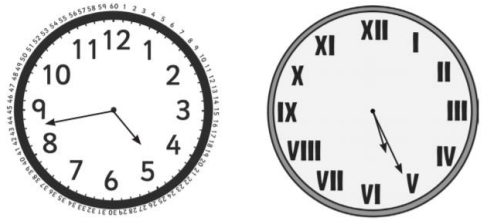
	preparation for understanding linear/proportional graphs. Knows approximate conversions of imperial/metric units. Knows how to use a number line to add and subtract positive and negative integers for measures such as temperature.	Knows how to calculate with negative and positive numbers.	Knows how to use, read, write and convert between standard units, converting measurements of length, mass, volume and time from a smaller unit of measure to a larger unit, and vice versa, using decimal notation to up to three decimal places.
Links to resources and policy documents: 1 inch ≈ 2.5 centimetres Convert 12.5 cm into inches. Use a number line to calculate:  + | -4 | -2 | 0 | 2 | 4 -3 -1 1 3	Use the number line to answer the questions.  • What is 6 less than 4? • What is 5 more than −2? • What is the difference between 3 and −3? How to convert **km** to **miles**  There are ___ mm in one centimetre. There are ___ cm in one metre. There are ___ m in one kilometre.  Use these facts to complete the table. mm | cm | m | km 44,000 2,780 15.5 1.75	**When we convert:** a tonnes to kilograms we ___ by 1000 b kilograms to tonnes we ___ by ___ 1. Here are 2 clocks. How much faster is the one on the right?  mm | cm | m | km 20 000 412 1.1

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<table><tr><td>Today, Aberdeen is 6°C colder than Newcastle is.</td><td>The temperature in Cardiff this lunchtime is exactly halfway between that of Manchester and Southampton.</td></tr><tr><td>This lunchtime, Southampton is 11°C warmer than Belfast.</td><td>The temperature in Norwich will be 8°C warmer than Edinburgh today.</td></tr><tr><td>Today, the temperature in Leeds will be 6°C below that in Plymouth.</td><td>The temperature in Manchester this lunchtime is -2°C.</td></tr><tr><td>Birmingham is 3°C warmer than Manchester today.</td><td>This lunchtime, the temperature in Edinburgh will be exactly · halfway between that of Birmingham and Aberdeen</td></tr><tr><td>The temperature in Newcastle is 5°C colder than Cardiff today.</td><td>This lunchtime, London will be 4°C warmer than Leeds.</td></tr><tr><td>Today, the temperature in Plymouth is 1°C warmer than Norwich.</td><td>Belfast is 6°C colder than Birmingham is this lunchtime.</td></tr></table>			
Fractions: calculating and solving problems	Knows how to calculate with FDP with accuracy.	Knows how to convert improper fractions and mixed numbers. Knows how to round decimals and use the correct notation for recurring decimal places. Knows how to calculate with fractions; including how to add and subtract fractions with different denominators by identifying equivalent fractions with the same denominator. Knows that dividing by 2 is the same as multiplying by $\frac{1}{2}$. Knows how to multiply and divide numbers with up to two decimal places by one-digit and two-digit whole numbers. Knows how to multiply decimals by whole numbers in practical contexts, such as measures and money.	Knows how to solve problems which require answers to be rounded to specified degrees of accuracy. Knows how to recall and use equivalences between simple fractions, decimals and percentages, including in different contexts.

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		Knows how to divide decimal numbers by one-digit whole numbers, in practical contexts involving measures and money.	

Links to resources and policy documents:

On Monday I ran $1\frac{2}{3}$ km and on Tuesday I ran $2\frac{2}{5}$ km.
How far did I run altogether on these two days?

On Wednesday I ran $1\frac{2}{3}$ km and my sister ran $2\frac{2}{5}$ km.
How much further did my sister run than I did?

Last month Kira saved $\frac{3}{5}$ of her £10 pocket money. She also saved 15% of her £20 birthday money.

How much did she save altogether?

Curtis used $\frac{1}{3}$ of a can of paint to cover 3·5 square metres of wall.

How much wall will one whole can of paint cover?

Eva has a full tin of paint. She uses $\frac{1}{3}$ of the tin on Friday, $\frac{1}{21}$ on Saturday and $\frac{2}{7}$ on Sunday. How much paint does she have left?

Tommy is adding mixed numbers. He adds the wholes and then adds the fractions. Then, Tommy simplifies his answer.

$$1\frac{1}{2} + 2\frac{1}{6} = 1\frac{3}{6} + 2\frac{1}{6} = 3\frac{4}{6} = 3\frac{2}{3}$$

Use Tommy's method to add the fractions.

$3\frac{1}{2} + 2\frac{3}{8} =$ $34\frac{1}{9} + 5\frac{2}{5} =$ $12\frac{5}{12} + 2\frac{1}{7} =$

E.g. 560 ÷ 24 =

$$24\overline{)560.000} = 23.333\ldots$$

(5 8 8 8 8)

rounded to the nearest whole number is

6.01 →	6
9.51 →	
7.75 →	

In each number sentence, replace the boxes with different whole numbers less than 20 so that the number sentence is true:

$\frac{1}{\square} = \frac{3}{\square}$

$\frac{\square}{3} = \frac{\square}{12}$

$\frac{\square}{\square} = \frac{\square}{\square}$

$\square \div \square = \square \cdot \square$

$\frac{30}{\square} = \frac{45}{\square}$

Number these equivalents in order from smallest (1) to largest (6):

$\frac{1}{2}$	
0.875	
25%	
75%	
0.2	
$\frac{1}{8}$	

10. George needs to round the following lengths.

Work alone or with a partner to complete them.

- 50% of 345cm rounded to the nearest metre.
- $\frac{3}{4}$ of 5.4m rounded to the nearest tenth of a metre.
- 30% of 475mm rounded to the nearest centimetre.
- $\frac{4}{5}$ of 23.4cm rounded to the nearest millimetre.

Q12. Here are three bags in a shop

A
£11.50

B
£14.65

C
£16.50

How much does bag B cost to the nearest pound?

$\frac{1}{4} \div 2$ *We know this is the same as:* $\frac{1}{4} \times \frac{1}{2} = \frac{1}{8}$

Now it's your turn!

$\frac{1}{5} \div 2 = \frac{1}{5} \times \square = \square$

$\frac{1}{6} \div 3 = \frac{1}{6} \times \square = \square$

$\frac{3}{11} \div 4 = \frac{3}{11} \times \square = \square$

$$\frac{1}{2} \times \frac{2}{3} = \frac{2}{6} = \frac{1}{3}$$

A boy bought 4 magazines at £1.34 each and 3 birthday cards at £1.65 each.

How much did he spend? £

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		A jar of sweets weighs 1.213 kg. How much would 4 jars weigh? 	
Algebra: formulae	Knows how to use formulae in mathematics and science	Knows how to find the common difference for the nth term. Knows how to use the arithmetic relationships to find unknowns or variables.	Know how to use simple formulae.

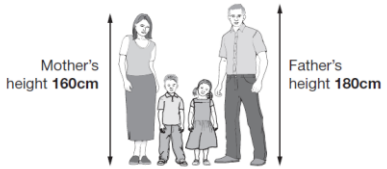
Links to resources and policy documents:

The following formula is used to convert a temperature in degrees Celsius (°C) to a temperature in degrees Fahrenheit (°F).

F = 1.8 × C + 32

Use the formula to convert a temperature of 20 degrees Celsius to degrees Fahrenheit.

Here are Alfie and Emma with their parents.

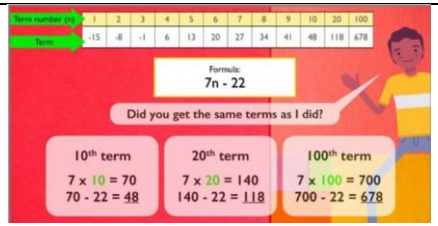


You can use the table below to predict how tall children will be when they are adults.

There is one formula for boys and a different one for girls:

Boy's predicted height	Girl's predicted height
$0.4(x + y) + 42$	$0.4(x + y) + 29$
x is the father's height in cm. y is the mother's height in cm.	

Calculate the predicted height of Alfie when he is an adult.



The numbers in this sequence **increase** by 45 each time.

Write the missing numbers.

☐ 155 200 245 ☐ ☐

In this sequence, the rule to get the next number is

Multiply by 2, and then add 3

Write the missing numbers.

☐ 25 53 ☐

c) In these equations, **a** is worth 7. Calculate the value of each shape:

△ = 3a	△ =
4 + a = ⬠	⬠ =
◇ = 10 - a	◇ =
a + a = ☐	☐ =

Roshni and Darren are using sequence-generating rules.

Roshni's rule is: 'Start at 4, and then add on 5, and another 5, and another 5, and so on.'

Darren's rule is: 'Write out the numbers that are multiples of 5, starting with 5, and then subtract 1 from each number.'

Roshni and Darren notice that the first few numbers in the sequences generated by each of their rules are the same. They think that all the numbers in the sequences generated by each of their rules will be the same.

Do you agree? Explain your decision.

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		A theme park sells tickets online. Each ticket costs £24 There is a £3 charge for buying tickets. Which of these shows how to calculate the total cost, in pounds? Tick **one**. number of tickets × 3 + 24 ☐ number of tickets × 24 + 3 ☐ number of tickets + 3 × 24 ☐ number of tickets + 24 × 3 ☐	Ali has made three sequences of shapes by sticking coloured squares together. The sequence of red shapes starts  and so on. The sequence of blue shapes starts  and so on. The sequence of green shapes starts  and so on. Ali says, 'If I put a red and a blue shape together, they will make a shape that is the same as one of the green shapes.' Do you agree with Ali? Explain your reasoning. Which of the following statements do you agree with? Explain your decisions. ■ The value 5 satisfies the symbol sentence 3 × ☐ + 2 = 17 ■ The value 7 satisfies the symbol sentence 3 + ☐ × 2 = 10 + ☐ ■ The value 6 solves the equation $20 - x = 10$ ■ The value 5 solves the equation $20 \div x = x - 1$
Ratio and proportion: solving problems	Knows how to solve problems with ratio and proportion.	Knows that proportions relate to the whole and ratios are part to part. Knows ratios compares quantities. Knows the notation *a:b* to record a ratio. Knows how to use multiplication/division to find a scale factor.	Knows how to solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts. Knows how to solve problems involving similar shapes where the scale factor is known or can be found. Knows how to solve problems involving unequal sharing and grouping using knowledge of fractions and multiples.

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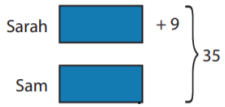
<table>
<tr>
<td colspan="2">Links to resources and policy documents:

To make a sponge cake, I need six times as much flour as I do when I'm making a fairy cake.
If a sponge cake needs 270 g of flour, how much does a fairy cake need?

Sam has 9 fewer sweets than Sarah. They have 35 sweets altogether.

How many sweets does Sam have?

Bar modelling can be a useful strategy for solving these type of problems as illustrated below.
For further information visit www.ncetm.org.uk/resources/44565

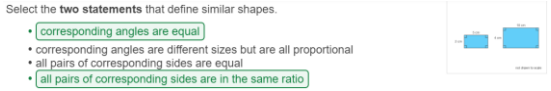
35 – 9 = 26
26 ÷ 2 = 13
Sam has 13
Sarah has 22

Sam and Tom share 45 marbles in the ratio 2:3.

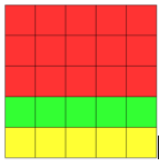
How many more marbles does Tom have than Sam?

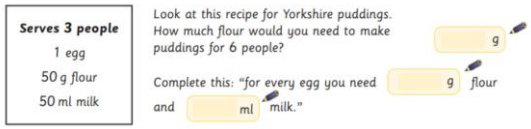
To make a tomato pizza topping for a normal pizza, Jake uses 300 g of tomatoes, 120 g of onions and 75 g of mushrooms.
Jake wants enough sauce for a giant pizza, so he uses 900 g of tomatoes.

What mass of onions will be used?
How many 120 g boxes of mushrooms will he have to buy?

 
</td>
<td colspan="2">Ratio of red to green to yellow is

3:1:1

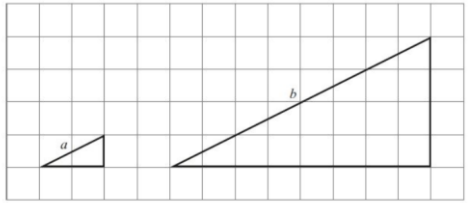
Amina planted some seeds.

For every 3 seeds Amina planted, only 2 seeds grew.

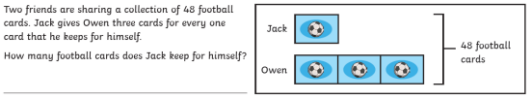
Altogether, 12 seeds grew.

How many seeds did Amina plant?

Here are two similar right-angled triangles.

Write the ratio of side a to side b.

$a : b =$ ____ : ____</td>
<td colspan="2"> 

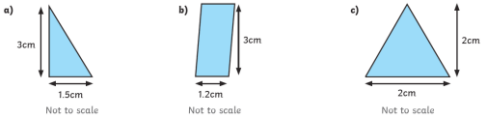
In a supermarket, washing powder is sold in three sizes:

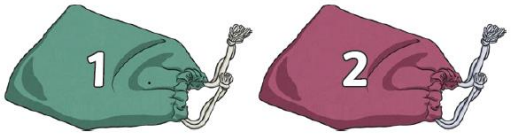
Standard 2.5kg Price £3 | Large 10kg Price £10 | Mega 20kg Price £18

What would be the cheapest way to buy 20kg of washing powder?

Enlarge the shapes by a scale factor of 3. Label each shape to show length and width. You will need to use some additional squared paper.

There are two bags of marbles.

In the first bag, for every 3 red marbles there are 2 green marbles.

In the second bag, for every 1 red marble there are 2 green marbles.

There are the same number of marbles in each bag.

The second bag of marbles contains 10 green marbles.

How many red marbles are in the first bag?</td>
</tr>
<tr>
<td>Statistics:
line graphs</td>
<td>Knows how to interpret and draw graphs relating two variables, arising from</td>
<td colspan="2">Knows which representations of data are most appropriate and why.
Knows the arithmetic for finding the mean average.</td>
<td colspan="2">Knows how to interpret and construct pie charts and line graphs and use these to solve problems.</td>
</tr>
</table>

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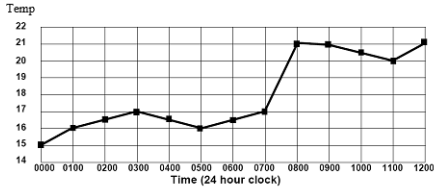
	their own enquiry and in other subjects.		

Links to resources and policy documents:



This graph shows the temperature in a room over a twelve hours. Answer the questions below.

1) What was the lowest temperature recorded on the chart.
2) What was the temperature at 3 o'clock am?
3) What was the temperature at 11.00?
4) Which hour shows the biggest rise in temperature?
5) For how long was the temperature between 16 and 17 degrees?
6) Can you estimate the temperature at 07.30?
7) Can you estimate the temperature at 10.00?
8) Complete the table below using the line graph.

Time	Temperature
00.00	
01.00	
02.00	
03.00	
04.00	
05.00	
06.00	
07.00	
08.00	

J	F	M	A	M	J	J	A	S	O	N	D
102	118	130	126	121	131	98	82	69	77	84	78

The table shows the usual rainfall in each month in mm for Sydney, Australia.

The table shows the seasons and months. Write some statements to match the information in both tables.

Summer	Dec, Jan, Feb
Autumn	Mar, Apr, May
Winter	June, July, Aug
Spring	Sep, Oct, Nov

Here is a method to find the mean.

No. of glasses of juice drunk by 3 friends	Total glasses of juice drank	If each friend drank the same no. of glasses
		

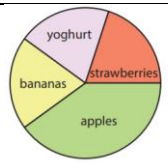
The mean number of glasses of juice drunk is 3

Use this method to calculate the mean average for the number of slices of pizza eaten by each child.

Seven children measured their heights.

Children	Height (cm)
Stefan	144
Lara	136
Olivia	142
Chen	143
Maria	152
Dev	148
Sarah	150

What is the mean height of the children?



The pie chart represents the proportions of the four ingredients in a smoothie drink.

The sector representing the amount of strawberries takes up 22% of the pie chart.

The sector representing the amount of apple is twice as big as the sector representing the amount of strawberries.

The sectors representing the amount of yoghurt and the amount of banana are identical.

Calculate the percentage of bananas needed to make a smoothie drink.

What percentage of bananas would be needed to make two smoothie drinks?

Explain your reasoning.

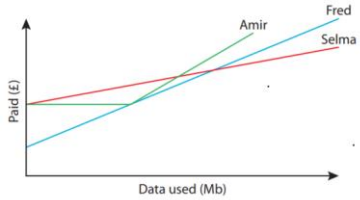
Three mobile phone companies each have different monthly pay-as-you-go contracts.

Phil's Phones: £5 fee every month and 2p for each Mb of data you use.

Manish's Mobiles: £7 fee every month and 1p for each Mb of data you use.

Harry's Handsets: £7 fee every month and 200Mb of free data, then 3p for each Mb of data after that.

Amir, Selma and Fred have mobile phones and they have recorded for one month how much data they have used (in Mb) and how much they have paid (in £). They have represented their data on this graph.



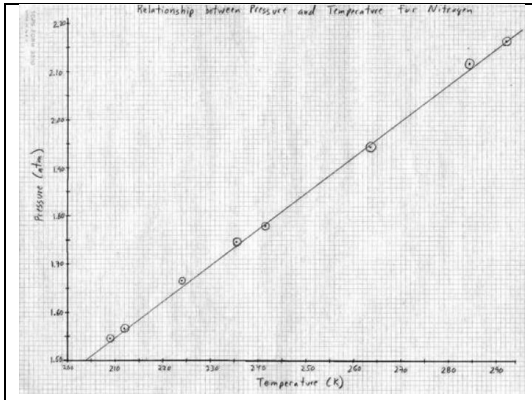
With which company do you think Amir has his contract?

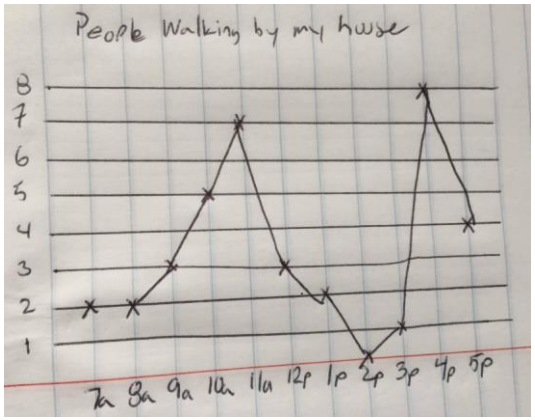
With which company do you think Selma has her contract?

With which company do you think Fred has his contract?

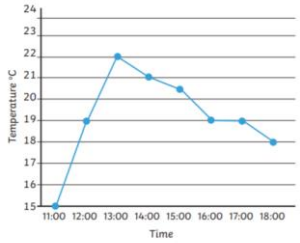
Explain each of your choices.

Mathematics Medium Term Planning: Summer term Y6





1. A Line Graph Showing the Temperature of a Day in August



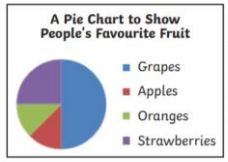
a) What was the temperature at 17:00?

b) What time was the highest temperature recorded?

c) At which times was the temperature less than 19°C?

d) What was the difference in temperature between the lowest and highest temperature?

4. 32 people were asked to name their favourite fruit. This pie chart shows their responses:



a) What percentage of people said that strawberries were their favourite fruit?

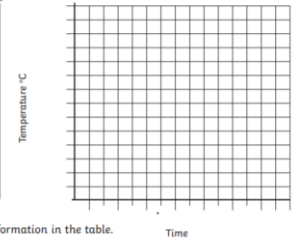
b) How many people said that grapes were their favourite fruit?

c) How many more people chose strawberries as their favourite fruit compared to oranges?

d) The school tuck shop wants to add more fruit to their menu. They use this pie chart to help then decide what fruit to sell. They already sell grapes. Should they add apples, strawberries or oranges to their menu?

6. On Sunday, Zara measures the temperature in her garden at each hour. This chart shows the information she collected.

Day	Temperature
09:00	12 °C
10:00	10 °C
11:00	9 °C
12:00	8 °C
13:00	13 °C
14:00	11 °C
15:00	14 °C



a) Plot a line graph showing the information in the table.
b) Using the graph estimate the temperature at 13:30.

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