

Level 6 means that I can...

- Use trial and improvement to solve things like $x^3 + 5x = 38$

Without using the $\sqrt{\quad}$ button on your calculator, show how you would use trial and improvement to find $\sqrt{19}$. In the comment column write TB (Too Big) or TS (Too Small)

Try	Workout	Comment
4	16	TS
5	25	TB
The answer is between 4 and 5		
4.5	20.25	TB
4.4	19.36	TB
4.3	18.45	TS
The answer is between 4.3 and 4.4		
4.35	18.9225	TS
4.36	19.0096	TB
The answer is between 4.35 and 4.36		
4.355	18.966025	TS

4.356	18.974736	TS
4.357	18.983443	TS
4.358	18.992164	TS
4.359	19.000881	TB
Answer is between 4.358 and 4.359		
The answer is 4.36 to 2 d.p.		

Work out one number as a fraction or percentage of another

1. What fraction – in its lowest terms – is 16 out of 40?

$$16/40 \rightarrow 4/10 \rightarrow 2/5$$

2. What percentage is the same as 12/60?

$$12 \div 60 \times 100 = 20\%$$

- Understand that fractions, decimals and percentages can be equivalent to each other (eg $0.5=50\%$)

Copy and complete this table:

Fraction	Decimal	Percentage
$\frac{3}{4}$	0.75	75%
$\frac{3}{5}$	0.6	60%
$\frac{9}{20}$	0.45	45%
$\frac{5}{8}$	0.625	62.5%
$\frac{7}{20}$	0.35	35%
$\frac{1}{20}$	0.05	5%

- Calculate using ratio

1. Share 36 into the ratio 1 : 3 : 5

• **$1 + 3 + 5 = 9$**

• **$36 \div 9 = 4$**

• **$1 \times 4 : 3 \times 4 : 5 \times 4$**

• **$4 : 12 : 20$**

2. Concrete is made from cement, sand and gravel in the ratio:

Cement : Sand : Gravel
1 : 3 : 4

How much cement and gravel will be needed for 120 kg of sand?

3 x 40 = 120 so multiply by 40

Cement : Sand : Gravel
1 : 3 : 4

40 : 120 : 160

- Add and subtract fractions with common denominators

1. Evaluate:

a. $\frac{2}{7} + \frac{3}{7}$

$= \frac{5}{7}$

b. $\frac{7}{8} - \frac{5}{8} = 2$

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

c. $3\frac{4}{5} + 2\frac{2}{5}$

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

d. $4\frac{7}{10} - 2\frac{3}{10}$

$2\frac{4}{10} \rightarrow 2\frac{2}{5}$

Find and describe in words the rule for the next term in a sequence (linear)

Describe the rule gives the next term in these sequences:

a) 4, 7, 10, 13... **Add on 3**

b) 18, 10, 2, -6... **Subtract 8**

Find and describe in words the rule for the n^{th} term in a sequence

Describe the n^{th} term rule for these sequences:

a) 4, 7, 10, 13... **n^{th} term = $3n + 1$**

b) 4, 9, 14, 19... **n^{th} term = $5n - 1$**

Solve linear equations with integer coefficients

a) $5x = 10$	b) $x/5 = 7$
$x = 2$	$x = 35$
c) $x + 2 = 12$	d) $x - 7 = 43$
$x = 10$	$x = 50$
e) $3x + 6 = 18$	f) $4x - 5 = 19$
$x = 4$	$x = 6$
g) $3x + 5 = x + 13$	h) $4x - 5 = x + 13$
$x = 4$	$x = 6$
i) $4x + 2 = 2x - 18$	h) $5x - 12 = 3x - 2$
$x = -10$	$x = 5$

Plot the graph of $y = mx + c$

1. Using graph paper, plot the graphs of:

a. $y = x + 3$

b $y = x - 1$

c. $y = 2x + 5$

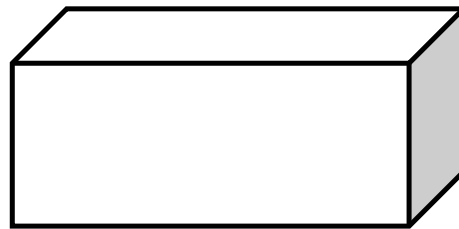
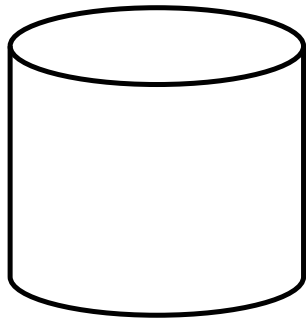
d. $y = 3x - 2$

e. $y = 6 - x$

f. $y = 8 - 2x$

- Recognise 2D representations of 3D objects

Draw a front elevation, side elevation and plan of a cylinder and cuboid.

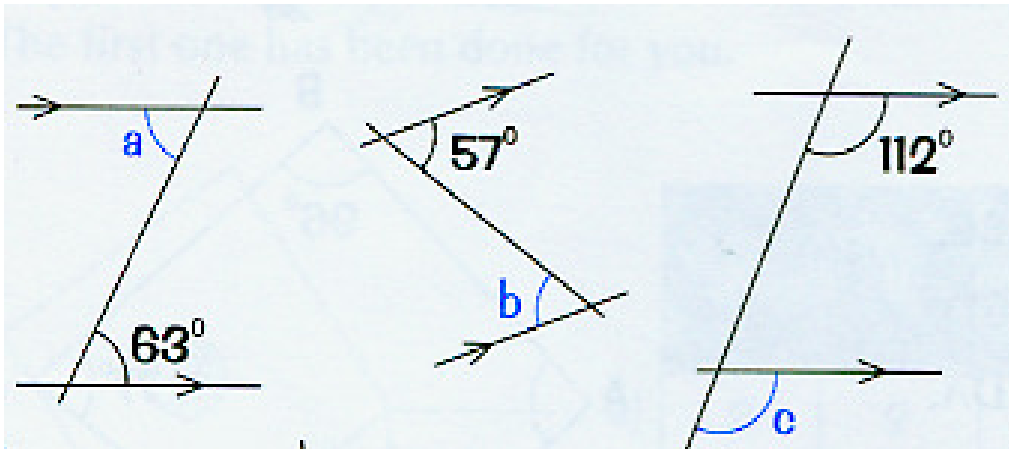


- Classify quadrilaterals by knowing their properties. Draw each of the quadrilaterals named in the table and explain the special things about the quadrilateral's sides, angles and symmetry.

Shape	Sides	Angles	Symmetry
Rectangle	Opposite sides equal in length and parallel	Right angles in each of the four corners	Two lines of symmetry
Square	All sides equal in length and opposite sides parallel	Right angles in each of the four corners	Four lines of symmetry
Parallelogram	Opposite sides equal in length and parallel	Diagonally opposite corners have equal angles	No lines of symmetry
Rhombus	All sides equal in length and opposite sides parallel	Diagonally opposite corners have equal angles	No lines of symmetry
Kite	Adjacent lines on that are on opposite sides of the line of symmetry are equal in length	One pair of diagonally opposite angles are equal	One line of symmetry
Trapezium		One pair of opposite sides are equal	

- Find the missing angles when two parallel lines are intersected

Find the angles a, b and c in the diagrams below.



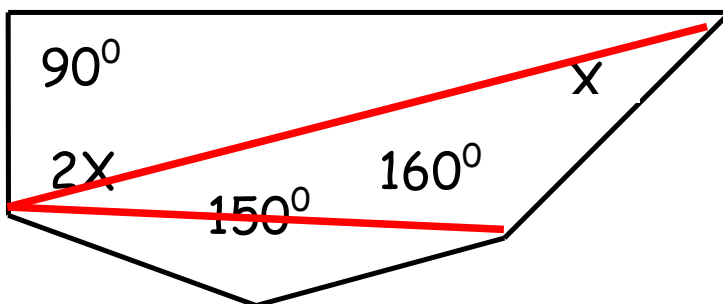
$a = 63^\circ$

$b = 57^\circ$

$a = 112^\circ$

- Solve angle problems in polygons

Calculate the value of X



Split 3 triangle \rightarrow total degrees = 540

$540 - (90 + 150 + 160) = 140$

$3x = 140 \rightarrow x = 46.67^\circ$

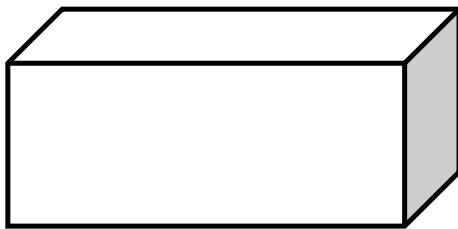
- Find the area and circumference of a circle

Copy and complete this table to show the information for the four circles

Radius	Diameter	Circumference	Area
4 cm	8 cm	25.12 cm	50.24 cm²
10 cm	20 cm	62.8 cm	314 cm²
11.94 cm	23.89 cm	75 cm	447.8 cm²
6.18 cm	12.36 cm	38.81 cm	120 cm ²

- Find the volume of cuboids

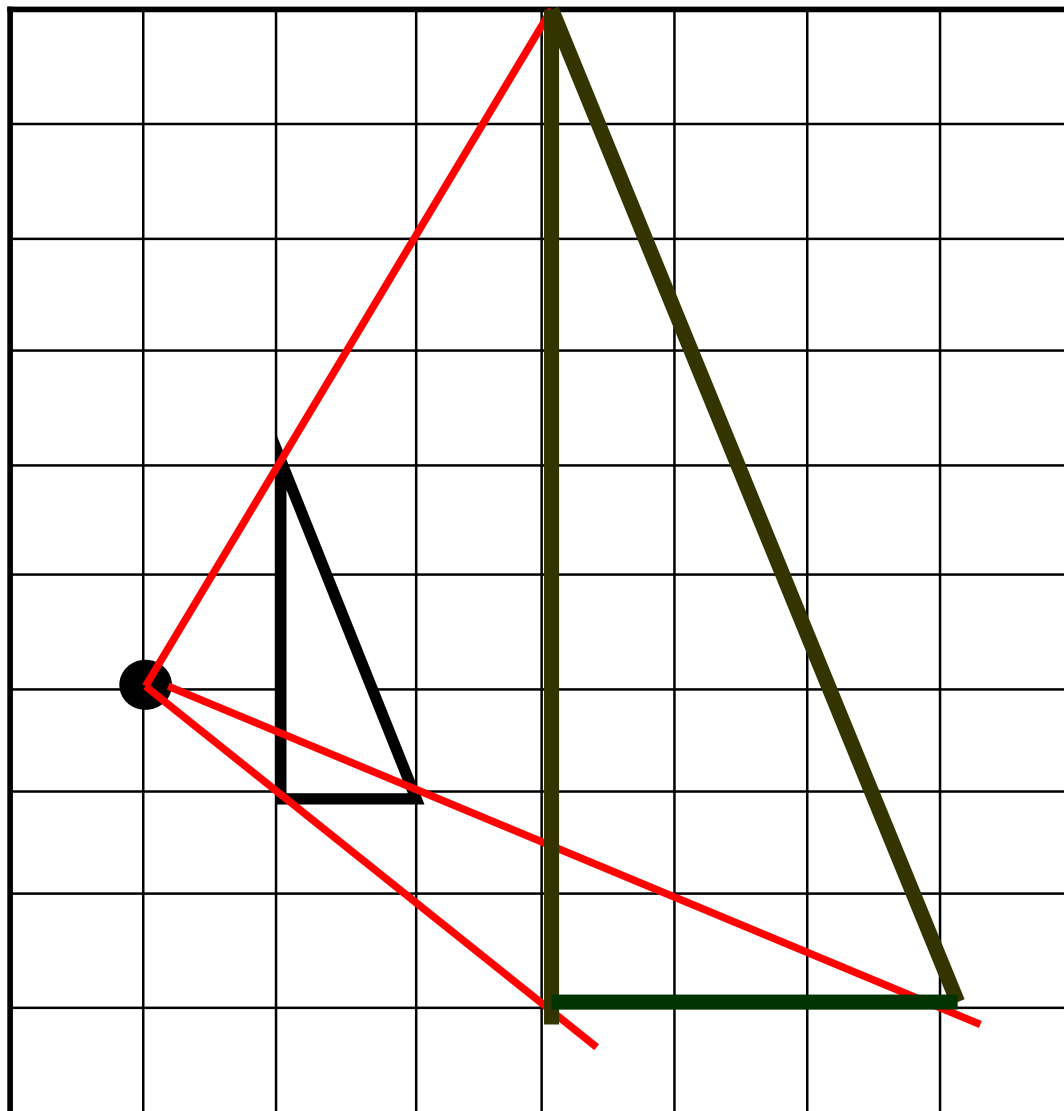
Calculate the volume of a cuboid with a 10 cm long by 3 cm high and 4 cm wide.



$$\text{Volume} = 10 \times 3 \times 4 \rightarrow \text{Vol} = 120 \text{ cm}^2$$

- Enlarge a shape by a positive scale factor

Enlarge the triangle by a scale factor of 3 using the given centre of enlargement.



Work with continuous data

Here are the ages of ten people - 2, 11, 12, 12, 17, 18, 21, 23, 27 and 30. Write the frequencies for each class interval into the table below and then calculate an estimated mean age.

Age	Frequency	Mid Age	Mid x Freq
0 – 8	1	4	4
8 – 16	3	12	36
16 – 24	4	20	80
24 – 32	2	28	56
Totals	10		176

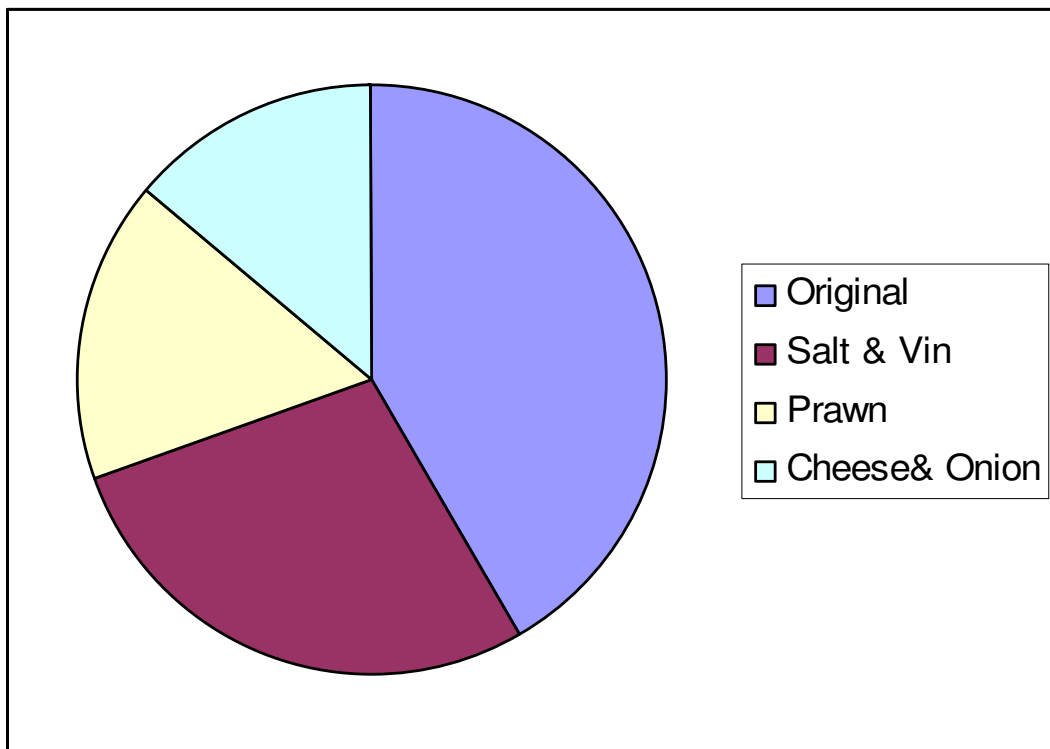
Estimated Mean = $176 \div 10$

Estimated Mean = 17.6

□ Construct pie charts

Here are the results of a survey of 72 people. It shows the people's favourite crisp flavour. Put the information onto a pie chart

Flavour	Freq	Angle
Plain (Original)	30	$360 \div 72 \times 30 = 150$
Salt & Vinegar	20	$360 \div 72 \times 20 = 100$
Prawn	12	$360 \div 72 \times 12 = 60$
Cheese & Onion	10	$360 \div 72 \times 10 = 50$
Total	72	



Say what a scatter diagram tells us

Using graph paper, draw a scattergram to show this information.

.What type of correlation does the scattergram show?

Student	A	B	C	D	E	F	G	H	I	J	K	L	M
Age	11	12	14	13	12	11	15	16	16	14	13	12	15
Shoe Size	4	6	7	6	5	3	8	8	10	8	7	5	9

Understand correlation

Explain what is meant by:

Positive Correlation

Negative Correlation

No Correlation

Weak positive/negative correlation

Strong positive/negative correlation

- Find all the possible outcomes of two experiments

A single dice and a coin are thrown at the same time. What is the probability of getting a 4 and a head – $P(4 \text{ \& \; Head})$

$$P(4 \text{ and Head}) = 1/12$$

- Use the fact that the probability of mutually exclusive events add up to 1

If a football team's probability of winning the next match is 0.4 and probability of losing the next match is 0.5, what is the probability of the team obtaining a draw in the next match?

$$P(\text{Draw}) = 1 - (0.4 + 0.5)$$

$$P(\text{Draw}) = 0.1$$