

Year 9 Foundation

Percentage of Amounts without a Calculator:

47% of £120
 10% = £12 \Rightarrow 40% = £12 \times 4 = **£48**
 1% = £1.20 \Rightarrow 7% = £1.20 \times 7 = **£8.40**
 Add these two answers together to get 47%:
£48 + £8.40 = 56.40

Algebraic Terminology:

Expression:
 $4x + 5y, 2x - 5, 7x(3x - 7)$ etc.
 Equation:
 $4x - 7 = 15, 4(3x + 1) = 7$ etc.
 Identity:
 $4(x - 2) \equiv 4x - 8$ etc.
 Formula:
 $y = 3x - 1, \text{Area} = \pi r^2, V = b^3$ etc.
 Inequality:
 $4x - 1 < 11, 5x + 2 \geq 17$ etc.

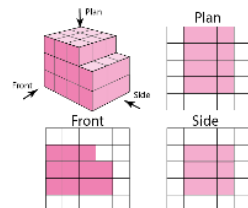
Percentage Increase without a calculator

1.) Increase £48 by 13%
13% of £48 = £6.24
 2.) To increase, add on the £6.24.
New Amount = £48 + £6.24 = £54.24

Percentage Decrease without a calculator

1.) Decrease £48 by 13%
13% of £48 = £6.24
 2.) To decrease, subtract the £6.24.
New Amount = £48 - £6.24 = £41.76

Plan: Birds Eye View
 Side Elevation: View from Side
 Front Elevation: View from Front



Sample Space Diagrams

We use sample space diagrams to list all outcomes when carrying out two probability experiments at the same time

		Player 2					
		Rock	Paper	Scissors			
Player 1	Rock	RR	RP	RS			
	Paper	PR	PP	PS			
	Scissors	SR	SP	SS			

$$P(\text{Scissors}) = \frac{3}{9} = \frac{1}{3} \quad P(\text{Prime}) = \frac{15}{36} = \frac{5}{12}$$

Percentage of Amounts with a Calculator:

47% of £120
 $47\% \times 120 = \mathbf{£56.40}$

Percentage Increase with a Calculator:

Increase £48 by 13%
 $100\% + 13\% = 113\%$
 $113\% \times £48 = \mathbf{£54.24}$

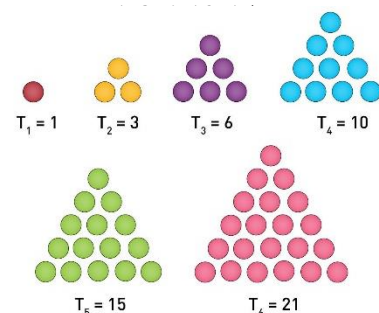
Arithmetic Sequences: Add or subtract the same number each time (The common difference)

2, 11, 20, 29, ... Common difference = 9
 14, 11, 8, 5, ... Common difference = -3

Geometric Sequence: Multiply by the same number each time (The common ratio)

5, 10, 20, 40, ... Common Ratio = 5
 12, 6, 3, 1.5, ... Common Ratio = 0.5
 1, -3, 9, -27, ... Common Ratio = -3

Triangular Numbers



Dividing into a Ratio:

Share £480 in the ratio 3:5:4
 $3 + 5 + 4 = 12$
 1 Part = £480 \div 12 = £40
 3 Parts = £40 \times 3 = £120
 5 Parts = £40 \times 5 = £200
 4 Parts = £40 \times 4 = £160

£120:£200:£160

Ratio and the Unitary Method

Billy and James have some sweets in the ratio 9:2. Billy has 35 more sweets than James. How many sweets are there altogether?

Billy has 7 more parts than James.
1 Part = 35 \div 7 = 5.

2 Parts = 2 \times 5 = 10

Total Number of sweets = 5 + 10 = **45**

Recipes and Proportion:

8 People:

400g Pasta
 2 Tins Chopped Tomatoes
 1 Onion
 4tbsp Tomato Puree

To find the recipe for 6 people, divide each amount by 8 and then multiply by 6:

6 People:

$(400 \div 8) \times 6 = \mathbf{300g \text{ Pasta}}$
 $(2 \div 8) \times 6 = \mathbf{1.5 \text{ Tins Tomato}}$
 $(1 \div 8) \times 6 = \mathbf{\frac{3}{4} \text{ Onion}}$
 $(4 \div 8) \times 6 = \mathbf{3tbsp \text{ Puree}}$

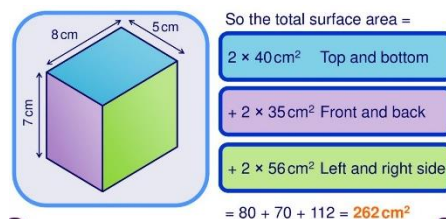
Substitution:

Find the value of $3x + 5y$, when $x = 6$ and $y = -1$.
 $(3 \times 6) + (5 \times -1)$
 $= 18 - 5$
 $= 18 - 5$
 $= \mathbf{13}$

If $y = 6x - 13$, find the value of y when $x = 1.5$.
 $y = (6 \times 1.5) - 13$
 $y = 9 - 13 = \mathbf{-4}$

Surface Area:

The surface area of a 3D shape is the **TOTAL AREA OF ALL FACES.**



Dividing by a Decimal:

Make the number we are dividing by an **INTEGER**

$$\begin{array}{l} \times 100 \quad 0.246 \div 0.02 \\ \times 100 \quad 24.6 \div 2 \end{array}$$

$$\begin{array}{r} 12.3 \\ 2 \overline{) 24.6} \\ \underline{24} \\ 0.6 \\ \underline{0.6} \\ 0 \end{array}$$

$$\begin{array}{l} \times 10 \quad 1.738 \div 0.5 \\ \times 10 \quad 17.38 \div 5 \end{array}$$

$$\begin{array}{r} 3.476 \\ 5 \overline{) 17.380} \\ \underline{15} \\ 2.380 \\ \underline{2.350} \\ 0.300 \\ \underline{0.300} \\ 0 \end{array}$$

Remember that if you divide by a number between 0 and 1 your answer will be bigger!

Calculating Percentage Change:

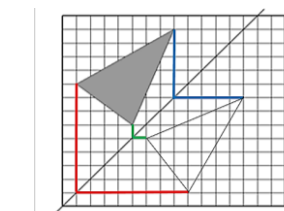
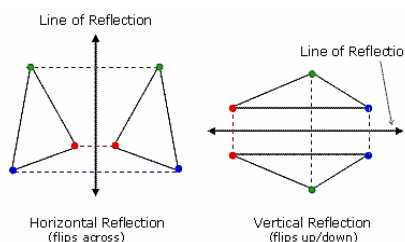
$$\text{Percentage Change} = \frac{\text{Difference}}{\text{Original}} \times 100$$

A new car is valued at a price of £17000. 4 years later it is valued at £9450. The Percentage Change is:

$$\frac{17000 - 9450}{17000} \times 100 = \mathbf{44.4\% (1dp)}$$

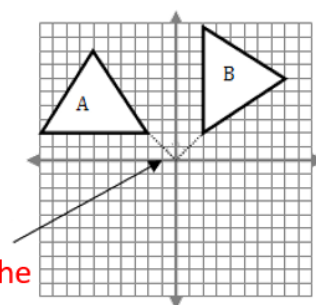
The car has lost 55.6% of its original value

Reflections



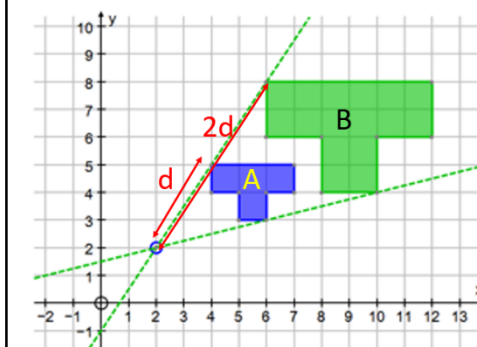
Rotations

Angle (90°, 180° or 270°)
 Direction (Clockwise or Anti-Clockwise)
 Centre of Enlargement



Shape A has been rotated 90° Clockwise about the Origin (0,0)

Enlargements



Shape A has been enlarged by a scale factor 2 about the point (2,2) to obtain shape B

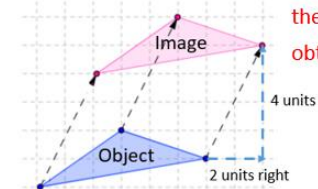
Shape B is also twice the distance from (2,2) compared to Shape A

Triangle Constructions: Triangles can be made using one of the following construction types: SAS – Side Angle Side SSS – Side Side Side and ASA – Angle Side Angle

Translations:

Translation Vectors: $\begin{pmatrix} x \\ y \end{pmatrix}$

The object has been translated by the vector $\begin{pmatrix} 2 \\ 4 \end{pmatrix}$ to obtain the image



Scatter Graphs and Correlation



The points lie close to a straight line, which has a positive gradient.

This shows that as one variable increases the other increases.

The points lie close to a straight line, which has a negative gradient.

This shows that as one variable increases, the other decreases.

There is no pattern to the points.

This shows that there is no connection between the two variables.