

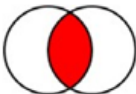
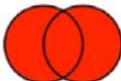
Year 9 – Half term 1 Maths Knowledge organiser

Rounding

Rounding to a given number of 1 decimal places	To do this put a line in 1 number after the decimal point (after the tenths). If the number after this line is less than 5 round down , or round up if the number is 5 or above.
Rounding to 1 significant figure.	The first non zero number is the first significant figure. All numbers after this should be zero.
Rounding to 'n' significant figures.	The first non zero number is the first significant figure all other numbers including zero are significant. Write the first n numbers then all the rest are zero.
ESTIMATE a calculation,	Round every individual number to 1 significant figure then calculate the answer.

Important vocabulary

Factor	Numbers we can multiply together to get another number
Multiple	The result of multiplying a number by an integer (not by a fraction).
Prime	A number which is divisible by 1 and itself. A Prime number has 2 factors, itself and 1.
Highest Common Factor (HCF)	The highest number that divides exactly into two or more numbers.
Lowest Common Multiple (LCM)	The smallest positive number that is a multiple of two or more numbers.

2. HCF and LCM using Venn Diagram	Instruction	Venn Diagram
Find the Highest Common Factor (HCF)	Multiply numbers in the overlap section of the Venn diagram	
Find Lowest Common Multiple (LCM)	Multiply all the numbers in the Venn diagram	

Indices:

$$3^a \times 3^b = 3^{a+b}$$

$$3^a \div 3^b = 3^{a-b}$$

$$(3^a)^b = 3^{a \times b}$$

$$3^{-a} = \frac{1}{3^a}$$

$$x^1 = x$$

$$x^0 = 1$$

BIDMAS

B	Brackets
I	Indices
D	Division
M	Multiplication
A	Addition
S	Subtraction

Standard form

Any number between 1 and less than 10 → $A \times 10^n$ ← Any integer

Year 9 – Half term 2 Maths Knowledge organiser

Fractions:

Addition

$\frac{1}{4} + \frac{3}{8} =$

If the **denominators** are different, first find a **common denominator**.

$\left[\frac{1}{4} \times \frac{2}{2}\right] + \frac{3}{8} =$

$\frac{2}{8} + \frac{3}{8} = \frac{5}{8}$

Then add or subtract the **numerators**.

The **denominators** stay the same.

Multiplication

Multiply the **numerators**.

$\frac{3}{4} \times \frac{4}{5} = \frac{12}{20} = \frac{3}{5}$

Multiply the **denominators**.

Reduce.

Remember to Reduce!

Subtraction

$\frac{5}{6} - \frac{3}{4} =$

If the **denominators** are different, first find a **common denominator**.

$\left[\frac{5}{6} \times \frac{2}{2}\right] - \left[\frac{3}{4} \times \frac{3}{3}\right] =$

$\frac{10}{12} - \frac{9}{12} = \frac{1}{12}$

Then add or subtract the **numerators**.

The **denominators** stay the same.

Division

First, invert the **divisor**.

$\frac{4}{5} \div \frac{5}{6} =$

Multiply the **numerators**.

$\frac{4}{5} \times \frac{6}{5} = \frac{24}{25}$

Multiply the **denominators**.

Percentages

on a calculator

39% of 82
 0.39×82

Change to a decimal and multiply

fraction to %

$\frac{15}{20} = \frac{75}{100} = 75\%$
OR
 $15 \div 20 \times 100 = 75\%$

without a calculator

50% - half
25% - half and half
75% - 50% + 25%

10% - divide by 10
5% - half 10%
20% - double 10%

increasing

Increase £60 by 12%

12% of 60 = $0.12 \times 60 = £7.20$

New amount = $£60 + £7.20 = £67.20$

ADD

decreasing

decrease £60 by 12%

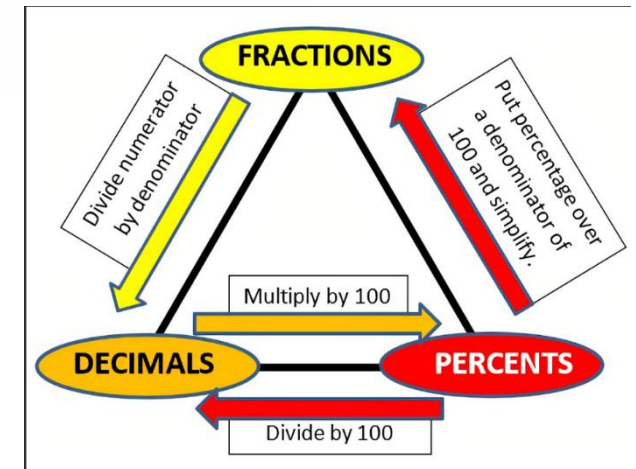
12% of 60 = $0.12 \times 60 = £7.20$

New amount = $£60 - £7.20 = £52.80$

SUBTRACT

FDP conversions:

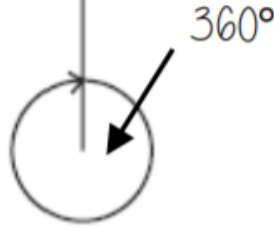
Decimal	Percentage	Fraction
0.5	50%	$\frac{1}{2}$
0.25	25%	$\frac{1}{4}$
0.75	75%	$\frac{3}{4}$



YEAR 9 KNOWLEDGE ORGANISER HALF TERM 3

Sum of angles at a point

The sum of angles around a point is 360°



$$y = mx + c$$

The **coefficient** of x (the number in front of x) tells us the **gradient** of the line

$$y = mx + c$$

Arrows point from the text 'y and x are coordinates' to the 'y' and 'x' in the equation. Arrows also point from the text 'The value of c is the point at which the line crosses the y-axis. Y intercept' to the 'c' in the equation.

The value of c is the point at which the line crosses the y -axis. **Y intercept**

y and x are coordinates.

Sum of angles on a straight line

Adjacent angles that share a common point on a line add up to 180°

Vertically opposite angles

Vertically opposite angles are the same

Sum of angles in triangles

Sum of interior angles in a triangle = 180°

Sum of angles in quadrilaterals

Sum of interior angles in a quadrilateral = 360°

⚡ Key Points

Beware of minus signs and remember:

" - x - = + "

" - x + = - "

1. Write **FOIL** above your working space

F - First term in each bracket

O - Outer pair of terms

I - Inner pair of terms

L - Last term in each bracket

2. Write down the four **MULTIPLICATIONS**

3. Simplify by collecting **LIKE TERMS**
(if there are any)

Q1 Expand and simplify $(a + 5)(b - 3)$

$$\begin{aligned} & (a+5)(b-3) \\ 1. & \quad \text{F} \quad \text{O} \quad \text{I} \quad \text{L} \\ 2. & = ab - 3a + 5b - 15 \\ 3. & \text{(No LIKE TERMS)} \end{aligned}$$

Q2 Expand and simplify $(x - 4)(2x - 3)$

$$\begin{aligned} & (x-4)(2x-3) \\ 1. & \quad \text{F} \quad \text{O} \quad \text{I} \quad \text{L} \\ 2. & = 2x^2 - 3x - 8x + 12 \\ 3. & = 2x^2 - 11x + 12 \end{aligned}$$

YEAR 9 KNOWLEDGE ORGANISER HALF TERM 4

Sum of angles at a point

The sum of angles around a point is 360°

Sum of angles on a straight line

Adjacent angles that share a common point on a line add up to 180°

Sum of angles in triangles

Sum of interior angles in a triangle = 180°

Sum of angles in quadrilaterals

Sum of interior angles in a quadrilateral = 360°

Missing angles in regular polygons



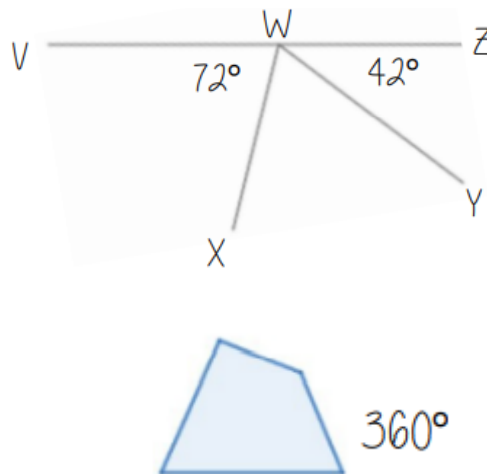
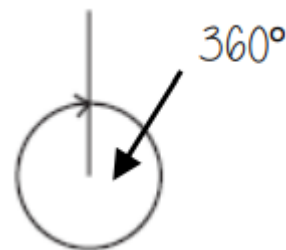
Exterior angles in regular polygons = $360^\circ \div \text{number of sides}$

Sum of interior angles

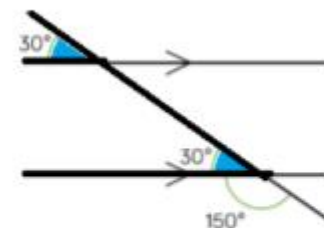
$(\text{number of sides} - 2) \times 180$

Vertically opposite angles

Vertically opposite angles are the same

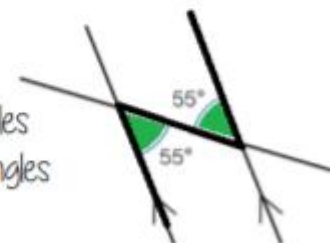


Alternate/ Corresponding angles

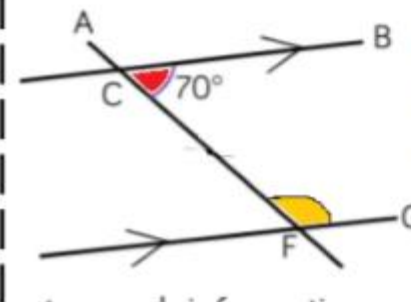


Because alternate angles are equal the highlighted angles are the same size

Because corresponding angles are equal the highlighted angles are the same size



Co-interior angles

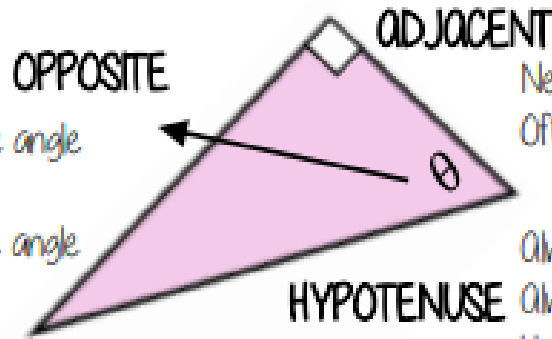


Because co-interior angles have a sum of 180° the highlighted angle is 110°

As angles on a line add up to 180° co-interior angles can also be calculated from applying alternate/ corresponding rules first

Hypotenuse, adjacent and opposite

ONLY right-angled triangles are labelled in this way



Always opposite an acute angle
Useful to label second
Position depend upon the angle
in use for the question

Next to the angle in question
Often labelled last

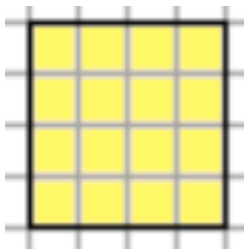
Always the longest side
Always opposite the right angle
Useful to label this first

$$\sin \theta = \frac{\text{opposite side}}{\text{hypotenuse side}}$$

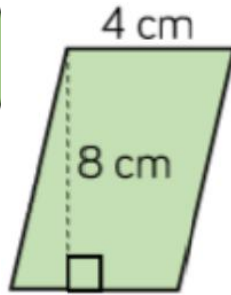
$$\cos \theta = \frac{\text{adjacent side}}{\text{hypotenuse side}}$$

$$\tan \theta = \frac{\text{opposite side}}{\text{adjacent side}}$$

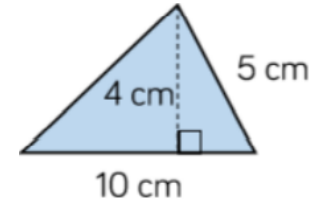
$$\text{Rectangle/ Square area} = \text{Base} \times \text{Height}$$



$$\text{Parallelogram} = \text{Base} \times \text{Perpendicular height}$$

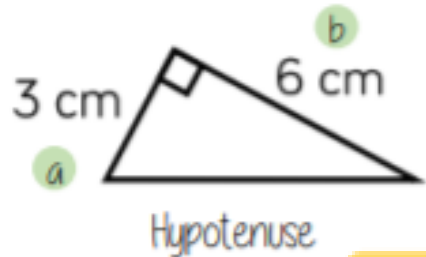


Area



$$\text{Area triangle} = \frac{1}{2} \times \text{base} \times \text{perpendicular height}$$

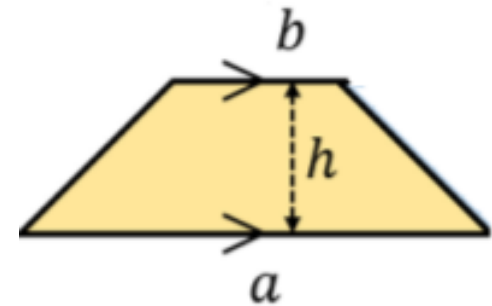
Pythagoras' theorem



$$a^2 + b^2 = \text{hypotenuse}^2$$

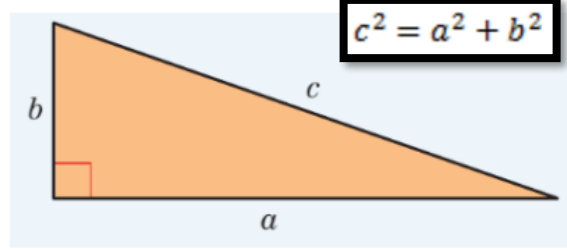
Area of a trapezium

$$\frac{(a + b) \times h}{2}$$

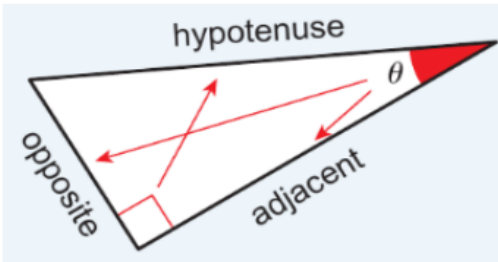


Year 9 – Half Term 5 Maths Knowledge Organiser

Pythagoras Theorem:



Identifying hypotenuse, opposite and adjacent sides in a Right Angled Triangle



Sine Ratio (sin)

$$\sin \theta = \frac{\text{opposite}}{\text{hypotenuse}}$$

Cosine Ratio (cos)

$$\cos \theta = \frac{\text{adjacent}}{\text{hypotenuse}}$$

Tangent Ratio (tan)

$$\tan \theta = \frac{\text{opposite}}{\text{adjacent}}$$

Ratio	A way to compare two or more quantities e.g.. 3:5
Proportion	Compares a part with the whole
Unit ratio	One of the numbers is 1 e.g.. 1:5
Direct proportion	One quantity increases at the same rate as the other e.g.. When one value doubles, so does the other.
Inverse proportion	One quantity increases at the same rate as the other one decreases e.g. When one value is doubled, the other is halved.

y is proportional to x

$$y \propto x$$

If y is proportional to x then

$$y = kx$$

k is the constant of proportionality

Y is inversely proportional to x

$$y \propto \frac{1}{x} \quad y = \frac{k}{x}$$

Pie Chart

A Pie Chart is a circle divided into sectors. Each sector represents a set of data.



EXTRAS

Angle Facts

Year 9 – Half Term 5b Maths KO

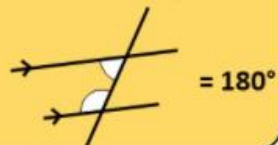
Corresponding Angles



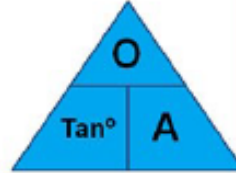
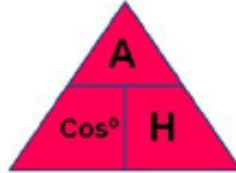
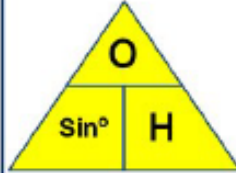
Alternate Angles



Co-Interior Angles



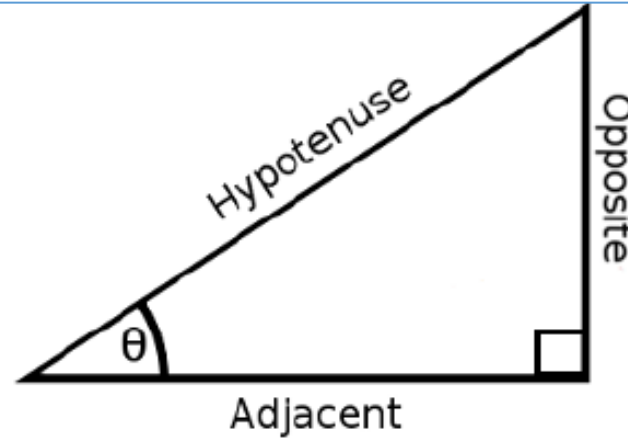
SOH CAH TOA



Hypotenuse: Longest side—opposite the right angle.

Opposite: Opposite the angle given or that you are wanting to find.

Adjacent: Next to the angle given or that you are wanting to find.



Trigonometry

Exact Values

	0°	30°	45°	60°	90°
$\sin \theta$	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1
$\cos \theta$	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0
$\tan \theta$	0	$\frac{\sqrt{3}}{3}$	1	$\sqrt{3}$	$\pm \infty$

How do I solve problems with pie charts?

- Use the following facts
 - **angles** are **proportional** to the **frequencies** of each category
 - **360°** represents the **total frequency**
- For harder problems, it helps to work out
 - **what frequency** is represented by **1°**
 - **what angle** is represented by **1 unit** of frequency
- For example, if a sector of 30° represents 15 people, then
 - 1° = 0.5 people (dividing by 30)
 - 2° = 1 person (multiplying by 2)
- These relationships can then be scaled **up** or **down** accordingly
 - If 1° = 0.5 people
 - then 360° = 180 people (multiplying by 360)

Calculating Basic Probability:

P (event) = $\frac{\text{Number of ways the event can occur}}{\text{Total number of outcomes}}$

P (event **not** happening) = 1 - P (event happening).

$P(\text{rolling a 6}) = \frac{1}{6}$

$P(\text{not rolling a 6}) = 1 - \frac{1}{6} = \frac{5}{6}$

Key Word	Definition / Rule	Example
Probability	Used to describe the chance of something happening.	The probability it will rain this month is very high 0 0.5 1 ImpossibleEvensCertain
Probability scale	All probabilities lie between 0 and 1	
Sample space	In the space diagram P(4) = 3/16 There are three ways of getting a number 4 from a possible 16 outcomes	

x	1	2	3	4
1	1	2	3	4
2	2	4	6	8
3	3	6	9	12
4	4	8	12	16

Year 9 – Half Term 6 Maths KO

Key Facts

Mode

Most common

Mean

$\frac{\text{Sum of values}}{\text{Number of values}}$

Median

Middle value in ascending order

Averages

The **range** is not an average. It tells you how the data is spread out.

Range

Largest value – smallest value

Exam Tip

When *estimating the mean*...you need two extra columns

Midpoint

M x F (midpoint x frequency)

HOT TIP

Key Facts – Advantages and Disadvantages		
Average	Advantages	Disadvantages
Mean	Every value makes a difference	Affected by extreme values
Median	Not affected by extreme values	May not change if a data value changes
Mode	Easy to find. Not affected by extreme values. Can be non-numerical	There may not be one. There may be more than one.