

Maths Knowledge Organiser GCSE Higher Part 1

Know

10
things

to learn

1

× and ÷ with negatives: e.g. $5 \times -3 = -15$
 $-5 \times -3 = 15$
 One - ⇒ answer is -
 $-20 \div 2 = -10$
 Both - ⇒ answer is +
 $-20 \div -2 = 10$

2

integer means 'whole number'

3

A unit fraction power is a root

e.g. $25^{\frac{1}{2}} = \sqrt{25}$
 $7^{\frac{1}{3}} = \sqrt[3]{7}$

4

An **irrational** number is one which can't be written as an integer or fraction. (This means its decimal form never recurs or terminates.)

5

sin, cos & tan

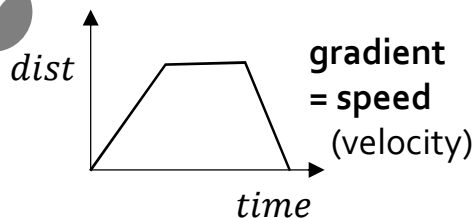
SOH-CAH-TOA

6

Quadratic formula:

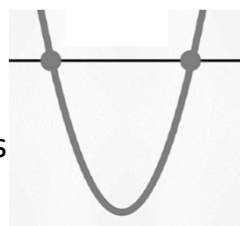
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

7



8

Roots are the x-values where a graph crosses the x-axis

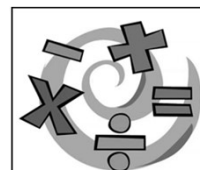
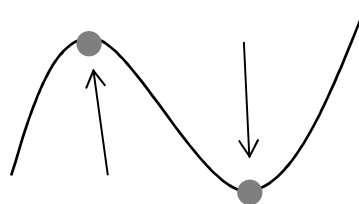


9

In an **arithmetic sequence** (**linear sequence**) we add or subtract the same each time e.g. 5, 8, 11, 14, ... (add 3)

10

A **turning point** has zero gradient. It is either a **minimum point** or a **maximum point**.



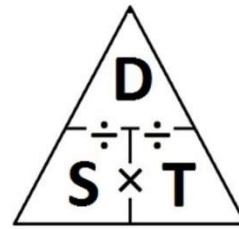
**LITERACY
IN MATHS**



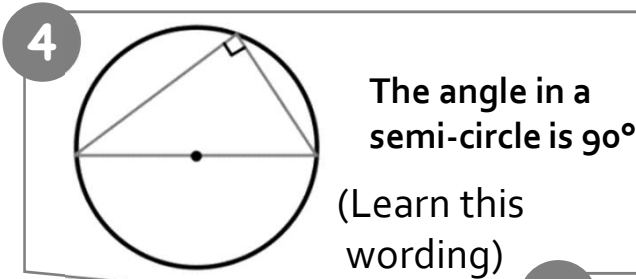
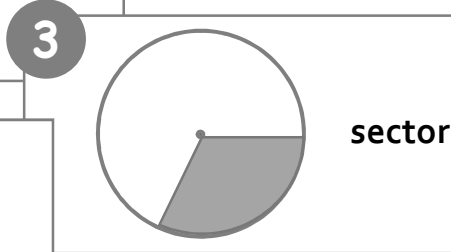
10 things to learn

Maths Knowledge Organiser
GCSE Higher Part 2

1 speed
distance
time



2 1 km = 1000 m
1 kg = 1000 g

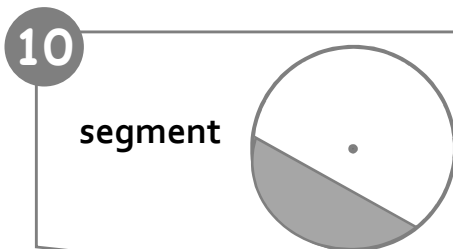
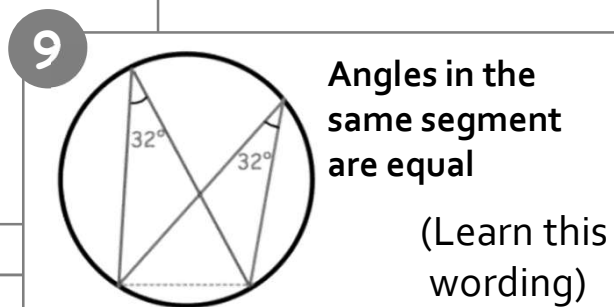


5 An **exact** answer usually contains π or a surd

6 **difference** means subtract
e.g. the difference between 10 and 6 is 4.

7 A **function** 'does something' to **input** numbers to turn them into **output** numbers.
e.g. "add 5" is a function

8 Equation of a line:
 $y = mx + c$
where m = gradient
 c = y-axis intercept



Maths Knowledge Organiser GCSE Higher Part 3

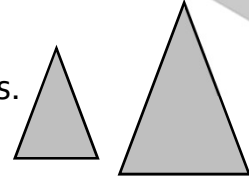
10
things

to learn

Know

1

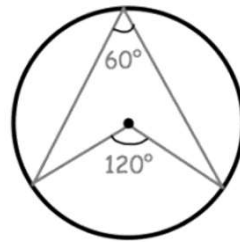
Similar shapes have the same angles.
One is an enlargement of the other.



2

A pair of **interior** and **exterior** angles adds up to 180°

3



The angle at the centre is double the angle at the circumference

4

More complex fraction powers are a power and a root

e.g. $8^{\frac{2}{3}} = (\sqrt[3]{8})^2$

5

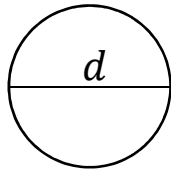
product means 'multiply'

e.g. the product of 3 and 4 is 12

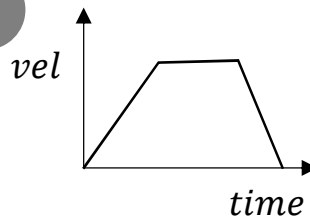
6

Circumference of a circle:

$$C = \pi \times d$$



7



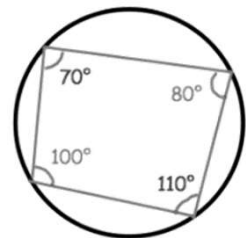
gradient = acceleration

8

When transforming shapes an **invariant point** (or line) stays in the same place

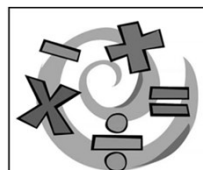
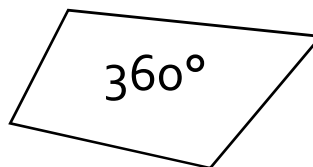
9

Opposite angles in a cyclic quadrilateral add up to 180°



10

The **angles** in any **quadrilateral** add up to 360°



LITERACY
IN MATHS

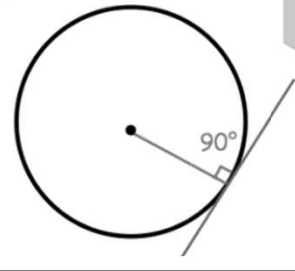


10 things to learn

Maths Knowledge Organiser
GCSE Higher Part 4



1 A radius and a tangent meet at 90°



2 Anything to power 0 equals 1
e.g. $p^0 = 1$, $57^0 = 1$

3 A prime number has exactly two factors (1 and itself)
Learn the **primes** less than 20:
2, 3, 5, 7, 11, 13, 17, 19, ...

4 For **powers of powers** we multiply the powers
e.g. $(x^5)^3 = x^{15}$

5 **Rotations, reflections and translations** produce **congruent** (identical) images.
Enlargements produce a **similar** image.

6 $>$ means 'greater than'
On a number line:



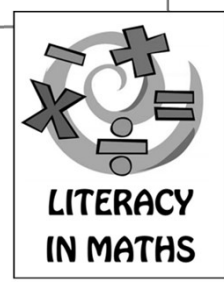
7 1 litre = 1000 ml

8 \geq means 'greater than or equal to'
On a number line:



9 A **recurring** decimal has a repeating pattern
A dot notation is used to show the pattern
e.g. $0.4\dot{5} = 0.455555 \dots$
 $0.\dot{4}5 = 0.454545 \dots$

10 **reciprocal** means '1 divided by the number'
This inverts fractions $\frac{2}{3}$ $\frac{3}{2}$
e.g. the reciprocal of $\frac{2}{3}$ is $\frac{3}{2}$



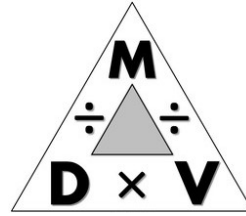
10
things

to learn

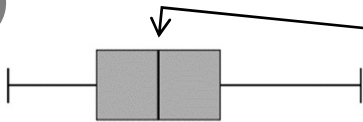
Maths Knowledge Organiser GCSE Higher Part 5

1

density
mass
volume



2



median

3

Capacity and volume

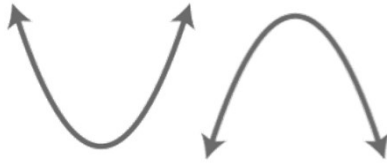
$$1 \text{ ml} = 1 \text{ cm}^3$$

$$1 \text{ litre} = 1000 \text{ cm}^3$$

Know

4

A **quadratic** (x^2) graph makes a U-shape called a **parabola**



5

Area of a sector:

$$\frac{\theta}{360} \times \pi r^2$$

6

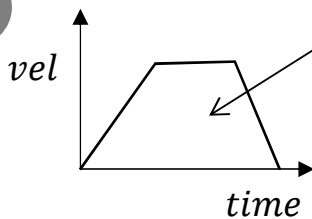
Arc length of a sector:

$$\frac{\theta}{360} \times \pi d$$

7

In a **geometric sequence** we multiply or divide by the same amount each time
e.g. 3, 6, 12, 24, ... ($\times 2$)

8



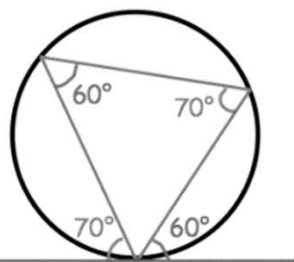
area
= distance

9

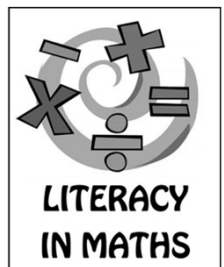
A **power of -1** is a reciprocal

e.g. $5^{-1} = \frac{1}{5}$

10



The Alternate
Segment
Theorem



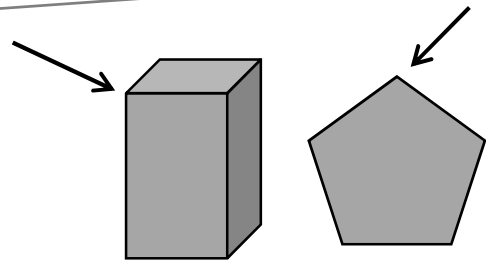
Maths Knowledge Organiser GCSE Higher Part 6

10
things

to learn

1

In a 2D or 3D shape, a **vertex** is a corner.
(plural: **vertices**)



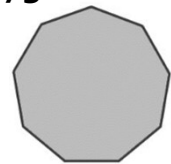
2

The **surface area** of a 3D solid is the areas of all of its faces added together

3

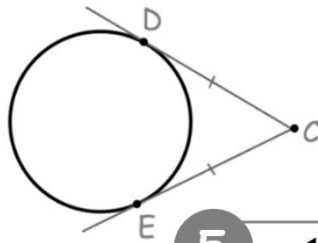
A **regular shape (polygon)** has:

- all equal sides
- all equal angles



4

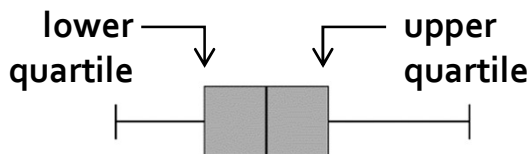
Tangents to a point are the same length



5

$$\frac{1}{4} = 0.25 = 25\%$$

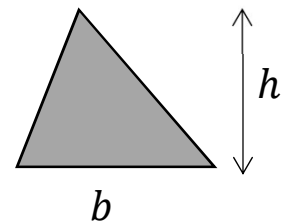
6



7

Area of triangle

$$\frac{b \times h}{2}$$



Know

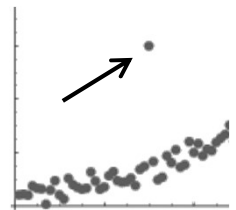
8



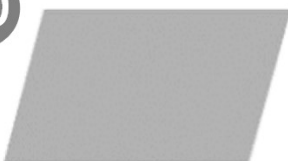
A **rhombus** has 4 equal sides

9

An **outlier** is a piece of data that doesn't fit the pattern of the rest of the data



10



A **parallelogram** has two pairs of parallel sides



Maths Knowledge Organiser GCSE Higher Part 7

10
things

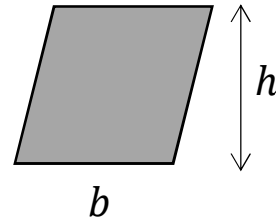
to learn

Know

1

Area of parallelogram

$$b \times h$$



2

We usually **estimate** by rounding each number to 1 significant figure

3

discrete data can only have certain values

e.g. number of people
shoe size

4

continuous data can be measured very accurately

e.g. height, weight, time

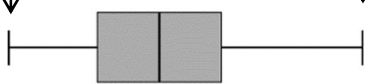
5

$$\frac{3}{4} = 0.75 = 75\%$$

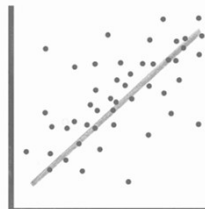
6

lowest value

highest value



7



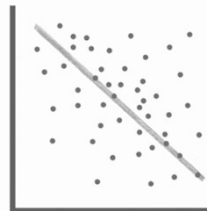
positive
correlation

8

Negative powers

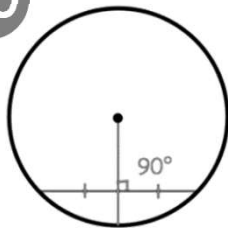
e.g. $5^{-2} = \frac{1}{5^2} = \frac{1}{25}$

9



negative
correlation

10



The perpendicular
bisector of a chord
is a radius



chaseterraceacademy



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IN MATHS

Maths Knowledge Organiser

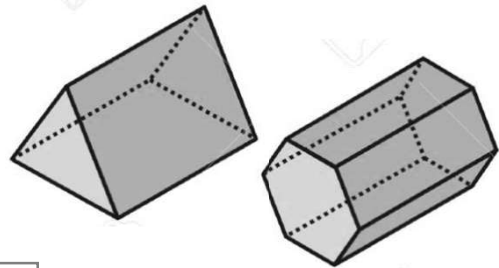
GCSE Higher Part 8

10
things

to learn

1

A **prism** has the same shape running all the way through the middle



2

Interquartile range

$$\text{IQR} = \text{UQ} - \text{LQ}$$

3

To find the **median** average

- put the numbers in **order**
- select the **middle** number (or in between the two, if there are 2 middle numbers)

4

A **square number** is made by multiplying a number by itself

Learn the **squares** up to 10 x 10:

1, 4, 9, 16, 25, 36, 49, 64, 81, 100, ...

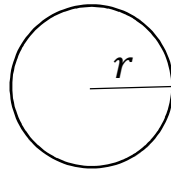
5

$$\frac{1}{10} = 0.1 = 10\%$$

6

Area of a circle:

$$A = \pi \times r^2$$



7

trend means 'overall pattern'

e.g. The profits went up

Know

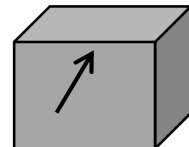
8

The **Sine Rule:**

$$\frac{a}{\sin A} = \frac{b}{\sin B}$$

9

In a 3D shape, an **edge** is a line connecting two faces.



10

$$1 \text{ m} = 100 \text{ cm}$$

$$1 \text{ m}^2 = 100^2 \text{ cm}^2$$

$$1 \text{ m}^3 = 100^3 \text{ cm}^3$$



Maths Knowledge Organiser

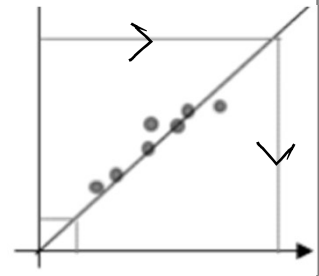
GCSE Higher Part 9

10
things

to learn

1

In a scatter diagram, it is usually unreliable to make predictions **outside the range of the original data**



2

consecutive numbers are in order
e.g. 5, 6, 7, 8 (or $n, n + 1, n + 2$)

3



A **scalene triangle** has no equal sides and no equal angles

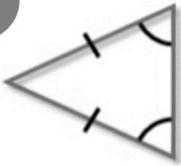
4

In **simple random sampling** every person (or object) has the same probability of being in the sample.
e.g. names from a hat

5

$$\frac{1}{5} = 0.2 = 20\%$$

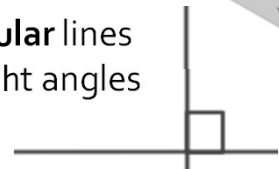
6



The **base angles** of an isosceles triangle are equal

7

Perpendicular lines meet at right angles



Know

8

The **mode** is the data value which is the most common.
There can be 2 modes (**bimodal** data) or no mode.

9

evaluate means 'work out the **value**' giving your answer as a number

10

A **cube number** is made by multiplying three of the number together (cubing it)
e.g. $2 \times 2 \times 2 = 8$
Learn the first five cube numbers: 1, 8, 27, 64, 125, ...



10 things to learn

**Maths Knowledge Organiser
GCSE Higher Part 10**

1 In a **quadratic sequence** the coefficient of n^2 is half the 2nd difference

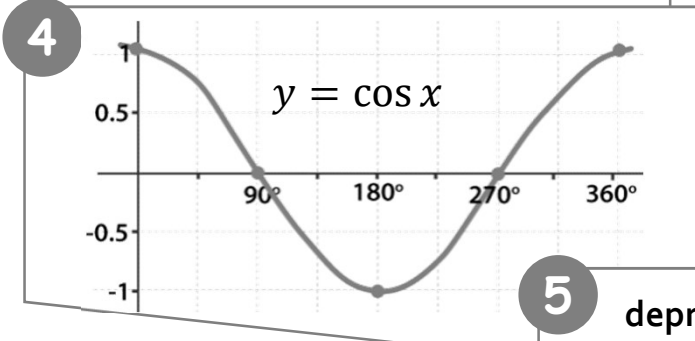
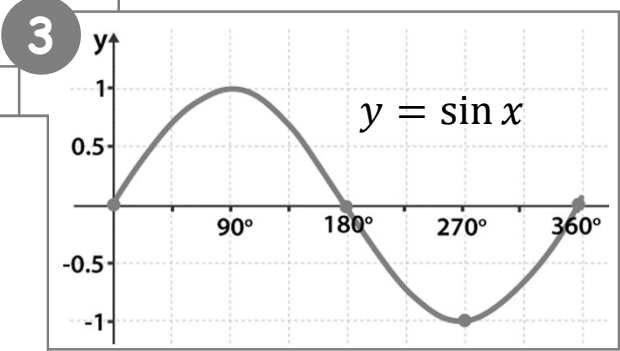
e.g. $2n^2 \dots$

0, 1, 6, 15

+1 +5 +9

+4 +4

2 A **plan** is a view from above



5 **depreciate** means 'go down in value' (like a second-hand car)

6 **Pythagoras' theorem:**

$a^2 + b^2 = c^2$

7 In probability, **OR** means **ADD**

Know

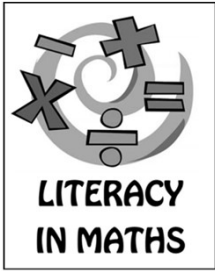
8 **Volume of cuboid:**

$a \times b \times c$

9 In probability, **AND** means **MULTIPLY**

10 A **recurrence relation** is a sequence where each term is calculated from the previous term(s).

e.g. $x_{n+1} = 2x_n - 3$

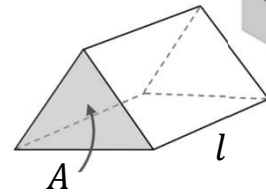


10 things to learn

Maths Knowledge Organiser
GCSE Higher Part 11

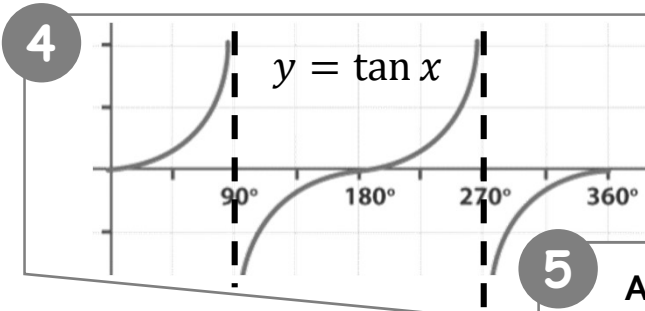
Know

1 Volume of prism:
 $\text{area of end} \times \text{length}$



2 The **median** and **interquartile range** are likely to be more reliable than the **mean** and **range**, because they are not affected by outliers

3 A **vector** describes movement
e.g. $\begin{pmatrix} 5 \\ 2 \end{pmatrix}$ 5 right & 2 up
 $\begin{pmatrix} -5 \\ -2 \end{pmatrix}$ 5 left & 2 down



5 **A% of B:** $A \div 100 \times B$
e.g. 12% of £300: $12 \div 100 \times 300$

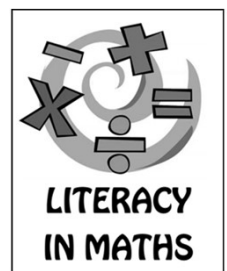
6 **iteration** means 'doing the same thing over and over again'

7 It's easy to **multiply fractions**:
e.g. $\frac{2}{5} \times \frac{3}{7} = \frac{6}{35}$ ← 2×3
← 5×7

8 $<$ means 'less than'
On a number line:

9 The **square root** of a number is what you square to make it
e.g. $\sqrt{16} = 4$ because $4 \times 4 = 16$

10 \leq means 'less than or equal to'
On a number line:



Maths Knowledge Organiser GCSE Higher Part 12

10
things

to learn

1

Gradient from 2 points:

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

2

in terms of π means
'leave π in your answer' e.g. 6π

3

$$\frac{1}{3} = 0.\dot{3} = 33.\dot{3}\%$$

Know

4

In a **Fibonacci-type sequence**, two terms are added to get the next one
e.g. 1, 1, 2, 3, 5, 8, 13, ...
($1 + 1 = 2$, $1 + 2 = 3$, etc.)

5

A out of B as a % $A \div B \times 100$
e.g. 5 out of 17: $5 \div 17 \times 100$

6

A number in **standard form**:

1.3×10^9
↙ ↘
between 1 & 10 power of 10

7

Parallel lines go in the same direction.
They have the same **gradient**
e.g. $y = 5x + 2$, $y = 5x - 7$

8

+ - makes -
- - makes +
e.g. $5 + -3 = 5 - 3 = 2$
 $5 - -3 = 5 + 3 = 8$

9

The **cube root** of a number is what you cube to make it
e.g. $\sqrt[3]{8} = 2$ because $2 \times 2 \times 2 = 8$

10

The **Cosine Rule**:

$$a^2 = b^2 + c^2 - 2bc \cos A$$

Maths Knowledge Organiser

GCSE Higher Part 13

Know

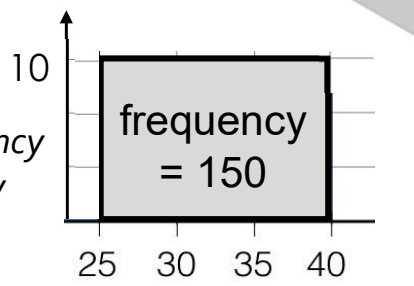
10
things

to learn

1

In a **histogram**, the area is the frequency

frequency
density



2

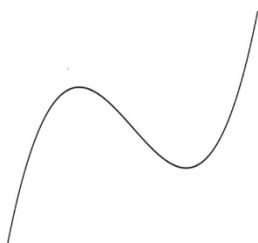
equidistant means 'equal distances' (from two points)

3

$$\sin 30 = \cos 60 = \frac{1}{2}$$

4

A **cubic** (x^3) graph generally has a shape like this:



5

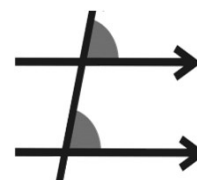
bisect means 'cut in half'

6

$$\sin 60 = \cos 30 = \frac{\sqrt{3}}{2}$$

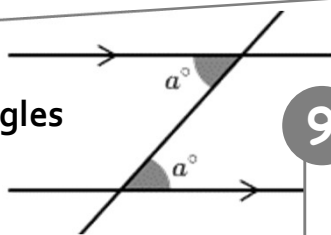
7

corresponding angles are equal



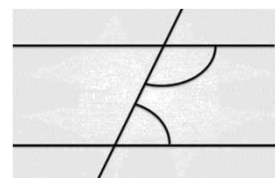
8

alternate angles are equal



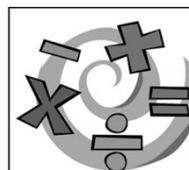
9

co-interior angles add up to 180°



10

$$\sin 45 = \cos 45 = \frac{\sqrt{2}}{2}$$



Maths Knowledge Organiser

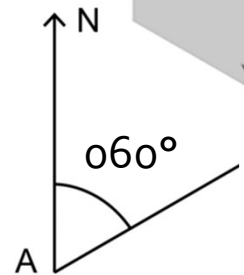
GCSE Higher Part 14

10 things to learn



1

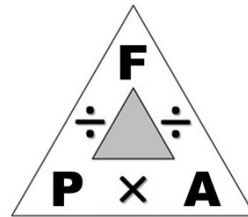
bearings are measured clockwise from north and written with 3 digits



2

inverse means 'opposite'
e.g. + and - are inverse operations

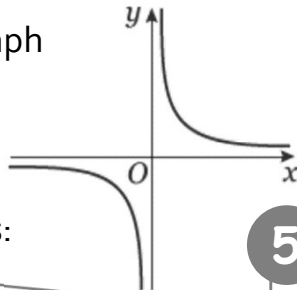
3



pressure
force
area

4

A **reciprocal** graph such as $y = \frac{1}{x}$ looks like this:



5

With **simple interest**, the interest is the same amount every time

6

$$\tan 30 = \frac{\sqrt{3}}{3}$$

7

To **divide by a fraction**, multiply by its reciprocal

e.g. $\frac{2}{5} \div \frac{3}{7} = \frac{2}{5} \times \frac{7}{3} = \frac{14}{15}$

KFC

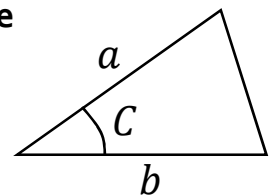
8

$$\tan 60 = \sqrt{3}$$

9

Area of a triangle

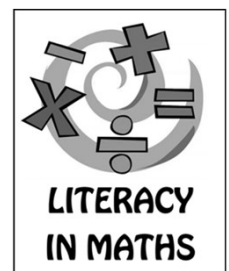
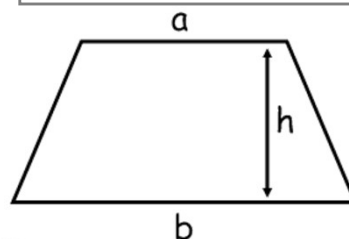
$$\frac{1}{2} ab \sin C$$



10

Area of a trapezium

$$\frac{1}{2} (a + b) h$$



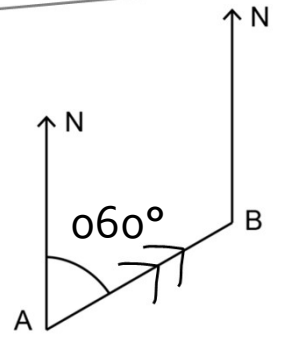
Maths Knowledge Organiser GCSE Higher Part 15

10
things

to learn

1

The bearing of **B from A** is the direction to travel to get to B from A.



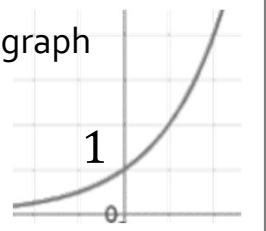
2

Direct proportion: $y = kx$

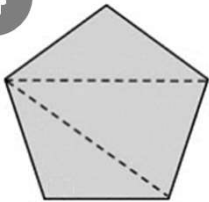
3

An exponential graph looks like this:

e.g. $y = 2^x$



4



For an n -sided polygon, sum of interior angles

$$(n - 2) \times 180$$

5

Equation of a circle: (centred at the origin)

$$x^2 + y^2 = r^2$$

Know

6

Inverse proportion: $y = \frac{k}{x}$

7

Gradients of perpendicular lines are a 'negative reciprocal'

e.g. $\frac{2}{3}$ and $-\frac{3}{2}$

8

The conditions for triangles to be congruent are:

SSS, SAS, ASA, RHS

9

$$\tan 45 = 1$$

10

The exterior angles of any polygon add up to 360°

