

Maths Knowledge Organiser

GCSE Foundation Part 1

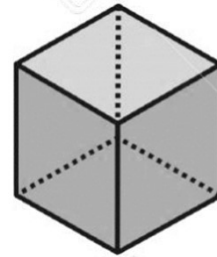
Know

10
things

to learn

1

A **cube** has squares for all of its faces



2

sum means 'total' (add up)
e.g. the sum of 7 and 3 is 10

3

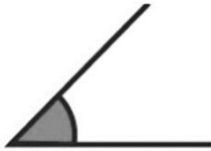
even numbers are the 2 times table:

2, 4, 6, 8, 10, 12, 14, 16, ...

They end in 2, 4, 6, 8 or 0

4

An **acute angle** is less than 90°

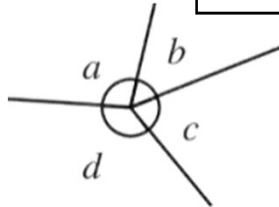


5

The **area** of a shape is the amount of space inside it

6

Angles at a point
add up to 360°



7

To **multiply**, we **add** the powers

$$p^9 \times p^3 = p^{12}$$

$$5^{11} \times 5^9 = 5^{20}$$

8

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

$$1 \text{ cm} = 10 \text{ mm}$$

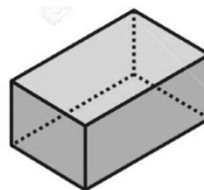
9

A **mixed number** has a whole number part and a fraction part

e.g. $5\frac{2}{3}$

10

A **cuboid** has rectangles for all of its faces (some can be squares)



Maths Knowledge Organiser

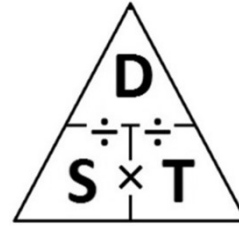
GCSE Foundation Part 2

10
things

to learn

1

speed
distance
time



Know

2

1 km = 1000 m
1 kg = 1000 g

3

odd numbers are those which are not in the 2 times table:

1, 3, 5, 7, 9, 11, 13, 15, ...

They end in 1, 3, 5, 7 or 9

4

An **obtuse angle** is more than 90° but less than 180°



5

An **improper fraction** is 'top-heavy'

e.g. $\frac{17}{5}$

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

A **sphere** is a ball-shape

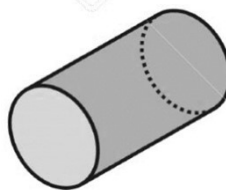


9

expand or **multiply out** mean 'get rid of the brackets'

10

A **cylinder** is a tube-shape, with circles at both ends



Maths Knowledge Organiser

GCSE Foundation Part 3

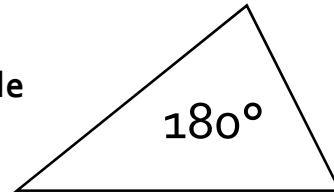
Know

10
things

to learn

1

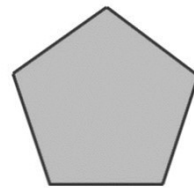
The **angles** in any **triangle** add up to 180°



2

A **factor** goes into another number
e.g. the factors of 10 are: 1 & 10, 2 & 5

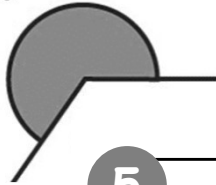
3



A **pentagon** has 5 sides

4

A **reflex angle** is more than 180° but less than 360°



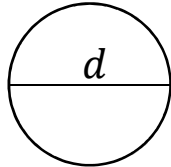
5

product means 'multiply'
e.g. the product of 3 and 4 is 12

6

Circumference of a circle:

$$C = \pi \times d$$



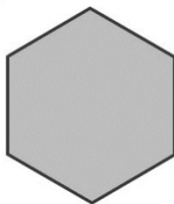
7

To **divide**, we **subtract** powers

$$\text{e.g. } p^9 \div p^3 = p^6$$
$$5^{11} \div 5^9 = 5^2$$

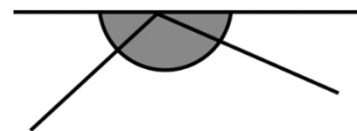
8

A **hexagon** has 6 sides



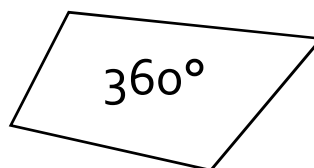
9

Angles on a line add up to 180°



10

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

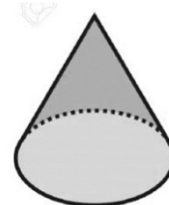


10 things to learn

Maths Knowledge Organiser
GCSE Foundation Part 4



1 A **cone** has a curved surface with a point at one end and circle at the other end



2 **integer** means 'whole number'

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 To work out the **mean** average,
- **add** up all the data
- **divide** by the number of items

5 The **perimeter** of a shape is the total distance around the outside of it

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:

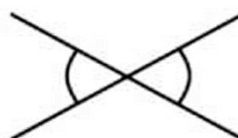


9 A **recurring decimal** has a repeating pattern
Dot notation is used to show the pattern:

e.g. $0.4\dot{5} = 0.455555 \dots$

$0.\dot{4}5 = 0.454545 \dots$

10 **vertically opposite angles** are equal



LITERACY
IN MATHS



Maths Knowledge Organiser

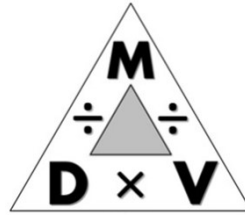
GCSE Foundation Part 5

10
things

to learn

1

density
mass
volume



Know

2

percent means 'out of 100'

3

A right angle has exactly 90°

4

Area of rectangle

$$b \times h$$

h



5

index means 'power' (plural: indices)

e.g. $2^4 = 2 \times 2 \times 2 \times 2 = 16$

6

The **multiples** of a number
are its times table.

e.g. multiples of 10 are: 10, 20, 30, 40, ...

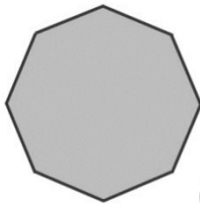
7

In an **arithmetic sequence**
(or **linear sequence**) we add or
subtract the same each time

e.g. 5, 8, 11, 14, ... (add 3)

8

An **octagon**
has 8 sides



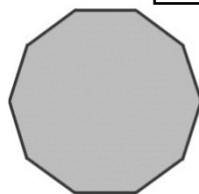
9

A negative power is a **reciprocal**

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

10

A **decagon**
has 10 sides



Maths Knowledge Organiser

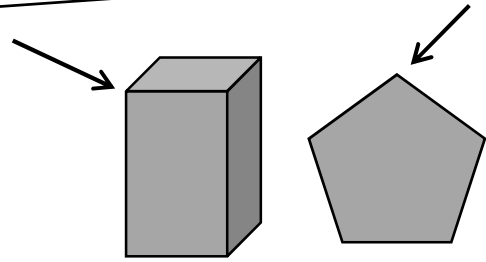
GCSE Foundation Part 6

10
things

to learn

1

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



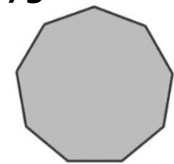
2

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



A **trapezium** has one pair of parallel sides

5

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

Know

6

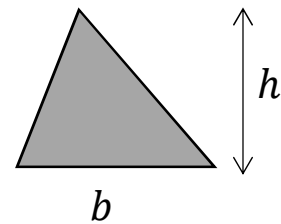
A **common factor** is a factor of both numbers

e.g. 2 is a common factor of 14 and 16

7

Area of triangle

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



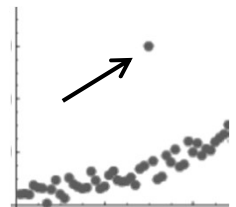
8



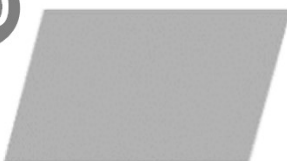
A **rhombus** has 4 equal sides

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 Foundation Part 7

Know

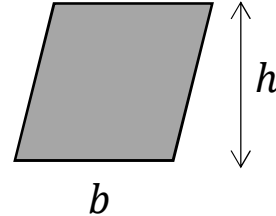
10
things

to learn

1

Area of parallelogram

$$b \times h$$



2

estimate means 'work out a rough answer'
(by rounding each number to 1 s.f.)

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

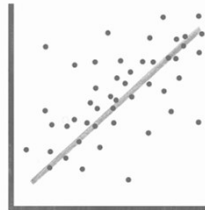
$$\frac{3}{4} = 0.75 = 75\%$$

6

A **common multiple** is a
multiple of both numbers

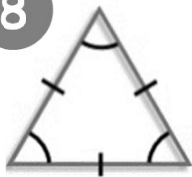
e.g. 20 is a common multiple of 2 and 5

7



**positive
correlation**

8



An **equilateral triangle**,
has 3 equal sides and
3 equal angles (of 60°)

9



**negative
correlation**

10

A **kite** has 2 pairs
of equal sides.
The equal sides are **adjacent**
(next to each other)



Maths Knowledge Organiser

GCSE Foundation Part 8

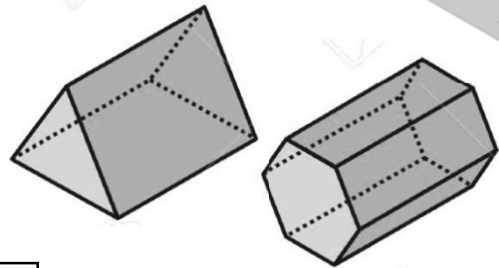
Know

10
things

to learn

1

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



2

factorise means 'put into brackets'

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, ...

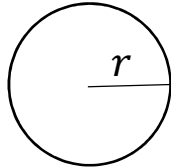
5

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

6

Area of a circle:

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



7

trend means 'overall pattern'
e.g. The profits went up

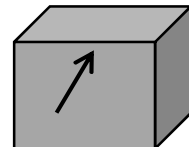
8



An **isosceles triangle** has 2 equal sides and 2 equal angles (the **base angles**)

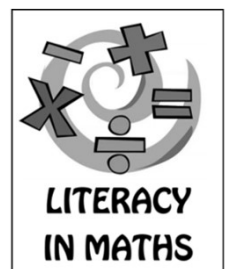
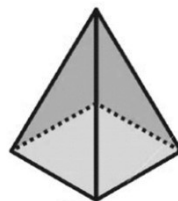
9

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



10

A **square-based pyramid** has one square face and the other faces triangular



10 things to learn

Maths Knowledge Organiser GCSE Foundation Part 9



1



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

2

The **volume** of a 3D solid is the amount of space it takes up

3

The **lowest common multiple** is the smallest multiple of both numbers
e.g. 20 is the **LCM** of 10 and 4

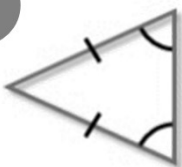
4

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

5

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

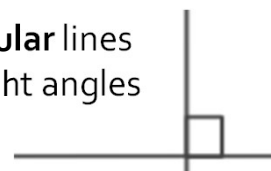
6



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

7

Perpendicular lines meet at right angles



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, ...



**LITERACY
IN MATHS**



Maths Knowledge Organiser

GCSE Foundation Part 10

Know

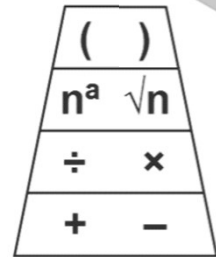
10
things

to learn

1

The order of operations tell us the right order to do a calculation

Learn the diagram on the right to help you remember the order



2

A **plan** is a view from above

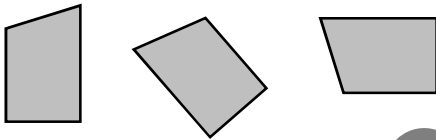
3

The **highest common factor** is the largest factor of both numbers

e.g. 2 is the **HCF** of 10 and 8

4

congruent shapes are identical
(One can be rotated or reflected)



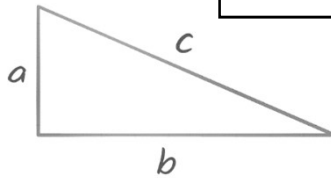
5

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

6

Pythagoras' theorem:

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



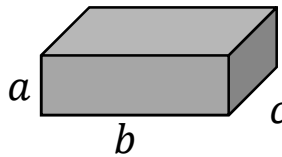
7

In probability,
OR means **ADD**

8

Volume of cuboid:

$$a \times b \times c$$

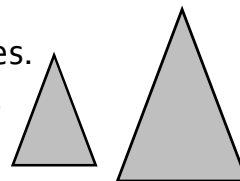


9

In probability,
AND means **MULTIPLY**

10

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



**LITERACY
IN MATHS**



chaseterraceacademy

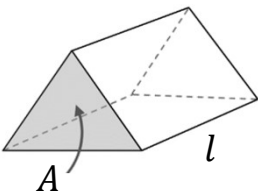
10 things to learn

Maths Knowledge Organiser
GCSE Foundation Part 11

Know

1 $\frac{4}{6} \overset{\times 2}{=} \frac{8}{12}$ We make **equivalent** (identical) fractions by multiplying (or dividing) the numerator and denominator by the same number

2 Volume of prism:
area of end \times *length*



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

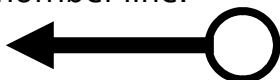
4 Equation of a line:
 $y = mx + c$
with m = gradient
 c = y -axis intercept

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

6 sin, cos & tan
SOH-CAH-TOA

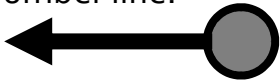
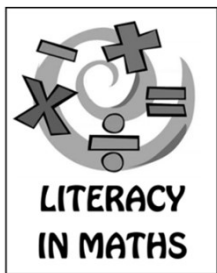
7 It's easy to multiply fractions:
e.g. $\frac{2}{5} \times \frac{3}{7} = \frac{6}{35}$ $\leftarrow 2 \times 3$
 $\leftarrow 5 \times 7$

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 Foundation Part 12

Know

10
things

to learn

1

We make **equivalent** (identical) ratios by multiplying (or dividing) both parts by the same number

$$\begin{array}{c} 1:5 \\ \times 2 \quad \left(\quad \right) \quad \times 2 \\ \hline 2:10 \end{array}$$

2

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

3

Gradient of a line:

$$m = \frac{\text{change in } y}{\text{change in } x}$$

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**:

$$\begin{array}{c} 1.3 \times 10^9 \\ \swarrow \quad \searrow \\ \text{between 1 \& 10} \quad \text{power of 10} \end{array}$$

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. $5 + -3 = 5 - 3 = 2$
 $5 - -3 = 5 + 3 = 8$

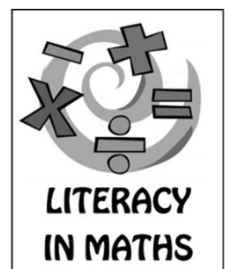
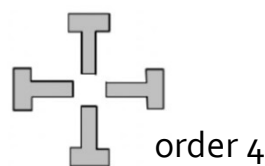
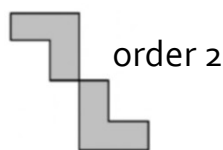
9

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 **order of rotational symmetry** is the number of ways the shape will look identical as it is rotated through a full turn.

e.g.



Maths Knowledge Organiser

GCSE Foundation Part 13

Know

10
things

to learn

1

× and ÷ with negatives:

One - ⇒ answer is -

Both - ⇒ answer is +

e.g. $5 \times -3 = -15$

$$-5 \times -3 = 15$$

$$-20 \div 2 = -10$$

$$-20 \div -2 = 10$$

2

equidistant means 'equal distances' (from two points)

3

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

4

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



5

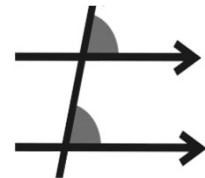
bisect means 'cut in half'

6

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

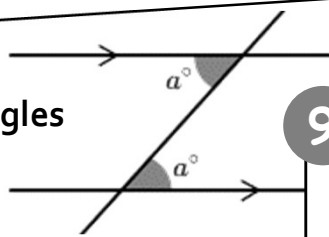
7

corresponding angles are equal



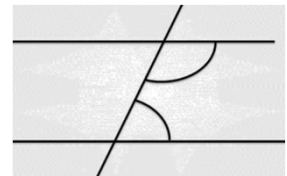
8

alternate angles are equal



9

co-interior angles add up to 180°



10

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

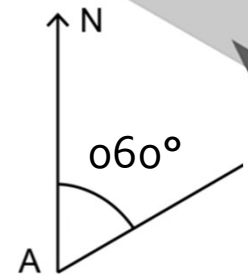
10 things to learn

Maths Knowledge Organiser
GCSE Foundation Part 14

Know

1

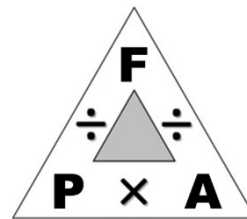
bearings are measured clockwise from north and written with 3 digits



2

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

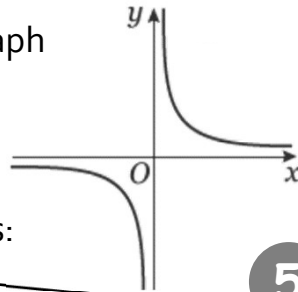
3



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

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

8

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

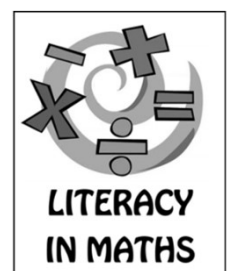
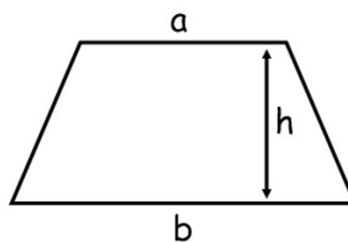
9

With **compound interest**, you pay (or earn) interest on the interest

10

Area of a trapezium

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



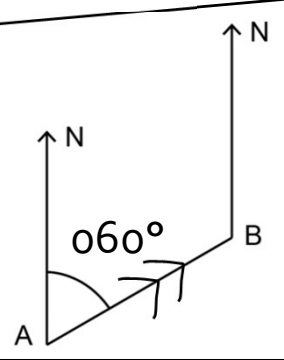
Maths Knowledge Organiser GCSE Foundation Part 15

10
things

to learn

1

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

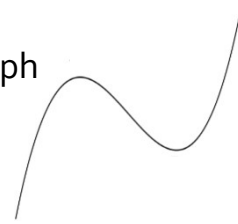


2

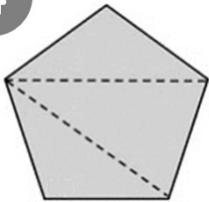
Direct proportion: $y = kx$

3

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



4

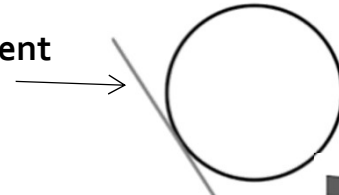


For an n -sided polygon, **sum of interior angles**

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

5

tangent

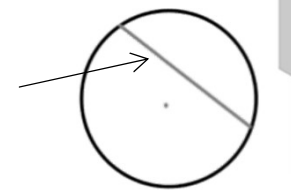


6

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

7

chord



Know

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°

