Maths booklet

Learn these...

×	1	2	3	4	5	6	7	8	9	10
1	1	2	3	4	5	6	7	8	9	10
2	2	4	6	8	10	12	14	16	18	20
3	3	6	9	12	15	18	21	24	27	30
4	4	8	12	16	20	24	28	32	36	40
5	5	10	15	20	25	30	35	40	45	50
6	6	12	18	24	30	36	42	48	54	60
7	7	14	21	28	35	42	49	56	63	70
8	8	16	24	32	40	48	56	64	72	80
9	9	18	27	36	45	54	63	72	81	90
10	10	20	30	40	50	60	70	80	90	100

KNOW YOUR TABLES!

Daily work to keep sharp will make you a confident mathematician.

Useful Mathematical Language

Angles	Angles are formed when 2 straight lines meet. Measured using degrees (°).
Acute angles	Smaller than 90 degrees.
Right angles	Measure exactly 90 degrees.
Obtuse angles	Greater than 90 degrees but less than 180 degrees.
Reflex angles	Greater than 180 degrees.
Area	The amount of surface a shape takes up. Measured in centimetres squared (cm^2).
Calculate	Work out
Capacity	The amount that something can hold. It can be measured in litres, millilitres or in cubic centimetres e.g. $100cm^3$.
Century	= 100 years
Decade	= 10 years
Degree	The unit of measurement we use for measuring angles and temperatures.

Difference	To find the difference between 2 numbers, you need to take the smaller number away from the larger one. E.g. the difference between 10 and 4 is 6.
Equilateral triangle	A triangle with sides of equal lengths and equal angles (all equal 60°).
Factors	A factor is a whole number which will divide exactly into another whole number. E.g. the factors of 12 are 1, 12, 2, 6, 3 and 4.
Inverse operation	If you have a calculation with a missing number, you can use the inverse operation to solve it. + and - are the inverse of each other x and ÷ are the inverse of each other
Mean	To find the mean of a set of numbers, you add all the numbers together and then divide by the number of results you have
Multiple	Multiples are whole numbers that a larger number can be made of by adding lots of the smaller number together. E.g. 12 is a multiple of 3

Percentage (%)	Means 'out of 100'. 20% = 20 out of 100
Perimeter	The distance around the outside of a shape.
Prime numbers	Numbers which will divide exactly only by themselves and 1. These are the prime numbers to 30: 1 2 3 7 11 13 17 19 23 29
Product	The answer when numbers have been multiplied together. E.g. the product of 3 and 4 is 12
Right-angled triangle	A triangle where one of the angles is a right angle (90°).
Scalene triangle	A triangle where no sides are the same length and no angles are the same measurement.
Square number	The product when a number is multiplied by itself. Square number to 100 are: 1 4 9 16 25 36 49 64 81 100
Sum	When numbers have been added together. E.g. the sum of 3 and 4 is 7

Place value

Five million, three hundred and twenty thousand, seven hundred and eighty-six point four one.

M	100 Th	10 Th	Th	H	T	O	.	t	h
Millions	Hundreds of Thousands	Tens of Thousands	Thousands	Hundreds	Tens	Ones	Decimal Point	Tenths	Hundredths
5,	3	2	0,	7	8	6	.	4	1

©Teaching

Rounding

Rounding Rap

Find the place value and circle the digit.

Move to the right and underline it.

0 - 4 the circle stays the same.

but 5 - 9 , adding 1 is the game !

Now , flex your muscles , just like a hero.

Digits to the right - - -change to 0.

All the other numbers , they stay the same.

Yo ! ! ! You 're a winner at the rounding game !

Roman Numerals

Addition

Learn your number facts (pairs of numbers that add to 10, 20 and 100).

Here are some different written methods you could use:

Partitioning...

$$14 + 28 =$$

$$10 + 20 = 30$$

$$4 + 8 = 12$$

$$30 + 12 = 42$$

Columns...

Method 1

```
  1 2 1
+   4 7
───────
  1 0 0
    6 0
      8
───────
  1 6 8
```

Method 2

```
  2 7 1
+ ₁9 3
───────
  3 6 4
```

Subtraction

Learn your number facts: learn the corresponding subtractions to addition pairs of numbers.

For example, if you learn that 5 + 3 = 8, you also know that 8 – 5 = 3 and 8 – 3 equals 5.

Here are some different written methods you could use:

Partitioning...

$36 - 24 = 36 - 20 - 4 = 12$

$436 - 204 = 436 - 200 - 4 = 232$

Number line...

$356 - 64$
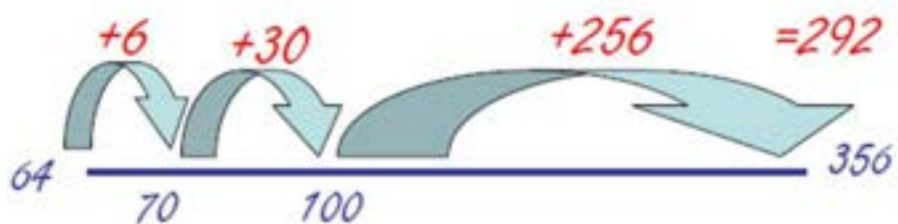
Columns...

Multiplication

Know your tables!

Here are some different written methods you could use:

Repeated addition... 13×5

$$
\begin{array}{r}
1 \\
1\,3 \\
1\,3 \\
1\,3 \\
1\,3 \\
+\ 1\,3 \\
\hline
6\,5 \\
\end{array}
$$

Partitioning... 14×6

$$
\begin{array}{r}
10 \times 6 = 60 \\
4 \times 6 = 24 \\
\hline
84 \\
\end{array}
$$

'Grid' method... 14×129

×	100	20	9		
10	1000	200	90	=	1290
4	400	80	36	=	516
				=	1806

Standard columns method…

Example 1:

$$\begin{array}{r} {}^{2} \\ 35 \\ \times 5 \\ \hline 175 \end{array}$$

<u>Step 1</u> – Start with the units. 5 x 5 = 25 (carry the 2 tens over to the tens column).

<u>Step 2</u> – 3 x 5 = 15. Add the 2 (carried over) to give 17.

Example 2:

$$\begin{array}{r} {}^{53} \\ 485 \\ \times 16 \\ \hline 2910 \\ + 4850 \\ \hline 7760 \\ {}_{1} \end{array}$$

<u>Step 1</u> – Position the digits in their place value columns.

<u>Step 2</u> – Multiply the <u>top units</u> by the <u>lower units</u>: 5 x 6 = 30. The '0' goes in the units column and the '3 tens' are carried over to the top ten.

Step 3 – Multiply the <u>top tens</u> by the <u>lower units</u>: 8 x 6 = 48. Add the 3 tens carried over which makes 51. The '1' is placed in the tens column and the '5' is carried over to the hundreds column.

Step 4 – Multiply the <u>top hundreds</u> by the <u>lower units</u>: 4 x 6 = 24. Add the 5 (carried over) = 29.

Step 5 – Write a zero in the units column below the first answer to show that all the answer is multiplied by 10.

Step 6 – Multiply the <u>top units</u> by the <u>lower tens</u>: 5 x 1 = 5. Write 5 in the tens column.

Step 7 – Multiply the <u>top tens</u> by the <u>lower tens</u>: 8 x 1 = 8. Write the answer in the hundreds column.

Step 8 – Multiply the <u>top hundreds</u> by the <u>lower tens</u>: 4 x 1 = 4. Write 4 in the thousands column.

Step 9 – Lastly, add the two products together using column addition: 2910 + 4850 = 7760.

Step 10 – Check your workings.

Division

Know your tables!

Once you know your tables, your understanding of inverse can help you to work out the answer. For example, if you know that 4 x 7 = 28 then you know that 28 ÷ 4 = 7 AND 28 ÷ 7 = 4.

Here are some different written methods you could use:

Chunking... $455 \div 3$

```
    455
  - 300        = 100 lots of 3
  -----
    155
  - 150        = 50 lots of 3
  -----
      5
  -   3        = 1 lot of 3
  -----
      2        = 151 r 2
```

Short division (bus stop)...

$455 \div 2$

```
      2 2 7,5
  2 | 4 5 5,0
```

A step by step guide to short division can be found at:

https://www.youtube.com/watch?v=SLze82Zcc4Y&safe=active

This method is sometimes referred to as the 'bus stop' method.

Fraction wall

Use this wall to help you understand equivalence between fractions (fractions that have the same value).

Using this wall, you can see that 1/2 = 2/4 = 3/6 = 4/8 = 5/10 = 6/12.
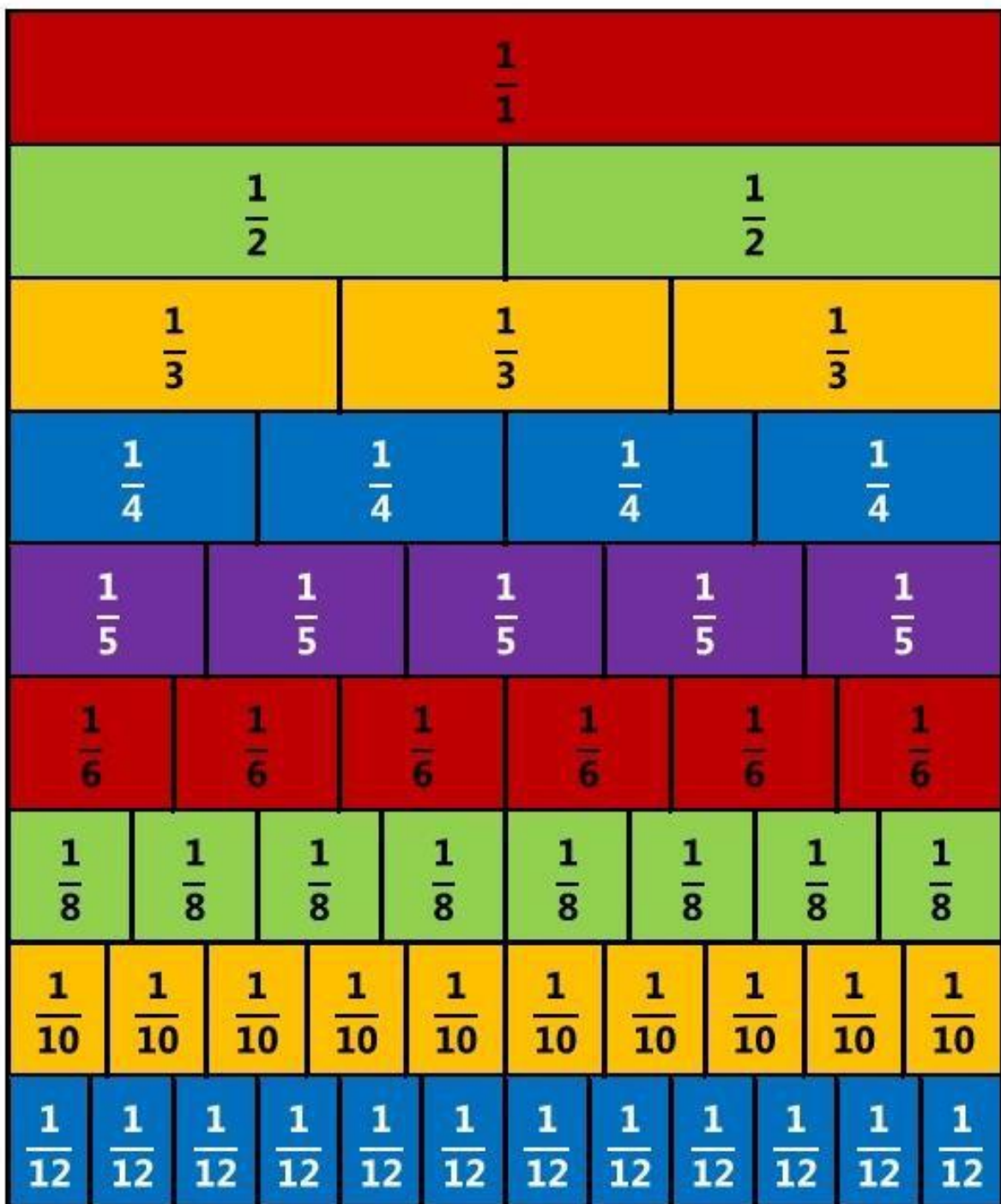
Fractions, decimals and percentages

Try to learn these equivalences - they will be VERY useful!

Fraction	Decimal	Percentage
$\dfrac{1}{2}$	0.5	50%
$\dfrac{1}{4}$	0.25	25%
$\dfrac{3}{4}$	0.75	75%
$\dfrac{1}{5}$	0.2	20%
$\dfrac{1}{10}$	0.1	10%
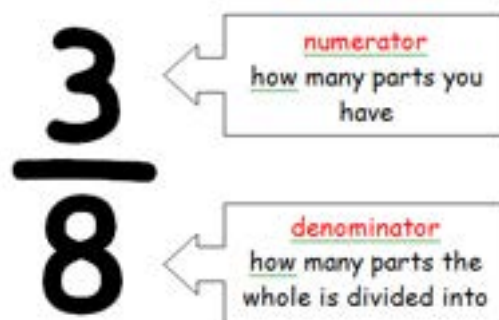
Finding a fraction of an amount

To find a fraction of an amount we divide the number by the denominator and then multiply our answer by the numerator.

Example:

$\dfrac{3}{8}$ of 24 = 9   It can also be written like this $\dfrac{3}{8}$ x 24 = 9

First 24 ÷ 8 = 3

Then 3 x 3 = 9

So the answer is 9

Changing an improper fraction to a mixed fraction

An improper fraction is when the numerator is larger than the denominator.

E.g. $\dfrac{15}{7}$

Divide the numerator by the denominator. 15 ÷ 7 = 2 with a remainder of 1. The whole number is the number of times the denominator divides into the numerator. The remainder 1 is then written over the denominator. So the answer is $2\dfrac{1}{7}$

Changing a mixed fraction to an improper fraction

A mixed fraction contains some whole numbers and fractions.

E.g. $1\frac{1}{4}$

To change this into an improper fraction we have to multiply the denominator by the whole number and add the answer so the numerator.

So, $1\dfrac{2}{5}$ =   1 x 5 = 5 + 2 = 7

So, $1\dfrac{2}{5}$ = $\dfrac{7}{5}$

Finding equivalent fractions

(Hint! Whatever you do to the numerator you <u>must</u> do to the denominator)

Equivalent fractions are fractions which have the same value. They are **equal**.

You can make equivalent fractions by multiplying or dividing **both the numerator and the denominator** by the same amount. You only multiply or divide, **never add or subtract**, to get an equivalent fraction. Remember to only divide when the numerator and denominator would still be whole numbers.

$$\text{E.g.}\underline{1} \quad = \quad \overset{(\times 2)}{\underset{(\times 2)}{\dfrac{1}{2}}} \quad = \quad \dfrac{2}{4}$$

$$\text{Or...} \quad \overset{(\div 3)}{\underset{(\div 3)}{\dfrac{18}{36}}} \quad = \quad \overset{(\div 6)}{\underset{(\div 6)}{\dfrac{6}{12}}} \quad = \quad \dfrac{1}{2}$$

Measures

Learn these measurements - they are VERY useful!

Liquids...

    1 litre = 1000 millilitres   (1 L = 1000 ml)

Mass/weight...

    1 kilogram = 1000 grams   (1 kg = 1000 g) 1/2

            kg = 0.5 kg = 500 g

            1/4 kg = 0.25 kg = 250 g

            3/4 kg = 0.75 kg = 750 g

Length...

    1 kilometre = 1000 metres   (1 km = 1000 m)

    1 metre = 100 centimetres   (1 m = 100 cm)

    1 centimetre = 10 millimetres   (1 cm = 10 mm)

5 miles = 8 kilometres
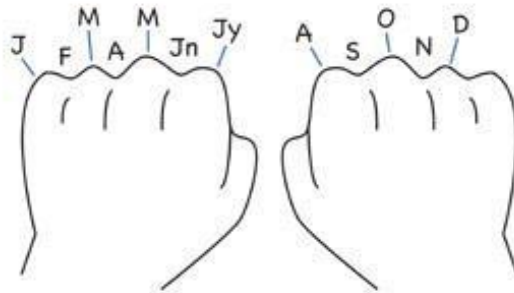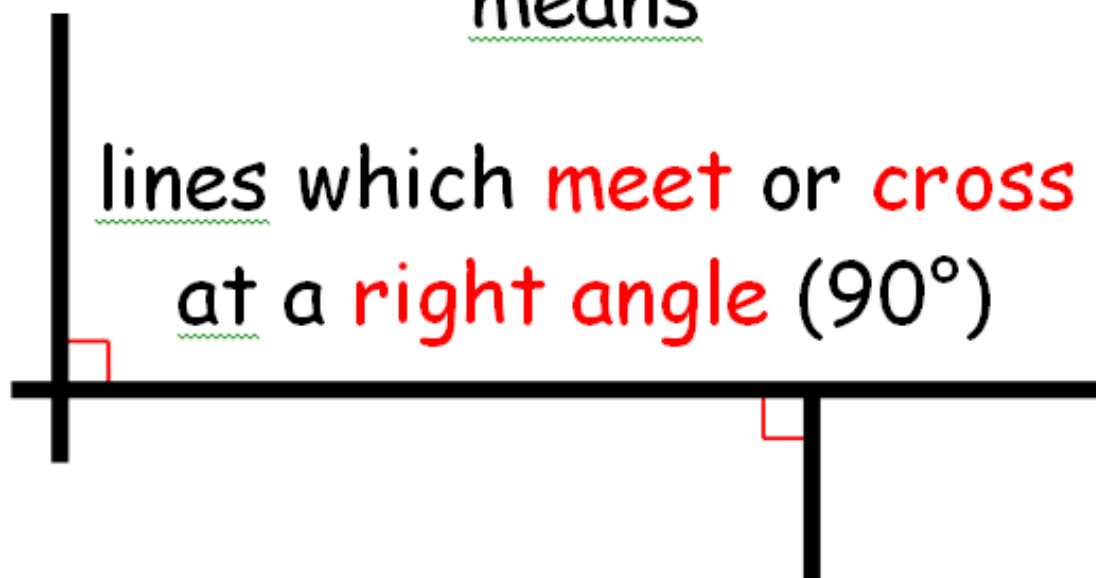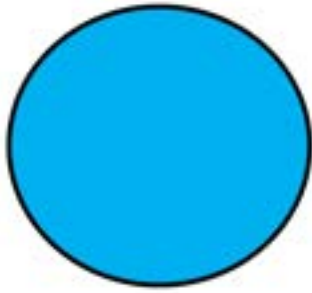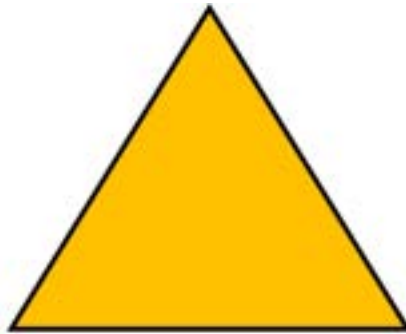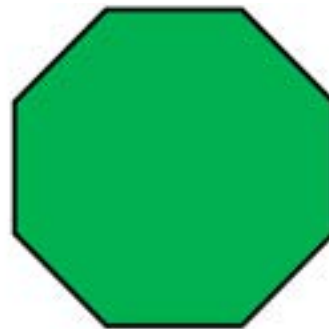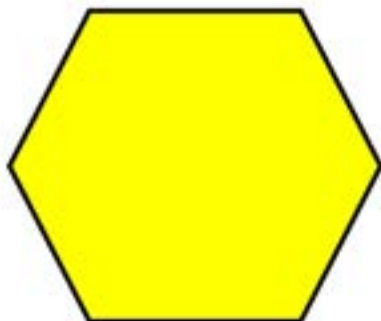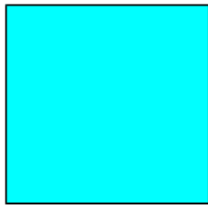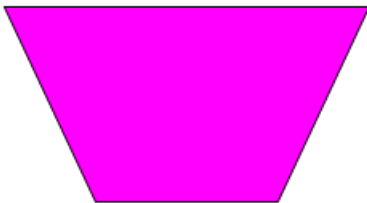
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Money...

    £1   One pound = 100 pence

    50p= £0.50   25p = £0.25

    10 x 10p = £1   5 x 20p = £1

Time

One year = 365 days

One leap year (every 4 years) = 366 days

12 months in a year

30 days have September, April, June and November. All the rest have 31.

Excepting February which has 28 days clear and 29 each leap year.

A fortnight = 2 weeks

A week = 7 days

A day = 24 hours

An hour = 60 minutes

A minute = 60 seconds

PARALLEL

means

lines which never cross
&
stay the same distance apart

PERPENDICULAR

means

lines which meet or cross
at a right angle (90°)

2D shapes

circle

1 curved side
0 corners

square

4 equal straight sides
4 corners
4 right angles

rectangle

4 straight sides
4 corners
4 right angles

triangle

3 straight sides
3 corners

octagon

8 straight sides
8 corners

hexagon

6 straight sides
6 corners

pentagon

5 straight sides
5 corners

Types of quadrilateral

Square

Properties:
- all sides the same length
- 4 lines of symmetry
- 4 right angles
- 2 pairs of parallel sides

Kite

Properties:
- 2 pairs of adjacent sides are equal
- opposite angles are equal
- 1 line of symmetry

Trapezium

Properties:
- 1 pair of parallel sides

Parallelogram

Properties:
- opposite sides are equal length
- opposite angles are equal
- 2 pairs of parallel sides
- 2 obtuse, 2 acute angles
- No lines of symmetry

Rhombus

Properties:
- all sides the same length
- opposite angles are equal
- 2 lines of symmetry
- 2 obtuse, 2 acute angles
- 2 pairs of parallel sides

Rectangle

Properties:
- opposite sides are equal length
- 2 lines of symmetry
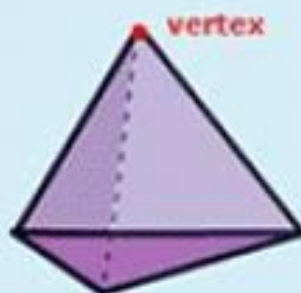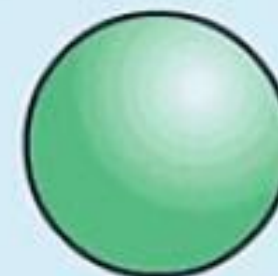- 4 right angles
- 2 pairs of parallel sides

3D shapes

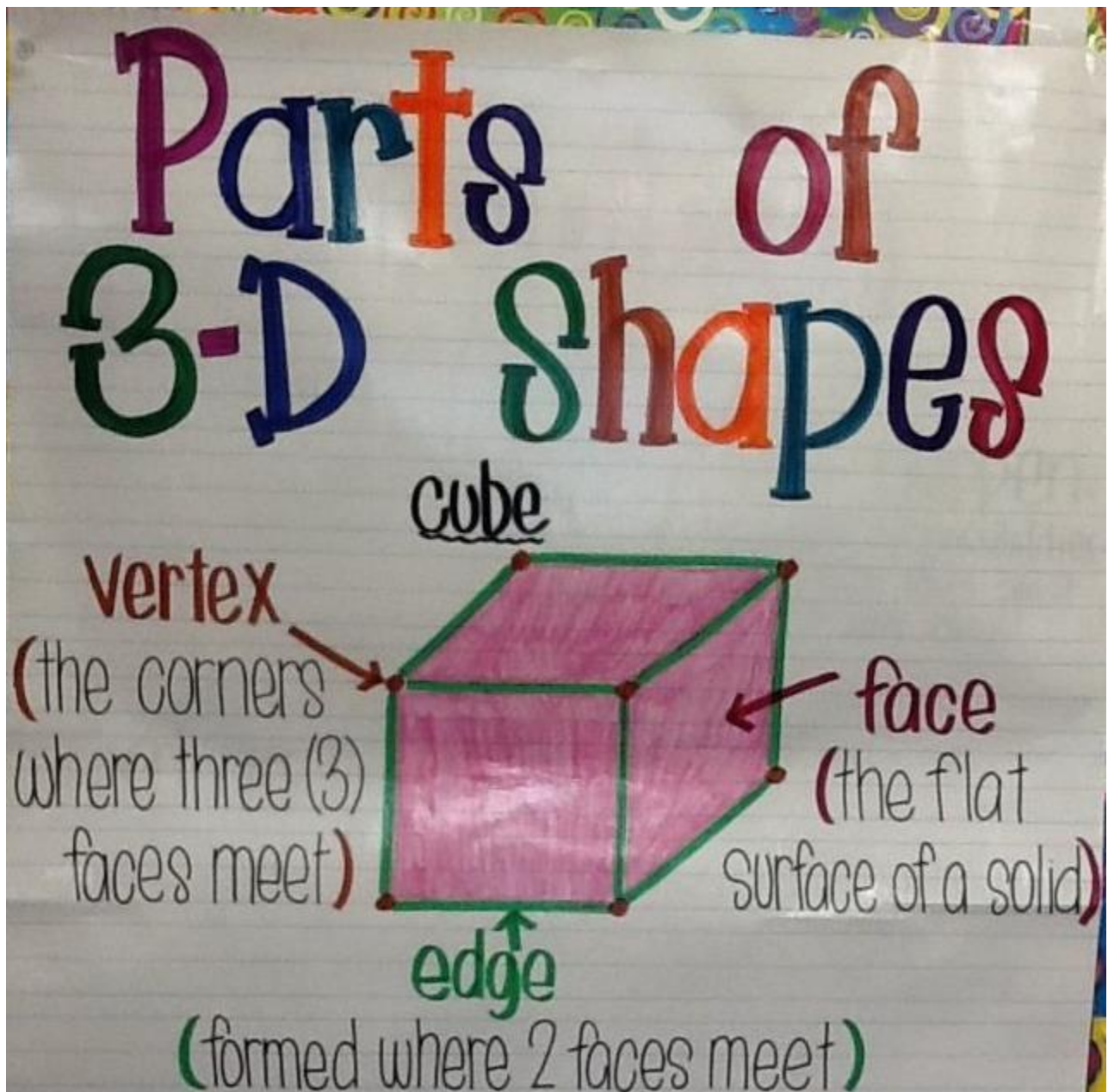| Shape	Label
Cube	face
Cuboid	edge
Square based pyramid	
Cone	
Triangular prism	
Triangular based pyramid	vertex
Cylinder	
Sphere	

Features of 3D shapes

Angles in shapes

The angles of <u>any</u> triangle will always add up to

180°

b

(a + b + c = 180°)

a

c

try it for yourself!

The angles of <u>any</u> quadrilateral will always add up to **360°**

b c

a d

think of it as 2 triangles stuck together!

(a + b + c + d = 360°)

Parts of a circle
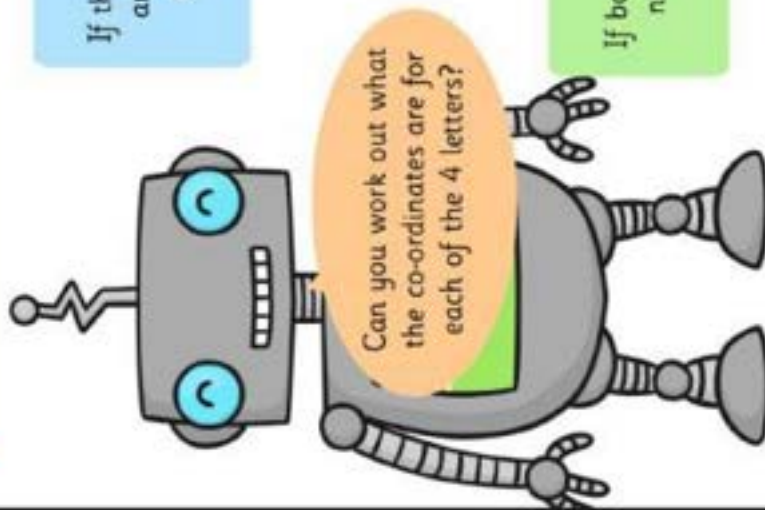

A circle's radius is the distance from the centre of the circle to the outer edge.

A circle's diameter is the length of a line through the centre, from one edge to another.
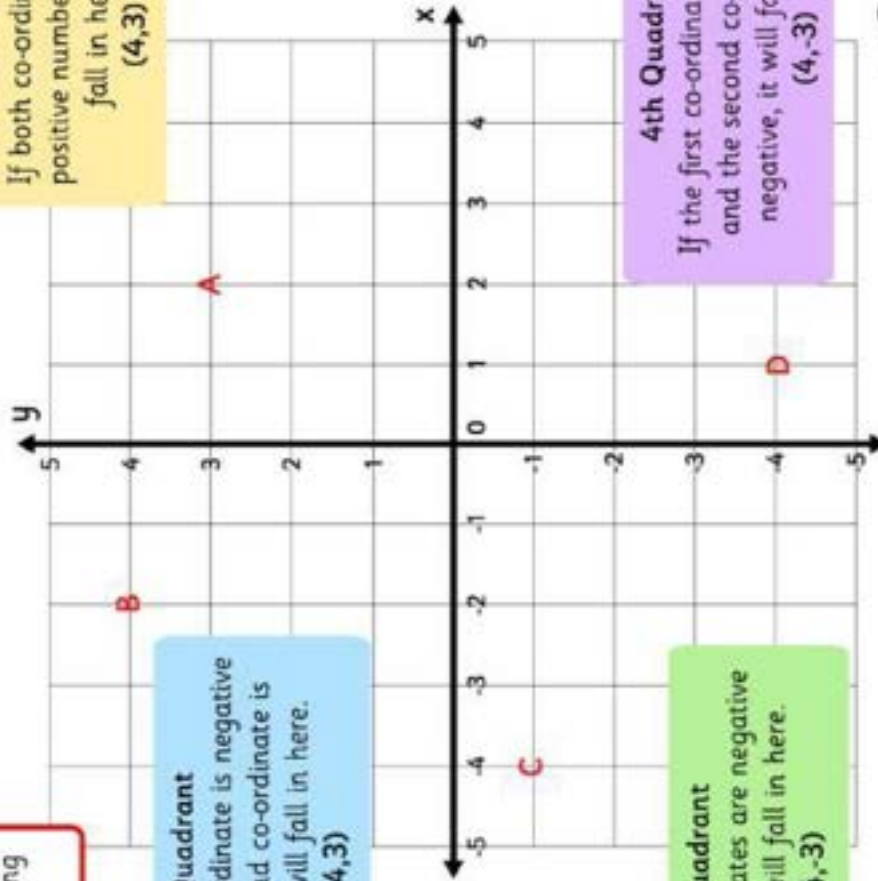
A circle's circumference is the distance around the edge.

Co-ordinates in the 4 Quadrants

Warning! This work involves negative numbers. Remember to follow the same rules for creating co-ordinates – x before y.

1st Quadrant
If both co-ordinates are positive numbers, it will fall in here.
(4,3)

2nd Quadrant
If the first co-ordinate is negative and the second co-ordinate is positive, it will fall in here.
(-4,3)

3rd Quadrant
If both co-ordinates are negative numbers, it will fall in here.
(-4,-3)

4th Quadrant
If the first co-ordinate is positive and the second co-ordinate is negative, it will fall in here.
(4,-3)

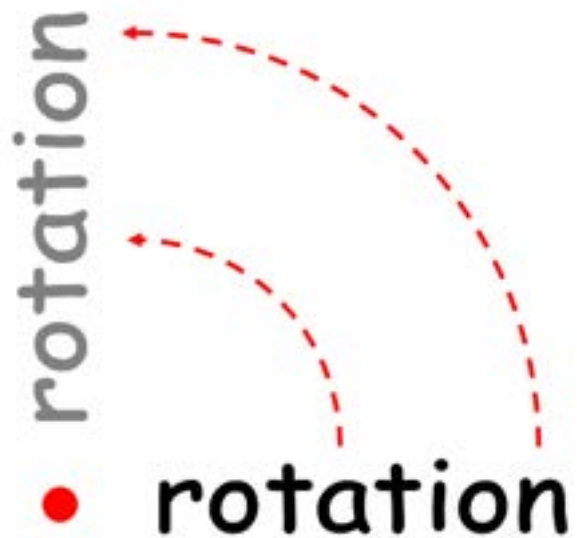Can you work out what the co-ordinates are for each of the 4 letters?

Transformations

reflection

- -

reflection

rotation

• rotation

translation

translation