# YSGOL DYFFRYN CONWY 



## NUMERACY BOOKLET

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## Calculating methods

## Addition

## Example $534+2678$

Place the digits in the correct "place value" columns with the numbers under each other. Begin adding in the units column.

| Show any carrying in the next column. | 12 | 16 | ${ }_{1} 7$ | 8 |
| :---: | :---: | :---: | :---: | :---: |
|  | 3 | 2 | 1 | 2 |

## Subtraction

Example: 7689-749
Place the digits in the correct "place value" columns with the numbers under each other.
Begin subtracting in the units column.
You can't subtract 9 from 6 so 'borrow from next door', move 1 from the 8 , to change the 6 into 16.

| Th | $H$ | $T$ | $U$ |
| :---: | :---: | :---: | :---: |
| ${ }^{6} 7$ | ${ }^{1} 6$ | ${ }^{7} 8$ | ${ }^{1} 6$ |
| - | 7 | 4 | 9 |
| 6 | 9 | 3 | 7 |

Note that the same has happened with the hundreds.

## Multiplication

## Example $56 \times 34$

Multiply the numbers on the top with the numbers on the side, and write the tens in the top box, and the units in the bottom. Add along the diagonals.

Since $8+2=10$, you need to carry the tens to the next diagonal.
$5 \quad 6$


4

4
$56 \times 34=1904$

## Division

Example: $432 \div 15$
It is written:
15

| 4 | 3 | 2 |
| :--- | :--- | :--- |


|  | 2 |  | 8 |
| :---: | :---: | :---: | :---: |
| 15 | 4 | ${ }^{4} 3$ | 8 |
| ${ }^{13} 2$ | .${ }^{12} 0$ |  |  |

It is not possible to divide 4 by 15 , therefore the 4 is carried to the next column.
$43 \div 15=2$ with 13 remainder. Carry the 13 to the next column. Write 2 on the top line. $132 \div 15=8$, with 12 remainder. Write the 8 on the top line. Since there is no number in the next column, you need to add a decimal point, followed by a 0 .
$120 \div 15=8$
$432 \div 15=28.8$

Even numbers
$2,4,6,8,10,12$, ............
2 divides exactly into every even number.
Odd numbers
$1,3,5,7,11$, $\qquad$
2 doesn't divide exactly into odd numbers.

Square numbers
$1^{2}=1 \times 1=1$
$2^{2}=2 \times 2=4$
$3^{2}=3 \times 3=9$
$4^{2}=4 \times 4=16$
$5^{2}=5 \times 5=25$
$6^{2}=6 \times 6=36$
$7^{2}=7 \times 7=49$

The first 10 square numbers are:
$1,4,9,16,25,36,49,64,81,100$

## Triangular numbers

| 1 | $=1$ | A factor is a number that <br> divides exactly into another |
| :--- | :--- | :--- |
| $1+2$ | $=3$ | number. |
| $1+2+3$ | $=6$ | The factors of 12 are: |
| $1+2+3+4$ | $=10$ | $1,2,3,4,6,12$ |
| $1+2+3+4+5$ | $=15$ |  |
| $1+2+3+4+5+6$ | $=21$ | The factors of 13 are 1 and 13 |
| $1+2+3+4+5+6+7$ | $=28$ |  |

The first seven triangular numbers are:
$1,3,6,10,15,21,28$
Prime numbers

A prime number has exactly two factors, namely 1 and itself.

The factors of 17 are 1 and 17, therefore 17 is a prime number.

The prime numbers between 1 and 100 are:

2, 3, 5, 7, 11, 13, 17, 19, 23,
$29,31,37,41,43,47,53,59,61$, $67,71,73,79,83,89,97$

## Factors

A factor is a number that divides exactly into another number.
The factors of 12 are:
1, 2, 3, 4, 6, 12
The factors of 13 are 1 and 13

Note: 1 is not a prime number since it only has 1 factor.

## Place value

| Thousands (1000) | Hundreds (100) | Tens (10) | Units <br> (1) | - | Tenths 1 10 | $\begin{gathered} \text { Hundredths } \\ \frac{1}{100} \end{gathered}$ | Thousandths $\begin{gathered} \underline{1} \\ 1000 \end{gathered}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |


| 10 units | $=1$ ten | 10 thousandths | $=1$ hundredth |
| :--- | :--- | :--- | :--- |
| 10 tens | $=1$ hundred | 10 hundredths | $=1$ tenth |
| 10 hundreds | $=1$ thousand | 10 tenths | $=1$ unit |

The placement of the digits within the number gives us the value of that digit.

The digit 4 has the value of

4 thousand (4000)


The digit 8 has the value 8 tens (80)


The digit 7 has the value 7 thousandths ( $7 / 1000$ )

## Inverse operations

Inverse operations allow you to undo a sum.


We use inverse operations when we work with function machines.

$$
\text { Input } \rightarrow \rightarrow \div 3 \rightarrow-7=3 \text { Output }
$$

If the output is 3 , the input? must be 30.

$$
30=\times 3 \leftarrow+7 \leftarrow{ }^{3}
$$

## Fractions

The numerator is the number on the top of the fraction


The denominator is the number on the bottom

If we have a number and a fraction mixed we call it a mixed fraction.

When the numerator is larger than the denominator we call this an improper fraction. $\frac{9}{7}$

## Equivalent fractions

All the fractions below represent the same proportion. Therefore they are called equivalent fractions.

$$
\begin{aligned}
1 / 2
\end{aligned}
$$

## Decimals

A decimal is any number that contains a decimal point.
The following are examples of decimals.
0.549
1.25
$256 \cdot 4$
3.406

## Percentages


7\% means $\quad 7 / 100$
$63 \%$ means $63 / 100$
100\% means
120\% means

$7 / 100$
$100 / 100$ or 1 whole.
$120 / 100$ It is possible to have a percentage that is greater than 1 whole.
Changing decimals and fractions into percentages
To change a decimal or fraction to a percentage you have to multiply with $100 \%$.

$$
0.75 \times 100 \%=75 \%
$$

$$
13 \times{ }^{5} 100 \%=65 \% \text { or } 13 \times 100 \%=1300=130=65 \%
$$

$$
\begin{array}{llll}
120 & 20 & 2 \theta & 2
\end{array}
$$

To change a fraction into a decimal you have to divide the numerator with the denominator.

$$
\frac{3}{8}=3 \div 8=0.375
$$

It is also possible to change a fraction into a percentage like this:

$$
\frac{2}{3}=2 \div 3=0.6666 \ldots=0.67 \text { (to } 2 \text { decimal places } \text { ) }
$$

then $0.67 \times 100 \%=67 \%$
Therefore $\underline{2}=67 \%$ (to the nearest one part of a hundred)

## Useful fractions, decimals and percentages

| Fraction | Decimal | Percentage |
| :---: | :---: | :---: |
| 1 | 1.0 | $100 \%$ |
| $1 / 2$ | 0.5 | $50 \%$ |
| $1 / 3$ | $0.33 \ldots$. | $33 \%$ |
| $1 / 4$ | 0.25 | $25 \%$ |
| $3 / 4$ | 0.75 | $75 \%$ |
| $1 / 10$ | 0.1 | $10 \%$ |
| $2 / 10(=1 / 5)$ | 0.2 | $20 \%$ |
| $3 / 10$ | 0.3 | $30 \%$ |

## Ratio

Ratio is used to make a comparison between two things.

## Example

## 

In this pattern we can see that there are 3 happy faces to every sad face. We use the symbol : to represent to in the above statement, therefore we write the ratio like this:

$$
\begin{aligned}
\text { Happy } & : \text { Sad } \\
3 & : 1
\end{aligned}
$$

Sad : Happy
1 : 3

Ratio is used in a number of situations:

- In a cooking recipe
- In building when mixing concrete
- It is used in the scale of maps e.g. if a scale of 1 : 100000 is used, it means that 1 cm on the map represents 100000 cm in reality which is 1 km .



## Directed numbers

The negative sign ( - ) tells us the number is below zero e.g. -4 . The number line is useful when working with negative numbers. Below is a part of the number line.

| Negative direction | $\leftarrow$ |  | $\rightarrow$ | Positive direction |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| -9 | -8 | -7 | -6 | -5 | -4 | -3 | -2 | -1 | 0 | 1 | 2 | 3 | 4 | 5 | 6 |

The numbers on the right are greater than the numbers on the left e.g. 5 is greater than 2 and 2 is greater than - 3 . Note that -3 is greater than -8 .

The Number line game can be used to add and subtract negative numbers:

## Rules:

Start at zero facing the positive direction.
The symbol + means "step forward".
The - sign means "step backwards".
When you see a number, step that number of places.
Your position at the end will be the answer.
Example: - 3-4+6

| Sum | -8 | -7 | -6 | -5 | -4 | -3 | -2 | -1 | 0 | 1 | Method |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| - |  |  |  |  |  |  |  |  |  |  | Start on 0. |
| 3 |  |  |  |  |  |  |  |  | $\leftarrow$ |  | Step back 3 spaces. |
| - |  |  |  |  |  |  |  |  |  |  |  |
| 4 |  |  |  |  |  |  |  |  |  |  |  |
| + |  |  |  |  |  |  |  |  |  |  |  |
| Step forward 6 places. |  |  |  |  |  |  |  |  |  |  |  |
| 6 |  |  |  |  |  |  |  |  |  |  |  |
| Step back 4 spaces. |  |  |  |  |  |  |  |  |  |  |  |

Example: 2+-8--9

| -9 | -8 | -7 | -6 | -5 | -4 | -3 | -2 | -1 | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |

- Startat 0 .
- $\quad$ Step forward 2 spaces.
- Step backwards 8 spaces.
- $\quad$ Step forward 9 spaces. The answer is 3


## Add and Subtract Negative Numbers

Adding a negative number is the same as subtracting:
$3+-4=3-4=-1$
Subtracting a negative number is the same as add:
$3-4=3+4=7$

## Multiplying and dividing directed numbers

We multiply and divide directed numbers in the usual way whilst remembering these very important rules:

Two signs the same, a positive answer.

| $x$ | + | - |
| :---: | :---: | :---: |
| + | + | - |
| - | - | + |

Two different signs, a negative answer.


Remember, if there is no sign before the number, it is positive.

## Examples:

$$
\begin{aligned}
5 \times-7 & =-35
\end{aligned} \quad \begin{aligned}
& \text { (different signs gives a negative answer) } \\
& -4 \times-8 \\
& 48 \div-6=-8
\end{aligned} \quad \begin{aligned}
& \text { (two signs the same gives a positive answer) } \\
& -120 \div-10=12
\end{aligned} \quad \text { (different signs gives a negative answer) }
$$

## Co-ordinates

We use co-ordinates to describe location.


The co-ordinates of the points are:
$A(1,2)$
$B(-2,3)$
$C(-2,-2)$
$D(3,-2)$

There is a special name for the point $(0,0)$ which is the origin.
The first number ( $x$-coordinate) represents the distance across from the origin. The second number ( $y$-coordinate) represents the distance going up or down.

Example: The point $(1,2)$ is one across and two up from the origin.
Example: The point $(-4,-3)$ is four across to the right and three down from the origin.

## Inequalities

We use the = sign to show that two sums are equal. If one sum is greater than or less than the other we use inequalities:

$$
\begin{array}{ll}
<\text { less than } & >\text { more than } \\
\leq \text { less than or equal to } & \geq \text { more than or equal to }
\end{array}
$$

## Examples :

$5<8$

5 is less than 8
$x \leq 8$
$y \geq 17$
$x$ is less than or equal to 8
$y$ is greater than or equal to 17

## Names of two dimensional shapes

A polygon is a closed shape made up of straight lines.

A regular polygon has equal sides and equal angles.


3D means three dimensions - 3D shapes have length, width and height.

| Shape | Name | Faces | Edges | Vertices <br> (corners) |
| :---: | :---: | :---: | :---: | :---: |
| Cuboid | 6 | 6 | 4 |  |

## The circle



## Circumference of a circle

The circumference of a circle is the distance around the circle.

$$
\begin{aligned}
& \text { Circumference }=2 \pi \times \text { radius } \\
& \text { Circumference }=2 \pi r
\end{aligned}
$$

Since the diameter is twice the length of the radius, we can also write

Circumference $=\pi \times$ diameter
Circumference $=\pi \mathrm{d}$

## $\pi$ (pi)

$\pi$ is a Greek letter which represents
$3 \cdot 1415926535897932384 \ldots$. . . (a decimal that carries on for ever without repetition)
We round $\pi$ to $3 \cdot 14$ in order to make calculations or we use the $\pi$ button on the calculator.

## Perimeter and Area

## Perimeter

Perimeter is the distance around the outside of a shape. We measure the perimeter in millimetres ( mm ), centimetres ( cm ), metres ( m ), etc.


This shape has been drawn on a 1 cm grid. Starting on the orange circle and moving in a clockwise direction, the distance travelled is . . .

$$
\begin{aligned}
& 1+1+1+1+1+1+1+1+1+2+1+2=14 \mathrm{~cm} \\
& \text { Perimeter }=14 \mathrm{~cm}
\end{aligned}
$$

## Area of 2D Shapes

The area of a shape is how much surface it covers. We measure area in square units e.g. centimetres squared ( $\mathrm{cm}^{2}$ ) or metres squared $\left(\mathrm{m}^{2}\right)$.

## Areas of irregular shapes

Given an irregular shape, we estimate its area through drawing a grid and counting the squares that cover the shape.


Whole square count as one.


Half a square or more count as one.


Less than half a square ignore.

$$
\text { Area }=11 \mathrm{~cm}^{2} .
$$

Remember that this is an estimate and not the exact area.

## Area

## Rectangle



Multiply the length with the width.

$$
\text { Area }=1 \times w
$$

## Trapezium



Add the parallel sides, multiply with the height and divide by two.

$$
\text { Area }=\frac{(a+b) h}{2}
$$

## Circle



Multiply the radius with itself, then multiply with $\pi$.

$$
\text { Area }=r \times r \times \pi=\pi r^{2}
$$

## Triangle



Multiply the base with the height and divide by two.

$$
\text { Area }=\frac{b \times h}{2}
$$

## Parallelogram



Multiply the base with the height.

Area $=b \times h$

## Volume

Volume is the amount of space that an object contains or takes up. The object can be a solid, liquid or gas.

Volume is measured in cubic units e.g. cubic centimetres $\left(\mathrm{cm}^{3}\right)$ and cubic metres $\left(\mathrm{m}^{3}\right)$.


## Cuboid

Note that a cuboid has six rectangular faces.


Volume of a cuboid $=$ length $\times$ width $\times$ height

## Prism

A prism is a 3-dimensional object that has the same shape throughout its length i.e. it has a uniform cross-section.


Volume of a prism $=$ area of cross-section $\times$ length

## Metric units of length

| Millimetre | mm | $10 \mathrm{~mm}=1 \mathrm{~cm} 1000 \mathrm{~mm}=1 \mathrm{~m}$ |
| :--- | :--- | :--- |
| Centimetre | cm | $100 \mathrm{~cm}=1 \mathrm{~m} \quad 100000 \mathrm{~cm}=1 \mathrm{~km}$ |
| Metre | m | $1000 \mathrm{~m}=1 \mathrm{~km}$ |
| Kilometre | km |  |
| Imperial units of length |  |  |
| Inch | in or " | $12 \mathrm{in}=1 \mathrm{ft}$ |
| Foot | ftor | $3 \mathrm{ft}=1 \mathrm{yd}$ |
| Yard | yd | $1760 \mathrm{yd}=1 \mathrm{mile}$ |
| Mile |  |  |

## Metric units of mass

| Milligram | mg | $1000 \mathrm{mg}=1 \mathrm{~g} \quad 1000000 \mathrm{mg}=1 \mathrm{~kg}$ |
| :--- | :--- | :--- | :--- |
| Gram | g | $1000 \mathrm{~g}=1 \mathrm{~kg}$ |
| Kilogram | kg | $1000 \mathrm{~kg}=1 \mathrm{t}$ |
| Metric tonne | t |  |
| Imperial units of mass |  |  |
| Ounce | oz | $16 \mathrm{oz}=1 \mathrm{lb}$ |
| Pound | lb | $14 \mathrm{lb}=1 \mathrm{st}$ |
| Stone | st | $160 \mathrm{st}=1 \dagger$ |

Metric units of volume

| Millilitre | ml | $1000 \mathrm{ml}=11$ |
| :--- | :--- | :--- |
| Litre | l |  |

Imperial units of volume

| Pint | pt | $8 \mathrm{pt}=1 \mathrm{gal}$ |
| :--- | :--- | :--- |
| Gallon | gal |  |



## Converting between imperial and metric units

Length

| 1 inch | $\approx 2.5 \mathrm{~cm}$ |
| :--- | :--- |
| 1 foot | $\approx 30 \mathrm{~cm}$ |
| 1 mile | $\approx 1.6 \mathrm{~km}$ |
| 5 miles | $\approx 8 \mathrm{~km}$ |

Weight/Mass

| 1 pound | $\sim 454 \mathrm{~g}$ |
| :--- | :--- |
| 2.2 pounds | $\sim 1 \mathrm{~kg}$ |
| 1 ton | $\sim 1$ metric tonne |

## Volume

| 1 gallon | $\approx 4.5$ litre |
| :--- | :--- |
| 1 pint | $\approx 0.6$ litre $(568 \mathrm{ml})$ |
| $1 \frac{3}{4}$ pints | $\approx 1$ litre |

## Temperature

Converting from Celsius ( ${ }^{\circ} \mathrm{C}$ ) to Fahrenheit ( ${ }^{\circ} \mathrm{F}$ ) Use the following formula

$$
F=1.8 \times C+32
$$

Converting from Fahrenheit ( ${ }^{\circ} \mathrm{F}$ ) to Celsius ( ${ }^{\circ} \mathrm{C}$ )
Use the following formula

$$
C=(F-32) \div 1.8
$$

The freezing point of water is $0^{\circ} \mathrm{C}$ or $32^{\circ} \mathrm{F}$

## Time

| 1000 years | $=1$ millennium |
| ---: | :--- |
| 100 years | $=1$ century |
| 10 years | $=1$ decade |
| 60 seconds | $=1$ minute |
| 60 minutes | $=1$ hour |
| 24 hours | $=1$ day |
| 7 | days |
|  | $=1$ week |
| 12 months | $=1$ year |
| 52 weeks | $\approx 1$ year |
| 365 days | $\approx 1$ year |
| 366 days | $\approx 1$ leap year |



## The Yearly Cycle



## The 24 hour and 12 hour clock

|  | 24 hour | 12 hour |  |
| :---: | :---: | :---: | :---: |
| Midnight | 00:00 | 12.00 a.m. | Midnight |
| The 24 hour clock always uses 4 digits to show the time. | 01:00 | 1:00 a.m. | The 12 hour clock shows the time with a.m. before midday and p.m. after mid-day. |
|  | 02:00 | 2:00 a.m. |  |
|  | 03:00 | 3:00 a.m. |  |
|  | 04:00 | 4.00 a.m. |  |
|  | 05:00 | 5:00 a.m. |  |
|  | 06:00 | 6:00 a.m. |  |
| The 24 hour system does not use a.m. nor p.m. | 07:00 | 7:00 a.m. |  |
|  | 08:00 | 8:00 a.m. |  |
|  | 09:00 | 9:00 a.m. |  |
|  | 10:00 | 10:00 a.m. |  |
|  | 11:00 | 11:00 a.m. |  |
| Mid-day | 12:00 | 12:00 p.m. | Mid-day |
|  | 13:00 | 1:00 p.m. |  |
|  | 14:00 | 2:00 p.m. |  |
|  | 15:00 | 3:00 p.m. |  |
|  | 16:00 | 4:00 p.m. |  |
|  | 17:00 | 5:00 p.m. |  |
|  | 18:00 | 6:00 p.m. |  |
|  | 19:00 | 7:00 p.m. |  |
|  | 20:00 | 8:00 p.m. |  |
|  | 21:00 | 9.00 p.m. |  |
|  | 22:00 | 10.00 p.m. |  |
|  | 23:00 | 11:00 p.m. |  |

## Time vocabulary

| 02:10 | Ten past two in the morning | 2:10 a.m. |
| :--- | :---: | :---: |
| 07:15 | Quarter past seven in the morning | 7:15 a.m. |
| 15:20 | Twenty past three in the afternoon | 3:20 p.m. |
| 21:30 | Half past nine in the evening | 9:30 p.m. |
| 14:40 | Twenty to three in the afternoon | $2: 40$ p.m. |
| 21:45 | Quarter to ten at night | $9: 45$ p.m. |

## Bearings

A bearing describes direction. A compass is used to find and follow a bearing.
The diagram below shows the main compass points and their bearings.


The bearing is an angle measured clockwise from the North.
Bearings are always written using three figures e.g. if the angle from the North is $5^{\circ}$, we write $005^{\circ}$.

## Data

There are two types of data:

## Discrete data

Things that are not measured:

## Continuous data

Things that are measured:

- Colours
- Pupil height
- Days of the week
- Favourite drink
- Volume of a bottle
- Number of boys in a family
- Mass of a chocolate bar
- Shoe size
- Time to complete a test
- Area of a television screen


## Discrete data

## Collecting and recording

We can record data in a list
e.g. here are the numbers of pets owned by pupils in form 9C:
$1,2,1,1,2,3,2,1,2,1,1,2,4,2,1,5,2,3,1,1,4,10,3,2,5,1$
A frequency table is more structured and helps with processing the information.

| Number of pets | Tally | Frequency |
| :---: | :--- | :---: |
| 1 | HI HI | 10 |
| 2 | HI III | 8 |
| 3 | III | 3 |
| 4 | II | 2 |
| 5 | II | 2 |
| 6 |  | 0 |
| 7 |  | 0 |
| 8 |  | 0 |
| 9 |  | 0 |
| 10 | $I$ | 1 |

## Displaying

In order to communicate information, we use statistical diagrams. Here are some examples:

## Pictogram

A pictogram uses symbols to represent frequency. We include a key to show the value of each symbol.

The diagram below shows the number of pets owned by pupils in $9 C$.

Represents two pupils.


## Bar chart

The height of each bar represents the frequency. All bars must be the same width and have a constant space between them. Notice that the scale of the frequency is constant and starts from 0 every time. Remember to label the axes and give the chart a sensible title.

Pets owned by pupils of $9 C$


Number of animals

## Vertical line graph

A vertical line graph is very similar to a bar chart except that each category has a line instead of a bar. Notice that the category labels are directly below each line.

Pets owned by pupils of $9 C$


Number of animals

## Pie chart

The complete circle represents the total frequency. The angles for each sector are calculated as follows:

Here is the data for the types of pets owned by 9C

| Type of pet | Frequency | Angle of the sector |  |
| :--- | :---: | :---: | :---: |
| Cats | 13 | $13 \times 10^{\circ}=130^{\circ}$ |  |
| Dogs | 11 | $11 \times 10^{\circ}=110^{\circ}$ |  |
| Birds | 5 | $5 \times 10^{\circ}=50^{\circ}$ |  |
| Fish | 7 | $7 \times 10^{\circ}=70^{\circ}$ |  |
| Total | 36 |  | $360^{\circ}$ |

Divide $360^{\circ}$ by the total of the frequency:

$$
360^{\circ} \div 36=10^{\circ}
$$

Therefore $10^{\circ}$ represents one animal

Remember to check that the angles of the sectors add up to $360^{\circ}$.

## Types of pet owned by 9 C



## Continuous data

## Displaying

With graphs representing continuous data, we can draw lines to show the relationship between two variables. Here are some examples:

## Line graph

The temperature of water was measured every minute as it was heated and left to cool. A cross shows the temperature of the water at a specific time. Through connecting the crosses with a curve we see the relationship between temperature and time.


The line enables us to estimate the temperature of the water at times other than those plotted e.g. at $6 \frac{1}{2}$ minutes the temperature was approximately $40^{\circ} \mathrm{C}$.

## Conversion graph

We use a conversion graph for two variables which have a linear relationship. We draw it in the same way as the above graph but the points are connected with a straight line.


From the graph, we see that 8 km is approximately 5 miles.

## Scatter diagram

We plot points on the scatter diagram in the same way as for the line graph. We do not join the points but look for a correlation between the two sets of data.


Positive correlation


No correlation


Negative correlation

If there is a correlation, we can draw a line of best fit on the diagram and use it to estimate the value of one variable given the other.

The following scatter graph shows a positive correlation between the weights and heights of 12 pupils.


The line of best fit estimates the relationship between the two variables.
Notice that the line follows the trend of the points.
There are approximately the same number of points above and below the line.
We estimate that a pupil 155 cm tall has a weight of 60 kg .

## Important things to remember when drawing graphs

- Title and label axes
- Sensible scales
- Careful and neat drawing with a pencil


## Average

The average is a measure of the middle of a set of data. We use the following types of average:

Mean - We add the values in a set of data, and then divide by the number of values in the set.

Median - Place the data in order starting with the smallest then find the number in the middle. This is the median. If you have two middle numbers then find the number that's halfway between the two.

Mode - This is the value that appears most often.

## Spread

The spread is a measure of how close together are the items of data. We use the following to measure spread:

Range - The range of a set of data is the difference between the highest and the lowest value.

## Example

Find the mean, median, mode, and range of the following numbers:

| 4 | , $2,0,1,3,1$ |  | 5 |
| :---: | :---: | :---: | :---: |
| Mean | $4+3+2+0+1+3+1+1+4+5$ | $=2.4$ |  |
|  | 10 |  |  |
|  |  | 2+3 |  |
| Median | $0,1,1,1,2,3,3,4,4,5$ | 2 | $=2.5$ |
| Mode | $0,1,1,1,2,3,3,4,4,5$ |  | $=1$ |
| Range | $0,1,1,1,2,3,3,4,4,5$ | 5-0 | $=5$ |

## Vocabulary / Geirfa

| Acceleration | Cyflymiad |
| :--- | :--- |
| Acute angle | Adio lem |
| Add | Ongl |
| Angle | Gwrthglocwedd |
| Anti-clockwise | Brasamcan |
| Approximation | Arwynebedd |
| Area | Cyfartaledd |
| Average | Echelin |
| Axis | Cydbwysedd |
| Balance | Cyfeiriant |
| Bearing | Biliau |
| Bills | Haneru |
| Bisect/Halve | Ffin |
| Boundary | Cyfrifiannell |
| Calculator | Cynhwysedd |
| Capacity | Arian Parod |
| Cash | Cylch |
| Circle | Cylchyn |
| Circumference | Clocwedd |
| Clockwise | Colofn |
| Column | Cwmpas (llunio cylchoedd) |
| Compass (drawing circles) | Cwmpawd (pwyntio ir Gogledd) |
| Compass (points North) | Côn |
| Cone | Cyfesurynnau |
| Co-ordinates | Cyfatebol |
| Corresponding | Trawsdoriad |
| Cross-section | Cromlin |
| Cube | Degolyn |
| Curve | Cylinder |
| Cheapest |  |
| Density |  |


| Deposit | Blaendal |
| :---: | :---: |
| Depth | Dyfnder |
| Diagonal | Croeslin |
| Diameter | Diamedr |
| Dice | Dîs |
| Digit | Digid |
| Dimension | Dimensiwn |
| Discount | Disgownt |
| Drawn to scale | Lluniadu wrth raddfa |
| East | Dwyrain |
| Edge | Ymyl |
| Enlarge | Helaethu |
| Equal/Unequal | Hafal/Anhafal |
| Equivalent | Cywerth |
| Estimate | Amcangyfrif |
| Even number | Eilrif |
| Extend | Ymestyn |
| Factor | Ffactor |
| Fraction | Ffracsiwn |
| Frequency | Amlder |
| Gradient (slope) | Graddiant |
| Height | Uchder |
| Horizontal | Llorweddol |
| Index | Indecs |
| Interest (rate) | Llog (cyfradd llog) |
| Intersection | Croesdoriad |
| Interval | Cyfwng |
| Invest | Buddsoddi |
| Irregular | Afreolaidd |
| Layer/Tier | Haen |
| Length | Hyd |
| Loan | Benthyciad |
| Loss | Colled |
| Lower/Reduce | Gostwng |
| Mass | Màs |


| Maximum | Uchafswm |
| :---: | :---: |
| Mean | Cymedr |
| Measure | Mesur |
| Median | Canolrif |
| Minimum | Lleiafswm |
| Mode | Modd |
| Multiple | Lluosrif |
| Net | Rhwyd |
| North | Gogledd |
| Obtuse angle | Ongl aflem |
| Octagon | Octagon |
| Odd number | Odrif |
| Parallel | Paralel |
| Percent | Canran |
| Perimeter | Perimedr |
| Perpendicular | Perpendicwlar |
| Power | Pwer |
| Pressure | Gwasgedd |
| Prime number | Rhif cysefin |
| Probability | Tebygolrwydd |
| Profit | Elw |
| Quadrilateral | Pedrochr |
| Radius | Radiws |
| Range | Amrediad |
| Rate of exchange | Cyfradd cyfnewid |
| Ratio | Cymhareb |
| Rectangle | Petryal |
| Reduce/Decrease | Lleihau |
| Reflection | Adlewyrchiad |
| Reflex angle | Ongl atblyg |
| Remainder | Gweddill |
| Right angle | Ongl sgwâr |
| Round off | Talgrynnu |
| Row | Rhes |
| Salary (income) | Cyflog (incwm) |
| Save | Cynilo |


| Scale | Graddfa |
| :--- | :--- |
| Solution | Datrysiad |
| South | Gofod |
| Space | Buanedd |
| Speed | Sffêr |
| Sphere | Sgwâr |
| Square | Rhif sgwâr |
| Square number | Ail Isradd |
| Square Root | Amnewid |
| Substitute | Cymesuredd |
| Symmetry | Cyfanswm |
| Total | Triongl |
| Triangle | Rhif triongl |
| Triangular number | Anhysbysyn |
| Unknown | Anhebygol |
| Unlikely | Treth ar Werth (TAW) |
| Value Added Tax (VAT) | Cyflymder |
| Velocity | Fertig |
| Vertex | Fertigol |
| Vertical | Cyfaint |
| Volume | Pwysau |
| Weight | Gorllewin |
| West | Lled |
| Width |  |

