Rye Hills Academy

YEAR 7

KNOWLEDGE ORGANISER

AUTUMN

Knowledge Organi

Drawing Rules

Step 1: Shape
Record shape accurately. Make sure to use LIGHT PENCIL outline so that you can easily rub it out if you make a mistake

Step 2: Tone
You can create a range of tones by applying different pressures or layering with your pencil. Make sure that you start with your lightest tones first and work your way towards the darker tones. Remember to use the correct line direction, following the shape of the object.

Step 3: Texture
Create a range of textures using different mark making types. It is important to include texture in your drawings to make them appear realistic. Match the marks you make with the surface you are observing.

Shape > Tone > Texture >

Subject vocabulary

Gradual - As your tone progresses from light to dark
Composition – The placement or layout of an image
Record – To draw from observation
Shade – A colour with regard to how dark it is
Sketch – A rough drawing used as a study or proposal

Sound like an expert

Remember:
Most objects we are drawing do not have a line around them. we can see edges of objects because of a difference in tone (light next to dark)

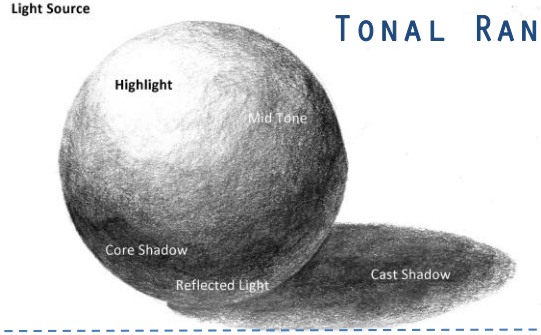
Hold your pencil at the end when applying light tone

Hold your pencil at the tip for more control and heavy pressure

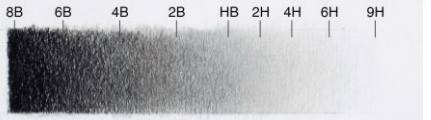
Shape

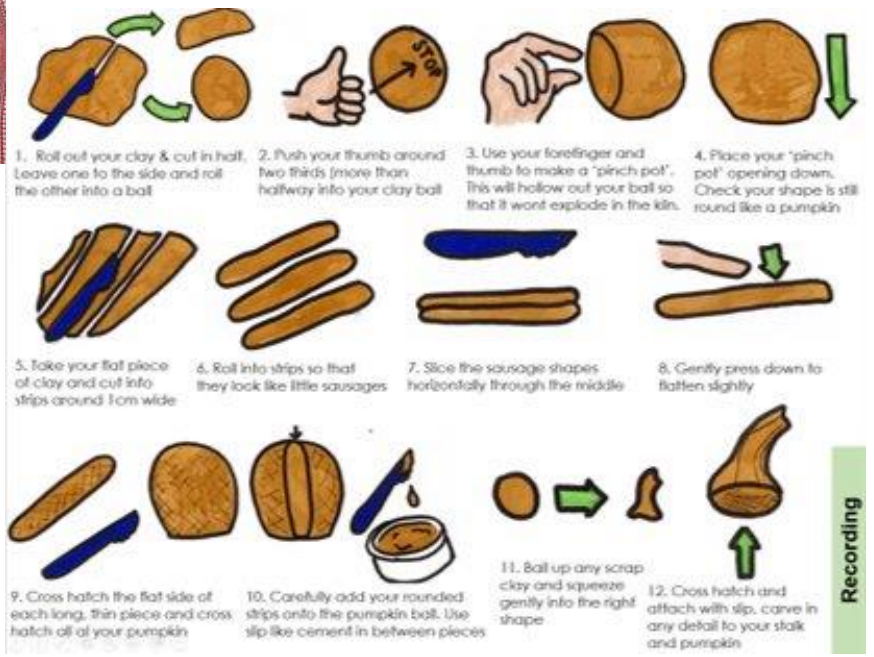
Tonal Range

Tone



Start off on the light side and blend towards the dark side





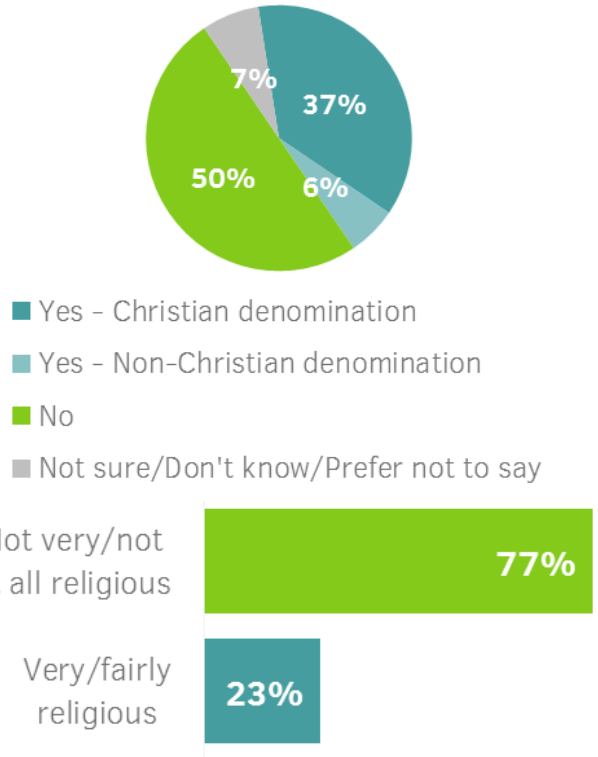
Theist - a person who does believe in the existence of God.
Atheist - a person who does not believe in the existence of God.
Agnostic - a person who believes nothing is known about the existence of God, and therefore can't be sure of God's existence.
Secular – not connected with religion.
Omnipotent – all-powerful.
Omniscient – all-knowing.
Omnibenevolent – all-loving.

religion
/rɪˈlɪdʒ(ə)n/

Noun
The belief in and worship of a superhuman (**deity**) controlling power, especially a personal God or gods.

7 Stages of Faith – A religious philosopher James W. Fowler came up with the idea that through any persons life, they may experience the 7 stages of faith in their life. These 7 stages may lead someone to develop a faith in one of the religions.

1. Stage 0 - develop a sense of trust and safety
2. Stage 1 – patterns of stories
3. Stage 2 – understanding right from wrong
4. Stage 3 – respecting and conforming to authority
5. Stage 4 – responsibility
6. Stage 5 – questions about how the world exists and works
7. Stage 6 – a sense of community for everyone



Britain is a multi-faith society because several religions are practised in Britain and everyone is free to practise their faith.

Humanism – a belief system that does not believe in God due to a lack of evidence. Humanism values everyone's individuality and recognises there is no one ultimate meaning to life. They also look to science to gain truth about how the universe came to exist as it is.

Year 7 - Computing - Office Skills- Knowledge Organiser

Apps in Office 365

Outlook Email

OneDrive Cloud Storage

Teams Collaboration workspace

PowerPoint Presentation creation software

Excel Spreadsheets

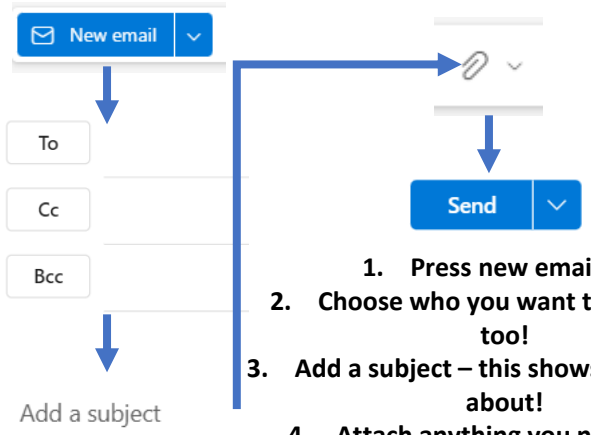
Word Document creation software

Top tips for searching the web

- Use trustworthy websites
- Check more than one website
- Use keywords to narrow it down

Key Words	
Formatting	Formatting is all about adding visual touches to a document to make it easier to read and look more appealing
Alignment	Where text is positioned on a document. For example, left aligned means place to the left margin.
Plagiarism	The practice of taking someone else's work or ideas and passing them off as one's own.
BCC	Blind carbon copy is a message copy sent to an additional recipient, without the primary recipient being made aware.
Teams assignment	Work set for you in Teams. This must be completed and turned in at the end of each lesson.

Steps to send an email



1. Press new email
2. Choose who you want to send it too!
3. Add a subject – this shows what it is about!
4. Attach anything you need to.
5. Press send!

Formatting

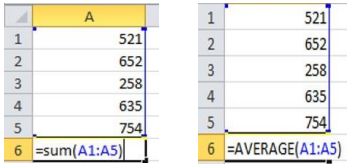
Formulas & Functions

Formulas & Functions perform calculations. Functions are used for more complex calculations

Formulas

= All formulas must start with this
\+ Use this to add
\- Use this to subtract
/ Use this to divide
* Use this to multiply

Functions



Year 7- Developing Skills

Key terminology

Vocal skills

Pitch- how high or low your voice is.

Pace- how quickly or slowly you speak

Pause- how you use pauses in your speech

Volume- how loud or quiet you speak

Accent- the sound of your voice reflecting the region you are form

Tone- how you sound when you speak (sincere, sarcastic, angry, happy etc.)

Movement/interaction

Eye contact (or lack of)- to show character relationships.

Posture – the position you hold your body when standing or sitting.

Proxemics- your awareness of distance between yourself and other actors

Stance- how you balance your weight (lunging, wide, narrow etc)

Gait- The way you walk

Expression

Facial expression- showing your character's thoughts, feelings or emotions by altering the appearance of your face.

Vocal expression- using your vocal skills to convey your character's emotion through their dialogue.

Gesture- non-verbal communication through the movement of your hands or arm. Example: To show that I had done a good job in understanding gestures, my teacher gave my a thumbs up.

Body language- communicating character emotions or feelings through our bodies.

Unit key words

Stimulus- a catalyst used to create something else. I.e- A photograph can be used to create an entire character biography

Tableau(x)- a still image used to depict a moment in time (x=plural)

Reacting- to respond to the action of something else. Example: jumping at a scary moment in a film

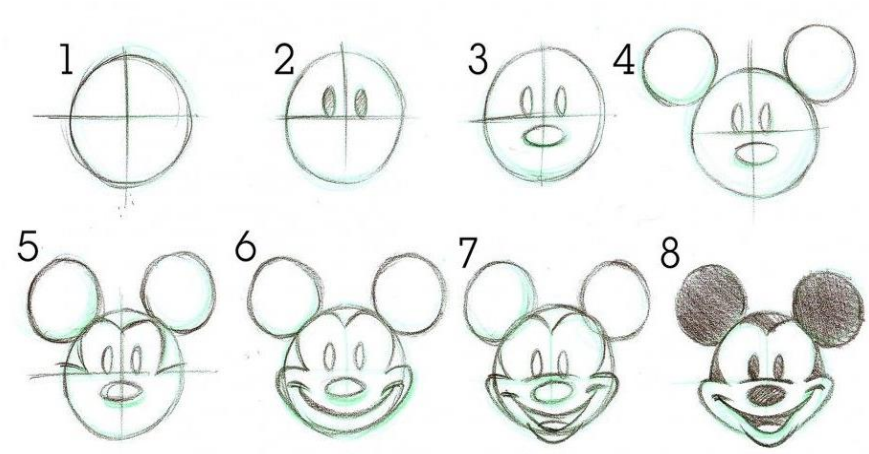
Student knowledge Organiser

2D Drawing Techniques

Construction Lines

Use construction lines to plan out your drawing. Construction lines help divide your drawings into smaller chunks. They help you plan the size of each part to keep drawings in the correct scale/ratio. Ensure construction lines are light as they will not form part of your final drawings.

Below is an example of a drawing being built up using construction lines.



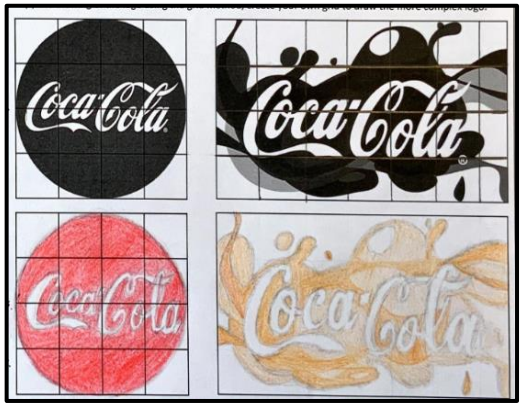
Grid Method

The grid method can be used by drawing a grid around an existing image you wish to duplicate.

Usually, the existing image would be divided into equal sections forming a grid. The grid would be duplicated exactly on a blank piece of paper.

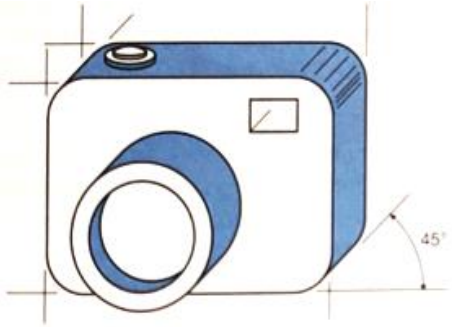
Using the existing image with the grid, copy each smaller section into the new grid.

This method helps break the image down, ensuring the duplication is identical with each part of the image in the exact place.

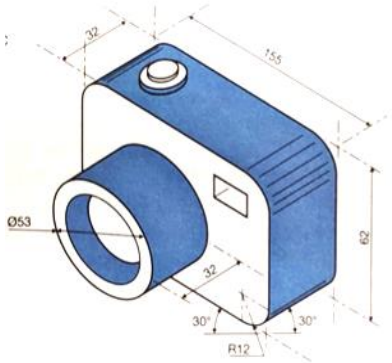


3D Drawing Techniques

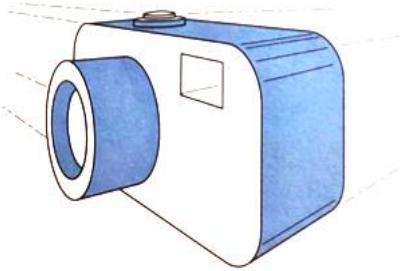
Cabinet Oblique



Isometric Projection



Two Point Perspective



Cabinet Oblique: Design is drawn from the front in 2D. 45° lines are drawn to show the depth of the product. This is the quickest and easiest 3D drawing technique.

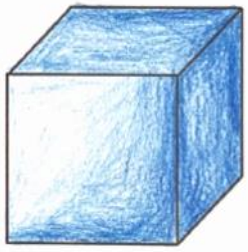
Isometric Projection: Uses 30° lines (parallel) to show the width and depth of a product. The height is drawn with vertical lines. Much more detailed than Cabinet Oblique and can be a quick drawing technique if practiced.

2 Point Perspective: Uses Vanishing Points. The Width and Depth are drawn towards the vanishing points. 2 point perspective is the most time consuming technique but also the most accurate as it emulates how the human eye would view a product.

Tone

Tone is the various shades of a colour which can be achieved by how heavy we press on a pencil.

We use tone to show how light projects onto an object. This helps demonstrate the 3D qualities of our drawings.



Texture

Adding colour in certain ways can help demonstrate the texture and materials on our designs/drawings.

This, paired with tone, is known as 'rendering'. Rendering is used to bring drawings to life and make them look as realistic as possible.

Graphic Design

KNOWLEDGE ORGANISER

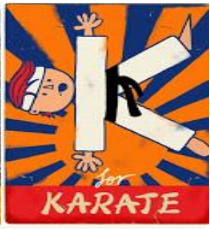
Graphic design is the art of creating **visual** content, which includes using typography, images, colours, and shapes to **communicate messages or ideas**. Its ultimate goal is to make information easy to comprehend.

Serif – easy to read, looks traditional.

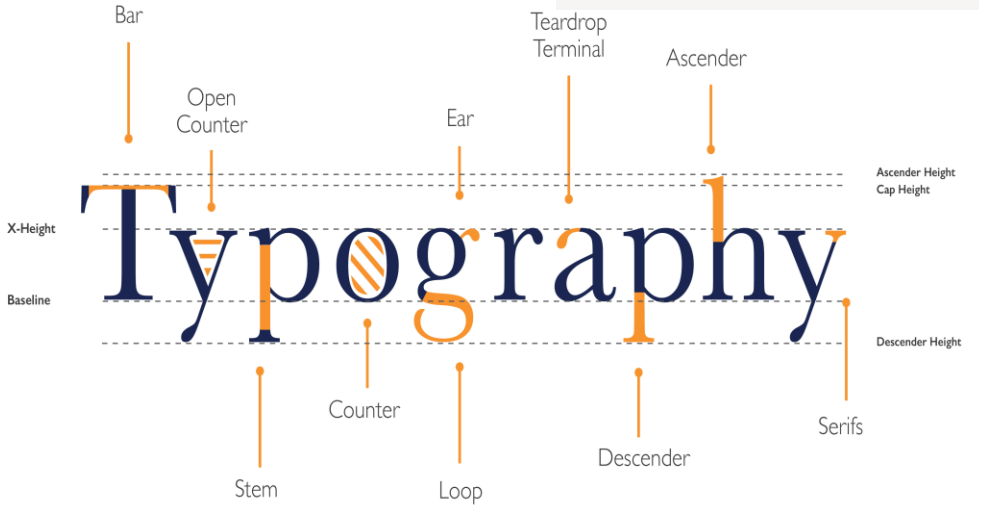
Sans serif – strong, bold and clear. Modern looking. Often used for titles and headings.

Script – looks more personal, and depending on the styles used, historical. Can be difficult to read.

Decorative – attracts attention, and gives text a particular feel or association. Can be difficult to read. Best used for main titles.



1 PET	2 HDPE	3 PVC	4 LDPE	5 PP	6 PS	7 OTHER
POLYETHYLENE TEREPHTHALATE	HIGH-DENSITY POLYETHYLENE	POLYVINYL CHLORIDE	LOW-DENSITY POLYETHYLENE	POLYPROPYLENE	POLYSTYRENE	OTHER
WATER BOTTLES; JARS; CAPS	SHAMPOO BOTTLES; GROCEY BAGS	CLEANING PRODUCTS; SHEETINGS	BREAD BAGS; PLASTIC FILMS	YOGURT CUPS; STRAWS; HANGERS	TAKE-AWAY AND HARD PACKAGING; TOYS	BABY BOTTLES; NYLON; CDS



Expectations

If you speak through a practical automatic consequence, not following instructions – C2 during health and safety, dangerous behavior.

Consequences for shouting out. Raise your hand.

Nobody should be out of seats unless I have told you.

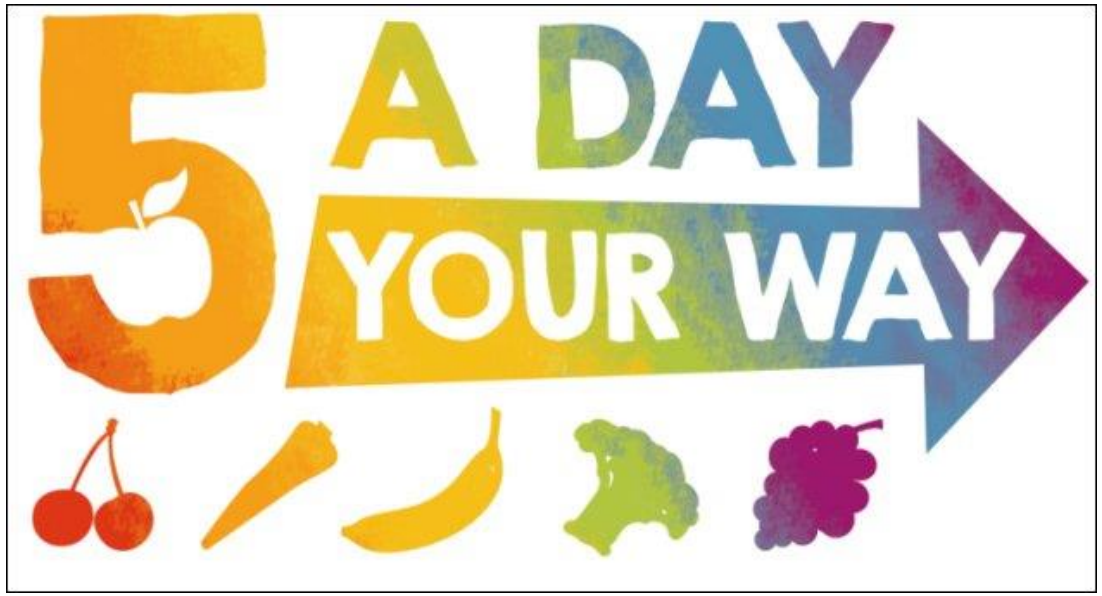
Be respectful to everyone in the room.

Be tolerant – We don't laugh at people's views and opinions.

SMART: Monday 7th November 2022 Eat well guide

Brain Spill:
What does this symbol mean?

The Government recommends that we eat at least 5 portions of a variety of fruit and vegetables a day.



CHALLENGE – Explain why it is important that we eat these types of foods??

What Counts Towards My 5 a Day?

1 handful of grapes

7 cherry tomatoes

1/2 an avocado

3 tbsp of peas

1 banana

2 satsumas

3 tbsp of sweetcorn

1 handful of carrot sticks

2 plums

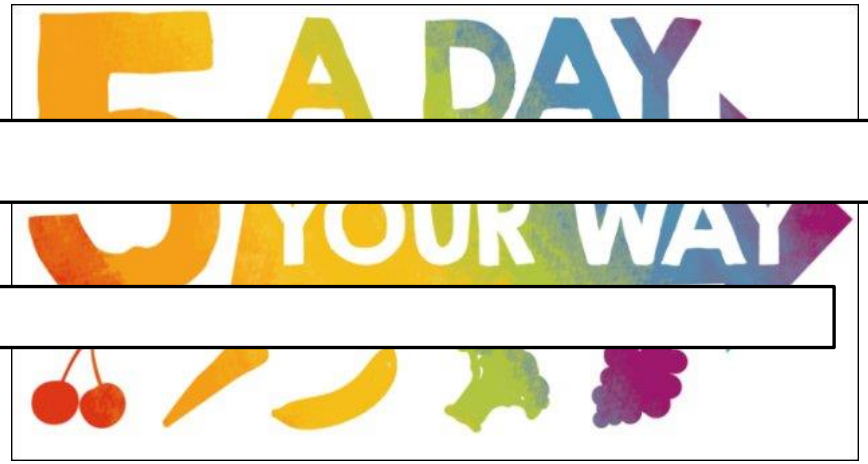
2 broccoli florets

1 medium pear

1 medium apple

SMART: Brain Spill

What does this symbol mean?



1. 5 of what foods should be eaten?

Fruit & Vegetables

1. Why do we eat these foods?

For a variety of vitamins and minerals

1. What types of food are suitable?

Fresh fruits and vegetables, canned, frozen and dried (raisins etc)

1. How big is one portion?

One closed fist or palm of the hand.

CHALLENGE – How many cups of water should we drink per day?

(6 to 8 – tea, water, juice all count – fresh juice doesn't.

Objective

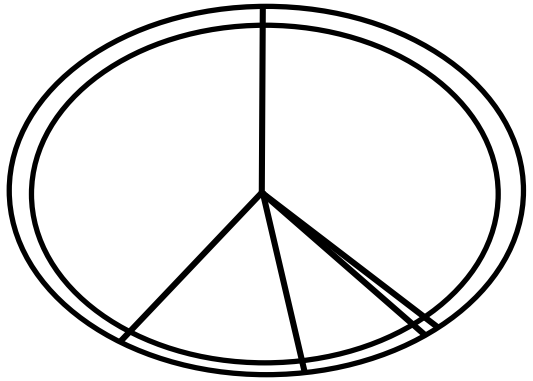
Building core knowledge

To improve your understanding on what makes a balanced diet

LEARNING		OUTCOME
To **EXPLORE** the Eatwell guide and understand the function of each section.	**So that...**	**We can independently identify the features the Eatwell guide and the function they have in our diet.**

Demonstrate: Eatwell Guide

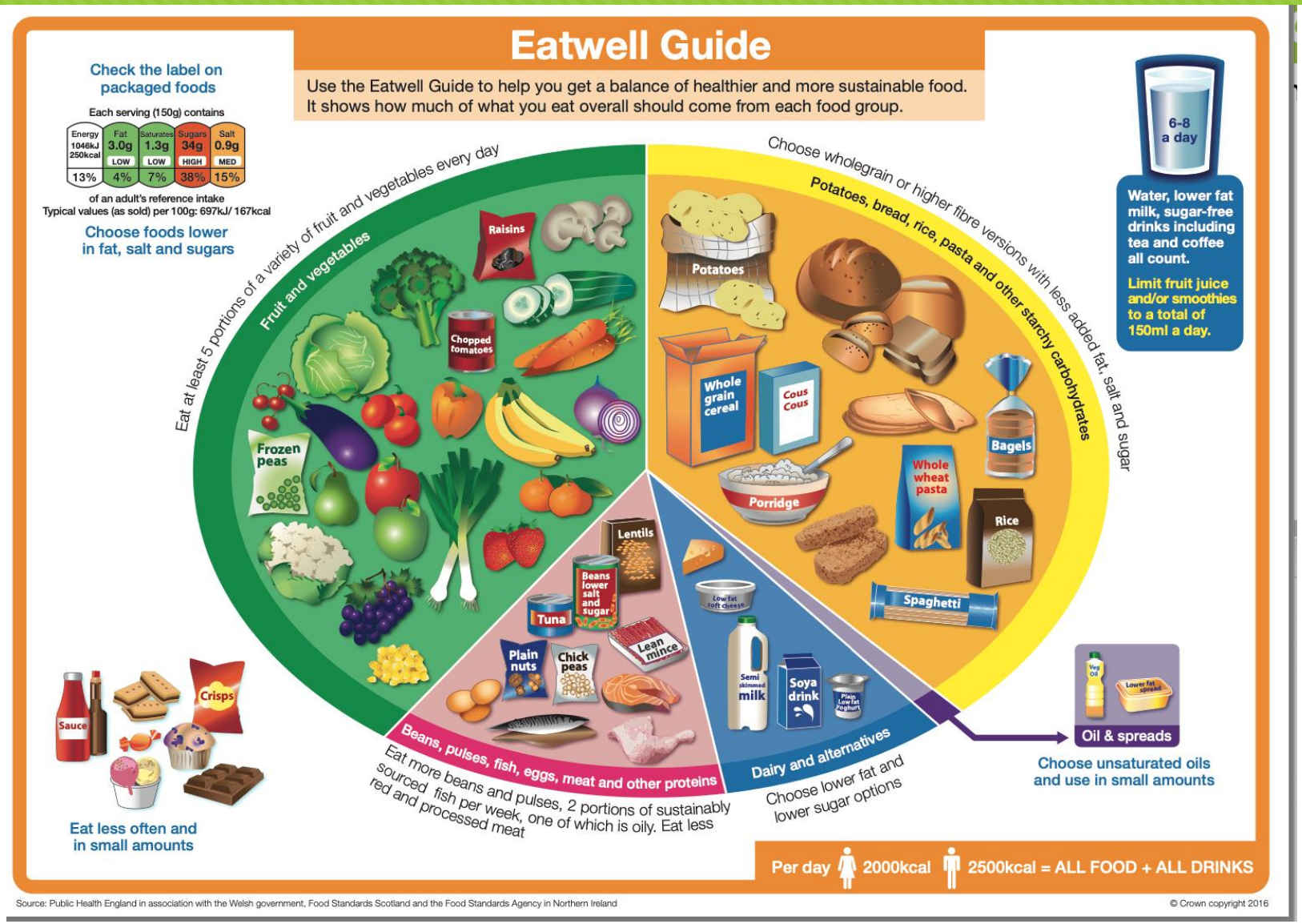
Watch this video and fill out your blank eat well guide. Include the **function** of each nutrient and the **types of foods eaten in each section**.



Activate

1. Which sections should we eat more of <u>and</u> <u>why?</u>

2. Explain the structure of the eat well guide- why is in a picture format?



Consolidate: THINKING HARD!

THINKING HARD

1.Explain why it is important to have 6-8 glasses of water a day?

2. What foods do we eat the least of on the EatWell Guide? Why?
Give 3 reasons why we eat these the least.

CHALLENGE –
What is a protein alternative?
Can you name 2?

Year 7
Population and Migration

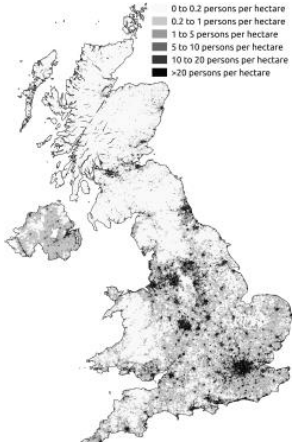
Make sure you know the 'bare bones' of this unit.

Keywords:

1. **Population** – the total number of people living in an area
2. **Population distribution** – where people live and how this is spread out
3. **Sparsely populated** – fewer people living in an area
4. **Densely populated** – lots of people living in an area
5. **Demographic Transition Model** – model that shows us how a population changes over time as a country develops and improves
6. **Birth rate** – number of births per 1000
7. **Death rate** – number of deaths per 1000
8. **Natural increase** – where there are more births than deaths
9. **Migration** - people moving from one place to another
10. **Immigrant** – People who move into another country
11. **Illegal Immigrant** - When someone does not have permission to move into a country
12. **Refugee** - a person who has been forced to leave their country for their own safety
13. **Push factor** – something that is bad that makes people want to leave an area e.g. war, lack of water, no jobs
14. **Pull factor** – something that is good about a place that makes people want to move there e.g. safe, clean water, jobs, healthcare

UK population Distribution

- More people live in the South East of London – for example London. This is because there are more jobs available, better transport links and services.
- There are still other areas of high population density (lots of people) in other cities such as Liverpool, Birmingham, Manchester and Newcastle.
- Scotland and Wales have more sparsely populated (fewer people) mainly due to the high relief making it harder to live there

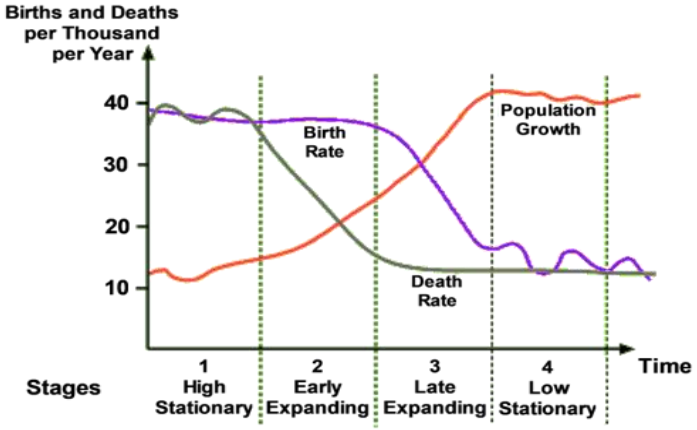


LICs	Poorest countries in the world. GNI per capita is low and most citizens have a low standard of living.
NEEs	These countries are getting richer as their economy is progressing from the primary industry to the secondary industry. Greater exports leads to better wages.
HICs	These countries are wealthy with a high GNI per capita and standards of living. These countries can spend money on services.

Population control

Governments in different countries around the world are developing strategies to control their populations. These strategies differ depending on which stage of the demographic transition model a country is at

Demographic Transition Model



Mexico to USA Migration

There is a 2000 km border between the USA and Mexico as illegal migration is a huge problem. U.S. Border Patrol guards the border and try to prevent illegal immigrants from entering the country.

Impacts on the USA

- Some Americans think Mexican immigrants are a drain on the economy. They believe that migrant workers keep wages low which affects Americans.
- Mexicans will do the jobs some Americans will not for a low wage
- Mexican culture has also enriched the USA border states with food, language and music.

Impacts on Mexico

- It often is younger people and men that migrate; this leaves an aging population and many women left behind
- Legal and illegal immigrants together send back $6 billion a year back to Mexico.
- 10,000 people try to smuggle themselves over the border every week. One in three get caught

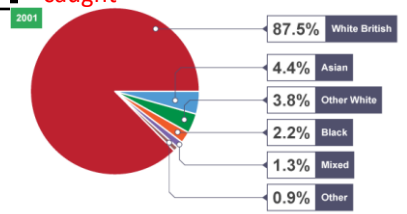
Trying to decrease a population: One Child Policy

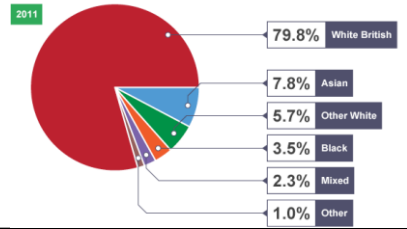
This is where the Chinese government brought in a law where people were only allowed to have one child; this was because they feared there would be another famine (lack of food).

- ☺ 400 million births were prevented
- ☹ Gender imbalance as families preferred boys - men outnumber women by more than 60 million
- ☹ Because they preferred boys there was female infanticide – this is where baby girls were aborted or orphaned
- ☹ There are now not enough working age people

Multiculturalism

The increase in the number of people of mixed race is due to the development of a multicultural society where the people of the UK are now made up of different cultures and races, this is due to migration from being apart of the EU and inviting people from previous British Empire countries to come and live in the UK to help provide key skills and services.





Year 7: The Norman Conquest

Key Vocab	Definitions
Saxons	The English army at Hastings
Normans	William's men (from Normandy in France)
Fyrd	Working men who were called up to fight for King Harold
Housecarls	Well trained, full time Saxon soldiers. Harold's bodyguard
Mounted knights	Soldiers on horseback
Archers	Soldiers with bows & arrows
Shield Wall	Saxon defensive tactic
Oath	A promise
Domesday Book	Survey of English lands & property made about 1086.
Feudal system	System of government introduced by William I
Senlac Hill	Where the Battle of Hastings was fought
Bayeux tapestry	Norman embroidery depicting the battle
Rebellion	An act of armed resistance
Heir	Next in line to the throne
Pevensey	Where William's army landed
Conquest	Invasion & control of a country using military force

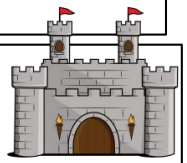
Claimants to the Throne

King Edward the Confessor died childless in January 1066. 4 men believed they should be king:

1. Edgar the Atheling
2. William Duke of Normandy
3. Harald Hardrada
4. Harold Godwinson

The **Witan** (royal council) chose **Harold Godwinson** to be king. Harald Hardrada & William then each launched invasions.

Castles



The earliest castles were **motte & bailey** castles. They were made of wood so were easy to burn down. From around 1100, castles were made from stone. The first stone castles had a rectangular keep. Later, castles with round towers were built. In the 12th & 13th centuries concentric castles were built (outer & inner walls).

Castle defences: moats, ramparts, machicolations, battlements, drawbridge, portcullis, murder holes, arrow slits.

Attacking a castle: Fire arrows, battering ram, catapults e.g. trebuchet & mangonel, mining, siege tower, ladders, siege warfare.

Why did William win the Battle of Hastings?

1. Harold's bad luck e.g. had to rush south into battle after victory at Stamford Bridge.
2. William's men were better prepared & more experienced
3. The Norman army was stronger.
4. The Normans tricked the Saxons by using a fake retreat. They had better tactics.
5. The Normans had the Pope's support.

Armies at Hastings

Normans
3000 foot soldiers (infantry)
3000 mounted knights (cavalry)
2000 archers

Saxons
2000 Housecarls
5000 Fyrd

The Harrying of the North

Some English people rebelled against William's rule, including Hereward the Wake. The biggest rebellion was in the north of England in 1069. It was led by Edgar the Atheling, who had a blood-claim to the throne. He was joined by Danish and Scottish armies.
William defeated the rebellion. In the north-east of England, he ordered villages to be destroyed and people to be killed. Herds of animals and crops were burnt. Most people who survived later starved to death.

1064	Jan 1066	20 Sep 1066	25 Sep 1066	14 Oct 1066	25 Dec 1066
Harold's **oath**	**King Edward dies** Harold is crowned	Hardrada wins **Battle of Fulford Gate**	King Harold wins the **Battle of Stamford Bridge**	**Battle of Hastings**	William is crowned king **'William the Conqueror'**

Knowledge Organisers and Practice questions

North East Learning Trust

Year 7 Topic 1 Number and Calculations Student Knowledge Organiser

Key words and definitions

Odd numbers– a number ending in 1, 3, 5, 7 or 9, can not be divided by 2

Even numbers – a number ending in 2, 4, 6, 8 or 0, can be divided by 2

Prime numbers – a number that can only be divided by 1 and itself

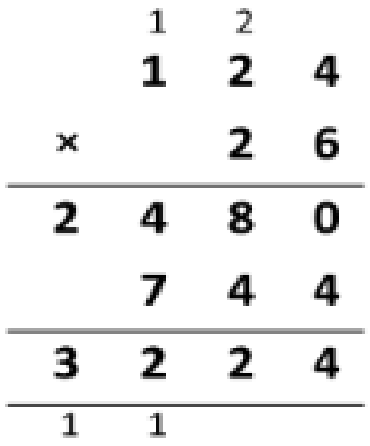
Square numbers– multiply by itself, e.g. 2 x 2 = 4 written as 2^2

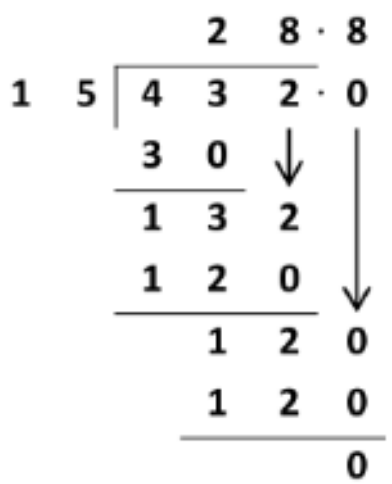
Cube numbers – multiply by itself 3 times e.g. 2 x 2 x 2 = 8 written as 2^3

Factors – numbers which divide into another number with no remainder

Multiples – answers to times tables

Multiplication and division





Answer: 3224

Answer: 28·8

North East Learning Trust

Types of numbers

Here are a list of numbers
23, 24, 27, 28, 31, 33, 34, 35

a) List the prime numbers 23, 31
Can only be divided by 1 and itself, 24, 28, 34 can be divided by 2, 27 and 33 are in the 3 times table (and others), 35 is in the 5 times table

b) Find the cube number 27
1 x 1 x 1 = 1, 2 x 2 x 2 = 8, 3 x 3 x 3 = 27

BIDMAS – Order of operation

B	Brackets	10 × (4 + 2) = 10 × 6 = 60
I	Indices	$5 + 2^2 = 5 + 4 = 9$
D	Division	10 + 6 ÷ 2 = 10 + 3 = 13
M	Multiplication	10 - 4 × 2 = 10 - 8 = 2
A	Addition	10 × 4 + 7 = 40 + 7 = 47
S	Subtraction	10 + 2 - 3 = 5 - 3 = 2

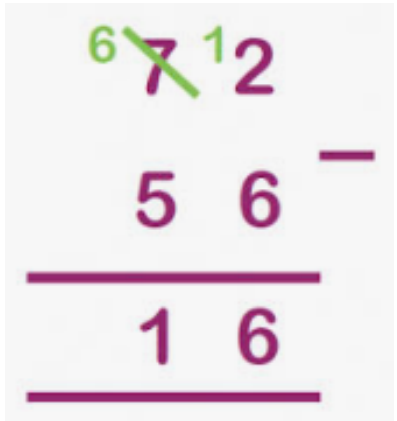
Using a given number fact

Given that 37 x 432 = 15984

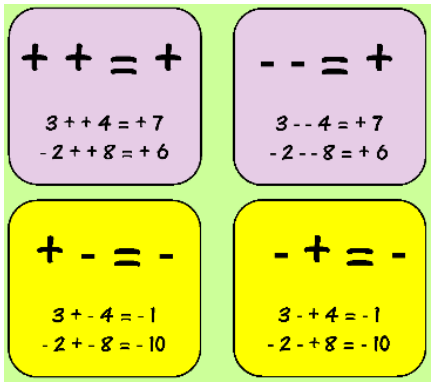
3.7 x 4.32 = 19.984
3.7 is 10 times smaller than 37, 4.32 is 100 times smaller than 432. So the answer is 1000 times smaller than 15984

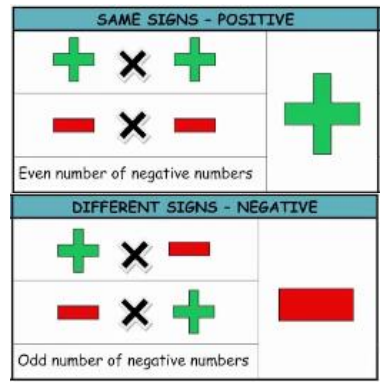
159.84 ÷ 43.2 = 3.7 Rearrange original 15984 ÷ 432 = 37
159.84 is 100 smaller than 15984, 43.2 is 10 times smaller than 432. So the answer is 10 times smaller than 37

Addition and subtraction



Negative numbers - directed





Hegarty Maths Skills Links

Addition and Subtraction	9, 18, 19, 20, 40, 41, 47
Multiplication and division	6, 10, 11, 21, 22, 23, 48, 49, 50, 144, 145
Order of operations	24, 44, 120, 150
Negative numbers	37, 38, 39, 40 ,41, 42, 43, 44

Year 7 Topic 1 Number and Calculations Practice Questions

Addition and subtraction

1) 34 + 57
2) 237 + 645
3) 64 – 37
4) 234 – 148
5) 2.3 + 5.7
6) 5.9 – 3. 6
7) 2.45 + 4.6
8) 10 – 3.29

Multiplication and division

1) 6 x 7
2) 3 x 17
3) 234 x 27
4) 2.4 x 3.57
5) 28 ÷ 7
6) 5096 ÷ 14
7) 9310 ÷ 15
8) 1.24 ÷ 0.4

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BIDMAS

1) 3 x 4 + 5
2) $4 + 8 \times 3^2$
3) $(5 + 2)^2 \times 2$
4) 12 – 15 + 7
5) 5 x 21 ÷ 3
6) (4 + 2) ÷ (10 – 7)

Using a given number fact

Given that 49 x 253 = 12397

1) 4.9 x 25.3
2) 490 x 2.53
3) 123.97 ÷ 49
4) 1239.7 ÷ 253
5) 50 x 253

Types of number

2 5 8 10 13 14 16 18 64 From the list of numbers find,

1) An odd number
2) A multiple of 6
3) A square number
4) A cube number
5) Both a cube and square number
6) A prime number
7) A multiple of 7
8) Any factors of 16

Negative numbers

1) -3 x –4
2) -6 + -3
3) +18 ÷ -3
4) 6 - -5

Applying knowledge

Neil buys 30 pens, 30 pencils, 30 rulers and 30 pencil cases.

Price list	
pens	6 for 82p
pencils	15 for 45p
rulers	10 for £1.25
pencil cases	37p each

What is the total amount of money Neil spends?

The price list shows the normal price of some items in a catalogue.

Normal Price	
Bubble bath	£3.00
Shower gel	£2.95
Soap	£2.50
Hand cream	£3.50

There is a special offer.
Joanna can buy any 3 **different** items from the list for a total price of £5

Work out the most money she can save.

Year 7 Topic 2 Factors and Multiples Student Knowledge Organiser

Key words and definitions

Factors – numbers which divide into another number with no remainder

Multiples – answers to times tables

Prime factor decomposition – write a number as a product of its prime factors

Rounding – make a number simpler but still close to the original number

Significant figures – the importance of each single digit in a number

Approximate – estimate calculations by rounding each number to 1 significant figure first

Factors and Highest common factor

To find the factors of a number, find all of the numbers that can divide exactly into that number with no remainders
To find the HCF of two or more numbers, find the factors of each number and then find the highest number that appears in both lists

16 → 1, 2, 4, 8, 16

24 → 1, 2, 3, 4, 6, 8, 12, 24

So the highest common factor of 16 and 24 is 8

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Multiples and LCM

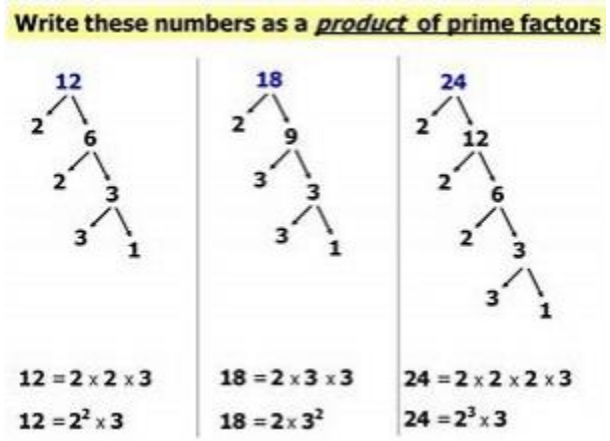
To find multiples of a number, list the answers in that ties table.
To find the LCM of two or more numbers, find multiples of each number then loo for the lowest number in each list

Multiples of 3:
0, 3, 6, 9, 12, 15, 18, 21, 24 ...

Multiples of 4:
0, 4, 8, 12, 16, 20, 24, 28 ...

The LCM of 3 and 4 is 12.

Prime factor decomposition



Significant figures

Rounding to 1.s.f

304.2 ≈ 300 18.97 ≈ 20 2.47 ≈ 2 0.3901 ≈ 0.4

Approximate calculations

Round each number to 1 significant figure then calculate

19 x 1.73 ≈ 40
20 x 2

98.1 x 41.8 ≈ 4000
100 x 40

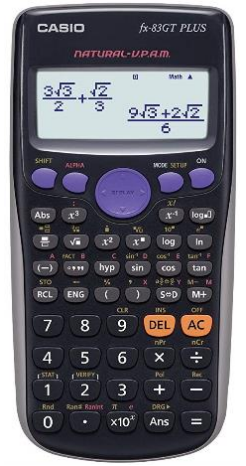
73.8 ÷ 4.85 ≈ 14
70 ÷ 5 = 14

$\frac{(82.1+17.3)}{(11.4)} \approx 10$
$\frac{80+20}{10} = \frac{100}{10}$

$\frac{4.1\times6.4}{3.25+4.91} \approx 3$
$\frac{4\times6}{3+5} = \frac{24}{8}$

$\frac{22.03\times38.4}{0.179} =$

Using a calculator



Be familiar with, and be able to use the following keys – this is not an exhaustive list.

Brackets keys

Change between fraction and decimal form


Fraction key


Find the square root of a number

Press to square a number

Hegarty Maths Skills Links

Factors and multiples	27, 31, 32, 33, 34, 35
Significant figures	130
Approximate calculations	131
Using a calculator	129
Product of prime factors	29,30

Year 7 Topic 2 Factors and Multiples Practice Questions

Types of numbers

Here is a list of 8 numbers.

15 16 17 18 20 22 24 29

(a) Write down a prime number

.....

(b) Write down a factor of 30

.....

(c) Write down a multiple of 3, which is even.

.....

Here is a list of numbers

6 10 11 16 24 30 40

(a) Write down a multiple of 20

.....

(b) Write down a factor of 12

.....

(c) Write down a prime number

.....

Product of prime factors

Write 28 as the product of its prime factors.

Write 18 as the product of its prime factors.

Express 36 as a product of its prime factors.

Express 144 as the product of its prime factors.
Write your answer in index form.

Problems

Jenny is organising a barbecue.
There are 30 bread rolls in a pack.
There are 16 sausages in a pack.
She needs **exactly** the same number of bread rolls as sausages.
What is the smallest number of each pack she must buy?
You **must** show all your working.

Tom, Sam and Matt are counting drum beats.
Tom hits a snare drum every 2 beats.
Sam hits a kettle drum every 5 beats.
Matt hits a bass drum every 8 beats.
Tom, Sam and Matt start by hitting their drums at the same time.
How many beats is it before Tom, Sam and Matt **next** hit their drums at the **same** time?

Polly Parrot squawks every 12 seconds.
Mr Toad croaks every 21 seconds.
They both make a noise at the same time.
After how many seconds will they next make a noise at the same time?

Year 7 Topic 3 Charts and Averages Student Knowledge Organiser

Key words and definitions

Primary data – data collected first hand, in a survey or experiment

Secondary data – data collected by someone else

Discrete – can only take certain values, usually something you can count

Continuous – data that can be measured, can take any value

Average – a typical value for some data, see mean, mode and median

Distribution – how data is spread out, takes account of average & range

Averages

Mode
Most common

Mean
Sum of values / Number of values

Median
Middle value in ascending order

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

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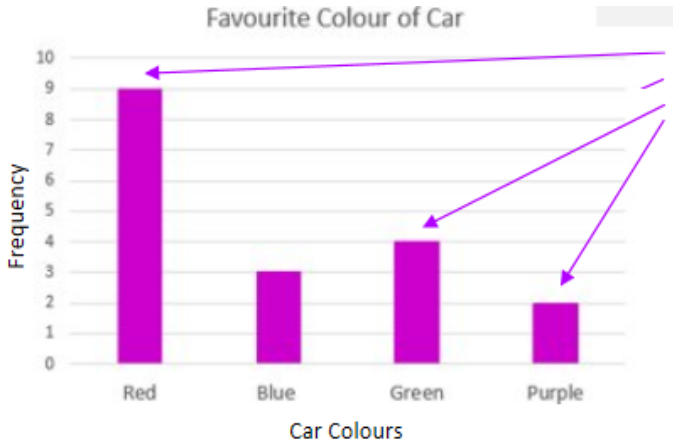
Tally Charts and bar charts

Complete a tally chart for the most popular colour of car

Red, blue, red, green, red, purple, red, green, red, purple, green, blue, red, green, blue, red, red, red

Colour	Tally	Frequency
Red	𝍸 IIII	9
Blue	III	3
Green	IIII	4
Purple	II	2



The number of red, blue, green and purple cars is the **frequency (height of the bars).**

IMPORTANT

The **bars** are the **SAME width**

The **gaps** between the bars are the **SAME width**

Both axes are **labelled**

The graph has a **title**

Frequency starts at 0

Range

Range

Largest value – smallest value

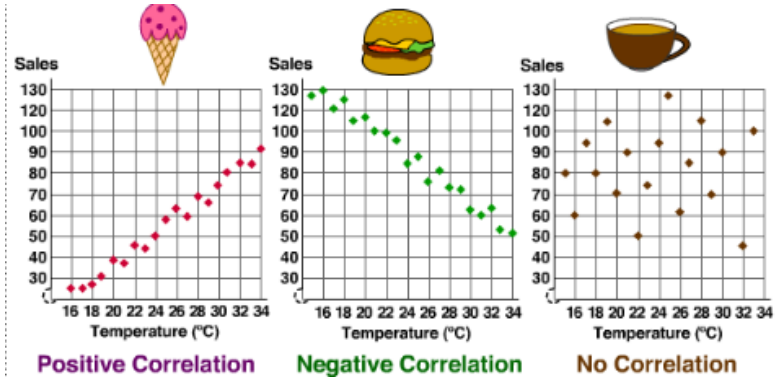
Pie chart

1	Sum (add up) the frequency
2	360° ÷ frequency 360° ÷ 72 = 5
3	Multiply each category x5 to find sector size

Fish	Frequency	
Perch	10	x 5 = 50°
Bream	23	x 5 = 115°
Carp	39	x 5 = 195°
TOTAL	72	360°
360° ÷ 72 = 5		

Draw an accurate pie chart to show this information.
This table give information about then number of fish in a lake.

Scatter graphs



Hegarty Maths Skills Links

Averages	404, 405, 406, 407, 408, 409, 410, 413
Tally and bar charts	401, 425
Scatter graphs	453, 454
Pie charts	427, 428, 429

Year 7 Topic 3 Charts and averages Student Knowledge Organiser

Averages

1) Here are fifteen numbers.
10 12 13 15 15 17 19 20 20 20 21 25 25 25 25

a) Find the mode.

b) Find the median.

c) Work out the range.

2) A rugby team played 7 games.
Here is the number of points they scored in each game.
3 5 8 9 12 12 16

a) Find the median.

The rugby team played another game.
They scored 11 points.

b) Find the median number of points scored in these 8 games.

3) The mean of eight numbers is 41
The mean of two of the numbers is 29
What is the mean of the other six numbers?

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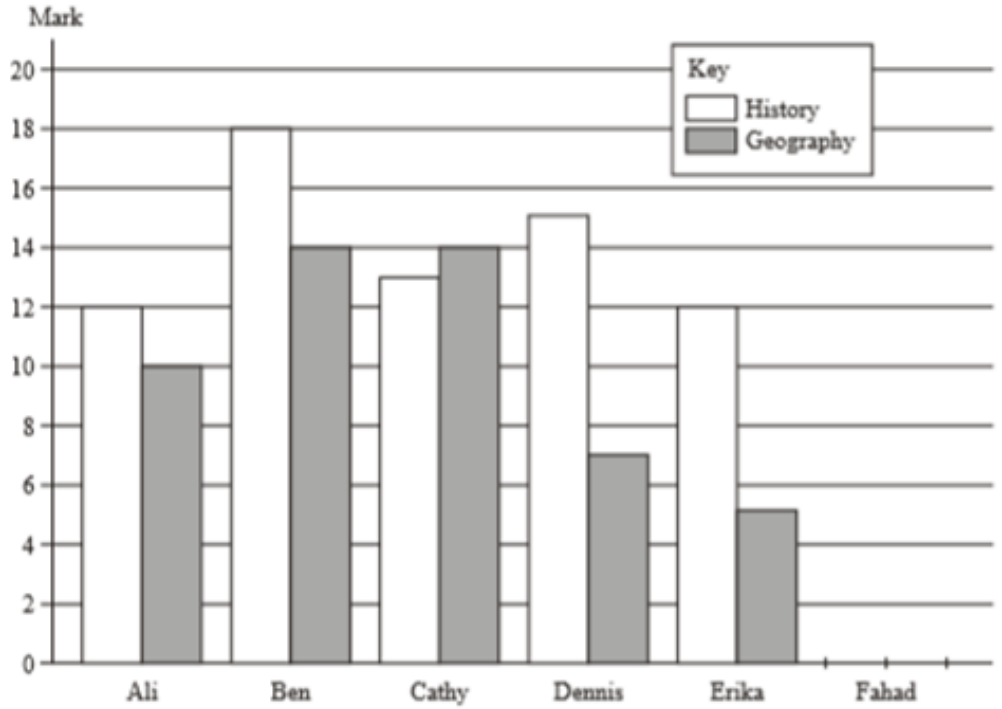
Bar Carts

Six students each sat a history test and a geography test.
The marks of five of the students, in each of the tests, were used to draw the bar chart.



(a) How many marks did Ali get in his history test?

.....

(b) How many marks did Dennis get in his geography test?

.....

(c) One student got a lower mark in the history test than in the geography test.
Write down the name of this student.

Pie charts

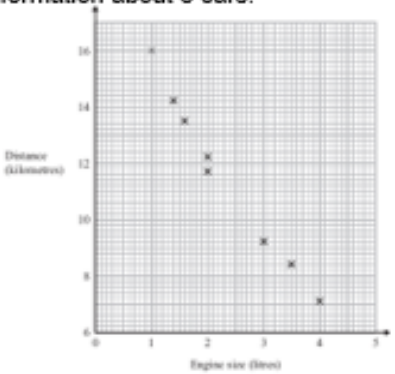
Harry asked each student in his class how they travelled to school that day.
He used the results to draw this pie chart.

How did most of the students travel to school?

Harry asked a total of 24 students.
Work out the number of students who cycled to school.

Scatter Graphs

The scatter graph shows some information about 8 cars.



What type of correlation does the scatter graph show?

A car has an engine size of 2.5 litres.
Estimate the distance travelled on one litre.

Year 7 Topic 4 Area and Volume Student Knowledge Organiser

Key words and definitions

Area – the area of a 2D shapes is the amount of space inside it

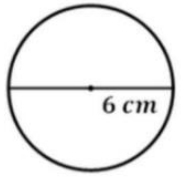
Perimeter – the perimeter is the total distance around the outside of a shape

Circumference – the distance around the outside of a circle

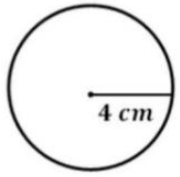
Surface area – sum of the areas of all the faces in a 3D shape

Volume – the amount of 3D space occupied by an object

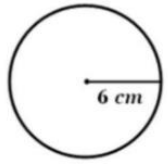
Area and Circumference



$C = \pi d$
$= 3.142 \times 6 \text{ cm}$
$= 18.85 \text{ cm}$

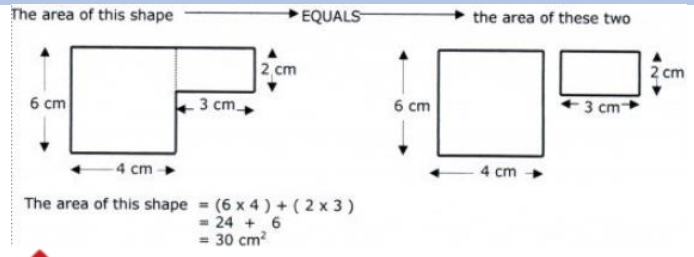


$C = 2\pi r$
$= 2 \times 3.142 \times 4 \text{ cm}$
$= 25.14 \text{ cm}$



$A = \pi r^2$
$= 3.142 \times 6^2$
$= 3.142 \times 36$
$= 113.11 \text{ cm}^2$

Compound area



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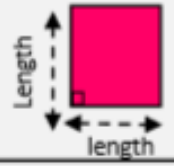
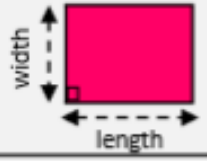
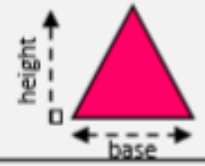
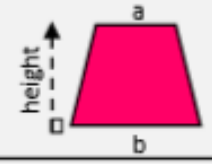
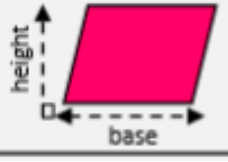
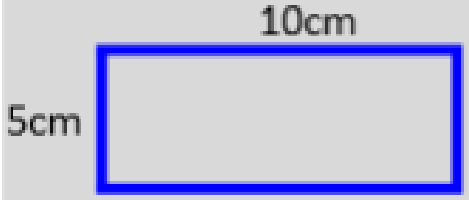
Area

SQUARE $A = \text{Length}^2$	
RECTANGLE A = Length x width	
TRIANGLE $A = \frac{1}{2}$ Base x height*	
TRAPEIZUM $A = \frac{1}{2}(a + b) \times$ height*	
PARALLELOGRAM A = Base x height*	

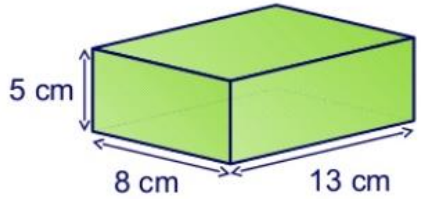
Perimeter



Add the sides
10 + 10 + 5 + 5
= 30cm

Volume of a cuboid

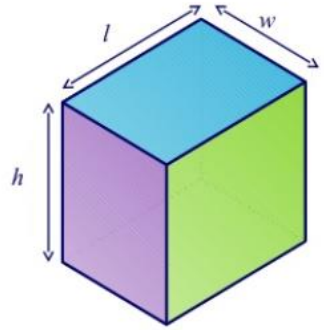
What is the volume of this cuboid?



Volume of cuboid
= length × width × height
= 5 × 8 × 13
= 520 cm³

Surface area of a cuboid

We can find the formula for the surface area of a cuboid as follows.



Surface area of a cuboid =

$2 \times lw$	Top and bottom
$+ 2 \times hw$	Front and back
$+ 2 \times lh$	Left and right side

$= 2lw + 2hw + 2lh$

Hegarty Maths Links

Area	553, 554, 555, 556, 557, 558
Perimeter	548, 549, 550, 551, 552
Circles	534, 535, 536, 537, 538, 539, 540,541, 542, 543
Volume	567,568
Surface area	584, 590

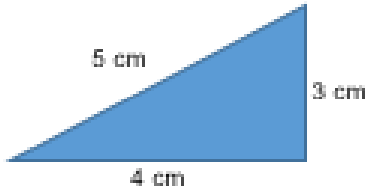
Year 7 Topic 4 Area and Volume Student Knowledge Organiser

Area and perimeter

Calculate the area and perimeter of the following shapes:

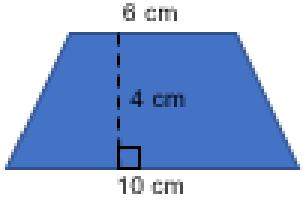
1)

2)



Calculate the area of the following shapes:

3)



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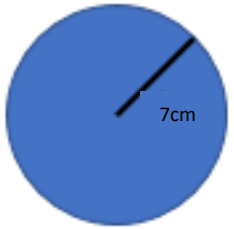
Circles

Calculate the area and circumference of the following shapes:

1)



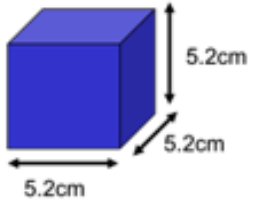
2)

Surface Area

1) How many vertices does a cube have?

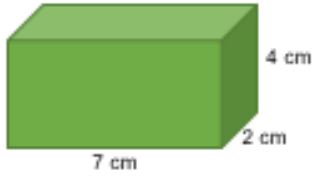
2) Draw the net of a cube

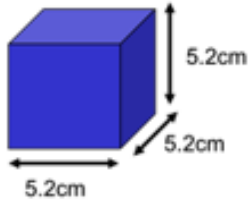
3) Calculate the surface area of the following:



Volume

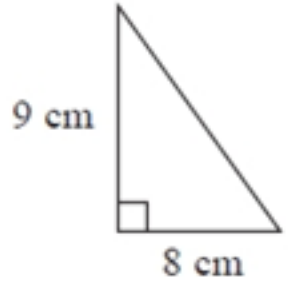
Calculate the volume of the following

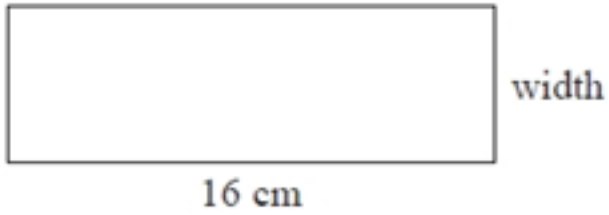




Problem Solving

Here are a triangle and a rectangle.





The area of the rectangle is 6 times the area of the triangle.

Work out the width of the rectangle.

Year 7 Topic 5 Fractions Student Knowledge Organiser

Key words and definitions

Fraction – represents part(s) of a whole

Percentage – how many parts per hundred

Equivalent – equal in value

Improper – a fraction where the numerator (top number) is larger than the denominator (bottom number)

Finding a fraction of an amount

When we work out a fraction of an amount we

multiply by the numerator
and
divide by the denominator

For example,

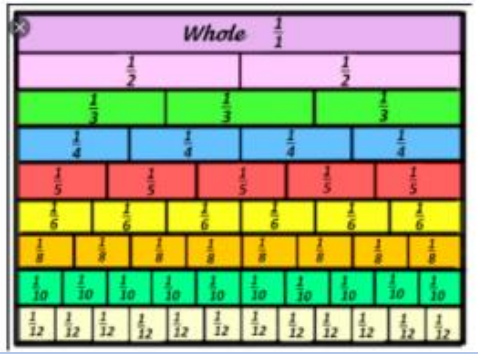
$\frac{2}{3}$ of 18 litres = 18 litres ÷ 3 × 2

= 6 litres × 2

= 12 litres

Equivalent fractions

Represent equivalence with fraction walls



Calculating with fractions

Add	$\frac{1}{2}+\frac{1}{3}=\frac{1x3}{2x3}+\frac{1x2}{3x2}=\frac{3}{6}+\frac{2}{6}=\frac{5}{6}$	6 is the lowest **common denominator** for 2 and 3
Subtract	$\frac{7}{8}-\frac{1}{3}=\frac{7x3}{8x3}-\frac{1x8}{3x8}=\frac{21}{24}-\frac{8}{24}=\frac{13}{24}$	24 is the lowest **common denominator** for 8 and 3
Multiply	$\frac{3}{4}\times\frac{1}{3}=\frac{3}{12}=\frac{1}{4}$	Multiply the numerators, multiply the denominators and the then simplify if possible
Divide	$\frac{1}{2}\div\frac{1}{3}=\frac{1}{2}\times\frac{3}{1}=\frac{3}{2}=1\frac{1}{2}$	Turn the 2nd fraction over (reciprocal) and change the sign to multiplication

Improper fractions and mixed numbers

$\frac{14}{3}$ How many 3's fit into 14? $4\frac{2}{3}$

$7\frac{2}{5}$ $(5 \times 7) + 2 =$ $\frac{37}{5}$

Equivalent fractions

$\frac{6}{48} \xrightarrow{\div 2} \frac{3}{24} \xrightarrow{\div 2} \frac{1}{8}$

$\frac{6}{48} \xrightarrow{\div 3} \frac{2}{16} \xrightarrow{\div 3} \frac{1}{8}$

Hegarty Maths Skills Links

Fraction, decimal, percentages	73, 74, 75, 76
Equivalent fractions	59, 60, 61, 62
4 operations with fractions	65, 66, 67, 68, 69, 70, 71, 72
Fraction of an amount	77, 78
Improper fractions/mixed numbers	63, 64
Percentage of an amount	84, 85, 86

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Year 7 Topic 5 Fractions Student Knowledge Organiser

Simplifying Fractions

Simply fully:

1) $\frac{10}{12}$

2) $\frac{25}{50}$

3) $\frac{120}{300}$

4) $2\frac{12}{30}$

Improper Fractions and Mixed Numbers

Write as an improper fraction:

1) $1\frac{2}{5}$

2) $5\frac{4}{9}$

3) $11\frac{7}{10}$

4) $6\frac{5}{8}$

Write as a mixed number:

1) $\frac{12}{5}$

2) $\frac{45}{11}$

3) $\frac{90}{4}$

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Calculating with fractions

Calculate and simplify:

1) $\frac{4}{5} \times \frac{3}{10}$

2) $\frac{6}{7} \times \frac{5}{6}$

3) $\frac{5}{6} \times \frac{10}{11}$

4) $\frac{4}{9} \times \frac{3}{5}$

5) $\frac{4}{5} \div \frac{2}{3}$

6) $\frac{2}{3} \div \frac{4}{5}$

7) $\frac{1}{6} \div \frac{2}{3}$

8) $\frac{10}{11} \div \frac{5}{7}$

9) $\frac{2}{3} + \frac{1}{8}$

10) $\frac{4}{5} - \frac{1}{3}$

11) $\frac{5}{9} - \frac{4}{11}$

12) $\frac{1}{5} + \frac{6}{11}$

Fractions of an Amount

1) Find $\frac{3}{4}$ of £80

2) Find $\frac{2}{5}$ of £24

3) Find $\frac{3}{10}$ of 70 litres

4) Find $\frac{9}{10}$ of 12 kg

Problem Solving

Danny shares a bag of 20 sweets with his friends.

He gives Mary $\frac{3}{5}$ of the sweets.

He gives Ann $\frac{1}{10}$ of the sweets.

He keeps the rest for himself.

How many sweets does Danny keep for himself?

A school has 1200 pupils.
575 of these pupils are girls.

$\frac{2}{5}$ of the girls like sport.

$\frac{3}{5}$ of the boys like sport.

Work out the total number of pupils in the school who like sport.

Year 7 Expressions Student Knowledge Organiser

Key words and definitions

Expression – numbers, symbols and operators grouped together

Term – number or variable or numbers and variables multiplied together

Equation – a mathematical statement that shows two things are equal

Expand – multiply to remove brackets

Factorise – the reverse of expanding, taking out a common factors

Substitution – putting numbers in place of letters

Simplify – collect like terms

Simplifying expressions

Simplifying

$3e + 6r - e + 5t$

$2e + 11t$

If there is **no sign** in front of the term, it is *POSITIVE*

Substitution

Evaluate 3a - 2b, for a = 10 and b = 4

$3a - 2b \quad (a = 10 \quad b = 4)$

$= 3(10) - 2(4)$

$= 30 - 8$

$= 22$ ✓

Expand a single bracket

Expanding single brackets

$3(x + 2)$

$3x + 6$

Common misconceptions

$3(x + 2)$

$3x + 5$ ✗ This is incorrect

The last term has been **added INSTEAD of multiplying.**

Solve simple equations

Balancing method

$8a - 5 = 11$

$+5 \quad +5$

$8a = 16$

$\div 8 \quad \div 8$

$a = 2$

Function machine method

$8a - 5 = 11$

$a \rightarrow \times 8 \rightarrow -5 \rightarrow 11$

$2 \leftarrow \div 8 \leftarrow +5 \leftarrow 11$

$a = 2$

Factorising

$4x + 16$

4 is a factor of both 4 and 16.

$4(x + 4)$

Hegarty Maths Links

Expression – 156, 157, 158, 159

Expand – 160, 161

Factorise – 167, 168, 169, 170, 171

Substitution – 780, 781, 782, 783, 784

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Year 7 Topic 6 Expressions Student Knowledge Organiser

Simplifying

a) $3x + 6y - 4y + 2x$

b) $y + y$

c) $3p \times 5q$

d) $p \times p \times p \times p$

Substituting

1) Find $3x + 5y$ when $x = 4$ and $y = 2$

2) Find abc when $a = 2$, $b = 3$ and $c = 5$

3) Find $7s - 2t$ when $s = 4$ and $t = -3$

4) Find $4(2n - 3)$ when $n = 5$

Expanding

1) $3(a + 4)$

2) $5(c + 6b)$

3) $4(x - 3y)$

4) $a(a + 5)$

5) $x(4y - 2x)$

Expanding and simplifying

1) $4(2x + 3y) + 2(x + 2y)$

2) $5(a + 3b) - 3(a - b)$

3) $4(x + 4) - 2x(x + 5)$

Factorising

1) $3x + 33$

2) $5y + 25$

3) $4a - 18$

4) $x^2 + 4x$

Writing expressions

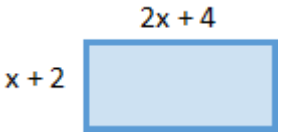
My age is C, write expressions for the ages of the members of my family if:

a) My brother is 3 years older than me

b) My sister is 2 years younger than me

c) My mum is double my age

Write an **expression** for the **area** of the rectangle.



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Year 7 Topic 7 Fractions, decimals and percentages Student Knowledge Organiser

Key words and definitions

Fraction – represents part(s) of a whole

Percentage – how many parts per hundred

Equivalent – equal in value

Improper – a fraction where the numerator (top number) is larger than the denominator (bottom number)

Fraction, decimal and percentage equivalence

Fractions	Decimals	Percentages
$\frac{1}{5}$	0.2	20%
$\frac{3}{4}$	0.75	75%
$\frac{1}{8}$	0.125	12.5%
$\frac{1}{2}$	0.5	50%

Improper fractions and mixed numbers

Improper to mixed number & visa versa

$\frac{14}{3}$ How many 3's fit into 14? $4\frac{2}{3}$

$7\frac{2}{5}$ $(5 \times 7) + 2 =$ $\frac{37}{5}$

Percentages

on a calculator

39% of 82

0.39 x 82

Change to a decimal and multiply

fraction to %

$\frac{15}{20} \times 5 = \frac{75}{100} = 75\%$ (×5 top and bottom)

OR

15 ÷ 20 x 100 = 75%

without a calculator

50% - half

25% - half and half

75% - 50% + 25%

10% - divide by 10

5% - half 10%

20% - double 10%

increasing

Increase £60 by 12%

12% of 60 = 0.12 x 60 = £7.20

New amount = £60 + £7.20

= £67.20

ADD

decreasing

decrease £60 by 12%

12% of 60 = 0.12 x 60 = £7.20

New amount = £60 - £7.20

= £52.80

SUBTRACT

Convert FDP

$\frac{70}{100}$ → This also means 70 ÷ 100 → 70 out of 100 squares → 70 "hundredths" = 7 "tenths" = 0.7 →  → 70 hundredths = 70%

Using a calculator

$\frac{\square}{\square}$ → S⇌D → Convert to a decimal

This will give you the answer in the simplest form

× 100 converts to a percentage

Be careful of recurring decimals

eg $\frac{1}{3}$ = 0.3333333

= $0.\dot{3}$

The dot above the 3

Hegarty Maths Skills Links

Fraction, decimal, percentages	73, 74, 75, 76
Equivalent fractions	59, 60, 61, 62
4 operations with fractions	65, 66, 67, 68, 69, 70, 71, 72
Fraction of an amount	77, 78
Improper fractions/mixed numbers	63, 64
Percentage of an amount	84, 85, 86

Year 7 Topic 7 Fractions, decimals and percentages Student Knowledge Organiser

Equivalent fractions

1) Complete the table below.

Fraction	Decimal	Percentage
½		
	0.6	
		15%
¼		

2) Would you rather have ¾, 70% or 0.72 of a pizza? Why?

Here are four numbers.

$$0.43 \qquad \frac{3}{7} \qquad 43.8\% \qquad \frac{7}{16}$$

Write these numbers in order of size.

Start with the smallest number.

Percentage of an amount

1) Calculate 40% of 600 ml.

2) Calculate 67% of £120.

3) Bobby went to the shop and there was a 20% sale. He was going to buy a top for £24. How much does he save?

4) Sarah went to the shop and there was a 15% sale. She was going to buy a CD for £8. How much does she save?

Problem Solving

Shafira had collected £720 in a sponsored event.

She gave $\frac{1}{2}$ of the amount collected to her local youth club.

She gave 40% of the amount collected to a children's hospital.

She gave the rest of the money to a mountain rescue group.

How much money did Shafira give to the mountain rescue group?

What percentage of the £720 did Shafira give to the mountain rescue group?

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Year 7 Topic 8 Ratio Student Knowledge Organiser

Key words and definitions

Ratio – Measuring how two quantities compare to each other in size

Proportion – comparing two or more things against the whole

Bar model – a pictorial representation of a number to help understanding

Simplify – reduce to its simplest terms

Highest common factor – the highest number that can be divided exactly in to two or more numbers

Simplify ratio

Ratios can be fully **simplified** just like fractions.

To simplify a ratio, divide all of the numbers in the ratio by the same number (**highest common factor**) until they cannot be divided any more.

Simplify: 6 : 12

Divide both by 6

1 : 2

Write in the form 1:n

When asked to write a ratio in the format 1 : n, you need to **divide BOTH sides** by **the ratio where the 1 is.**

Write 7 : 21 in the ratio 1: n

7 : 21 divide both sides by 7

1 : 3

Share in a given ratio

Monty and Mosaurus get A TOTAL of £72 pocket money.

They share it in the **ratio 5 : 3**

How much do they each get?

- **Add the ratios: 3 + 5 = 8**
- **Divide 72 by 8 (72 ÷ 8 = 9)**

Each ONE portion is worth £9

Monty has 5 portions

5 x 9 = £45

Mosaurus has 3 portions

3 x 9 = £27

In a school the ratio of boys to girls is 9 : 4.

There are 270 boys in the school.

How many students are there in the school altogether?

Divide the total number of boys by the boy's ratio

270 ÷ 9 = 30

This gives the number for 1 'portion'

Girls

4 x 30 = 120

Total = 270 + 120 = 390

Recipes

A recipe for 6 people uses 900 g of mince. How much mince is needed for

a 12 people

P : M

6 : 900g (×2) → 12 : 1800g

b 3 people

P : M

6 : 900g (÷2) → 3 : 450g

c 9 people?

6 people + 3 people = 9 people

900 + 450 = 1350 g

Exchange rates

The exchange rate is:

£1 buys $2.12

Find how many dollars ($) can be bought for £1500

£1 = $2.12 (×1500)

£1500 = $.....

(1)

Maps and scales

6. Each diagram is part of a map. Find the actual distance between the two places for each map. Give your answers in metres.

(a) Scale 1 : 12 500

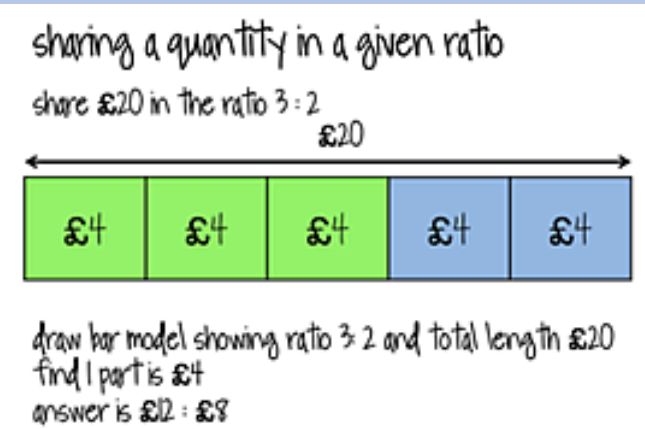
1 cm : 12 500cm

2.6 cm : 32 500 cm (×2.6)

if 100 cm is 1m

32 500cm is 325 m

Bar modelling



Hegarty Maths Links

Ratio – 328, 329, 330, 331, 332, 333, 334

Proportion – 339, 340

Recipes – 739, 740, 741, 742

Maps and scales – 864, 865, 866

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Year 7 Topic 8 Ratio Practice Questions

Simplify ratio

Write the ratio of blue beads to yellow beads for each necklace.
Simplify each ratio if possible. The first one has been started for you.

a  blue : yellow = 4 : 2 = 2 : ☐

b 

c 

Write each ratio in its simplest form.

a 2 : 20	b 25 : 5	c 4 : 24	d 6 : 30
e 8 : 24	f 6 : 10	g 30 : 25	h 24 : 10
i 16 : 6	j 40 : 15		

Write each ratio as a whole number ratio in its simplest form.

a 0.4 : 6 b 3.5 : 4.2 c 45 : 13.5 d 25.6 : 46.4

Discussion What should you multiply by if a number in a ratio has 2 decimal places?

Write each ratio as a whole number ratio in its simplest form.

a 0.25 : 3.1 b 1.4 : 0.28 c 1.62 : 1.8 d 4.8 : 11.2

Which of these ratios are equivalent?

A 36 : 16	B 135 : 60
C 28 : 16	D 126 : 56
E 49 : 28	

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Recipes

Real A recipe for six people uses four eggs. How many eggs are needed for

a 12 people
b 3 people
c 9 people
d 15 people?

A recipe for 4 people uses 6 eggs. How many eggs are needed for

a 8 people b 2 people c 6 people d 10 people?

Scale

Write these conversions as ratios.

a mm : cm	b cm : m	c km : m
d kg : g	e ml : l	f m : cm

Complete these conversions.

a 9 m = ☐ cm	b 2 cm = ☐ mm	c 7 l = ☐ ml
d 5000 m = ☐ km	e 200 cm = ☐ m	f 30 mm = ☐ cm
g 12000 ml = ☐ l	h 10 cm = ☐ mm	i 100 m = ☐ km

Complete these conversions.

a 3.6 m = ☐ cm	b 2.8 kg = ☐ g	c 3.1 cm = ☐ mm
d 8.9 kg = ☐ g	e 3900 m = ☐ km	f 630 cm = ☐ m
g 84 mm = ☐ cm	h 8600 ml = ☐ l	i 70 m = ☐ cm

Sharing in a given ratio

Share these amounts between Alice and Ben in the ratios given.
Show how you check your answers.

a £21 in the ratio 2 : 1	b £45 in the ratio 2 : 3
c £96 in the ratio 7 : 5	d £28 in the ratio 4 : 3
e £72 in the ratio 3 : 5	f £60 in the ratio 11 : 4

Talil is going to make some concrete mix.
He needs to mix cement, sand and gravel in the ratio 1 : 3 : 5 by weight.
Talil wants to make 180 kg of concrete mix. Talil has

- 15 kg of cement
- 85 kg of sand
- 100 kg of gravel

Does Talil have enough cement, sand and gravel to make the concrete mix? **(4 marks)**

Ratio problems

Real Hummingbirds eat nectar made from sugar and water in the ratio 1 : 4. How much water is needed for 3 teaspoons of sugar?

Real A recipe for Thai chicken uses Thai sauce and fresh ginger in the ratio 2 : 1. Anna uses 4 tablespoons of Thai sauce. How much ginger does she use?

Finance / Problem-solving Harry invests some money in low-risk and high-risk investments in the ratio 7 : 3.
He invests £1800 into the high-risk investments.
How much money does he invest altogether?
Discussion Is there more than one way to work out the answer to this question?

Year 7 Topic 9 Equations Student Knowledge Organiser

Key words and definitions

Equation – a statement that two things are equal, each side of equals sign

Substitution – replacing an unknown with a number

Unknown – a number we do not know, usually shown by a letter

Solve – find the value of a variable that makes an equation true

Expand – multiply out the brackets

Inverse – doing the opposite function

Substitution

Evaluate 3a - 2b, for a = 10 and b = 4

$3a - 2b \quad (a = 10 \quad b = 4)$

$= 3(10) - 2(4)$

$= 30 - 8$

$= 22$ ✓

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Simple equations

Solve the equation $x - 3 = 7$

$x - 3 = 7$ — Visualise the equation as balanced scales.

$x - 3 + 3 = 7 + 3$ — The inverse of −3 is + 3. Do this to both sides to keep the equation balanced.

$x = 7 + 3$

$x = 10$

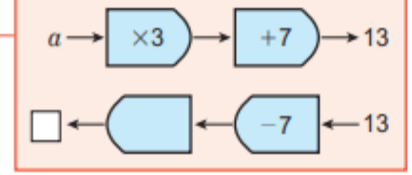
Check: $x - 3 = 10 - 3 = 7$ ✓

3 term equations

Solve the equation $3a + 7 = 13$

$3a + 7 - 7 = 13 - 7$

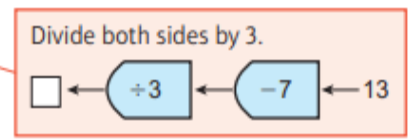
Subtract 7 from both sides.



$3a = 6$

$\frac{3a}{3} = \frac{6}{3}$

Divide both sides by 3.



$a = 2$

Check: $3a + 7 = 3 \times 2 + 7 = 13$ ✓

Equations with brackets

$2(4p + 1) = 18$ {Use Distributive Law}

$8p + 2 = 18$ {Subtract 2 from both sides}

$8p + 2 - 2 = 18 - 2$

$8p = 16$ {Divide both sides by 8}

$\frac{8p}{8} = \frac{16}{8}$

$p = 2$

Unknown on both sides

Solve $4d + 17 = 8d - 3$

$4d + 17 = 8d - 3$

$-4d$ $-4d$ — Visualise the equation as balanced scales. Subtract $4d$ from both sides.

$17 = 4d - 3$

$17 + 3 = 4d - 3 + 3$ — The inverse of −3 is + 3. Do this to both sides.

$20 = 4d$ — Divide both sides by 4.

$5 = d$

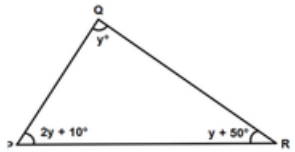
$d = 5$

Check: LHS = $4d + 17 = 4 \times 5 + 17 = 37$

RHS = $8d - 3 = 8 \times 5 - 3 = 37$ ✓

Forming and solving equations

PQR is a triangle. Form and solve an equation to find the value of y.



What do the angles in a triangle add up to?

180

How can we write an equation for this?

$2y + 10 + y + y + 50 = 180$

Can we collect like terms?

$4y + 60 = 180$

$4y = 120$

$y = 30$

Hegarty Maths Links

Solve equations – 177, 178, 179, 180, 181, 182, 183

Solve unknowns on both sides – 184, 185, 186

Set up and solve – 176, 188

Year 7 Topic 9 Equations Practice Questions

Simple equations

Solve

a $a + 3 = 4$ b $c - 6 = 4$

c $15 = g + 4$ d $21 + h = 23$

e $11 = k - 6$ f $l - 7 = 14$

Solve

a $4h = 40$ b $3m = 15$

3 term equations

Solve these equations.

a $2a + 1 = 5$ b $2a - 1 = 5$

c $3a + 2 = 8$ d $3a + 5 = 4$

e $7f - 12 = 9$ f $-5c + 12 = 2$

g $3a + 1 = 8$ h $2p - 4 = -5$

i $8t + 2 = -3$

Equations with brackets

Expand and solve

a $5(a - 5) = 70$ b $6(b + 5) = 30$

c $3(d - 5) = 15$ d $3(2d - 5) = 27$

e $4(m - 4) = 12$ f $9(b - 11) = 9$

g $7(4 - c) = 35$ h $-2(e + 2) = -10$

i $-3(7 - f) = -3$

Solve

a $\frac{3c + 4}{3} = 2$

b $\frac{4g - 5}{5} = 3$

c $\frac{5g + 7}{4} = 6$

Unknowns on both sides

Solve these equations.

a $2a + 9 = a + 5$ b $8b + 9 = 3b + 14$ c $4d + 17 = 8d - 3$

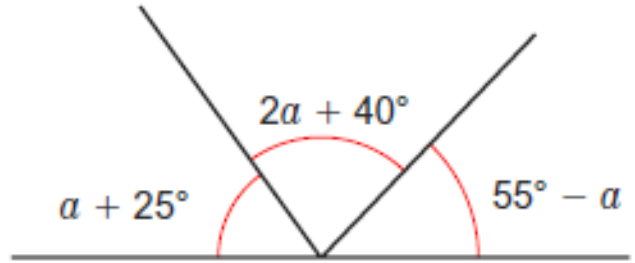
d $6v - 7 = 3v + 7$ e $3e = 7e - 18$ f $2h + 7 = 8h - 1$

Solve these equations.

a $40 - 3x = 1$ b $9 - 5x = 3x + 1$ c $1 - 6x = 9 - 7x$

d $8 + 3x = 1 - 4x$ e $13 - 2x = 3 - 7x$ f $3 - 9x = 5 - 6x$

Form and solve



Find the value of a.

Reasoning The length of a rectangle is 3 cm greater than its width.
The perimeter of the rectangle is 54 cm.
Find its length.

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Year 7 Topic 10 Shapes and angles Student Knowledge Organiser

Key words and definitions

Triangle – a three sided shape

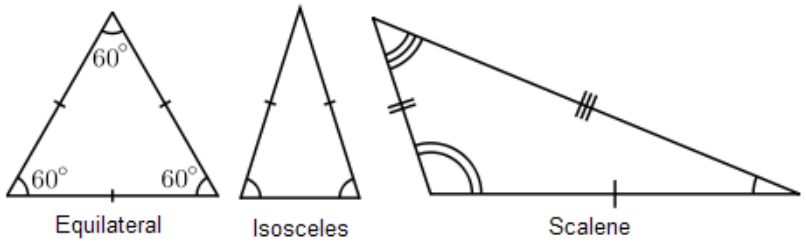
Quadrilateral – a general name for a four sided shape

Parallel lines – lines which never meet, they stay the same distance apart

Plan view – looking down on an object from above

Elevation – view from the front or side of an object

Types of triangles

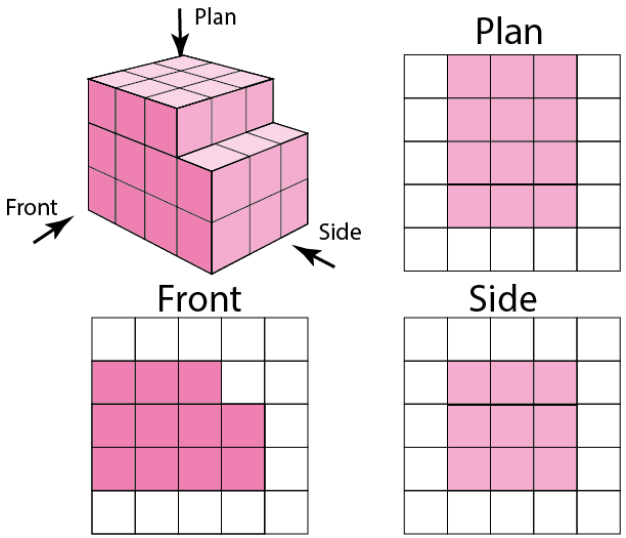


Angles in parallel lines

Types of special quadrilaterals

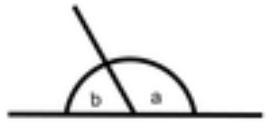
Quadrilateral	*Properties*
Rectangle	4 right angles and opposite sides equal
Square	4 right angles and 4 equal sides
Parallelogram	Two pairs of parallel sides and opposite sides equal
Rhombus	Parallelogram with 4 equal sides
Trapezium	Two sides are parallel
Kite	Two pairs of adjacent sides of the same length

Plans and elevations



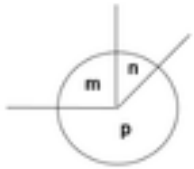
Angle facts

The angles on a straight line add up to 180°.
a + b = 180°



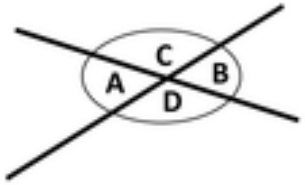
The angles in a triangle add up to 180°.
a + b + c = 180°

The angles at a point add up to 360°.
m + n + p = 360°



The angles in a quadrilateral up to 360°.
w + x + y + z = 360°

Vertically opposite angles are equal.
A = B
D = C



Hegarty Maths Links

Triangle – 823

Quadrilateral – 824, 825, 826

Parallel lines – 481, 482, 483

Plans and elevations – 837, 838, 839, 840, 841, 842, 843, 844

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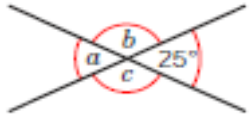
Year 7 Topic 10 Shapes and angles Practice Questions

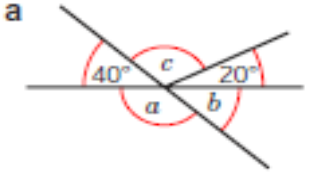
Angles facts

Reasoning Work out the angles marked with letters.
Give your reasons.



Reasoning Work out the angles marked with letters.
Give reasons for your answers.

a



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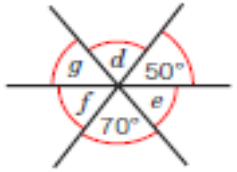

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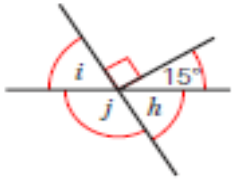
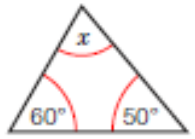


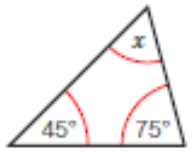
Angles in triangles and quadrilaterals

Calculate the size of each unknown angle.

a



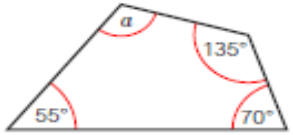
b



c

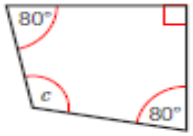
Calculate the size of each unknown angle.

a

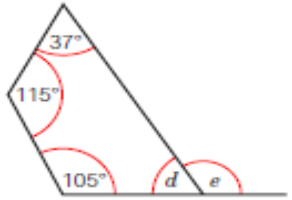


b

c



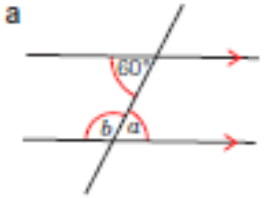
d



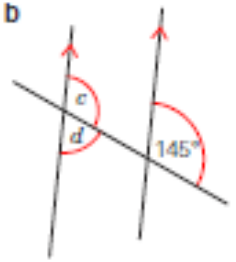
Angles in parallel lines

Reasoning Work out the angles marked with letters.
Give reasons for your answers.

a

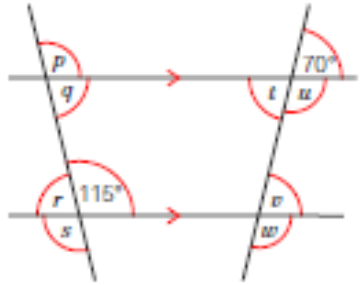


b



c

d



Plans and elevations

Draw the plan, the front elevation and the side elevation of each 3D solid on squared paper.

a

b

c

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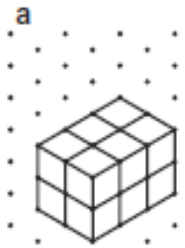
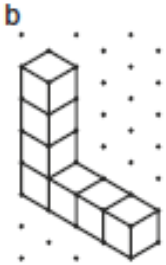
These solids are made from centimetre cubes.
Draw the plan, front elevation and side elevation of each solid on squared paper.

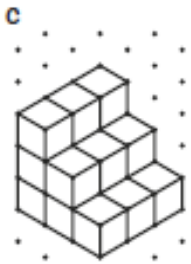
a



b



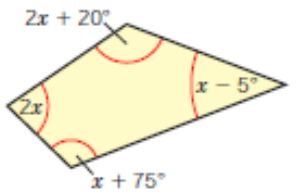
c



d

Angle problems

The diagram shows a quadrilateral.



a Write an equation in terms of x for the sum of the angles.
b Solve your equation to find the value of x.
c Write down the sizes of the four angles in the quadrilateral.

Problem-solving In triangle ABC, ∠ABC is twice the size of ∠BAC and ∠BCA is three times the size of ∠BAC.
Work out the sizes of the three angles in the triangle.

Year 7 Topic 11 Sequences Student Knowledge Organiser

Key words and definitions

Sequence – a list of numbers or patterns in a special order

Pattern – things arranged following a rule

nth term – a formula to help you find any term in a sequence

Position-to-term – this is another way of saying the nth term

Term-to-term – find the next number in a sequence if you know the previous one

Linear – a sequence which increase/decrease by the same amount each time

Using a term-to-term rule

Find the next term in the sequence 28, 37, 46, 55, 64, ___.

① ② ③ ④ ⑤ ⑥

28, 37, 46, 55, 64, 73, ...

+9 +9 +9 +9 +9

ARITHMETIC SEQUENCE

Answer 73

nth term of a linear sequence

3 8 13 18 23

+5 +5 +5

1. Find the *difference* between each term:
   5
2. Always put 'n' next to it (n = term number)
   5n
3. Add or subtract to get the first term in the sequence?
   5-2 = 3

The nth term is **5n -2**

Geometric sequence

A geometric sequence is one where to get from one term to the next you multiply by the same number each time. This number is called the *common ratio, r.*

Eg

1 2 3 4

2, 10, 50, 250 ...

x5 x5 x5

r=5

Sequences from patterns

Shape number	1	2	3	4	5	6	7	8	9	10	50
Number of matchsticks	3	5	7	9	11	13	15	17	19	21	101
Function rule	Number of matchsticks = Shape number x 2 + 1										

Finding missing terms

Find the missing terms and rule for: 48, ___, 70 , ___, 92

48 → 70 (2 jumps!) gives us: Add 22

So our rule for one jump is half this → Add 11 (common diff = +11)

Number after 48 → 48 + 11= 59

[CHECK: 59 → 59 + 11 = 70!]

Number after 70 → 70 + 11 = 81

Hegarty Maths Links

Pattern – 196

Term-to-term – 197

nth-term – 198

Geometric sequences – 264

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Year 7 Topic 11 Sequences Practice Questions

Term to term rules

Write down the next two terms in each sequence.

a 1.5, 2, 2.5, 3, ☐, ☐

b $-\frac{2}{3}, -\frac{1}{3}, 0, \frac{1}{3}$, ☐, ☐

c 3.5, 2.7, 1.9, 1.1, ☐, ☐

d −1.5, −2.5, −3.5, −4.5, ☐, ☐

e $\frac{3}{5}, -\frac{1}{5}, -1, -1\frac{4}{5}$, ☐, ☐

f −10.6, −9.9, −9.2, −8.5, ☐, ☐

Use the first term and the term-to-term rule to generate the first five terms of each sequence.

a start at 3 and add 0.4

b start at 10 and subtract 0.2

c start at 7 and add 3

d start at 7 and add 2

e start at −3 and add 2

f start at −7 and subtract 5

In a Fibonacci sequence, the term-to-term rule is 'add the two previous terms to get the next one'. Write the next 3 terms in each Fibonacci sequence.

a 1, 1, 2, 3, 5, ...

b 3, 3, 6, 9, 15, ...

c 5, 5, 10, 15, 25, ...

Patterns

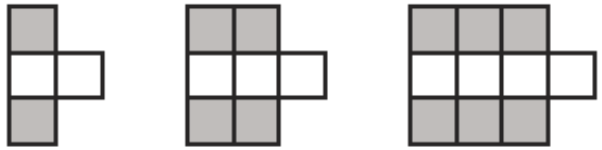
Here are some patterns made from white centimetre squares and grey centimetre squares.

a Draw pattern 4.

b Find the number of grey squares in Pattern 6.

A pattern has 20 grey squares.

c Work out how many white squares there are in this pattern.



Pattern 1 Pattern 2 Pattern 3

(4 marks)

Patterns and nth term

Here is a pattern made from dots.

4 7 10

a Draw the next pattern in the sequence.

b Copy and complete this table for the numbers of dots used to make the patterns.

Pattern number	1	2	3	4	5	6
Number of dots						

c Write, in terms of n, the number of dots needed for pattern n.

d How many dots are needed for pattern 30?

(5 marks)

nth term

Find the nth term for each sequence.

a 2, 5, 8, 11, 14, 17, ...

b 2, 6, 10, 14, 18, 22, ...

c 2, 7, 12, 17, 22, 27, ...

d 5, 7, 9, 11, 13, 15, ...

e 19, 17, 15, 13, 11, 9, ...

f 20, 18, 16, 14, 12, 10, ...

For each sequence, explain whether each number in the brackets is a term in the sequence or not.

a 2, 5, 8, 11, 14, ... (50, 66)

b 5, 8, 11, 14, 17, ... (50, 62)

c 1, 5, 9, 13, 17, ... (101, 150)

d 4, 9, 14, 19, 24, ... (168, 169)

e 40, 35, 30, 25, 20, ... (85, 4)

f 5, 11, 17, 23, 29, ... (119, 72)

Q6a hint Work out the nth term

☐n − ☐ = 50

n = ☐

Using the nth term given, find the 20th term.

a $2n$

b $3n + 1$

c $11 - 3n$

Q7 hint Use a function machine to help you visualise.

Find the nth term for each sequence. Use it to work out the 10th term.

a 1, 3, 5, 7, ...

b 3, 6, 9, 12, ...

c 10, 8, 6, 4, ...

d 3, 7, 11, 15, ...

Find the first term over 100 for each sequence.

a 9, 18, 27, 36, 45, ...

b 7, 10, 13, 16, 19, ...

c 4, 9, 14, 19, 24, ...

d 10, 15, 20, 25, 30, ...

Q9 hint
Solve nth term = 100

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Year 7 Topic 12 Graphs Student Knowledge Organiser

Key words and definitions

Co-ordinate – values that show an exact position. First number tells you how far along, second number how far up or down

Mid points – a point that divides a line segment in two equal parts

Straight line graphs – plotting a constant rate of change between two variables

Distance-time graphs – describes a journey where the gradient will give the speed.

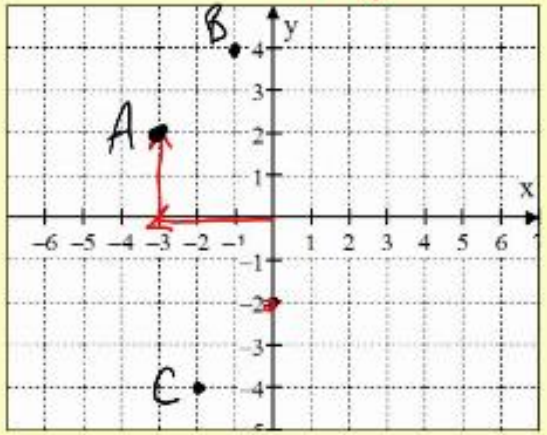
Plotting co-ordinates

Plot the following points.

(x, y)

(x, y)

1. A(-3, 2)
2. B(-1,4)
3. C(-2,-4)
4. D(0,-2)
5. E(3,0)



Drawing a straight line graph

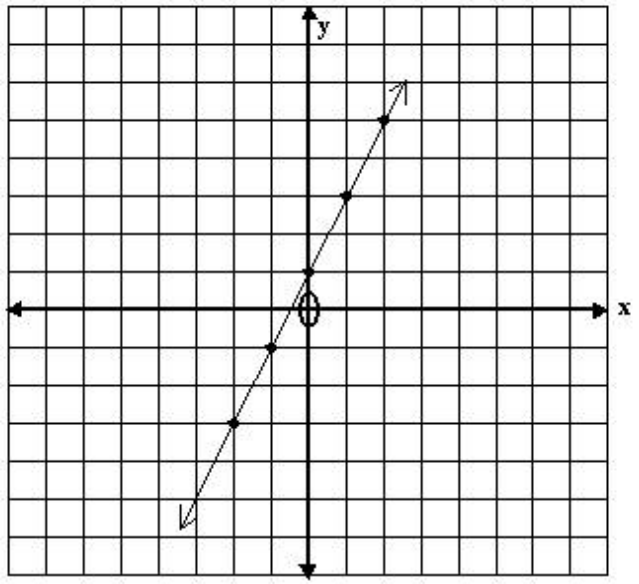
e.g. $y = 2x + 1$

x	2x + 1	y
-2	2(-2) + 1	-3
-1	2(-1) + 1	-1
0	2(0) + 1	1
1	2(1) + 1	3
2	2(2) + 1	5

Choose values for x.

Calculated y values

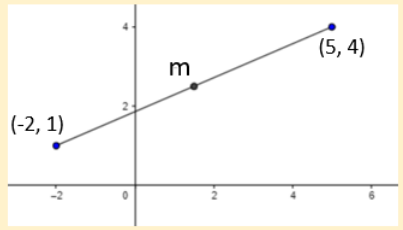
The points to plot are:
(-2,-3) (-1,-1) (0,1)
(1,3) (2,5)



Finding a mid-point

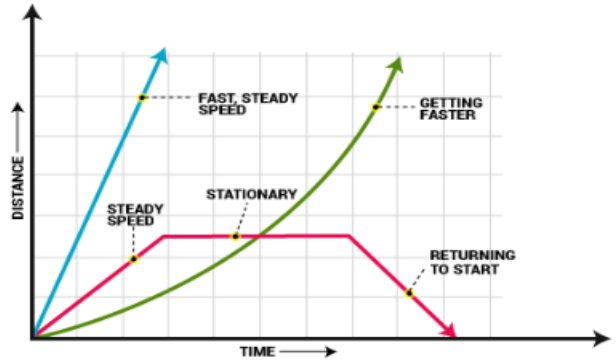
Midpoint Formula

$$\text{Midpoint} = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$



$$m = \left(\frac{-2+5}{2}, \frac{1+4}{2}\right)$$
$$= \left(\frac{3}{2}, \frac{5}{2}\right)$$
$$= (1.5, 2.5)$$

Distance time graphs



Hegarty Maths Links

Co-ordinate – 199

Mid points – 200

Straight line graphs – 201, 205, 206, 207

Distance-time graphs – 874, 875, 876

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Year 7 Topic 12 Graphs Practice Questions

Coordinates and midpoints

Reasoning a David uses this rule to generate coordinates.

The x-coordinate is always 1, no matter what the y-coordinate is.

Which of these coordinate pairs satisfy David's rule?

(1, 5), (5, 1), (1, 1), (–1, 3), (1, 0), (1, 4), (3, 1), (1, 2)

b Draw a coordinate grid from –5 to +5 on both axes.

Plot the points from part **a** that satisfy David's rule.

Reflect What do you notice about the points you have plotted?

c Charlie uses this rule to generate coordinates.

The x-coordinate is always 3, for any y-coordinate.

Charlie generates the coordinates (3, 0), (3, –2), (3, 4) and (3, 2).

Where do you expect these points to be on the grid?

d Plot the points on the same grid. Were you correct?

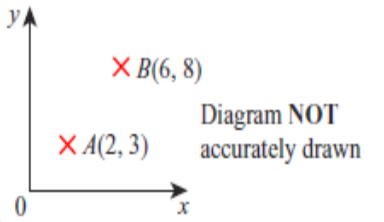

Diagram **NOT** accurately drawn

The point A has coordinates (2, 3).

The point B has coordinates (6, 8).

M is the midpoint of the line AB.

Find the coordinates of M. **(2 marks)**

June 2014, Q1, 1MA0/2H

Work out the midpoints of the line segments with these start and end points.

a (3, 5) and (7, 9) b (2, 7) and (5, 10)

c (–3, 4) and (1, 6) d (–2, –5) and (0, 3)

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Straight line graphs

a Copy and complete the tables of values for these straight-line graphs.

i

x	–3	–2	–1	0	1	2	3
$y = x + 1$			0	1			

ii

x	–3	–2	–1	0	1	2	3
$y = 2x - 3$			–5	–3			

b Draw a coordinate grid with –3 to +3 on the x-axis and –8 to +8 on the y-axis.

Draw and label the graphs of $y = x + 1$ and $y = 2x - 3$, using your tables of values from part **a**.

Draw and label these straight-line graphs for $x = -3$ to $+3$. Copy the coordinate grid from **Q6**. Draw all four graphs on the same grid.

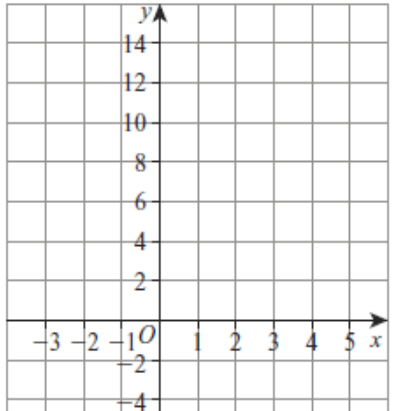
a $y = 3x - 2$ b $y = 2x + 4$

c $y = 4x - 6$ d $y = 0.5x + 1$

a Complete the table of values for $y = 2x + 2$

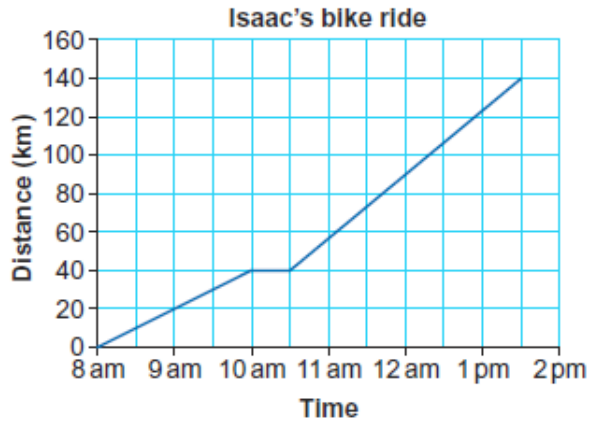
x	–2	–1	0	1	2	3	4
y	–2				6		

b On the grid, draw the graph of $y = 2x + 2$ **(4 marks)**



Distance time graphs

This distance–time graph shows Isaac's journey on his bicycle



a How far did Isaac ride his bike on the first part of the jour

b At what time did he stop to rest?

c How long did the first part of his journey take?

d What was his average speed on the first part of the journ

e How many minutes did Isaac rest for?

f How long did the last part of his journey take?

g How far did he ride on the last part of the journey?

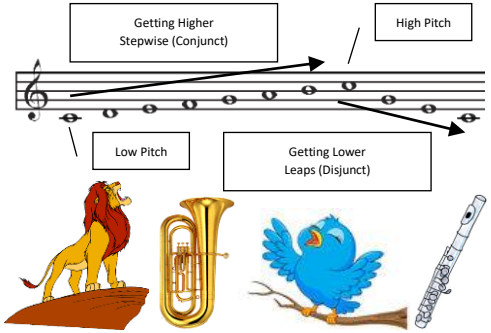
h What was his average speed for the last part of the journe

BUILDING BRICKS

Exploring the Elements of Music

A. Pitch

The **highness** or **lowness** of a sound.



B. Tempo

The **speed** of a sound or piece of music.

FAST: *Allegro, Vivace, Presto*
SLOW: *Andante, Adagio, Lento*
GETTING FASTER – *Accelerando (accel.)*
GETTING SLOWER – *Ritardando (rit.) or Rallentando (rall.)*

C. Dynamics

The **volume** of a sound or piece of music.

VERY LOUD: *Fortissimo (ff)*
LOUD: *Forte (f)*
QUITE LOUD: *Mezzo Forte (mf)*
QUITE SOFT: *Mezzo Piano (mp)*
SOFT: *Piano (p)*
VERY SOFT: *Pianissimo (pp)*
GETTING LOUDER: *Crescendo (cresc.)*
GETTING SOFTER: *Diminuendo (dim.)*

D. Duration

The **length** of a sound.

SHORT → **LONG**

E. Texture

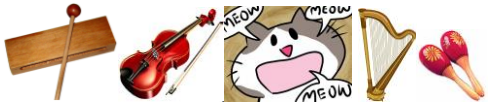
How much sound we hear.

THIN TEXTURE: *(sparse/solo)* – small amount of instruments or melodies.

THICK TEXTURE: *(dense/layered)* – lots of instruments or melodies.

F. Timbre or Sonority

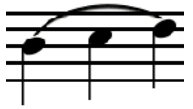
Describes the **unique sound or tone quality** of different instruments voices or sounds.



Velvety, Screechy, Throaty, Rattling, Mellow, Chirpy, Brassy, Sharp, Heavy, Buzzing, Crisp, Metallic, Wooden etc.

G. Articulation

How individual notes or sounds are **played/techniques**.

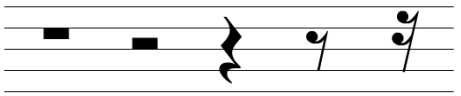


LEGATO – playing notes in a long, smooth way shown by a **SLUR**.

STACCATO – playing notes in a short, detached, spiky way shown by a **DOT**.

H. Silence

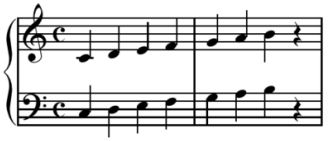
The opposite or absence of sound, **no sound**. In music these are **RESTS**.

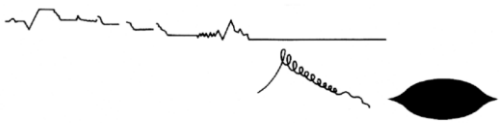


I. Notation

How music is **written** down.

STAFF NOTATION – music written on a **STAVE** (5 lines and spaces)





GRAPHIC NOTATION/SCORE – music written down using shapes and symbols to represent sounds.

Physical Education Department – Knowledge organiser – FOOTBALL year 7, 8 and 9

Key Skills/Techniques

Dribbling

Dribbling allows you to move the ball around the field without losing possession.
Keep the ball close to your feet at all times, when running with it.
Use the inside of your foot to control the ball when moving.
Don't look down when running with the ball. Keep your head up.

Passing

Non-kicking foot is closest to the ball.
Kicking foot needs to be at a right angle to the ball.
Body need to be over the ball.
Eyes focused upon the ball and arms are to be used for balance.

Shooting

Non kicking foot needs to be next to the ball and players needs to keep their body balanced with their head slightly over the ball.
Contact the ball either with the side of the foot (placement of ball) top of the foot (to generate power).
Both legs need to be fixed but when striking the ball, kicking foot needs to be fully extended on the follow-through.
For accuracy, aim to shoot between the goal keeper and the posts

Heading The forehead is used to contact the ball. Eye must be focused on the ball. Meet the ball with your head by moving your feet or jumping to gain the extra height advantage and power. Do not wait for the ball to hit your forehead.

Chest – Used when the ball is played in the air, to bring it down onto the floor. Player needs to align himself with the ball. Roll their shoulders back to generate a greater surface for the ball to contact with. Chest needs to be slightly curved, to cushion the ball. Bend your knees to take the impact of the ball and then allow the ball to roll down your leg to your kicking foot.

Rules/Tactics

Rules

Game is started with a **kickoff** or restarting it after a goal is scored. It is taken at the centre part of the soccer field. During a kickoff, both teams must be on their own halves and only the kicker and the receiver can be inside the centre circle.
The game has 11 players on the pitch, consisting of a goal keeper, defenders, midfielders and strikers. A referee and 2 linesmen, officiate the game. If the ball is played outside of the pitch lines, the possession is given to the opposing team. If it goes out the side of the pitch, a throw in is awarded. If it is kicked behind the A corner kick is awarded **when the whole of the ball passes over the goal line**, either on the ground or in the air, having last touched a player of the defending team. If the attacking team hit the ball behind the goal line a goal kick is awarded.
If a foul is committed a free kick or penalty is issued, depending on the incident.
To score a goal the ball must cross the opposition's goal line.
The team with the most amount of goals at the end of the game will win the game.

Tactics

Vary the passes that you make
Play to your opponents weaknesses (if they are dominantly using their left foot, then play the balls on their right).
Move opponents around he pitch to tire them out.
Vary the pace and direction of passes.

Glossary

Throw in Attack Defend Dribbling Foul
Off side Referee Volley Accuracy Penalty Pass Formation Goal Ball Posts
Free kick Striker Midfielder Header Tackle Passing communication Formation Corner kick

Pictures

Volley – The volley involves striking a ball that is still in the air. Focus eyes upon the ball. Arms out for balance. Keep eyes focused on the ball as you get into the line of flight. Head still. Non kicking foot on the floor and lead with the kicking leg forward.

Turning with the ball

Cruyff - Great skill for losing your opponent.
Named after the brilliant Dutchman Johan Cruyff.
Shape as if to pass or cross but then drag the ball behind your standing leg with the inside of foot. Turn your shoulders and your hips so that you are back in line with the ball and then race away.

Step over – Skill for sending an opponent in the opposite direction.
Lift your foot over the top of ball to use a 'step over' and this should immediately create you time and space. Then hook the ball away with the outside of the foot and race away.

Inside Hook - You need to keep your body between the ball and your opponent.
Reach round the outside of the ball with your foot so that you can change its direction. Bend your knees so that you can transfer your weight quickly and turn your hips to change your own direction. Then get a positive first touch on the ball that puts it into an area that is comfortable for you to move on to and accelerate away from your opponent .

Outside Hook – This tricks your opponent
Use the outside of the foot to hook the ball back in the direction that you are going to go.

Drag Back - The drag back is a great turn to use when you haven't got a lot of space to work.
Place one foot on top of the ball and staying in contact with it throughout, roll it back and move off in the opposite direction.

Team formation

4-4-2 (4 defenders, 4 midfielders and 2 strikers) a traditional team set up

5-4-1 (5 defenders, 4 midfielders and 1 striker) A more defensive set up.

3-5-1-1 (3 defenders, 5 midfielders, and 2 strikers one in front of each other). A more attacking set up.

Counter attacking – The team withdraws players into their own half but ensuring that one or two players are committed to the attack

Direct long ball football – Often used to deride 'boring' teams, the long-ball style of play is genuine route one football. Rather than spending time on the ball picking up the pass, exploiting small gaps in the opposition's defence or utilising the flanks, the long-ball is employed as an opportunistic method of attack.

Wide/Wing plays – The ball is played to the wings. By spreading the ball wide, you allow a different angle of attack and offer a number of opportunities for the winger; take on the fullback and drag central defenders out of position, cut inside and drive forward at an angle, or whip in a cross from deep for the strikers to attack.

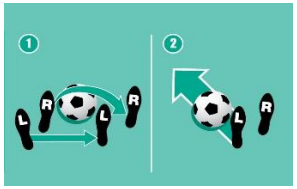
Off side - An attacking player is flagged offside by the assistant referee if there is only one defending player between the player and the goal line at the time the ball is struck. The player should be in active play if the offside offense is to be called.

Throw in - A method of restarting play during the game, when the ball has exited the side of the field of play. Throw in is taken from where it went out. At the moment of delivering the ball, the thrower must face the field of play. The thrower must have part of each foot on the touchline or on the ground outside the touchline, and use both hands to deliver the ball from behind and over the head.

Cruyff Turn

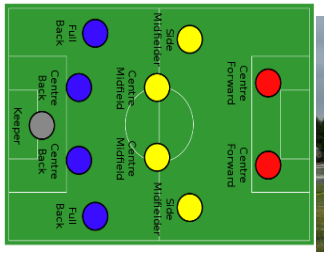
Inside Hook

Step over



Free Kick

4-4-2 example



Throw in

Key Vocabulary

.

Balance: Holding a static position that demonstrate strength, agility and flexibility for 3 seconds.

Aesthetically pleasing: A way that gives pleasure through beauty.

Fluency: Being capable to move effortlessly and smooth with ease once mastered a skill/technique.

Posture: the position in which someone holds their body when standing or sitting.

Flexibility: To have a wide range of motion in a joint.

Roll: A rotation over an axis in the body over a surface.

Forward roll: a gymnastic exercise in which a person tucks their head down and rolls their body in a forward circle on the floor.

Backward roll: a gymnastic exercise in which a person tucks their head down and rolls their body in a backward circle on the floor.

Cartwheel: The manoeuvre where one moves sideways, from hands to feet, in a straight line (in the motion that the wheel of a cart would follow), while keeping the back, arms, and legs straight, and the feet pointed.

Handstand: To stand straight up with a tight body and hands on floor.

Headstand: an act of balancing on one's head and hands with one's feet in the air.

Round-off: A type of cartwheel where the gymnast pushes off the ground and lands on two feet.

Gymnastics

Matching Balance

Copying exactly how your partner is balancing. E.g. same limbs.

Mirroring Balance

Doing the opposite of how your partner is balancing.

Full body weight balances

Having a partner hold your full body weight during a balance.

Part body weight balances

Having a partner hold part of your body weight during a balance.

Counter Balance

PUSHING against your partner

Counter Tension

PULLING against your partner

Lesson Overview

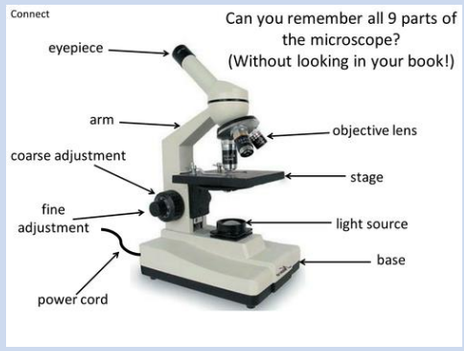
9. Travelling.
10. Balancing.
11. Partner Balances (Matching/Mirroring).
12. Partner Balances (Weight Baring).
5. Rolls and Rotation.
6. Jumps/Flight.
7. Routine Composition.
8. Routing Performance/Evaluation.

Knowledge Organiser – Cells and Organisation

1. Key Words!

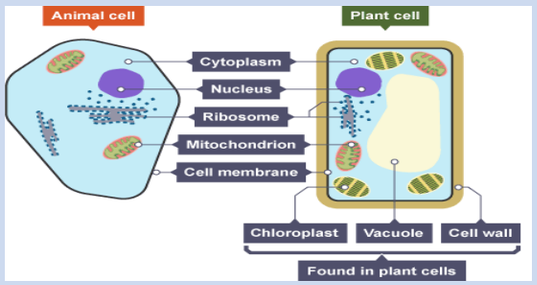
Cell: The unit of a living organism, contains parts to carry out life processes.
Uni-cellular: Living things made up of one cell.
Multi-cellular: Living things made up of many types of cell.
Tissue: Group of cells of one type.
Organ: Group of different tissues working together to carry out a job.
Diffusion: One way for substances to move into and out of cells.
Structural adaptations: Special features to help a cell carry out its functions.
Cell membrane: Surrounds the cell and controls movement of substances in and out.
Nucleus: Contains genetic material (DNA) which controls the cell's activities.
Vacuole: Area in a cell that contains liquid, and can be used by plants to keep the cell rigid and store substances.
Mitochondria: Part of the cell where energy is released from food molecules.
Cell wall: Strengthens the cell. In plant cells it is made of cellulose.
Chloroplast: Absorbs light energy so the plant can make food.
Cytoplasm: Jelly-like substance where most chemical processes happen.

2. Microscopes!



A microscope is used to examine very small specimens. Place the slide on the stage.. Look through the eyepiece. A light from the light source shines through the specimen allowing you to see the image. The adjustment wheels are used to bring the sample into focus.

3. Plant and Animal Cells!

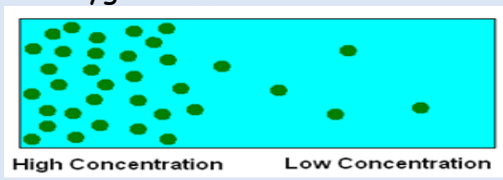


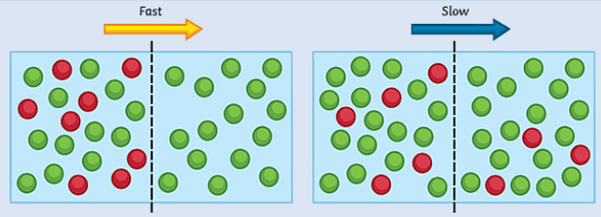
Animal cells usually have an irregular shape, and plant cells usually have a regular shape. Cells are made up of different parts.

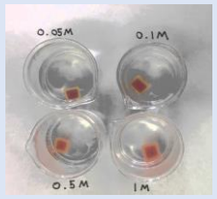
Structure	Function	Organisms found in
Cytoplasm	Chemical reactions happen here	Animal and Plant
Nucleus	Contains genetic material	Animal and Plant
Cell membrane	Controls the movement of substances in and out of the cell	Animal and Plant
Mitochondria	Where most energy is released in respiration	Animal and Plant
Chloroplasts	Absorb light energy for photosynthesis	Plant Only
Cell Wall	**Strengthens the cell and supports the plant**	Plant Only
Vacuole	Filled with cell sap to help keep the cell turgid	Plant Only

4 Diffusion

Diffusion
In animals, oxygen diffuses in and carbon dioxide diffuses out. In plants, carbon dioxide diffuses in and oxygen diffuses out.

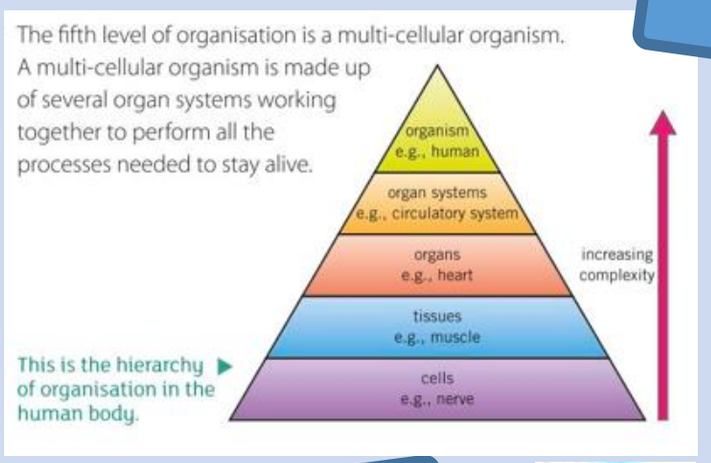






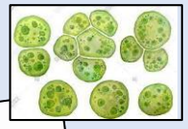
The greater the difference in concentration, the quicker the rate of diffusion.

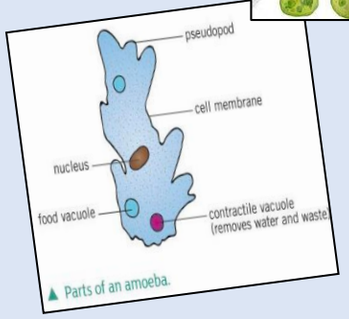
5. Levels of organisation



Plants and animals consist of different types of cell that work together. Animal and plant cells have certain structures in common. Many cells are specialised and are adapted for their function.

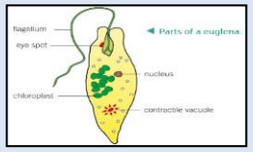
6. Uni-Cellular Organisms





An amoeba is a single celled organism that live in water or damp places. Although it is just one cell, it has adaptations that let it behave a bit like an animal.

Unicellular algae are plant like organisms that contain chlorophyll and so make their own food using sunlight.



Yeast have a cell wall, like plant cells, but no chloroplasts. This means they have to absorb sugars for their nutrition, rather than being able to make their own food by photosynthesis. Yeast can reproduce by producing a bud. The bud grows until it is large enough to split from the parent cell as a new yeast cell.

7. Further Reading

Organisms	
Plant and Animal Cells	https://www.youtube.com/watch?v=IH3kVOch9nU
What are cells?	https://www.bbc.com/bitesize/articles/zr69dxs
Using a Microscope	https://www.youtube.com/watch?v=xzjowD1KN20
Cells to Systems	https://www.bbc.com/bitesize/guides/z9hyvcw/revision/3
Diffusion	https://www.bbc.com/bitesize/articles/znqbcj6
Uni-cellular Organisms	https://www.bbc.com/bitesize/guides/z9hyvcw/revision/5

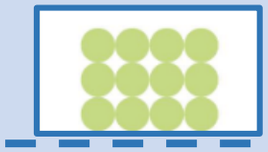
Knowledge Organiser – Year 7 – Matter

Key Words!

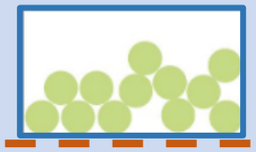
Particle: A very tiny object such as an atom or molecule, too small to be seen with a microscope.
Particle model: A way to think about how substances behave in terms of small, moving particles.
Diffusion: Random movement of particles (liquid or gas) from a region of high to low concentration
Density: How much matter there is in a particular volume, or how close the particles are.
Evaporate: Change from liquid to gas at the surface of a liquid, at any temperature.
Boil: Change from liquid to a gas of all the liquid when the temperature reaches boiling point.
Condense: Change of state from gas to liquid when the temperature drops to the boiling point.
Melt: Change from solid to liquid when the temperature rises to the melting point.
Freeze: Change from liquid to a solid when the temperature drops to the melting point.
Sublime: Change from a solid directly into a gas.

The Particle Model

Most substances can exist in all three states. The state depends on the temperature and the particles will act differently in each.



Solids
The particles touch their neighbours in a **regular** arrangement. They vibrate on the spot. Solids cannot be compressed and they do not flow. Solids have the highest density .



Liquids
The particles are in contact with each other as they slide over each other **randomly**. They are not as closely packed as in solids. Liquids are able to flow and change shape.

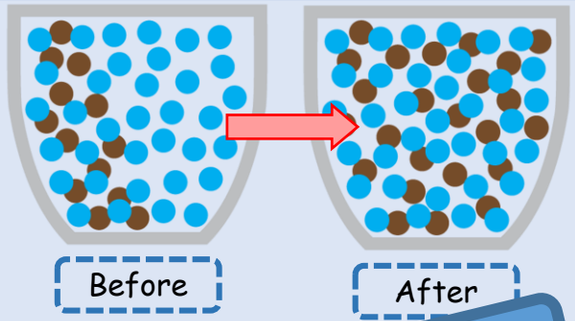
Gases
The particles are widely spaced and move **randomly** through the whole container. Gases have the lowest density; they can easily be compressed. They also flow.

Diffusion

Diffusion is the net movement of particles from an area of high concentration to an area of low concentration. Three things affect the rate of diffusion:

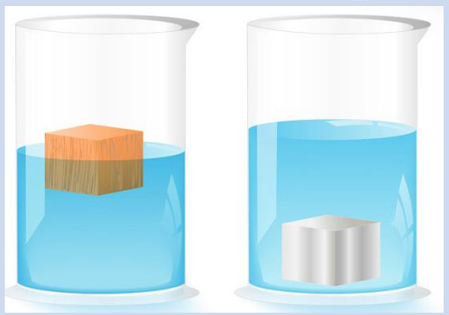
- The **size** of the particles
- **Temperature**
- The **state** of the particles

Higher temperature = faster diffusion
Smaller, lighter particles = faster diffusion
Gas state = fastest diffusion
Solid state = no diffusion



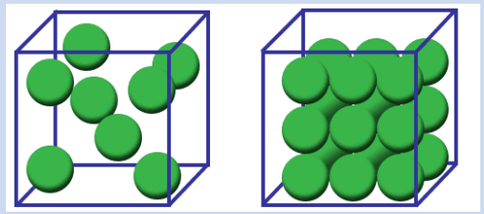
Density

Density is a measure of how much matter there is in a given volume of a substance, or how heavy it is for its size.
The more dense a substance is, the heavier it feels.



If a substance is **less** dense than water it will float.

If a substance is **more** dense than water it will sink.

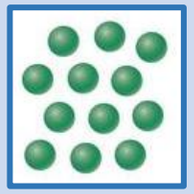


States of Matter

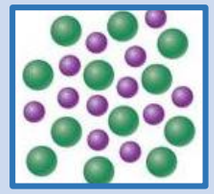
Everything is made up of matter containing tiny particles. The three states of matter are solid liquids and gases. An example of a solid would be wood. An example of a liquid would be water and an example of a gas would be air.

The properties of a substance depend on **what its particles are like, how they move and how they are arranged.**

The particles in a substance stay the same but their **arrangement and movement** change when the **state** changes.

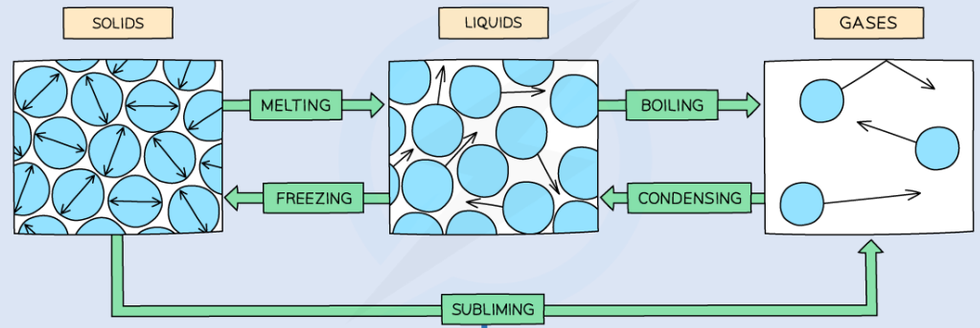


A pure substance is made of only type of material and so all of the particles are the same.



A mixture is made of more than one type of material. This means there is more than one type of particle.

Changes of State



Gaining energy

- Boiling
- Evaporation
- Melting

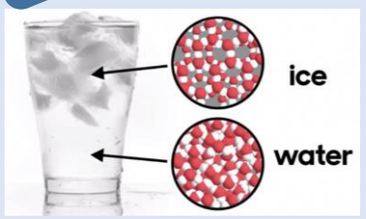
As temperature increases the particles gain more energy and begin to move around more. Melting happens at the melting point and boiling at the boiling point.

Losing energy

- Freezing
- Condensing

As the temperature decreases the particles transfer energy to the surroundings and begin to slow down. Condensing happens at the boiling point. The particles will move closer together and freeze at the melting point.

Further Reading



Matter	https://www.bbc.com/bitesize/topics/z9r4jxs
Particle Model	https://www.youtube.com/watch?v=npv74D2MO6Q
States of Matter	https://www.youtube.com/watch?v=C33WdI64FiY
Diffusion	https://www.youtube.com/watch?v=c_IYK8sy0QA

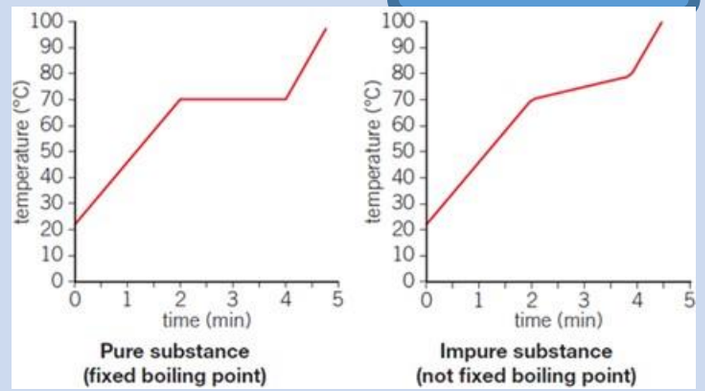
Knowledge Organiser – Year 7 – Science – Pure and Impure Substances

1. Key Words!

Solvent: A substance, normally a liquid, that dissolves another substance.
Solute: A substance that can dissolve in a liquid.
Dissolve: When a solute mixes completely with a solvent.
Solution: Mixture formed when a solvent dissolves a solute.
Soluble (insoluble): Property of a substance that will (will not) dissolve in a liquid.
Solubility: Maximum mass of solute that dissolves in a certain volume of solvent.
Pure substance: Single type of material with nothing mixed in.
Filtration: Separating substances using a filter to produce a filtrate (solution) and residue.
Distillation: Separating substances by boiling and condensing liquids.
Evaporation: A way to separate a solid dissolved in a liquid by the liquid turning into a gas.
Chromatography: Used to separate different coloured substances.

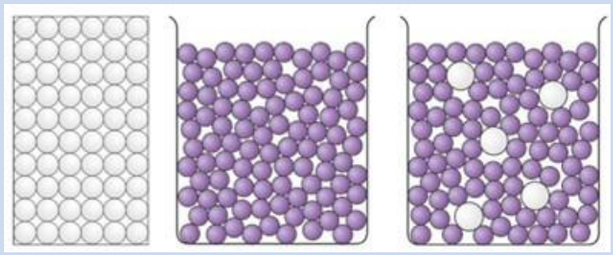
2. Purity

- The **melting point** of a substance is the temperature at which it turns from a solid to a liquid, or a liquid to a solid
- The **boiling point** of a substance is the temperature at which it turns from a liquid to a gas or a gas to a liquid
- **Pure substances** have a fixed (sharp) boiling or melting point, whereas impure substances have a range which appears as a diagonal line on a graph



3. Solutions

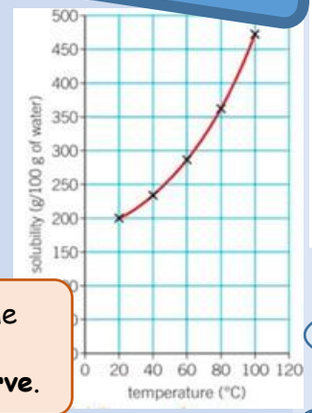
When you dissolve salt in water you get salt solution. Water is the **solvent** and salt is the **solute**.



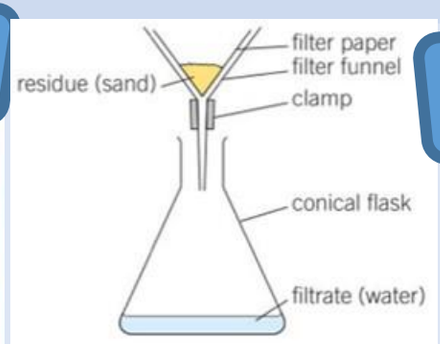
If no more of a substance can be dissolved the solution is **saturated**.

The water particles surround each salt particle. The particles can move freely

Increasing the temperate **usually** increases the solubility of a substance.
You can investigate this and plot a **solubility curve**.



4. Filtration



Separates an insoluble solid from a liquid.

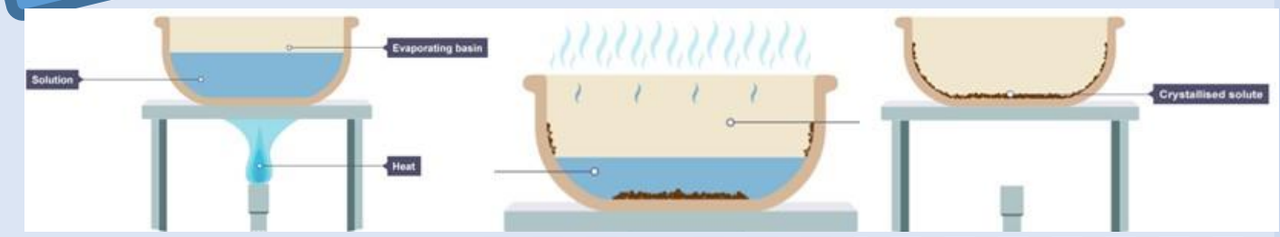
The mixture is poured into the filter funnel.

The liquid particles are small enough to pass through the holes in the filter paper and are collected as the filtrate.

The solid particles are too big to pass through and instead are trapped by the filter paper. This is the residue.

5. Evaporation

Separating a soluble solid from a liquid to collect the solid.



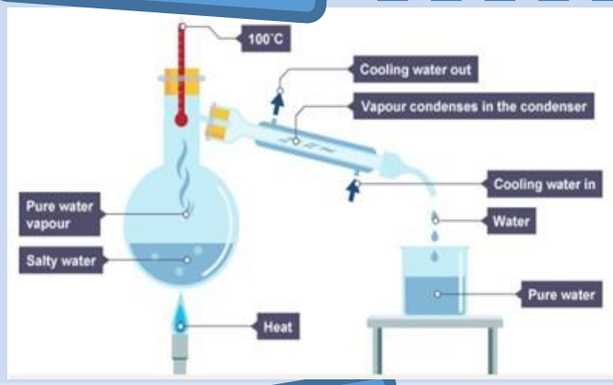
Gently heating with a Bunsen burner removes the **excess** water.

The volume decreases and crystals start to form.

The solution is left to evaporate until all of the liquid is gone.

6. Distillation

Water has a lower boiling point than the salt in the solution.



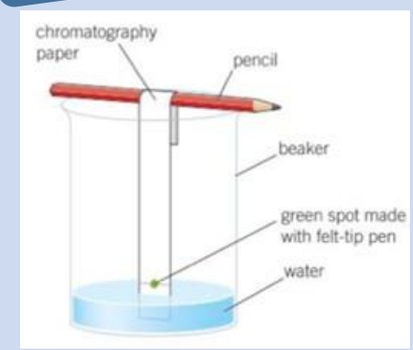
When heated the water boils, forming steam.

The steam moves into the condenser where it cools.

The cooled steam condenses to form liquid water.

The liquid water drips into a beaker while the salt remains in the distillation flask.

7. Chromatography



For the chromatography to work all of the dyes must be soluble in the chosen solvent.

A dye that is more strongly attracted to the solvent than the chromatography paper will travel further than a dye that is more attracted to the paper.

The separated dyes make a **chromatogram**.

A pure substance will produce only one coloured dot on the chromatogram. A mixture would have more than one coloured dot in different positions.

8. Further Reading

Separating techniques	https://www.bbc.co.uk/bitesize/guides/zgvc4wx/revision/1
Atoms, element & compounds	https://www.bbc.co.uk/bitesize/guides/zt2hpv4/revision/1
Chromatography	https://www.youtube.com/watch?v=kxrjvLvbY28
Distillation and filtration	https://www.youtube.com/watch?v=tUabxsvfuPk

How to use your knowledge organiser

Read through and highlight:

- what you already know
- cognates

Choose a section to revise:

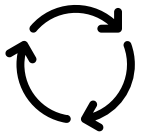
- foldy sheet
- flashcards
- mindmap
- look-cover-write-check
- make your own quiz

Test yourself!

Fill in a blank copy of the section you chose.

- Spanish – English
- English to Spanish

Go back to step 2 and repeat with the next section.



Finally, read through the model task.
Copy each section and adapt the text by changing key words.

SMART
Smart Minds Active Recall Time

Student Knowledge Organiser 7.2 – Mi Familia

Familia	Family
abuela	grandmother
hermano	brother
hermana	sister
hija	daughter
hijo	son
marido	husband
madrastra	stepmother
madre	mother
niña	girl
niño	boy
padrastro	stepfather
padre	father
tía	aunt
abuelo	grandfather
amigo	friend
primo	cousin
tío	uncle

Mascotas	Pets
un caballo	a horse
un gato	a cat
un perro	a dog
un conejo	a rabbit
un pez	a fish
un ratón	a mouse
una serpiente	a snake
una cobaya	a guinea pig

Key Questions	
¿Tienes hermanos?	Do you have brothers and sisters?
¿Cómo es tu familia?	What is your family like?
¿Tienes mascotas?	Do you have pets?
¿Cómo es?	What is she/he/it like?
¿Cómo son?	What are they like?

High-frequency words	
bastante	quite
muy	very
pero	but
también	also
un poco	a little

Aspecto	Appearance
bonito	pretty
delgado	slim
deportivo	sporty
feo	ugly
gordo	fat
alto	tall
guapo	good-looking
hermoso	beautiful
joven	young
largo	long
marrón	brown (eyes)
moreno/castaño	brown (hair)
negro	black
bajo	small
rubio	blond
las gafas	glasses
los ojos	eyes
el pelo	hair

Opiniones	Opinions
Me gusta	I like
No me gusta	I don't like
Me encanta	I love
Odio	I hate

Personalidad	Personality
alegre	cheerful
gracioso	funny
independiente	independent
listo	clever
nervioso	nervous
optimista	optimistic
perezoso	lazy
responsable	responsible
serio	serious
simpático	nice
tonto	silly
paciente	patient
contento	happy
inteligente	intelligent
tímido	shy

Colores	Colours
azul	blue
blanco	white
gris	grey
rojo	red
verde	green

Los numéros	Numbers
uno	1
dos	2
très	3
cuatro	4
cinco	5
seis	6
siete	7
ocho	8
nueve	9
diez	10
once	11
doce	12
trece	13
catorce	14
quince	15
dieciséis	16
diecisiete	17
dieciocho	18
diecinueve	19
veinte	20
veintiuno	21
veintidós	22
treinta	30
treinta y uno	31

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Student Knowledge Organiser 7.2 – Mi Familia

A or some

un	a (m)
una	a (f)
unos	some (m)
unas	some (f)

The

el	the (m)
la	the (f)
los	the (mpl)
las	the (fpl)

My

mi	my (s)
mis	my (pl)

Nouns and gender

All **nouns** in Spanish are either **masculine** or **feminine**. They are also either **singular** or **plural**.

This will change the words you use for **'a'** and **'the'.**

This also means that you have to pay attention to the spelling of **adjectives** as they must match the **gender** of the **noun** they describe.

Adjective Agreement

Masculine Singular	Feminine Singular	Masculine Plural	Feminine Plural
pequeño	pequeña	pequeños	pequeñas
azul	azul	azules	azules
paciente	paciente	pacientes	pacientes
marrón	marrón	marrónes	marrónes
optimista	optimista	optimistas	optimistas

Phonics

ll	caballo
ci	paciente
z	azul/pez
ge	inteligente
ga	gafas
r	pero
rr	perro

Making nouns plural

For most nouns, you just add 's'.
Nouns which end in a consonant, will need 'es'

Some nouns are irregular.
e.g. el pez – los peces

ser – to be

soy	I am
eres	you are
es	he/she is
son	they are

tener – to have

tengo	I have
tienes	you have
tiene	he/she has
tienen	they have

llamarse – to be calle

me llamo	I'm called
te llamas	you're called
se llama	he/she is called
se llaman	they're called

Model Text

¡Hola! Voy a describir mi familia.	Hi! I'm going to describe my family.
Mi madre se llama María y mi padre se llama Pedro.	My mum is called Maria and my dad is called Pedro.
Me encanta mi madre porque es muy lista y paciente.	I love my mum because she is clever and patient.
Mi padre es muy serio, pero bastante gracioso también.	My dad is vey serious, but also quite funny too.
Tengo una hermana y un hermano.	I have a sister and a brother.
Mi hermana tiene el pelo moreno y los ojos azules.	My sister has brown hair and blue eyes.
Se llama Laura y es tímida y nerviosa.	She is called Laura and she is shy and nervous.
Mi hermano es alto y deportivo.	My brother is tall and sporty.
Se llama Miguel y tiene dieciocho años.	He is called Miguel and he's 18 years old.
No me gusta Miguel porque es tonto y aburrido.	I don't like Miguel because he is silly and boring.
Lo que me encanta es mi perro que se llama Otis.	What I love is my dog who is called Otis.
Otis es marrón y hermoso.	Otis is brown and beautiful.
Me encantan los perros, pero odio los gatos porque son perezosos.	I love dogs but I hate cats because they are lazy.