Knowledge Organisers

"I have come that they may have life and have it to the full"

John 10: 10

Year 9

You MUST bring this every day for every lesson. It must be placed on your desk at the start of each lesson.

look say cover write check

Knowledge Organisers at St John Fisher Catholic School

Why do we have Knowledge Organisers?

Knowledge Organisers show you the key information for that particular topic of study. It is the 'key take-aways' of what knowledge you will need to know to be successful in this topic. It will give you an excellent understanding of the topic you are studying and the expectations.

How do I use it?

Your teachers will use your knowledge organisers with you, explained in the section below, but you can also use it to support your understanding of the topic and develop further knowledge. You will have a test at the end of each unit of study and an end of year exam which will cover all that you have learnt therefore it is important that this new knowledge is embedded so that you can recall it later.

Use the Look, Say, Cover, Write, Check system to learn the information on your organisers. Complete any support/challenge tasks outlined. Research tells us that this method of practising is a good way to remember the knowledge. Over time, you will build up this knowledge and be able to recall it.

Use the Knowledge Organiser when completing class and homework especially with key vocabulary.

How will my teachers use it?

Your teachers may set homework to learn parts of the Knowledge Organiser or set tasks from what is on there. You will be expected to complete between 30 minutes – 45 minutes of homework for each subject according to the homework timetable.

Your teachers will use the Knowledge Organiser in the lesson to support the new knowledge being taught so you must always keep this booklet with you and put on your desk at the start of each lesson.

You may be given low stake quizzes in your lessons which will test your recall of the current knowledge but also previous knowledge as the year progresses.

What do I do if I lose it?

All Knowledge Organisers are on the school website. However, you can purchase a copy at student services if you lose this.

Year 9 Cyber Security

Summary

You will learn what is meant by 'Cybercrime', the types of cyber crime and how to avoid becoming a victim.
You will learn the different types of malware, how to protect your device from becoming infected and how to recognise the signs your device may have been infected. You will learnt the different protection methods and their advantages and disadvantages.

Cyber Crime Facts

- Cyber crime makes more money for criminals than drug trafficking
- Around the world someone's identity is stolen online every 2 seconds
- It takes just 4 minutes from connecting to the internet for an unprotected device to become infected.
- Every 39 seconds there is a cyber attack
- 95% of cybersecurity breaches are caused by human error.
- 91% of cyber attacks in 2017 started with a phishing email.
- 90% of passwords can be cracked in less than six hours

CIA Triad

Confidentiality	Confidentiality is the protection of information from people who are not authorized to view it.
Integrity	Integrity aims at ensuring that information is protected from unauthorized or unintentional alteration.
Availability	Availability is the assurance that systems and data are accessible by authorized users when and where needed.

Websites

Learn more about cyber crime using these websites:
- www.nationalcrimeagency.gov.uk/what-we-do/crime-threats/cyber-crime
- www.becybersafe.com/more/links.html

Keywords

Anti-virus software	monitors a digital system, attempting to identify and remove malicious software before it can cause damage
Social Engineering	The act of getting users to share sensitive information through a false pretext (commonly known as 'blagging')
Malware	Malicious software designed to disrupt, damage, or gain unauthorised access to a computer system
Trojan Horses	Types of malware disguised as legitimate programs.
Spyware	A piece of software that is installed in a computer without the user's knowledge and transmits information about the user's computer activities over the Internet
Phishing	A cyberattack that sends spam messages to try and trick people to reply with desired information.
Pharming	A cyberattack that uses malware to direct a user to a fake website that requests information
Firewall	A device that protects an IT system (or network) from unauthorised access by blocking 'bad' network traffic

Year 9 Binary

Summary

Binary is a number system that only uses two digits: 1 and 0.
All information that is processed by a computer is the form of sequence of 1s and 0s. Therefore, all the data we want a computer to process needs to be converted into binary. This includes, text, images and sound.

Number systems

- Denary is a base 10 number system also known as decimal. It uses ten digits (0, 1, 2, 3, 4, 5, 6, 7, 8, and 9) to represent all numbers
- Binary is a base 2 number system that only uses two digits: 1 and 0.
- Hexadecimal (or hex) is a base 16 system used to simplify how binary is represented. A hex digit can be any of the following 16 digits: 0,1,2,3,4,5,6,7,8,9,A,B,C,D,E,F

Logic Gates

A logic gate is a series of transistors connected together to give one or more outputs

OR

A	B	O
1	1	1
1	0	1
0	1	1
0	0	0

AND

A	B	O
1	1	1
1	0	0
0	1	0
0	0	0

NOT

A	O
1	0
0	1

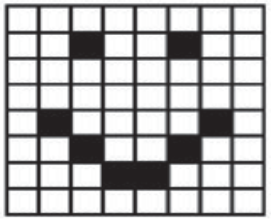
Websites

Learn more about binary using these websites:
- www.bbc.co.uk/bitesize/guides/zd88jty/revision/5
- https://logic.ly/

Keywords

ASCII	American Standard Code for Information Interchange. The ASCII character set is a 7-bit set of codes that allows 128 different characters
Bit	Smallest unit of data that a computer can process and store.
Byte	Unit of data that is eight binary digits long
Sampling	Method of converting an analogue sound signal into a digital file containing binary numbers.
Unicode	Uses between 8 and 32 bits per character, so it can represent characters from languages from all around the world.
Colour depth	The number of bits used for each colour
Pixel	Picture element - a single dot of colour in a digital bitmap image or on a computer screen
Metadata	Data, which is stored about a file. Examples include the type of file, date and time created, file size and geolocation.
Resolution	The number of pixels that make up an image e.g. 800 X 600

Image



Binary

0	0	0	0	0	0	0	0
0	0	1	0	0	1	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	1	0	0	0	0	1	0
0	0	1	0	0	1	0	0
0	0	0	1	1	0	0	0
0	0	0	0	0	0	0	0

□ = 0
■ = 1

PSHE- Knowledge organiser- Y9- Term 1

Themes	Topics	Key learning points
Living in the wider world	CEIAG 	• Job: a paid position of regular employment. • Career: an occupation undertaken for a significant period of a person's life and with opportunities for progress • Core subjects: subjects that everyone in England must take at GCSE (Science, Maths, English) • Core subjects at SJF: Science, Maths, English, RE, PSHE, PE • Options at SJF for KS4: MFL (Spanish, French, Polish), History, Geography, Art & Design, Business, Computing , Drama, English as an Additional Language, Food Technology, ICT, Learning Support, Leisure and Tourism, Media Studies, Music, Product Design, Sports Studies • It is important not to put limits on our personal abilities or skills as they may not have emerged yet, or may be discovered at a later time. • It is OK not to have a fixed idea about what job or career you want in the future. /If you do, you may want to choose certain exam subjects that you will need. • You can find out what subjects you need for different jobs from your careers teachers or careers advice service in school. You can also research online. • If you are not so sure about what job you want, choosing a mix of exam subjects can be helpful and keeps your options open. • It's important not to feel pressured into making choices
	Managing risks and staying safe 	• Violence is a learned behaviour from a variety of sources (e.g. media, friends, family, and environment). • Carrying a knife is illegal. A person can get up to 4 years in prison for possession of a knife, even if it is never used. People who carry a weapon are more likely to be hospitalised with a violence-related injury, and in many cases their own weapon has been used against them. • Gang: organized group of criminals • Coercion: the practice of persuading someone to do something by using force or threats. • Identity: the characteristics determining who or what a person is. • Peer influence: when you choose to do something you wouldn't otherwise do, because you want to feel accepted and valued by your friends.

Year 9 Term 1 –Of Mice and Men

Vocabulary	Definition
Protective	Looking after another person's wellbeing
Marginalised	Section of society that has been pushed to one side
Shrewd	Being clever and showing good judgment
Insecure	Not feeling confident about a situation or person
Loyalty	Having a strong feeling of support or allegiance
Wisdom	Quality of having good judgement/ being wise
Abandoned	People left alone or forgotten
Pugnacious	Always wanting to fight verbally or physically
Flirtatious	Being playful, usually with sexual undertones
Malevolence	Being deliberately hostile to others
Naive	Not knowing the greater situation around you
Regal	Acting like a king
Proud	Not wanting to feel shame in front of others
Lonely	Being by oneself without choices

Terminology	Definition
Symbolism	Use of places and objects to represent larger ideas
Metaphor	Comparing a person, thing or idea to another unrelated idea to create imagery
Simile	Comparing a person, thing or idea to another unrelated idea to create imagery using 'as' or 'like'
Protagonists	The main character who propels the action forward
Imagery	Visual descriptions that allows the audience to understand an idea
Mood	The emotions created by the text due to language use and structure
Juxtaposition	Placing contrasting ideas close together in a text
Foreshadowing	a hint or suggestion of what might happen later in the story
Emotive Language	Language which creates an emotion in the reader
Connotations/ Zooming in	Implied or suggested meanings of a word or phrases
Hyperbole	use of extremely exaggerated terms for emphasis

Key Contexts

Racism: In the 1930s, there were no laws ruling against racial discrimination. White and black people were segregated at the time, and the lynching of black people was common, sometimes for the most petty or unproven of crimes. The Jim Crow laws of post-1876 strongly reinforced racism.

The American Dream: Is a belief that freedoms, prosperity, success, and social mobility, can all be achieved through hard work. It implies that society has few barriers preventing anyone from achieving their dreams, should they be willing to put in enough effort.

The Wall Street Crash and The Great Depression: In the 1920s, the USA had been an enormously prosperous nation but millions of dollars were wiped out in an event that became known as the Wall Street Crash. This triggered the Great Depression where 15 million people became unemployed and lost their life savings. With no social support system, many families were left to face poverty.

Narrative

Chapter 1: George and Lennie travel to a ranch where they are intending to work. They rest in a clearing and arrive at the ranch the following morning.

Chapter 2: George and Lennie meet the boss of the ranch who is suspicious of them but gives them a job nevertheless.

Chapter 3: George confides in Slim about his past. Candy overhears George and Lennie discussing their American Dream. A fight breaks out on the ranch.

Chapter 4: Candy and Lennie speak to Crooks whilst the other workers go into town.

Chapter 5: Lennie speaks to Curley's Wife in the barn whilst the other men are outside.

Chapter 6: Lennie leaves the ranch and George eventually finds him in the brush (where they slept at the beginning of the story)

Assessment: How does Steinbeck present the theme of loneliness in the novel.

Year 9 Term 1 –Of Mice and Men

TiP ToP

Ti.. for **time change**; use this when
You want to move from **now** to **then**.

P.. for **place change**; this is found
Every time you **move around**.

To.. for **topic**; this is due
When you mention **something new**.

P.. for **person**; this would fit
When **someone else** comes into it.

Acronym for Transactional Writing

Pairs (juxtaposition)/Parenthesis
Imperative
Rhetorical q/repetition
Anecdote /anaphora/Anadiplosis
Triple
Emotive language

Modal verbs
Opinion (expert)
Use of 'you'
Statistic
Exaggeration (hyperbole)

7 key punctuation
!
“”
?
;
:
-
( )

Structure: DIIE sentences plus simple, compound and complex

Use of topic sentences

Summative Writing assessment: Every month, your local paper invites readers to respond to a controversial issue. This month's title is 'A true man is both strong and silent'. Write a letter to the editor of your local newspaper arguing either for or against this viewpoint.

ADDING - Additional supporting information to a claim	SEQUENCING - Showing the order of events or claims	ILLUSTRATING - Citing direct evidence or examples	CAUSE and EFFECT - Linking events together
And Also As well as Moreover Too Furthermore Additionally	First (ly), second (ly), third(ly) Finally Next Meanwhile Following Subsequently	For example Such as For instance In the case of As revealed by Illustrated by As shown by	Because So Therefore Thus Consequently Hence
COMPARING - Showing similarities	**QUALIFYING - Limit, specify, or modify**	**CONTRASTING - Showing differences**	**EMPHASIZING - Draw attention to a main idea/ claim/evidence**
Similarly Likewise As with Like Equally In the same way As compared to	But However Although Unless Except Apart from As long as If	Whereas Instead Alternatively Unlike Otherwise On the other hand Conversely	Above all In particular Especially Significantly Indeed Notably

Year 9 FOOD AND NUTRITION, Making choices. TERMS 1-3 (Rotation)

Length of Unit:
12 Weeks

You will learn about

- Hygiene and safety
- Knife skills
- Using the hob and the oven
- Accurate measuring of ingredients
- Healthy eating and nutrition.
- How to create a Healthy Meal
- The effects of food on digestion.
- Fats, sugars, and starches.

Different people need different amounts of dietary energy depending on their:

- age;
- gender;
- body size;
- level of
- activity;
- genes.

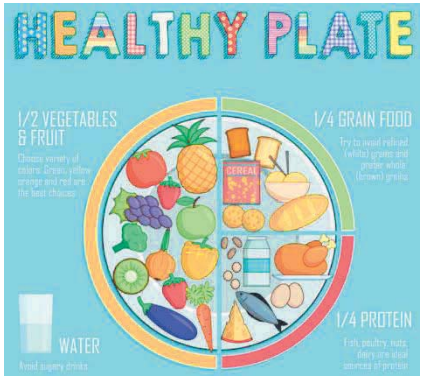
Energy

Energy is essential for life, and is required to fuel many different body processes, growth and activities. These include:

- keeping the heart beating;
- keeping the organs functioning;
- maintenance of body temperature;
- muscle contraction.

Digestion

The body requires energy from food and drink. Our bodies release the energy and nutrients from food. The food passes down the Gastrointestinal tract (GI) tract as shown below.

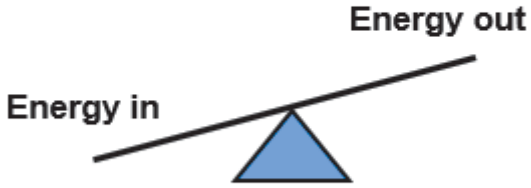


Key terms

Energy: The power the body requires to stay alive and function.
Digestion: The process by which food is broken down in the digestive tract to release nutrients for absorption.
Macronutrients: Nutrients needed to provide energy and as the building blocks for growth and maintenance of the body.
Micronutrients: Nutrients which are needed in the diet in very small amounts.

Energy balance

To maintain body weight it is necessary to balance energy intake (from food and drink) with energy expenditure (from activity).

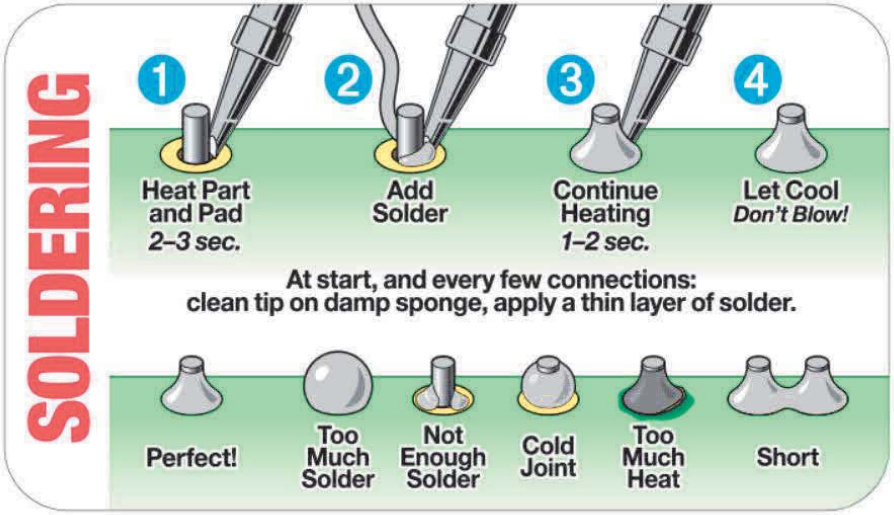


Energy in > Energy out = Weight gain

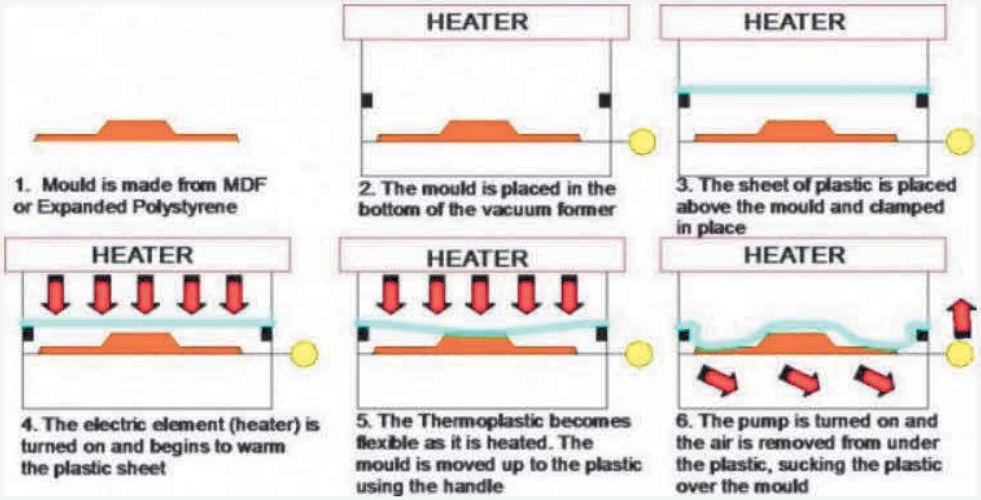
To find out more, go to:
https://bit.ly/31CBjke
https://www.bbc.co.uk/bitesize/topics/zjr8mp3/articles/zhkbn9q
The Eatwell Guide - NHS (www.nhs.uk)

What are you going to learn this term?

- Health and safety within the workshop
- How to complete a simple solder
- Vacuum forming plastics
- Working with hand tools safely
- To make creative decision, evaluate and refine your design as needed.



WHAT ARE THE STAGES OF VACUUM FORMING?



Find out more

A detailed list of D&T workshop safety rules: **www.notesandsketches.co.uk/Workshop_Safety_Rules.html** and **www.technologystudent.com/health1/safetyr1.htm**

Health and Safety Executive (HSE) guidance on the use of PPE: **www.hse.gov.uk/toolbox/ppe.htm**

▲ Synthetic polymers can endanger wildlife

Key words

monomers – chemical parts from which polymers can be made.

polymer – a material made from chains of a repeating chemical part called a monomer.

thermoplastic polymers – polymers that can be reshaped when heated.

Key words

thermosetting polymer – polymers that will not change shape when reheated.

vacuum forming – a process that uses heat and air pressure to shape a thermoplastic.

Find out more

More information on polymers: **www.bbc.co.uk/bitesize/guides/ztxnsbk/revision/2**, **www.mr-dt.com/materials/plastics.htm** and **www.technologystudent.com/designpro/plastic1.htm**

A video showing the lifecycle of plastic, from oil to its use as a recycled product: **www.youtube.com/watch?v=IwdUwffecsM**

A video showing various different manufacturing processes used with polymers: **www.youtube.com/watch?v=maTZvpziq4M**

A video showing the manufacture of polymer bottles: **www.youtube.com/watch?v=Gt9DRIfRwn0**

Types of polymer

There are two main types of polymer: thermoplastic and thermosetting. Both typically have good corrosion resistance and low electrical conductivity.

Length of Unit:

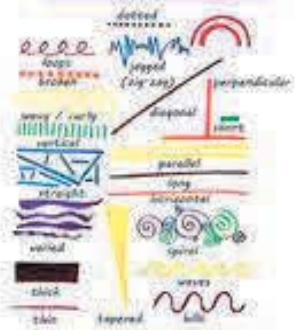
12 Weeks

The Formal Elements of Art

Line

Line is the path left by a moving point.
For example a pencil or a brush dipped in paint.
A line can take many forms.

Question:
What materials could you use to make different types of lines?

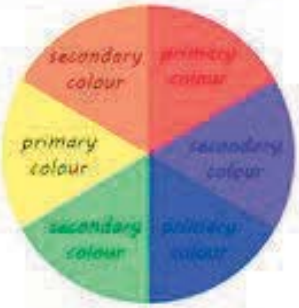


Colour

Red, yellow and blue are primary colours, which means they can't be mixed using any other colours.

Two primary colours mixed together make a secondary colour.

In theory, all other colours can be mixed from these three colours.



Tone

Tone refers to the lightness or darkness of something.
Tone and shading can be used to make 2D look 3D, giving it form.

Question:
How can you change the tone of a colour?

Shape

A shape is an area enclosed by a line.
It could be just an outline or it could be shaded in.

Shapes can be either geometric, like a circle, square or triangle, or irregular.

Question: How many 3D shapes can you name?

Form

Form is a three dimensional shape, such as a cube, sphere or cone.
Sculpture and 3D design are about creating forms.

Question: How many 3D shapes can you name? How many can you draw accurately?

Texture

Texture Describes the surface quality of something.

Actual texture really exists.

Visual texture is created using marks to represent texture.

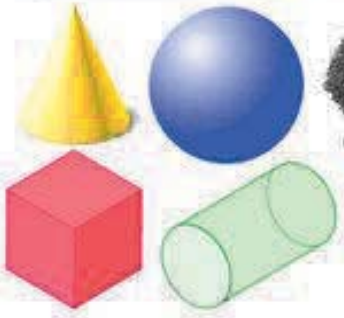
Pattern

Pattern is a design that is created by repeating lines, shapes, tones and colours.
A design which keeps occurring is called a motif.

Notice other patterns in your life: breathing, music, math, PE, nature, man-made

Seven formal elements

The art elements are line, shape, form, tone, texture, pattern and colour.
They are often used together, and how they are organised in a piece of art determines what the finished piece will look like.



CHECKLIST:
Can you use the formal elements to write / talk about an artists work?

Can you use the formal elements to write / talk about your own work?

Year 9 Art Textiles Knowledge Organiser

Skills

Fonts

Graffiti fonts are a style of typography inspired by the art of graffiti, often seen on walls and buildings. They mimic the hand-drawn, bold, and expressive lettering styles of street artists, characterized by exaggerated curves, unconventional angles, and various textures

Stencil

Stencil graffiti is a form of graffiti that makes use of stencils made out of paper, cardboard, or other media to create an image or text that is easily reproducible

Screen Printing

The process involves creating a stencil on the mesh screen, and then using a squeegee to force ink through the open areas of the screen, leaving a printed image.

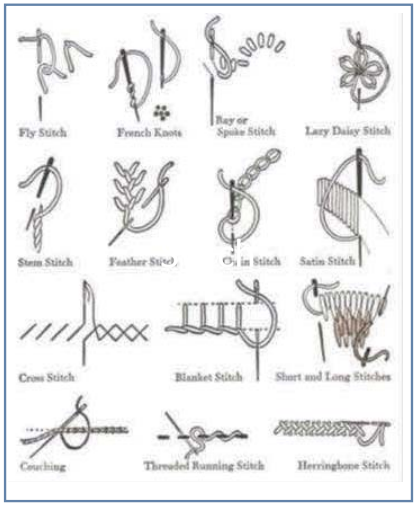
Vocabulary - Formal elements

Shape, form, space	Tone	Pattern and Texture	Line	Colour
Closed	Bright	Repeated	Fluent	Bright Bold
Open	Dark	Uniform	Free Rough	Primary
Distorted	Faded	Geometric	Controlled	Secondary
Flat	Smooth	Random	Powerful	Tertiary
Organic	Harsh	Symmetrical	Strong	Radiant
Deep	Contrasting	Soft	Geometric	Dull Vivid
Flat	Intense	Irregular	Angular	Contrasting
Positive	Sombre	Coarse Bold	Light	Deep
Negative	Grey	Uneven	Delicate	Monochrome
Foreground	Strong	Bumpy	Flowing	Harmonious
Background	Powerful	Rough	Simple	Complementary
Composition	Feint	Smooth	Thick Thin	Natural
Curvaceous	Light	Uneven	Horizontal	Earthy
Elongated	Medium	Spiky	Broken	Subtle
Large	Dark	Broken	Interrupted	Pale
Small	Dramatic	Furry	Rounded	Cool Warm
2D 3D	Large	Fine Flat	Overlapping	Saturated
	Small	Grid	Broken	Luminous
			Faint	Strong

Embellishment techniques

Outline with embroidery

Stitch Techniques



Screen print Artist- Andy Warhol

Hs works explore the relationship between artistic expression, celebrity culture, and advertising that flourished by the 1960s, and span a variety of media, including painting, silk-screening, photography, film, and sculpture. Some of his best known works include the silkscreen paintings Campbell's Soup Cans (1962) and Marilyn Diptych (1962

Graffiti Artist- Inkie

Inkie's works have been described as "diverse", incorporating styles from Maya architecture,
William Morris, Mouse & Kelly, Alphonse Mucha, the Arts and Crafts movement and Islamic geometry.

He was the head of the many artists arrested in 1989 during "Operation Anderson", the UK's largest ever graffiti bust

YEAR 9 – REASONING WITH ALGEBRA...

Forming and Solving Equations

@whisto_maths

What do I need to be able to do?

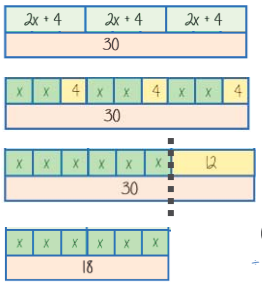
By the end of this unit you should be able to:

- Solve inequalities with negative numbers
- Solve equations with unknowns on both sides
- Solve inequalities with unknowns on both sides
- Substitute into formulae and equations
- Rearrange formulae

Keywords

Inequality: an inequality compares who values showing if one is greater than, less than or equal to another
Variable: a quantity that may change within the context of the problem
Rearrange: Change the order
Inverse operation: the operation that reverses the action
Substitute: replace a variable with a numerical value
Solve: find a numerical value that satisfies an equation

Solve equations with brackets (R)



$3(2x + 4) = 30$

Expand the brackets

$6x + 12 = 30$

$-12 \quad -12$

$6x = 18$

$\div 6 \quad \div 6$

$x = 3$

Form and solve inequalities (R)

Two more than treble my number is greater than 11

Find the possible range of values

$3x + 2 > 11$

Solve

$x \leftarrow -3 \leftarrow -2 \leftarrow 11$

$x > 3$

Inequalities with negatives

Method 1 Make x positive first

$2 - 3x > 17$

$+3x \quad +3x$

$2 > 17 + 3x$

$-17 \quad -17$

$-15 > 3x$

$\div 3 \quad \div 3$

$-5 > x$

x is true for any value smaller than -5

Smaller ← → Bigger

-7 -5 -3

CHECK IT!
$2 - 3(-6) = 20$
TRUE/ CORRECT

Method 2 Keep the negative x

$2 - 3x > 17$

$-2 \quad -2$

$-3x > 15$

$\div -3 \quad \div -3$

$x > -5$

x is true for any value bigger than -5

This cannot be true...

$x < -5$

When you multiply or divide x by a negative you need to reverse the inequality

Equations with unknown on both sides

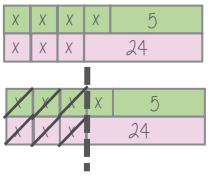
$4x + 5 = 3x + 24$

$-3x \quad -3x$

$x + 5 = 24$

$-5 \quad -5$

$x = 19$



Inequalities with unknown on both sides

Solving inequalities has the same method as equations

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

$5x + 20 < 3x + 6$

$2x + 20 < 6$

$2x < -14$

$x < -7$

Check it!

$5(-8 + 4) < 3(-8 + 2)$

$5(-4) < 3(-6)$

$-20 < -18$

✓ -20 IS smaller than -18

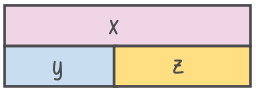
Formulae and Equations

Formulae – all expressed in symbols

Substitute in values →

Equations – include numbers and can be solved

Rearranging Formulae (one step)



$x = y + z$

Rearrange to make y the subject

$y = x - z$

$y \rightarrow +z \rightarrow x$

$y \leftarrow -z \leftarrow x$

Using inverse operations or fact families will guide you through rearranging formulae

Rearranging can also be checked by substitution.

Language of rearranging....

Make XXX the subject

Change the subject

Rearrange

Rearranging Formulae (two step)

In an equation (find x)

$4x - 3 = 9$

$+3 \quad +3$

$4x = 12$

$\div 4 \quad \div 4$

$x = 3$

In a formula (make x the subject)

$xy - s = a$

$+s \quad +s$

$xy = a + s$

$\div y \quad \div y$

$x = \frac{a + s}{y}$

The steps are the same for solving and rearranging

Rearranging is often needed when using $y = mx + c$

e.g. Find the gradient of the line $2y - 4x = 9$

Make y the subject first $y = \frac{4x + 9}{2}$

Gradient $= \frac{4}{2} = 2$

YEAR 9 – REASONING WITH ALGEBRA...

Testing conjectures

@whisto_maths

What do I need to be able to do?

By the end of this unit you should be able to:

- Use factors, multiples and primes
- Reason True or False
- Reason Always, sometimes never true
- Show that reasoning
- Make conjectures about number
- Expand binomials
- Make conjectures with algebra
- Explore the 100 grid

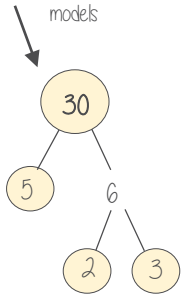
Keywords

Multiples: found by multiplying any number by positive integers
Factor: integers that multiply together to get another number.
Prime: an integer with only 2 factors.
HCF: highest common factor (biggest factor two or more numbers share)
LCM: lowest common multiple (the first time the times table of two or more numbers match)
Verify: the process of making sure a solution is correct
Proof: logical mathematical arguments used to show the truth of a statement
Binomial: a polynomial with two terms
Quadratic: a polynomial with four terms (often simplified to three terms)

Factors, Multiples and Primes

R

Multiplication part-whole models



All three prime factor trees represent the same decomposition

HCF – Highest common factor

HCF of 18 and 30

18: 1, 2, 3, 6, 9, 18
30: 1, 2, 3, 5, 6, 10, 15, 30

Common factors are factors two or more numbers share

LCM – Lowest common multiple

LCM of 9 and 12

9: 9, 18, 27, 36, 45, 54
12: 12, 24, 36, 48, 60

Common multiples are multiples two or more numbers share

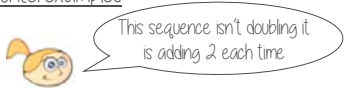
True or False?

Conjecture

A pattern that is noticed for many cases

1, 2, 4, ...
The numbers in the sequence are doubling each time.

Counterexamples



Only **one** counterexample is needed to disprove a conjecture

Always, Sometimes, Never true.

Always – Every value always supports the statement

Sometimes – Examples show the statement being true and counter examples to show when it is false.

Never – No example supports the statement

Examples to try
- 0 and 1
- Fractions
- Negative numbers

Show that

Numerical verification – Show the stages to a solution with numerical values

Algebraic verification – Show algebraic properties of the solution. You may want to use pictorial images to support this

Proof – Simple proofs using algebra

Compare the left hand side of an equation with the right hand side – are they the same or different?

Conjectures

Even $(2n)$ – Multiple of 2

Odd $(2n+1)$ – One more than any even

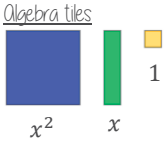
Use numerical verification first
Use pictorial verification – the representations of numbers of odd and even

Expanding binomials

$2(x+2) \equiv 2x+4$

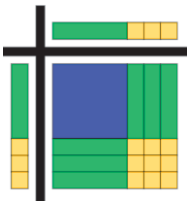
Algebra tiles can represent a binomial expansion
Has two terms

Algebra tiles



Positive values

$(x+3)(x+3) \equiv x^2+6x+9$



This is a quadratic. It has four terms which simplified to three terms

The order of the binomial has no impact on the outcome.
e.g. $(x+3)(3+x)$

Exploring the 100 square

In terms of 'n' is used to make generalisations about relationships between numbers

Positions of numbers in relation to n form expressions.
E.g one space to the right of n
$n+1$

E.g One row below n
$n+10$

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

The size of the grid for generalisation changes the relationship statements

YEAR 9 – CONSTRUCTING IN 2D/3D...

3D Shapes

@whisto_maths

What do I need to be able to do?

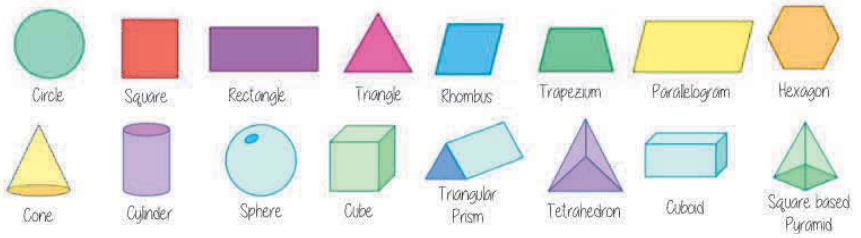
By the end of this unit you should be able to:

- Name 2D & 3D shapes
- Recognise Prisms
- Sketch and recognise nets
- Draw plans and elevations
- Find areas of 2D shapes
- Find Surface area for cubes, cuboids, triangular prisms and cylinders
- Find the volume of 3D shapes

Keywords

2D: two dimensions to the shape e.g. length and width
3D: three dimensions to the shape e.g. length, width and height
Vertex: a point where two or more line segments meet
Edge a line on the boundary joining two vertex
Face: a flat surface on a solid object
Cross-section: a view inside a solid shape made by cutting through it
Plan: a drawing of something when drawn from above (sometimes birds eye view)
Perspective: a way to give illustration of a 3D shape when drawn on a flat surface.

Name 2D & 3D shapes



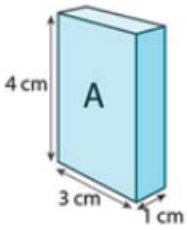
Recognise prisms

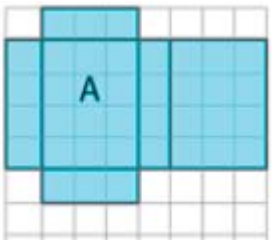
A solid object with two identical ends and flat sides

The cross section will also be identical to the end faces.

A cylinder although with very similar properties does not have flat faces so is not categorised as a prism

Nets of cuboids

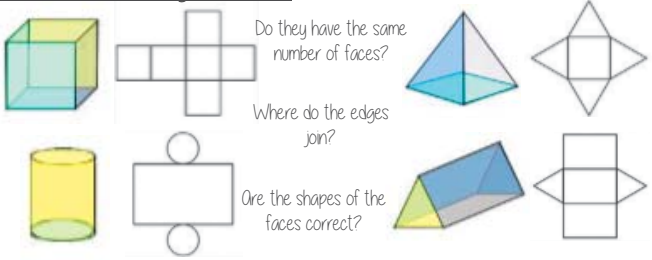




1cm grids help to draw accurately

Visualise the folding of the net. Will it make the cuboid with all sides touching

Sketch and recognise nets

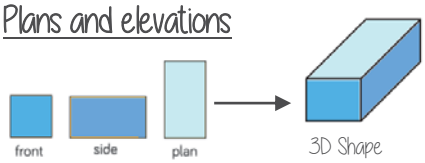


Do they have the same number of faces?

Where do the edges join?

Are the shapes of the faces correct?

Plans and elevations



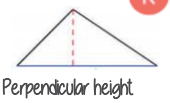
The direction you are considering the shape from determines the front and side views

Area of 2D shapes

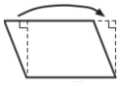
R

Rectangle
Base x Height

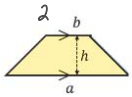
Triangle
½ x Base x Perpendicular height



Parallelogram/ Rhombus
Base x Perpendicular height



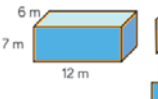
Area of a trapezium
$\frac{(a+b)\times h}{2}$



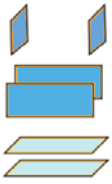
Area of a circle
π x radius^2

Surface area

Sketching nets first helps you visualise all the sides that will form the overall surface area



For cubes and cuboids you can also find one of each face and double it



Sides 6 x 7, 6 x 7
Front and back 12 x 7, 12 x 7
Top and Bottom 12 x 6, 12 x 6

Sum of all sides is surface area

For other shapes - not all the sides are the same, so calculate the individually

Surface area - cylinders

The area of the circle
π x radius^2

Circumference

The width of this face is the same as the circumference
π x diameter x height

$2 \times \pi \times \text{radius}^2 + \pi \times \text{diameter} \times \text{height}$

Volumes

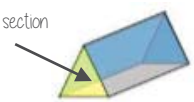
Volume is the 3D space it takes up – also known as capacity if using liquids to fill the space

Counting cubes
Some 3D shape volumes can be calculated by counting the number of cubes that fit inside the shape.

Cubes/ Cuboids = base x width x height

Remember multiplication is commutative

Cross section



Cross section

Prisms and cylinders = area cross section x height

Height can also be described as depth

Areas – square units
Volumes – cube units

Areas and volumes can be left in terms of pi π

YEAR 7 — PLACE VALUE AND PROPORTION

Ordering integers and decimals

@whisto_maths

What do I need to be able to do?

By the end of this unit you should be able to:

- Understand place value and the number system including decimals
- Understand and use place value for decimals, integers and measures of any size
- Order number and use a number line for positive and negative integers, fractions and decimals;
- use the symbols $=, \neq, <, >, \leq, \geq$
- Work with terminating decimals and their corresponding fractions
- Round numbers to an appropriate accuracy
- Describe, interpret and compare data distributions using the median and range

Keywords

Approximate: To estimate a number, amount or total often using rounding of numbers to make them easier to calculate with
Integer: a whole number that is positive or negative
Interval: between two points or values
Median: A measure of central tendency (middle, average) found by putting all the data values in order and finding the middle value of the list
Negative: Any number less than zero, written with a minus sign
Place holder: We use 0 as a place holder to show that there are none of a particular place in a number
Place value: The value of a digit depending on its place in a number. In our decimal number system, each place is 10 times bigger than the place to its right
Range: The difference between the largest and smallest numbers in a set
Significant figure: A digit that gives meaning to a number. The most significant digit (figure) in an integer is the number on the left. The most significant digit in a decimal fraction is the first non-zero number after the decimal point

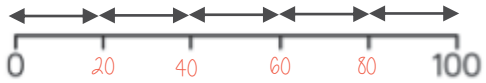
Integer Place Value

Billions			Millions			Thousands			Ones		
H	T	O	H	T	O	H	T	O	H	T	O
		3	1	4	8	0	3	3	0	2	9

Placeholder

Three billion, one hundred and forty eight million, thirty three thousand and twenty nine
1 billion 1, 000, 000, 000
1 million 1 000, 000

Intervals on a number line

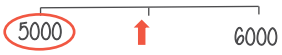


Divide the difference by the number of intervals (gaps).
E.g. 100 ÷ 5 = 20

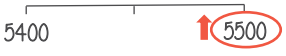
Rounding to the nearest power of ten

If the number is halfway between we "round up"

5495 to the nearest 1000



5475 to the nearest 100



5475 to the nearest 10

Compare integers using <, >, =, ≠

< less than
> greater than
= equal to
≠ not equal to

Two and a half million = 2 500 000
300 000 000 = Three billion
Six thousand and eighty < 68 000

Range

Spread of the values

Difference between the biggest and smallest

3 9 8 12

Range: Biggest value − Smallest value
12 − 3 = 9
Range = 9

Median

The middle value

Example 1
4 3 9 8 12

Median: put the in order 3 4 8 9 12
find the middle number 3 4 **8** 9 12

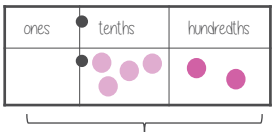
Example 2
150 154 148
137 160 158

Median: put the in order
137 148 150 154 158 160
There are 2 middle numbers
Find the midpoint
152

Decimals

We say "nought point five two"

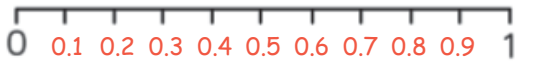
Five tenths and two hundredths



0 ones, 5 tenth and 2 hundredths
0 + 0.1 + 0.1 + 0.1 + 0.1 + 0.1 + 0.001 + 0.001
= 0 + 0.5 + 0.02
= 0.52

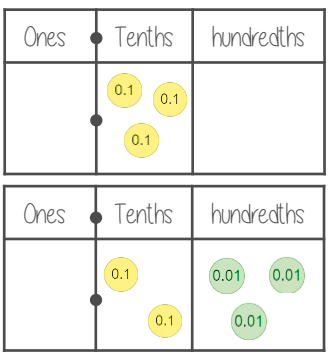
Decimal intervals on a number line

One whole split into 10 parts makes tenths = 0.1
One tenth split into 10 parts makes hundredths = 0.01



Comparing decimals

Which the largest of 0.3 and 0.23?



$0.3 > 0.23$

"There are more counters in the furthest column to the left"

0.30
0.23

Comparing the values both with the same number of decimal places is another way to compare the number of tenths and hundredths

Round to 1 significant figure

370 to 1 significant figure is 400
37 to 1 significant figure is 40
3.7 to 1 significant figure is 4
0.37 to 1 significant figure is 0.4
0.00000037 to 1 significant figure is 0.0000004

Round to the first non zero number

YEAR 10 – GEOMETRY...

@whisto_maths

Angles and bearings

What do I need to be able to do?

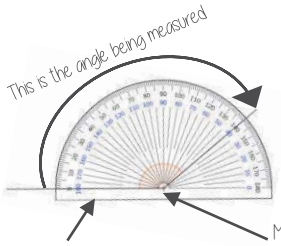
By the end of this unit you should be able to:

- Understand and represent bearings
- Measure and read bearings
- Make scale drawings using bearings
- Calculate bearings using angle rules
- Solve bearings problems using Pythagoras and trigonometry

Keywords

Cardinal directions: the directions of North, South, East, West
Angle: the amount of turn between two lines around their common point
Bearing: the angle in degrees measured clockwise from North.
Perpendicular: where two lines meet at 90°
Parallel: straight lines always the same distance apart and never touch. They have the same gradient.
Clockwise: moving in the direction of the hands on a clock.
Construct: to draw accurately using a compass, protractor and or ruler or straight edge.
Scale: the ratio of the length of a drawing to the length of the real thing.
Protractor: an instrument used in measuring or drawing angles.

Measure angles to 180° R



Read from 0° on the base line. Remember to use estimation. This is an obtuse angle so between 90 ° and 180 °

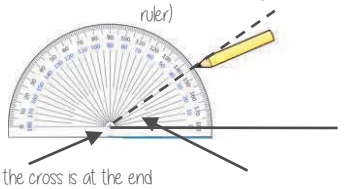
The base line follows the line segment

Make sure the cross is at the point the two lines meet

Draw angles up to 180° R

Draw a 35° angle

Make a mark at 35° with a pencil. And join to the angle point (use a ruler)

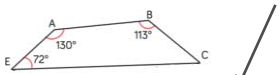


Make sure the cross is at the end of the line (where you want the angle)

The angle

Angle notation R

The letter in the middle is the angle. The arc represents the part of the angle



Angle Notation: three letters $A\hat{B}C$ This is the angle at B = 113 °

$\angle ABC$ is also used to represent the angle at B

Scale drawings R

1 : 20

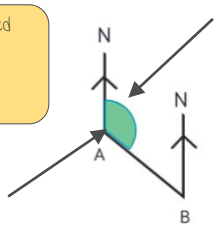
For every 1cm on the model there are 20cm in real life

Remember: Scale drawings ONLY change lengths and distances. Angles remain the same.

Understand and represent bearings

- A bearing is always measured from **NORTH**
- It is always given as three figures

The angle indicated starts from the North line at A and joins the path connecting A to B.



This angle shows the bearing of **B from A**

The bearing of B from A is calculated by measuring the highlighted angle

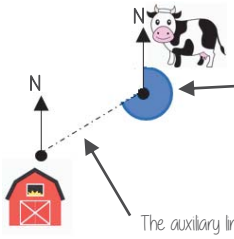
The sentence... "Bearing of ____ from _____" is really important in identifying the bearing being represented

Using **estimation** it is clear this angle is between 090° and 180°

Directions

Clockwise Anti-Clockwise

Measure and read bearings



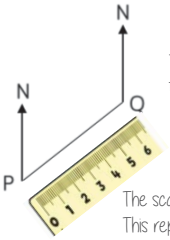
The bearing of the cow to the barn

This angle is measured from **NORTH**
It is measured in a clockwise direction
Estimation indicates this angle is between 180° and 270°
Use a protractor to measure accurately
Remember: bearings are written as three figures

The auxiliary line is drawn to help you measure and draw the angle that is measured to represent the bearing

Scale drawings using bearings

Remember – angles **DO NOT** change size in scaled drawings



The bearing measurements do not change from "real life" to images

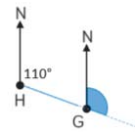
The units in the ratio scale are the same

The scale may need to be calculated from the image. This represents 30km from P to Q

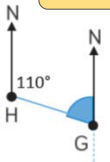
6cm = 30km
6:3,000,000

Bearings with angle rules

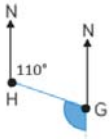
Because two North lines are **PARALLEL**....



They form **corresponding** angles and therefore are the same size



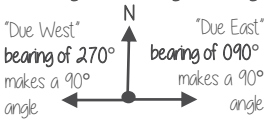
They form **co-interior** angles and add up to 180°



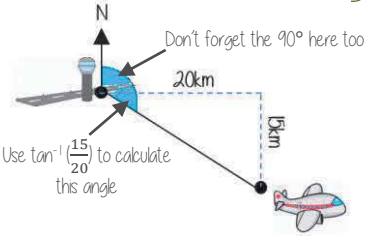
They form **alternate** angles and therefore are the same size

Bearings with right-angled geometry

Look for Right-angles: Pythagoras Trigonometry (Sin, Cos, Tan)



A plane flies East for 20km then turns South for 15km. Find the bearing of the plane from where it took off.



Use $\tan^{-1}(\frac{15}{20})$ to calculate this angle

YEAR 9 – REASONING WITH NUMBER...

Numbers

@whisto_maths

What do I need to be able to do?

By the end of this unit you should be able to:

- Identify integers, real and rational numbers
- Work with directed number
- Solve problems with number
- Find HCF/ LCM
- Add/ Subtract fractions
- Multiply/ Divide fractions
- Write numbers in standard form

Keywords

Integer: a whole number that is positive or negative
Rational: a number that can be made by dividing two integers
Irrational: a number that cannot be made by dividing two integers
Inverse operation: the operation that reverses the action
Quotient: the result of a division
Product: the result of a multiplication
Multiples: found by multiplying any number by positive integers
Factor: integers that multiply together to get another number

Integers, real and rational numbers

Rational – root word: ratio

Real numbers: $\frac{2}{3}$ stems from 2 ! ($\frac{2}{3}$ of the whole)

Irrational numbers: $\sqrt{2}$ the solution is a decimal that never ends and does not repeat

The square root of a negative is not a real number and cannot be found

HCF/LCM R

1 is a common factor of all numbers

Common factors are factors two or more numbers share

HCF – Highest common factor

HCF of 18 and 30

18: 1, 2, 3, 6, 9, 18
30: 1, 2, 3, 5, 6, 10, 15, 30

HCF = 6

LCM – Lowest common multiple

LCM of 9 and 12

9: 9, 18, 27, 36, 45, 54
12: 12, 24, 36, 48, 60

LCM = 36

The first time their multiples match

Standard form R

Any number between 1 and less than 10 × 10^{n} ← Any integer

$6 \times 10^5 + 8 \times 10^5$

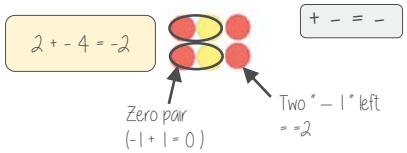
= 600000 + 800000
= 1400000
= 1.4×10^5

$(1.5 \times 10^5) \div (0.3 \times 10^3)$

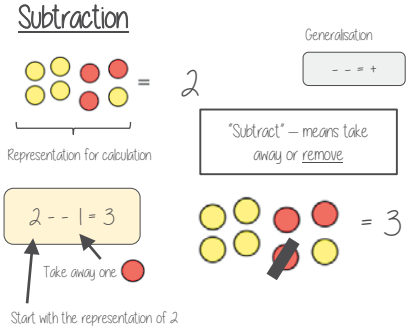
$15 \div 0.3 \times 10^5 \div 10^3$
$= 5 \times 10^2$

Directed number R

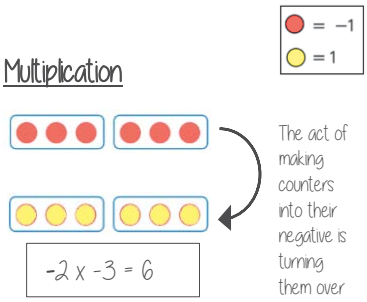
Addition



Subtraction



Multiplication



Divisions are the inverse operations

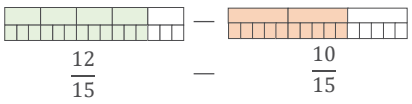
a = 5 b = -4

Brackets around negative substitutions helps remove calculation errors

$2a - b = 2 \times 5 - (-4) = 10 + 4 = 14$

Addition/ Subtraction of fractions R

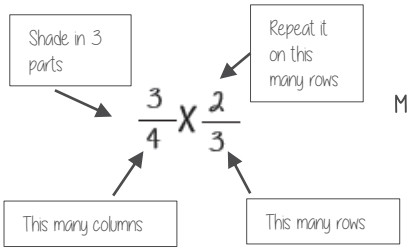
$\frac{4}{5} - \frac{2}{3}$



$= \frac{2}{15}$

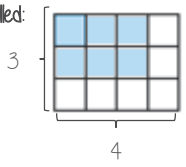
Use equivalent fractions to find a common multiple for both denominators

Multiplication/ Division of fractions R



$\frac{3}{4} \times \frac{2}{3} = \frac{6}{12}$ ← Parts shaded

Modelled:



Total number of parts in the diagram

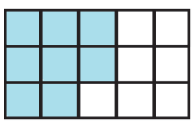
Remember to use reciprocals

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

$\frac{2}{5} \times \frac{4}{3}$

Multiplying by a reciprocal gives the same outcome

Represented



$= \frac{8}{15}$

YEAR 7 — APPLICATION OF NUMBER

Solving problems with addition and subtraction

@whisto_maths

What do I need to be able to do?

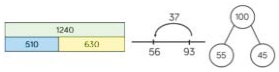
By the end of this unit you should be able to:

- Understand properties of addition/ subtraction
- Use mental strategies for addition/subtraction
- Use formal methods of addition/Subtraction for integers
- Use formal methods of addition/Subtraction for decimals
- Solve problems in context of perimeter
- Solve problems with finance, tables and timetables
- Solve problems with frequency trees
- Solve problems with bar charts and line charts

Keywords

Commutative: changing the order of the operations does not change the result
Associative: when you add or multiply you can do so regardless of how the numbers are grouped
Inverse: the operation that undoes what was done by the previous operation (The opposite operation)
Placeholder: a number that occupies a position to give value
Perimeter: the distance/ length around a 2D object
Polygon: a 2D shape made with straight lines
Balance: in financial questions — the amount of money in a bank account
Credit: money that goes into a bank account
Debit: money that leaves a bank account

Addition/ Subtraction with integers



Modelling methods for addition/ subtraction

- Bar models
- Number lines
- Part/ Whole diagrams

Addition is commutative

6 + 3 = 3 + 6

The order of addition does not change the result

Subtraction the order has to stay the same

360 – 147 = 360 – 100 – 40 – 7

- Number lines help for addition and subtraction
- Working in 10's first aids mental addition/ subtraction
- Show your relationships by writing fact families

Formal written methods

	H	T	O
	1	8	7
+	5	4	2

	H	T	O
	4	2	7
–	2	4	9

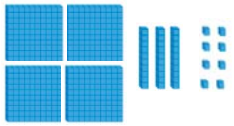
Remember the place value of each column.
You may need to move 10 ones to the ones column to be able to subtract

Addition/ Subtraction with decimals

4	.	3	8
7	.	9	0

0 can be used to fill empty places with value

The decimal place acts as the placeholder and aligns the other values



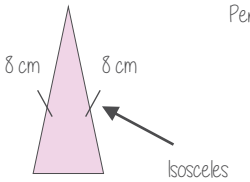
If  represents 1 instead of 100

$5.43 + \frac{8}{10}$

Revisit Fraction — Decimal equivalence
5.43 + 0.8

Solve problems with perimeter

Perimeter is the length around the outside of a polygon



Isosceles Triangle notation

The triangle has a perimeter of 25cm
Find the length of x

8cm + 8cm + $x$cm = 25cm
16cm + $x$cm = 25cm
$x$cm = 9cm

Solve problems with finance

Profit= Income - Costs

Credit — Money coming into an account

Debit — Money leaving an account

Money uses a two decimal place system
14.2 on a calculator represents £14.20

Check the units of currency — work in the same unit

Tables and timetables

Distance tables

	London		
211	Cardiff		
556	493	Glasgow	
518	392	177	Belfast

This shows the distance between Glasgow and London.
It is where their row and column intersects

Bus/ Train timetables

Harton	1005	1045	1130
Bridge	1024	1106	1147
Aville	1051	1133	1205
Ware	1117	1202	1233

Each column represents a journey, each row represents the time the 'bus' arrives at that location

TIME CALCUALTIONS — use a number line

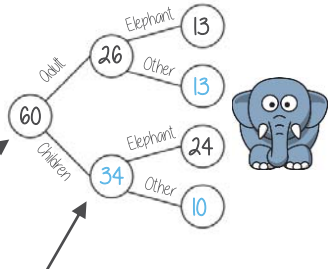
Two-way tables

	H	T
H	HH	HT
T	TH	TT

Where rows and columns intersect is the outcome of that action

Frequency trees

60 people visited the zoo one Saturday morning.
26 of them were adults. 13 of the adult's favourite animal was an elephant. 24 of the children's favourite animal was an elephant.

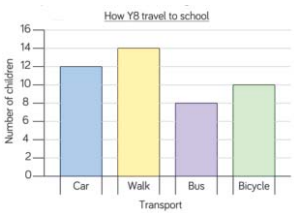


The overall total "60 people"

A frequency tree is made up from part-whole models.
One piece of information leads to another

Probabilities or statements can be taken from the completed trees
e.g. 34 children visited the zoo

Bar and line charts



Use addition/ subtraction methods to extract information from bar charts.

e.g. Difference between the number of students who walked and took the bus.
Walk frequency — bus frequency

When describing changes or making predictions:

- Extract information from your data source
- Make comparisons of difference or sum of values
- Put into the context of the scenario

YEAR 7 — APPLICATION OF NUMBER

Solving problems with multiplication and division

@whisto_maths

What do I need to be able to do?

By the end of this unit you should be able to:

- Understand and use factors
- Understand and use multiples
- Multiply/ Divide integers and decimals by powers of 10
- Use formal methods to multiply
- Use formal methods to divide
- Understand and use order of operations
- Solve area problems
- Solve problems using the mean

Keywords

Array: an arrangement of items to represent concepts in rows or columns
Multiples: found by multiplying any number by positive integers
Factor: integers that multiply together to get another number.
Mili: prefix meaning one thousandth
Centi: prefix meaning one hundredth
Kilo: prefix meaning multiply by 1000
Quotient: the result of a division
Dividend: the number being divided
Divisor: the number we divide by

Factors

Arrays can help represent factors

5 x 2 or 2 x 5

Factors of 10
1, 2, 5, 10

10 x 1 or 1 x 10

The number itself is always a factor

Square numbers have an ODD number of factors

Factors of 4
1, 2, 4

Factors of 36
1, 2, 3, 4, 6, 9, 12, 18, 36

Be strategic - Lay factors out in pairs can help you not to miss any

Multiples

Bar models can represent by something is a multiple. E.g. 20 is a multiple of 4

Lowest Common Multiples

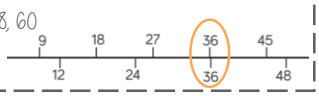
LCM of 9 and 12

The first time their multiples match

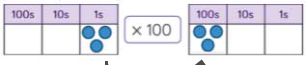
LCM = 36

9: 9, 18, 27, 36, 45, 54

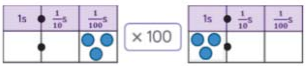
12: 12, 24, 36, 48, 60



Multiply/ Divide by powers of 10



3 x 100 = 300



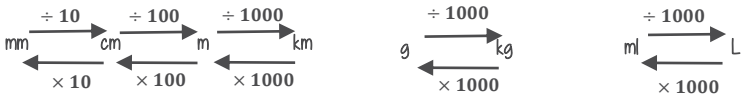
0.03 x 100 = 3

Repeated multiplication and division by powers of 10 is commutative

÷ 10 then ÷ 10 → ÷ 100

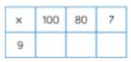
Metric conversions

Useful Conversions

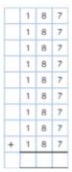


Multiplication methods

Long multiplication (column)



Grid method



Repeated addition

Less effective method especially for bigger multiplication

Multiplication with decimals

Perform multiplications as integers
e.g. 0.2 x 0.3 → 2 x 3

Make **adjustments** to your answer to match the question: 0.2 x 10 = 2
0.3 x 10 = 3
Therefore 6 ÷ 100 = 0.6

Estimations: Using estimations allows a 'check' if your answer is reasonable

Division methods

3584 ÷ 7 = 512

Short division

$$7 \overline{)\,3\,{}^{3}5\,8\,{}^{1}4} \quad 5\,1\,2$$

Complex division

÷ 24 = ÷ 6 ÷ 4

Break up the divisor using factors

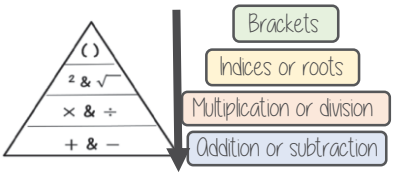
Division with decimals

The placeholder in division methods is essential — the decimal lines up on the dividend and the quotient

24 ÷ 0.02 → 24 ÷ 0.2 → 240 ÷ 2

All give the same solution as represent the same proportion
Multiply the values in proportion until the divisor becomes an integer

Order of operations



If you have multiple operations from the same tier work from left to right

e.g. 10 − 3 + 5 → 10 − 3 → 7 + 5

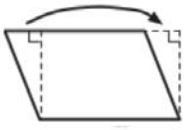
6 x 4 + 8 x 2

24 + 16 = 40

Area problems

Rectangle
Base x Perpendicular height

Parallelogram/ Rhombus
Base x Perpendicular height



Triangle
½ x Base x Perpendicular height

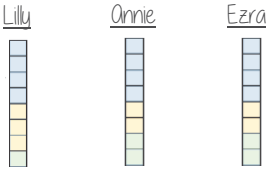
A triangle is half the size of the rectangle it would fit in

Mean problems

Mean — a measure of average
It gives an idea of the central value

Lilly, Annie and Ezra have the following cubes

Finding the mean amount is the average amount each person would have if shared out equally



The mean number of blocks would be 8 each

YEAR 9 – REASONING WITH NUMBER...

Using Percentages

@whisto_maths

What do I need to be able to do?

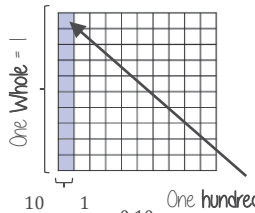
By the end of this unit you should be able to:

- Use FDP equivalence
- Calculate percentage increase and decrease
- Express percentage change
- Solve reverse percentage problems
- Solve percentage problems (calculator and non calculator problems)

Keywords

Percent: parts per 100 – written using the % symbol.
Decimal: a number in our base 10 number system. Numbers to the right of the decimal place are called decimals.
Fraction: a fraction represents how many parts of a whole value you have.
Equivalent: of equal value.
Reduce: to make smaller in value.
Growth: to increase/ to grow.
Integer: whole number, can be positive, negative or zero.
Invest: use money with the goal of it increasing in value over time (usually in a bank).
Multiplier: the number you are multiplying by.
Profit: the income take away any expenses/ costs.

FDP Equivalence (R)



$\frac{10}{100} = \frac{1}{10} = 0.10$

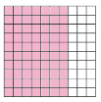
One **hundredth** (one whole split into 100 equal parts)

Percentage
100% = a whole = 100 hundredths

10 hundredths
10 out of 100
10%

ones	tenths	hundredths
	●	●

Converting FDP (R)

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

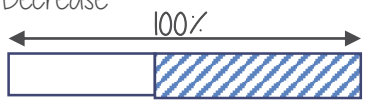
Using a calculator: $\frac{\square}{\square}$ → S⇔D Convert to a decimal

× 100 converts to a percentage

Be careful of recurring decimals
e.g. $\frac{1}{3} = 0.3333333 = 0.\dot{3}$
The dot above the 3

Percentage Increase/ Decrease (R)

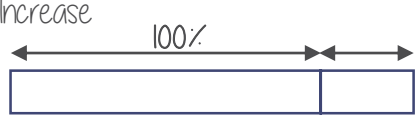
Decrease



Decrease by 58%

100% – 58% = 42%
100 – 0.58 = 0.42 ← Multiplier Less than 1

Increase

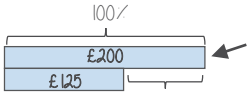


Increase by 12%

100% + 12% = 112%
100 + 0.12 = 1.12 ← Multiplier More than 1

Percentage change (R)

I bought a phone for £200. A year later sold it for £125



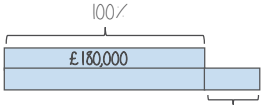
All values of change compare to the ORIGINAL value

Percentage loss

$\frac{75}{200} \times 100 = 37.5\%$

$$\frac{\text{Difference in values}}{\text{Original value}} \times 100$$

I bought a house for £180,000, I later sold it for £216,000.



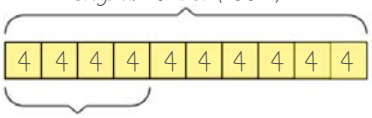
Percentage profit

Money made (profit value) → $\frac{36000}{180000} \times 100 = 20\%$

Reverse Percentages

40% of my number is 16. What am I thinking of?

Original Number (100%)

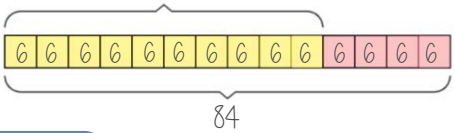


16

40% = 16
10% = 4
100% = 40

140% of my number is 84. What is the original number?

Original Number (100%)



84

140% = 84
10% = 6
100% = 60

Try to scale down to 10% or 1% and then scale back up to 100%

YEAR 9 – REASONING WITH NUMBER...

Maths & Money

@whisto_maths

What do I need to be able to do?

By the end of this unit you should be able to:

- Solve problems with bills and bank statements
- Calculate simple interest
- Calculate compound interest
- Calculate wages and taxes
- Solve problems with exchange rates
- Solve unit pricing problems

Keywords

Credit: money being placed into a bank account
Debit: money that leaves a bank account
Balance: the amount of money in a bank account
Expense: a cost/ outgoing
Deposit: an initial payment (often a way of securing an item you will later pay for)
Multiplier: a number you are multiplying by (Multiplier more than 1 = increasing, less than 1 = decreasing)
Per Annum: each year
Currency: the type of money a country uses.
Unitary: one – the cost of one.

Bills and Bank Statements

Bills – tell you the amount items cost and can show how much money you need to pay.

Some can include a total

Look for different units (Is it in pence or pounds)

Menu	Price
Milk	89p
Tea	£1.50

Bank Statements

Bank statement can have negative balances if the money spent is higher than the money coming into the account

Date	Description	Credit	Debit	Balance
19th Sept	Salary	£1500		£1500
19th Sept	Mortgage		£600	£900
25th Setp	Bday Money	£15		£915

Simple Interest

For each year of investment the interest remains the same

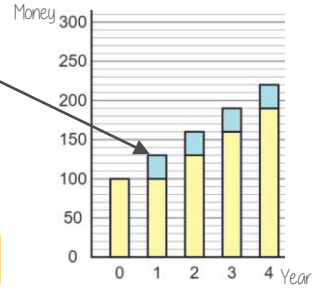
$$\frac{\text{Principal amount} \times \text{Interest Rate} \times \text{Years}}{100}$$

Principal amount is the amount invested in the account.

e.g. Invest £100 at 30/ simple interest for 4 years

$\frac{100 \times 30 \times 4}{100} = £120$

This account earned £120 interest. At the end of year 4 they have £220



Compound Interest

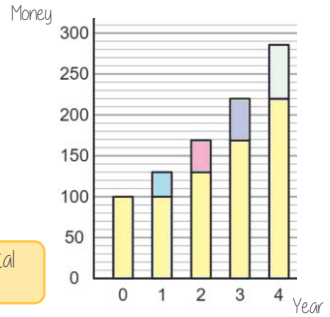
Interest is added to the current value of investment at the end of each year so the next year's interest is greater.

$$\text{Principal amount} \times \text{Multiplier}^{\text{Years}}$$

e.g. Invest £100 at 30/ compound interest for 4 years

$100 \times 1.3^4 = £285.61$

This account has £285.61 in total at the end of the 4 years.



Value Added Tax (VAT)

VAT is payable to the government by a business. In the UK VAT is 20/ and added to items that are bought.

Essential items such as food do not include VAT.

Wages and Taxes

Salaries fall into tax brackets – which means they pay this much each month from their salary.

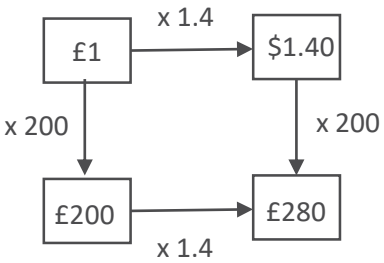
Taxable Income	Tax Rate
£12 501 to £50 000	20%
£50 001 to £150 000	40%
over £150 000	45%

Over time:

Time and a half – means 1.5 times their hourly rate

Double – 2 times their hourly rate

Exchange Rates



When making estimates it is also useful to use estimates to check if our solution is reasonable.

Use inverse operations to reverse the exchange process

Common Currencies

United Kingdom	£	Pounds
United States of America	$	Dollars
Europe	€	Euros

Unit Pricing

4 Oranges £1	5 cupcakes £1.20

$4 = £1.00 \div 2$
$2 = £0.50 \div 2$
$1 = £0.25$ Cost per Unit

$5 = £1.20 \div 5$
$1 = £0.20$

To calculate unit per cost you divide by the cost.

Cupcakes are the best value as one item has the cheapest value

There is a directly proportional relationship between the cost and number of units.

YEAR 9 – REASONING WITH GEOMETRY...

Deduction

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What do I need to be able to do?

By the end of this unit you should be able to:

- Identify angles in parallel lines
- Solve angle problems
- Make conjectures with angles
- Make conjectures with shapes

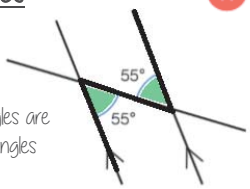
Keywords

Parallel: two straight lines that never meet with the same gradient.
Perpendicular: two straight lines that meet at 90°
Transversal: a line that crosses at least two other lines.
Sum: the result of adding two or more numbers.
Conjecture: a statement that might be true but is not proven.
Equation: a statement that says two things are equal
Polygon: a 2D shape made from straight edges.
Counterexample: an example that disproves a statement

Alternate angles

R

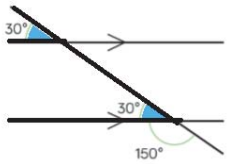
Because alternate angles are equal the highlighted angles are the same size



Corresponding angles

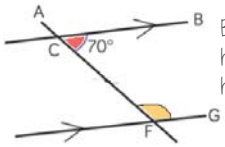
R

Because corresponding angles are equal the highlighted angles are the same size



Co-interior angles

R



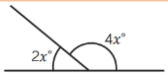
Because co-interior angles have a sum of 180° the highlighted angle is 110°

As angles on a line add up to 180° co-interior angles can also be calculated from applying alternate/ corresponding rules first

Solving angle problems

Angles on a straight Line
180°

Link angle facts to algebra



Form an equation

$$2x + 4x = 180°$$

State the reason

The sum of angles on a straight line is 180 °

Solve

$$2x + 4x = 180°$$
$$6x = 180°$$
$$x = 30°$$

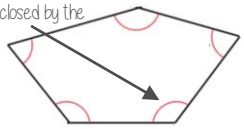
Vertically opposite angles
Equal

Angles around a point
360 °

Triangles
Sum of angles is 180 °

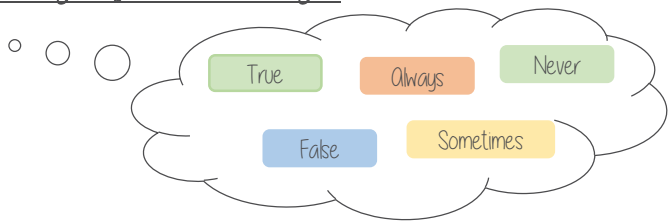
Isosceles have the same base angles

Interior Angles
The angles enclosed by the polygon



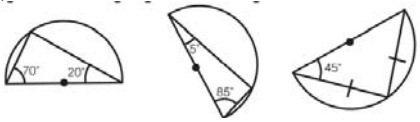
(number of sides – 2) x 180

Making conjectures with angles



Proving a conjecture
A pattern is noticed for many cases

Disproving a conjecture
Only one counterexample is needed to disprove a conjecture



Apply the angle rules

The sum of angles in a triangle is 180°

Test the theory

$$180 - 70 - 20 = 90$$
$$180 - 85 - 5 = 90$$
$$180 - 45 - 45 = 90$$

Make conjecture

The angle that meets the circumference in a semi circle is 90°

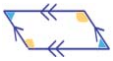
Making conjectures with shapes

Keywords and facts to recall with shape

Area: the amount of space inside a shape
Perimeter: the length around a shape
Regular Polygons: All sides and angles are equal

Quadrilateral Facts

Square
All sides equal size
All angles 90°
Opposite sides are parallel



Parallelogram
Opposite sides are parallel
Opposite angles are equal
Co-interior angles

Rectangle
All angles 90°
Opposite sides are parallel

Rhombus
All sides equal size
Opposite angles are equal

Kite
No parallel lines
Equal lengths on top sides
Equal lengths on bottom sides
One pair of equal angles

YEAR 7 – DIRECTED NUMBER

Operations with equations and directed numbers

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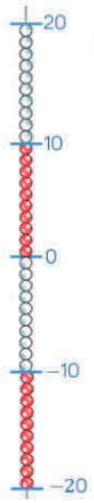
What do I need to be able to do?

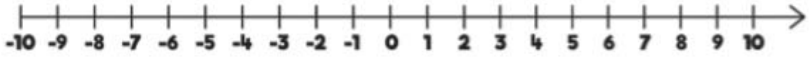
By the end of this unit you should be able to:

- Perform calculations that cross zero
- Add/ Subtract directed numbers
- Multiply/ Divide directed numbers
- Evaluate algebraic expressions
- Solve two-step equations
- Use order of operations with directed number

Keywords

Subtract: taking away one number from another.
Negative: a value less than zero.
Commutative: changing the order of the operations does not change the result
Product: multiply terms
Inverse: the opposite function
Square root: a square root of a number is a number when multiplied by itself gives the value (symbol $\sqrt{}$)
Square: a term multiplied by itself.
Expression: a maths sentence with a minimum of two numbers and at least one math operation (no equals sign)





Perform calculations that cross zero

Number lines are useful to help you visualise the calculation crossing 0

4 – 6 = -2

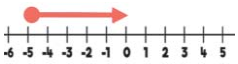
Use the number line to guide subtraction of 6

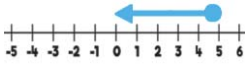
Start at 4

-5 + 5 = 0

Rearrangements of the same equation

5 – 5 = 0

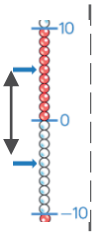




Find the difference between 6 and -4

From 6 to 0
6
From 0 to -4
4

10 beads between them



Add directed numbers

= -1
= 1
Representations

2 + - 4 = -2

Zero pair
(-1 + 1 = 0)

Two " – 1 " left
= -2

8 + -3 = 5

Partitioning

8 + -3 = 5

5 + 3 + - 3 = 5

Partition the value to create a zero pair calculation

Generalisation
+ – = –

Subtract directed numbers

= -1
= 1
Representations

Representation for calculation

2 "Subtract" – means take away or remove

2 - - 1 = 3

Take away one

Start with the representation of 2

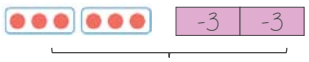
= 3

2 - - 3 = 5

= 5

Generalisation
- - = +

Multiply/ Divide directed numbers



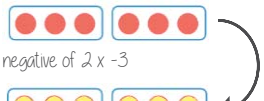
Two representations of the same calculation

2 x -3 = -6

Negative, Negative calculation

-2 x -3

This is the negative of 2 x -3



The act of making counters into their negative is turning them over

-2 x -3 = 6

Divisions are the inverse operations

Evaluate algebraic expressions

a = 5

b = -4

$a^2 = 5^2$

$a^2 = 25$

$b^2 = (-4)^2$

$b^2 = 16$

With negative numbers the brackets are important so that it performs -4 x -4.

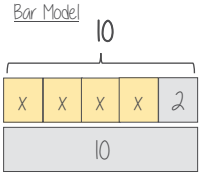
Brackets around negative substitutions helps remove calculation errors

2a – b = 2 x 5 – (-4) = 10 + 4 = 14

3b – 2a = 3(-4) – 2(5) = - 12 – 10 = -22

Two-step equations

Bar Model

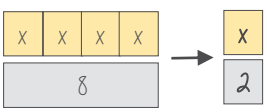


4x + 2 = 10

10 – 4x = 2

Representing the same question (use fact families)

Function machine



x → x4 → +2 → 10

Inverse operations to find x

Use order or operations

Brackets
Indices or roots
Multiplication or division
Addition or subtraction

Brackets around negative substitutions helps remove calculation errors

Remember square roots have a positive and negative value

x	-3	-2	-1	0	1	2	3
-3	9	6	3	0	-3	-6	-9
-2	6	4	2	0	-2	-4	-6
-1	3	2	1	0	-1	-2	-3
0	0	0	0	0	0	0	0
1	-3	-2	-1	0	1	2	3
2	-6	-4	-2	0	2	4	6
3	-9	-6	-3	0	3	6	9

YEAR 7 – LINES AND ANGLES

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Geometric reasoning

What do I need to be able to do?

By the end of this unit you should be able to:

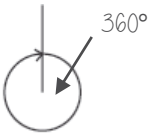
- Understand/use the sum of angles at a point
- Understand/use the sum of angles on a straight line
- Understand/use equality of vertically opposite angles
- Know and apply the sum of angles in a triangle
- Know and apply the sum of angles in a quadrilateral

Keywords

Vertically Opposite: angles formed when two or more straight lines cross at a point
Interior Angles: angles inside the shape
Sum: total, add all the interior angles together
Convex Quadrilateral: a four-sided polygon where every interior angle is less than 180°
Concave Quadrilateral: a four-sided polygon where one interior angle exceeds 180°
Polygon: a 2D shape made with straight lines
Scalene triangle: a triangle with all different sides and angles
Isosceles triangle: a triangle with two angles the same size and two angles the same size
Right-angled triangle: a triangle with a right angle

Sum of angles at a point

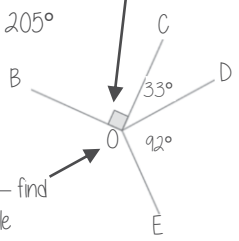
The sum of angles around a point is 360°

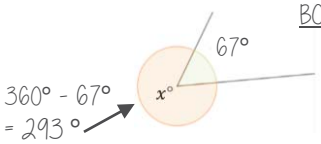


Find angle BOE

90° + 33° + 92° = 205°
360° - 205°
BOE = 155°

Angle notation – 90°



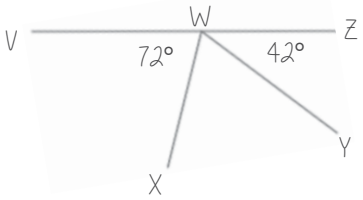


360° - 67°
= 293°

Angle notation – find this missing angle

Sum of angles on a straight line

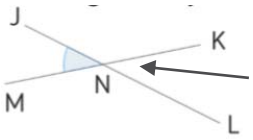
Adjacent angles that share a common point on a line add up to 180°



Find angle XWY

72° + 42° = 114°
180° - 114° = 66°

Vertically opposite angles

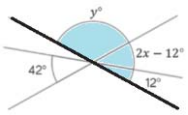


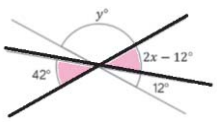
Angle JNM is vertically opposite to angle KNL

JNM = KNL

Vertically opposite angles are the same

Other angle rules still apply
Look for straight line sums and angles around a point

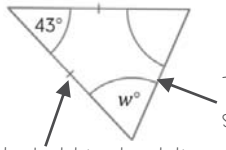




Form equations with information from diagrams:
$2x - 12 = 42$
$2x = 54$
$x = 27°$

Sum of angles in triangles

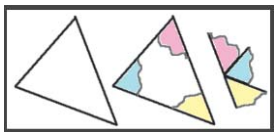
Sum of interior angles in a triangle = 180°



The two base angles will be the same size

Look at triangle notation. This indicates an isosceles triangle
∴ 180 - 43 = 137
137 ÷ 2 = 68.5°

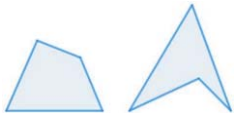
A triangle can only have ONE right angle



Have a go!
Tearing the corners from triangles forms a straight line which is therefore 180°

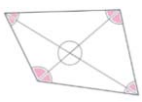
Sum of angles in quadrilaterals

Sum of interior angles in a quadrilateral = 360°

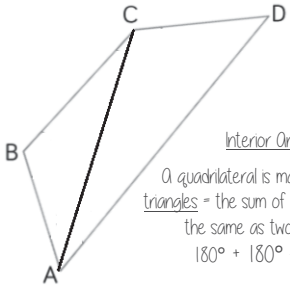


Convex Quadrilateral

Concave Quadrilateral



Interior angles are those that make up the perimeter (outline) of the shape



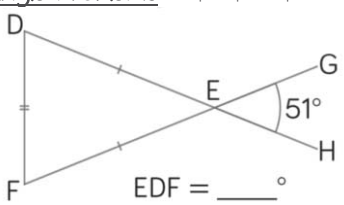
Interior Angles

A quadrilateral is made up of two triangles = the sum of interior angles is the same as two triangles:
180° + 180° = 360°

Angle Problems

Split up the problem into chunks and explain your reasoning at each point using angle notation

Keep working out clear and notes together



1. Angle DEF = 51° because it is a vertically opposite angle DEF = GEH
2. Triangle DEF is isosceles (triangle notation) ∴ EDF = EFD and the sum of interior angles is 180°
   180° - 51° = 129° 129° ÷ 2 = 64.5°
3. Angle EDF = 64.5°

YEAR 8 - DEVELOPING GEOMETRY...

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Angles in parallel lines and polygons

What do I need to be able to do?

By the end of this unit you should be able to:

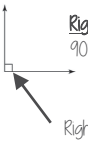
- Identify alternate angles
- Identify corresponding angles
- Identify co-interior angles
- Find the sum of interior angles in polygons
- Find the sum of exterior angles in polygons
- Find interior angles in regular polygons

Keywords

Parallel: Straight lines that never meet
Angle: The figure formed by two straight lines meeting (measured in degrees)
Transversal: A line that cuts across two or more other (normally parallel) lines
Isosceles: Two equal size lines and equal size angles (in a triangle or trapezium)
Polygon: A 2D shape made with straight lines
Sum: Addition (total of all the interior angles added together)
Regular polygon: All the sides have equal length; all the interior angles have equal size.

Basic angle rules and notation (R)

Acute Angles
0° < angle < 90°



Right Angles
90°

Right angle notation

Obtuse
90° < angle < 180°

Reflex
180° < angle < 360°

Straight Line
180°

The letter in the middle is the angle
The arc represents the part of the angle

Angle Notation: three letters ABC
This is the angle at B = 113°
Line Notation: two letters EC
The line that joins E to C

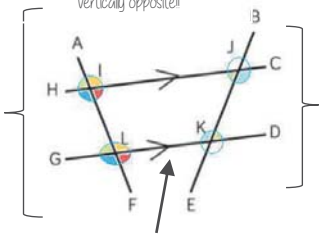
Vertically opposite angles
Equal
Angles around a point
360°

Parallel lines

Still remember to look for angles on straight lines, around a point and vertically opposite!

Lines QF and BE are **transversals** (lines that bisect the parallel lines)

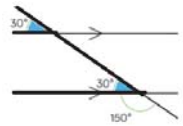
Corresponding angles often identified by their **"F shape"** in position



Alternate angles often identified by their **"Z shape"** in position

This notation identifies parallel lines

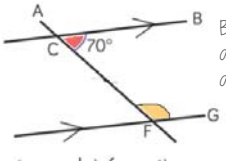
Alternate/ Corresponding angles



Because alternate angles are equal the highlighted angles are the same size

Because corresponding angles are equal the highlighted angles are the same size

Co-interior angles



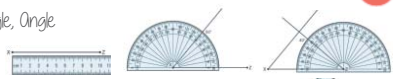
Because co-interior angles have a sum of 180° the highlighted angle is 110°

As angles on a line add up to 180° co-interior angles can also be calculated from applying alternate/ corresponding rules first

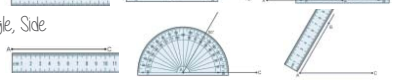
Triangles & Quadrilaterals

Link to steps (R)

Side, Angle, Angle



Side, Angle, Side



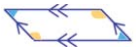
Side, Side, Side

Properties of Quadrilaterals

Square
All sides equal size
All angles 90°
Opposite sides are parallel

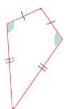
Rectangle
All angles 90°
Opposite sides are parallel

Rhombus
All sides equal size
Opposite angles are equal



Parallelogram
Opposite sides are parallel
Opposite angles are equal
Co-interior angles

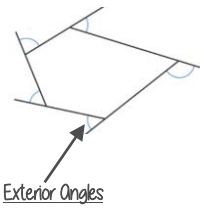
Trapezium
One pair of parallel lines



Kite
No parallel lines
Equal lengths on top sides
Equal lengths on bottom sides
One pair of equal angles

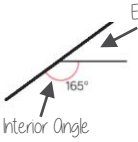
Sum of exterior angles

Exterior angles all add up to 360°



Exterior Angles
Are the angle formed from the straight-line extension at the side of the shape

Using exterior angles



Exterior Angle

Interior Angle

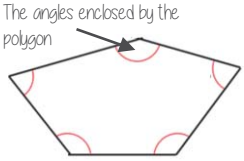
Interior angle + Exterior angle = straight line = 180°
Exterior angle = 180 − 165 = 15°

Number of sides = 360° ÷ exterior angle
Number of sides = 360 ÷ 15 = 24 sides

Sum of interior angles

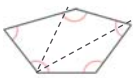
(number of sides − 2) x 180

Interior Angles
The angles enclosed by the polygon



This is an **irregular** polygon – the sides and angles are different sizes

Sum of the interior angles = (5 − 2) x 180

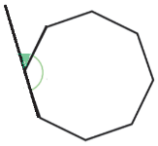


This shape can be made from three triangles
Each triangle has 180°

Sum of the interior angles = 3 x 180
= 540°

Remember this is **all** of the interior angles added together

Missing angles in regular polygons



Exterior angle = 360 ÷ 8 = 45°

Interior angle = $\frac{(8-2) \times 180}{8} = \frac{6 \times 180}{8} = 135°$

Exterior angles in regular polygons = 360° ÷ number of sides

Interior angles in regular polygons = $\frac{(\text{number of sides} - 2) \times 180}{\text{number of sides}}$

YEAR 8 - REASONING WITH DATA...

Measures of location

@whisto_maths

What do I need to be able to do?

By the end of this unit you should be able to:

- Understand and use mean, median and mode
- Choose the most appropriate average
- Identify outliers
- Compare distributions using averages and range

Keywords

Spread: the distance/ how spread out/ variation of data
Average: a measure of central tendency – or the typical value of all the data together
Total: all the data added together
Frequency: the number of times the data values occur
Represent: something that show's the value of another
Outlier: a value that stands apart from the data set
Consistent: a set of data that is similar and doesn't change very much

Mean, Median, Mode

The Mean

A measure of average to find the central tendency... a typical value that represents the data

24, 8, 4, 11, 8,

Find the sum of the data (add the values) 55

Divide the overall total by how many pieces of data you have 55 ÷ 5

Mean = 11

The Median

The value in the center (in the middle) of the data

24, 8, 4, 11, 8,

Put the data in order 4, 8, 8, 11, 24

Find the value in the middle 4, 8, 8, 11, 24

Median = 8

NOTE: If there is no single middle value find the mean of the two numbers left

The Mode (The modal value)

This is the number OR the item that occurs the most (it does not have to be numerical)

24, 8, 4, 11, 8,

This can still be easier if it the data is ordered first 4, 8, 8, 11, 24

Mode = 8

Choosing the appropriate average

The average should be a representative of the data set – so it should be compared to the set as a whole - to check if it is an appropriate average

Here are the weekly wages of a small firm

£240	£240	£240	£240	£240
£260	£260	£300	£350	£700

Which average best represents the weekly wage?

The Mean = £307
The Median = £250
The Mode = £240

Put the data back into context

Mean/Median – too high (most of this company earn £240)
Mode is the best average that represents this wage

It is likely that the salaries above £240 are more senior staff members – their salary doesn't represent the average weekly wage of the majority of employers

Identify outliers

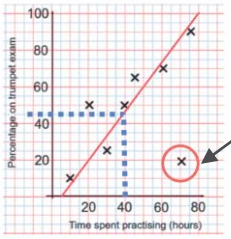
Outliers are values that stand well apart from the rest of the data

Outliers can have a big impact on range and mean. They have less impact on the median and the mode

Sometimes it is best to not use an outlier in calculations

Height in cm
152 150 142 158 182 151 153 149 156 160 151 144

Where an outlier is identified try to give it some context
This is likely to be a taller member of the group. Could the be an older student or a teacher?



Outliers can also be identified graphically e.g. on scatter graphs

Comparing distributions

Comparisons should include a statement of average and central tendency, as well as a statement about spread and consistency

Here are the number of runs scored last month by Lucy and James in cricket matches

Lucy: 45, 32, 37, 41, 48, 35
James: 60, 90, 41, 23, 14, 23

Lucy
Mean: 39.6 (1dp), **Median:** 38 **Mode:** no mode, **Range:** 16

James
Mean: 41.8 (1dp), **Median:** 32, **Mode:** 23, **Range:** 76

James has two extreme values that have a big impact on the range

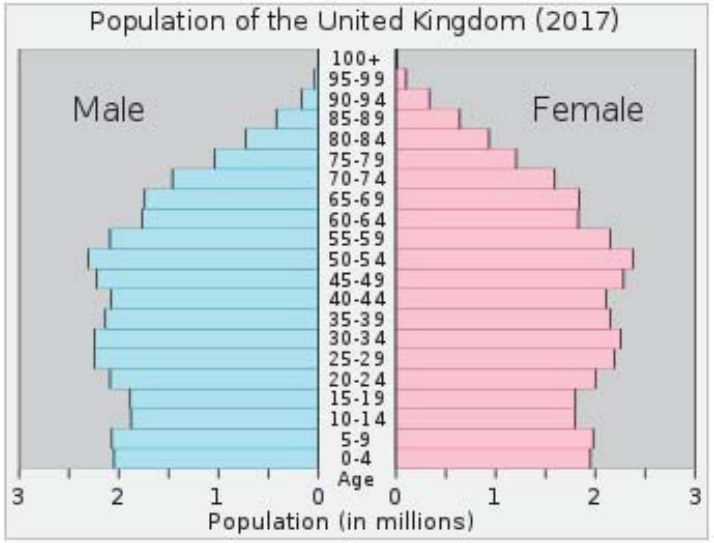
"James is less consistent that Lucy because his scores have a greater range. Lucy performed better on average because her scores have a similar mean and a higher median"

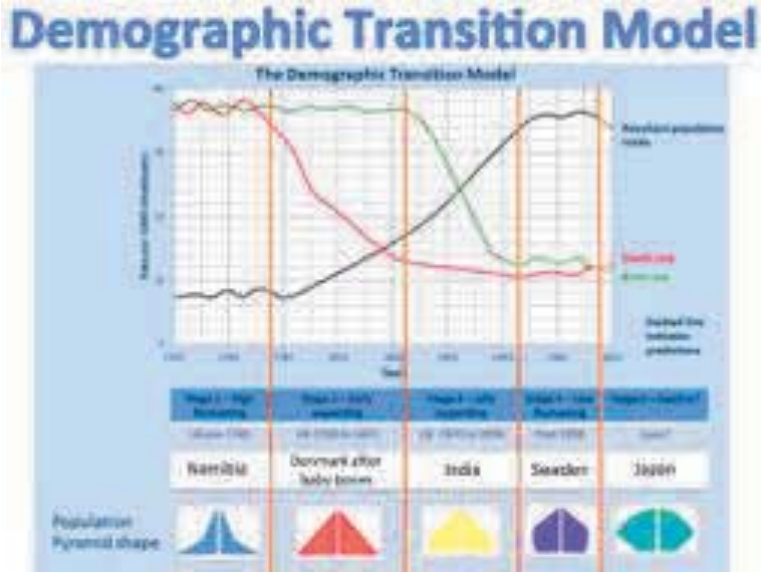
Geography - Year 9 Term 1 - Population

Key Terms

Age-Sex Pyramid	A graph showing the proportion of males and females in selected age groups in a population.
Birth Rate	The number of live births for every 1000 of the population.
Developed Country	A country that has lots of money, many services and a high standard of living. Also called a MEDC or HIC.
Developing Country	A country that is often quite poor, has few services and a low standard of living. Also called a LEDC or LIC.
Densely Populated	An area that is crowded with people.
Migration	The movement of people from one place to another to live or work.
Human Features	These have been made by people and include settlement, transport and the use of the land.
Life Expectancy	The average age a person born at a given time can expect to live.
Negative Factors	Physical or human features of places that discourage people from living in a place.
Rural to Urban Migration	The movement of people from the countryside to cities, normally seen in developing countries.
Urbanisation	The proportion of the population that lives in cities
Ageing Population	A population in which average age is increasing.
Dependency Ratio	The proportion of people of working age compared to those who are economically inactive (children and pensioners).

PUSH		PULL
Persecution Violence War	→	Safety and Stability Freedom
Poor wages Lack of jobs	→	Higher wages Job prospects
Crop failure and famine Pollution Natural disaster	→	Food availability Better environment
Limited opportunities Lack of services Family separation	→	Family Reunification Better quality of life Availability of services





TERM 1

Year 9 Drama

Autumn Term

Physical Theatre and Pantomime

Physical Theatre

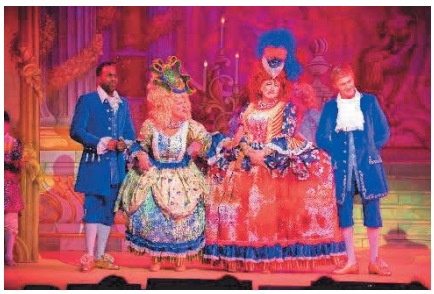
Physical theatre is a form of theatre which emphasises the use of physical movement, as in dance and mime, for expression.

Ensemble Skills:

Working as an ensemble is an approach to acting that aims for a unified effect achieved by all members of a cast working together on behalf of the play, rather than emphasizing individual performances.

The project:

You will utilise your newly acquired ensemble and physical theatre skills to bring a script to life. You will use movement and mime to tell the story instead of relying on props and set.



Pantomime:

Pantomime is theatrical entertainment, mainly for children, which involves music, topical jokes, and slapstick comedy and is based on a fairy tale or nursery story, usually produced around Christmas.

Stock Characters:

In pantomime, there are always a number of stock characters that appear in virtually every single story. These include the Evil villain, the damsel in distress and the Pantomime dame to name a few.

Commedia D'ell Arte:

This is a type of Italian improvised theatre that pantomime has been inspired by. This also utilised stock characters and scenarios.

The project:

You will be taking part in a whole class scene from a pantomime.

Dramatic Terminology:

- Characterisation-The act of changing voice, body language, movement, gesture etc. when in role.
- Ensemble skills-Working to create a unified performance with all cast members working together.
- Blocking a scene-the decisions that you make in order to bring a scene to life.
- Physicality-creating a character through movement and body language.
- Tone of voice-using your voice to convey how your character is feeling.
- Slapstick-comedy based on deliberately clumsy actions and humorously embarrassing events.
- Physical Theatre-theatre that focuses on use of movement to tell the story as opposed to detailed set and props.

Head

I have an excellent understanding of my own and others physical and mental capacity and use it to achieve success.

I can analyse performances to help improve my weakness

I can implement a variety of strategies for improvement within a game situation

I can demonstrate originality and sophistication when making ideas happen that contribute to the unique /exceptional quality of performance

Heart (Team work)

I have successfully worked hard in my lessons working with people who I don't usually work with

I have led a part of a warm up at the start of the lesson which my team has taken part in

I have successfully set up a drill with my team which we have used within the lesson

I have taken part in various roles within a game situation to benefit my team

Hands

I demonstrate a very high level of quality and consistency when passing, receiving, tackling and heading the ball

In a game I demonstrate effective marking, tackling and intercepting skills with consistency and control

I demonstrate a variety of passes with sound technique and accuracy and I can pass and shoot accurately with either foot

I can dribble the ball showing close control and I am successful when protecting it from the opposition

Year 9 Football

KEY VOCABULARY

Control and turning (Develop)	Moving with the ball under control and changing the direction of movement with the ball, when under increased pressure from a defender, **to change the point of attack into free space**
Shooting (Develop)	Kicking the ball towards the goal to score and gain an advantage, when under increased pressure from a defender. **Placing the ball into areas of the goal to gain an advantage.**
Passing – lofted pass	Passing the ball to another team mate using the laces part of the foot, **when increased pressure from a defender**
Beating an opponent	Moving past an opponent using a variety of skills.
Defensive tactics	Working as a team unit to stop the opponents scoring.
Set plays- tactics with width	Passing the ball wide to create space on the pitch to gain an advantage.

KEY QUESTIONS

Why is it important to play with wingers? How does this affect the opposition?
How can you make a better shooting position for a member of your team?
How can you make it difficult for your opponent to keep possession?
Highlight what the key roles/responsibilities of the central midfielder
How can formation be change to help a team be more successful?

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Hands

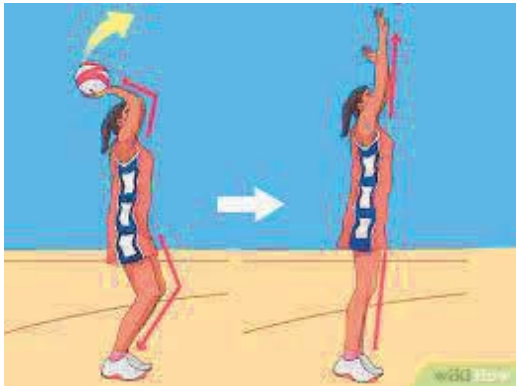
I can consistently apply footwork skills to a range of competitive situations.

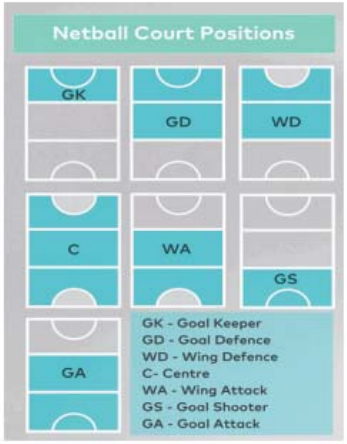
I have a good awareness of all positioning on court

Able to consistently outwit an opponent in defence and attack in competitive situations.

To successfully demonstrate shooting technique with some technique from a range of positions.

Year 9 Netballl





KEY VOCABULARY

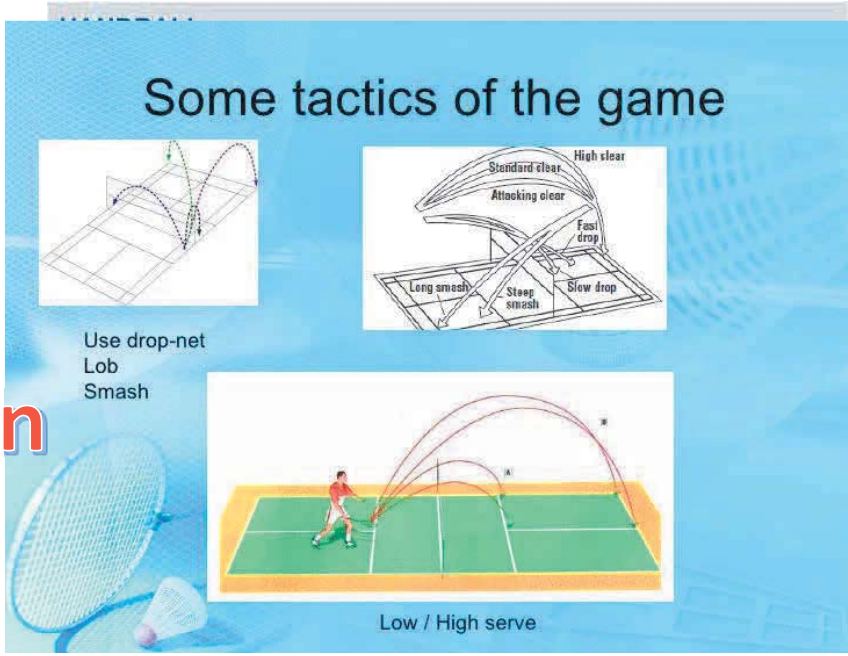
USE OF SPACE/COURT LINKAGE	This is used by the players to make the most of the space on the court and the position of team members by passing the ball down the court
ATTACKING PRINCIPLES	To demonstrate effective team play using attacking principles such as possession, timing, passing and space.
DEFENDING PRINCIPLES	To develop effective team play using defending principles such as interception, marking, goal protection and space limitation.
TACTICS- CENTRE PASS/WITHIN THE CIRCLE	To be able to select advanced tactics to outwit the opposition.

KEY QUESTIONS

How can passing the ball influence the game?
How can the speed of the pass gain the advantage in the game?
What should an attacking player do to keep possession of the ball?
How can footwork keep the game flowing?
How can the defender dominate the space the attacker can take?
How could the opposing GD respond to different tactics from the GA?

Year 9 Badminton

St John Fisher Catholic High School



Head

To develop an understanding about attacking principles related to handball

To understand how to pass the ball around opponents while under pressure in a game situation

To develop knowledge & understanding of basic strategies to outwit defenders

To refine tactics based on opponents weaknesses.

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Hands

Show a variety of passes with good speed and timing.

Can receive a variety of passes with 1 hand consistently.

Is able to Dribble well with control in a game situation

Able to shoot while being marked closely, attempt a variety of shots.

KEY VOCABULARY

Drop shot (recall)	A shot that travels over the net and lands close over the net on your opponents side, **under control in a rally**
Underarm shots	A shot played with the racket below your waist, **which travels to the back or front of the court to move your opponent out of position.**
Smash (Recall)	The smash shot is an attacking shot that is played directly to the floor of your opponent, **into free space created.**
Introduce net play (kill)	A shot that is played at the net that goes to the floor on your opponent without the racket hitting the net.
Single play tactics	A plan to outwit an opponent, creating space to play a winning shot during a rally when working alone
Introduce Doubles tactics	A plan to outwit an opponent, creating space to play a winning shot during a rally when working in a team.
Umpire	The person in charge of keeping score.
Service Line	The position on the court where the serve takes place from and must travel past to be in play.
Doubles markings	The court markings when playing in 2's.

Head

In a game situation I have a thorough understanding of tactics and team skills and I are able to take control of a game.

I can consistently communicate effectively with a variety of different 'audience' during complex situations showing extensive knowledge

I can analyse performances. I can implement a variety of strategies for improvement

I can referee a game applying basic rules and conventions

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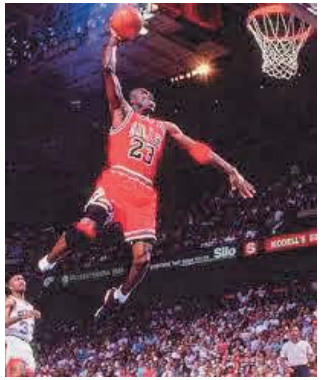
Hands

I rarely lose possession in a game situation and I have a range of shooting skills executed with a high level of technique.

I can shoot a lay-up with both hands and score consistently in a game

I make few unforced errors and show a good level of skill even under pressure.

My vision is good within a game. I can see passing opportunities and I attack effectively.

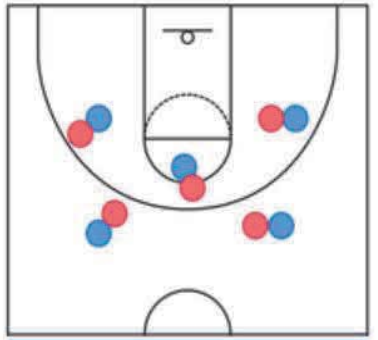


Year 9 Basketball

St John Fisher
Catholic High School

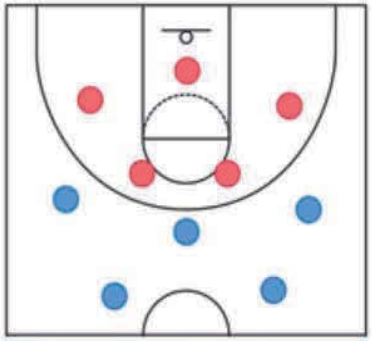
BASKETBALL DEFENCE STRATEGIES

MAN TO MAN MARKING

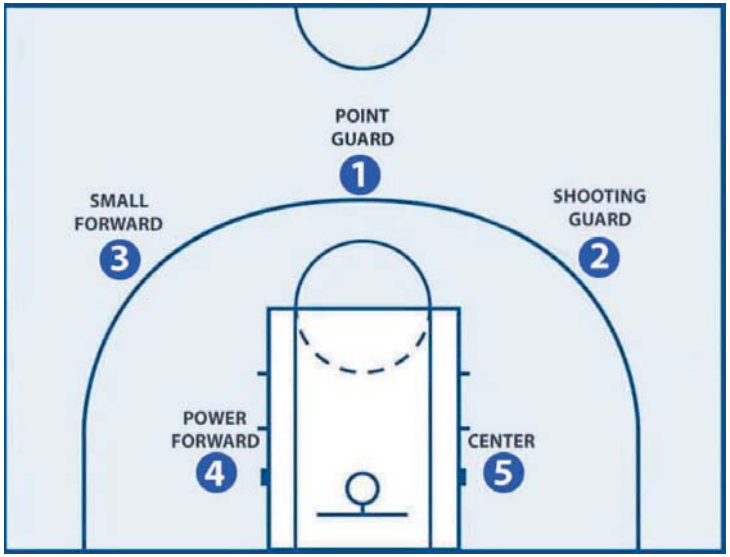


Man to man defences match up the defenders against specific attacking players. Defenders are usually assigned to be matched up with attacking players by size and ability.

ZONAL MARKING



Zone defence is different from man-to-man defence in that, instead of guarding a particular player, each zone defender is responsible for guarding an area of the floor, or "zone", and any offensive player that comes into that area.



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Hands

Be able to tackle and ruck to retain possession in contact situations..

use passing and running skills to outwit an opponent and beat a defender to score a try.

Be able to restart the game effectively using scrums and lineouts.

My vision is good within a game, I can see passing opportunities and I attack effectively.

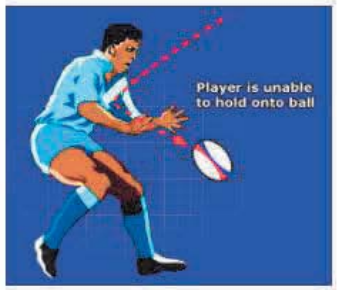
Year 9 Rugby

KEY VOCABULARY

Tackling + Rucking	Creating a tackling situation, that allows a ruck to be created afterwards to recycle the next phase of play.
Tackling + mauling	Creating a tackling situation, that allows a ruck to be created afterwards to recycle the next phase of play.
5 v 3 Overload attacking situation	5 Attacking players working against 3 defenders in an overload situation, the attackers draw in the defender for a tackle.
Conditioned game	A game scenario that allows the skills practiced in lesson in a game environment.
3 man scrum	The method of restarting the game when the ball has been passed forward.
Lineouts	. The method of restarting a game when the ball has been kicked or taken off at the side of the pitch.
Offside	Receiving the ball in front of the attacking line.
Forward pass	The ball being passed in front of the attacking line to a team mate
Knock on	When receiving the ball letting it slips and go forward.

KEY QUESTIONS

How do you safely scrum in rugby?
How can you use set plays to influence the game?
What individual skills can a player demonstrate to make them an effective player?
How can you decide on the style of play you will use against a team?
What types of decisions due you have to make when given a penalty in the opponents half?

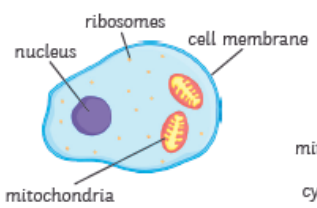


Science – Year 9 – Term 1 part 1 – Fundamentals of Biology - Cells as Building Blocks

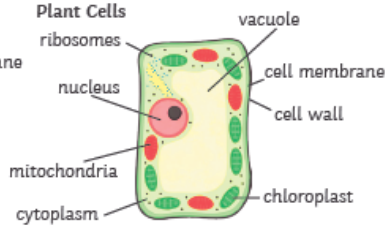
Prokaryotic and Eukaryotic Cells

Eukaryotic cells have membrane-bound organelles, for example, plant cells, animal cells and fungus cells. Prokaryotic cells do not contain a nucleus, for example, a bacterial cell.

Animal Cells



Plant Cells

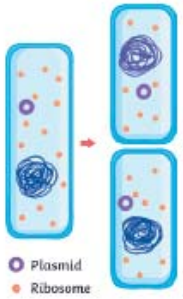


Plant and animal cells have similarities and differences:

Bacterial Cells

Bacterial cells do not have a true nucleus, they just have a single strand of DNA that floats in the cytoplasm. They contain a plasmid.

Prokaryotic cells reproduce by **binary fission** - the cell splits in two.



Stem Cells

Embryonic stem cells are **undifferentiated** cells, they have the potential to turn into any kind of cell.

Adult stem cells are found in the bone marrow, they can only turn into some types of cells e.g. blood cells.

Uses of stem cells:

- Replacing faulty blood cells;
- making insulin producing cells;
- making nerve cells.

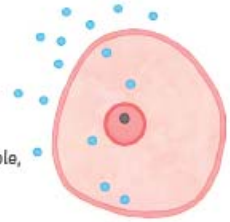
Key Processes

Diffusion is the spreading out of particles from an area of higher concentration to an area of lower concentration.

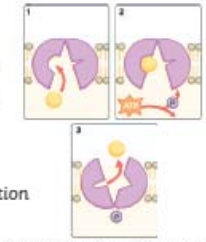
Cell membranes are semi-permeable, only small molecules can get through.

Osmosis is the movement of water molecules across a partially permeable membrane from a region of higher concentration to a region of lower concentration.

Active transport is the movement of substances against the concentration gradient. This process requires energy from respiration.



Cell Diffusion



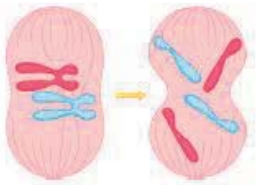
Active Transport in Cells

Chromosomes and Mitosis

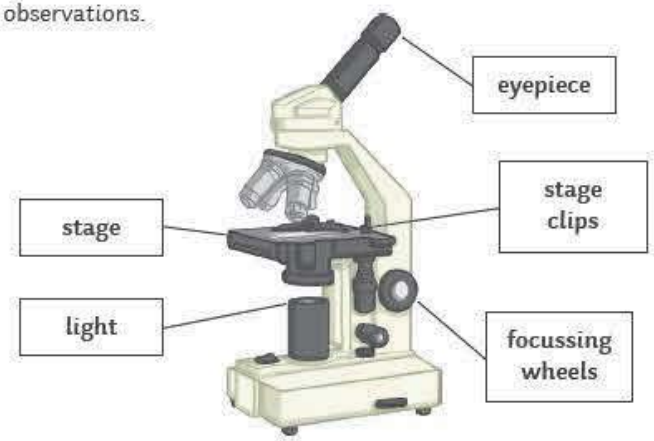
In the nucleus of a human cell there are 23 pairs of **chromosomes**. Chromosomes contain a double helix of **DNA**. Chromosomes have a large number of genes.

The **cell cycle** makes new cells.

Mitosis: DNA has to be **copied/replicated** before the cell carries out mitosis.



Includes preparing a slide, using a light microscope, drawing any observations – use a pencil and label important observations.



Osmosis and Potato Practical

- Independent variable – concentration.
- Dependent variable – change in mass.
- Control variable – volume of solution, temperature, time, surface area of the potato.

The potato in the sugar solution will lose water and so will have less mass at the end; the potato in the pure water solution will gain water.

Culturing Microorganisms in the Lab: Use agar jelly which contains nutrients. The bacteria will form colonies on the agar. Use inoculating loops to add the bacteria to the agar jelly. In a school lab the microorganisms are kept at 25°C to prevent the growth of any harmful bacteria.

Exchange – Humans

Multicellular organisms have a large surface area to volume ratio so that all the substances can be exchanged.

Gas exchange: Lungs

The alveoli are where gas exchange takes place.

They have a large surface area, moist lining, thin walls and a good blood supply.

Villi: Small Intestine

Millions of villi line the small intestine increasing the surface area to absorb more digested food.

They are a single layer of cells with a good blood supply.

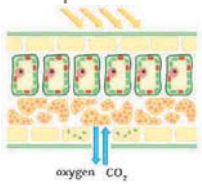
Exchange in Fish

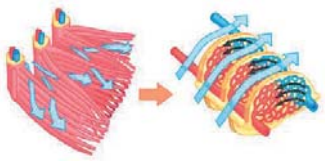
Fish have a large surface area for gas exchange. These are called **gills**. Water enters the fish through the mouth and goes out through the gills. The oxygen is transported from the water to the blood by **diffusion**. Carbon dioxide diffuses from the blood to the water. Each gill has **gill filaments** which give the gills a large surface area. **Lamellae** cover each gill filament to further increase the surface area for more gas exchange. They have a **thin surface layer** and **capillaries** for good blood supply which helps with diffusion.

Exchange in Plants

The surface of the leaf is flattened to increase the surface area for more gas exchange by diffusion.

Oxygen and water vapour diffuse out of the stomata. Guard cells open and close the stomata, controlling water loss.



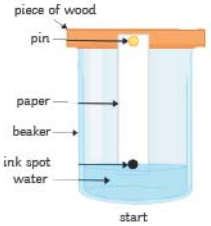


Science – Year 9 – Term 1 part 2 – Fundamentals of Chemistry - Atoms as Building Blocks

Mixtures, Chromatography and Separation

Mixtures – in a mixture there are no chemical bonds, so the elements are easy to separate. Examples of mixtures are air and salt water.

Chromatography – to separate out mixtures.



Filtration – to separate solids from liquids.

Evaporation – to separate a soluble salt from a solution; a quick way of separating out the salt.

Crystallisation - to separate a soluble salt from a solution; a slower method of separating out salt.

Alkali Metals

The alkali metals (**group 1 elements**) are soft, very reactive metals. They all have **one electron** in their **outer shell**, making them **very reactive**. They are **low density**. As you go down the group, they become more reactive. They get bigger and it is easier to lose an electron that is further away from the nucleus.

They form ionic compounds with non-metals.

They react with water and produce hydrogen.

Development of the Periodic Table

In the early 1800s, elements were arranged by atomic mass. The periodic table was not complete because some of the elements had not been found. Some elements were put in the wrong group.

Dimitri Mendeleev (1869) left gaps in the periodic table. He put them in order of **atomic mass**. The gaps show that he believed there was some undiscovered elements. He was right! Once found, they fitted in the pattern.

The Modern Periodic Table

Elements are in order of **atomic mass/proton number**. It shows where the metals and non-metals are. **Metals** are on the **left** and **non-metals** on the **right**. The **columns** show the **groups**. The **group number** shows the number of **electrons** in the **outer shell**. The rows are **periods** – each period shows another full shell of electrons.

Group 7 Elements and Noble Gases

Halogens

The halogens are **non-metals**: fluorine, chlorine, bromine, iodine. As you go down the group they become less reactive. It is harder to gain an extra electron because its outer shell is further away from the nucleus. The melting and boiling points also become higher.

Noble Gases

The **noble gases** (**group 0** elements) include: **helium**, **neon** and **argon**. They are un-reactive as they have full outer shells, which makes them very stable. They are all colourless gases at room temperature.

The boiling points all increase as they go down the group – they have greater intermolecular forces because of the increase in the number of electrons.

Metals and Non-metals

They are found at the **left** part of the periodic table. Non-metals are at the **right** of the table.

Metals

Are strong, malleable, good conductors of electricity and heat. They bond metallically.

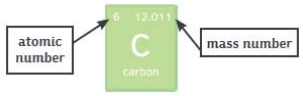
Non-Metals

Are dull, brittle, and not always solids at room temperature.

Atoms

Contained in the nucleus are the **protons** and **neutrons**. Moving around the nucleus are the **electron** shells. They are negatively charged.

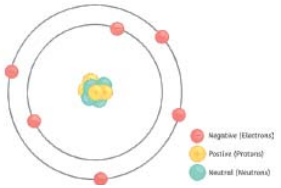
Particle	Relative Mass	Charge
proton	1	+1
neutron	1	0
electron	Very small	-1



Overall, atoms have no charge; they have the same number of protons as electrons. An ion is a charged particle - it does not have an equal number of protons to electrons.

Electronic Structure

Electrons are found in shells. A maximum of two in the most inner shell, then eight in the 2nd and 3rd shell. The inner shell is filled first, then the 2nd then the 3rd shell.



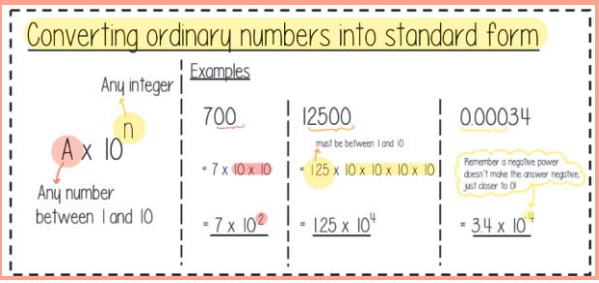
The Transition Metals

The transition metals are a block of elements found between groups 2 and 3 in the middle of the periodic table. Examples of transition metals include copper, nickel and iron with many more included. They have all the properties you would expect metals to have, such as being strong, shiny and conductors of electricity and heat. Transition metals make very good catalysts; this means they speed up a reaction without being used up themselves. Iron is used as a catalyst during the Haber process when making ammonia.

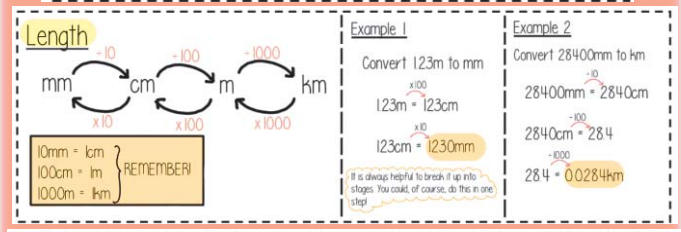
Transition metals can form more than one ion. For example, copper can take the form of Cu^{+}, Cu^{2+} and iron can be Fe^{2+} and Fe^{3+}. The ions are often coloured and the compounds they are found in are also coloured.

Science – Year 9 – Term 1 part 2 – Fundamentals of Maths in Science

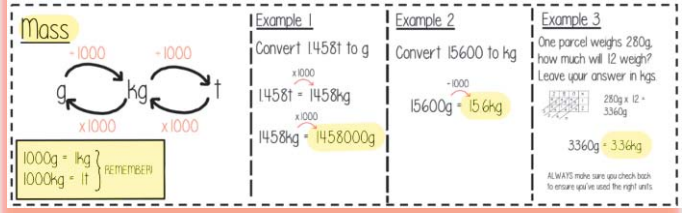
Converting ordinary numbers into standard form



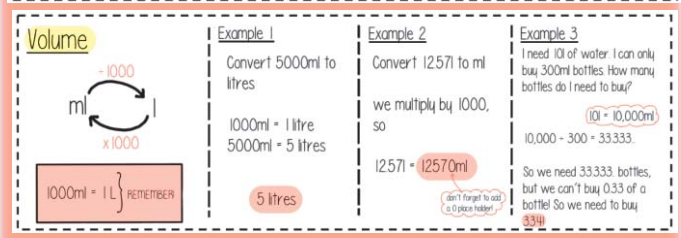
Length



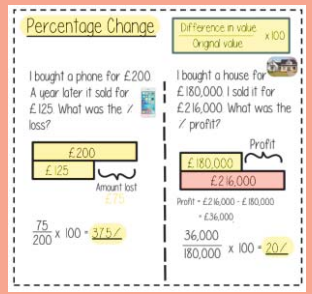
Mass



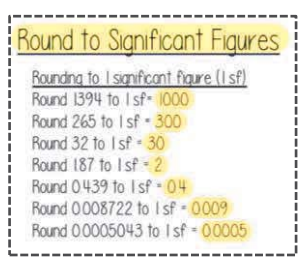
Volume



Percentage Change



Round to Significant Figures



CHAPTER 1:

CREATION AND COVENANT

Knowledge organiser

Key vocabulary	
imago Dei	A Latin phrase meaning 'in the image of God', the idea that humans reflect God's nature.
inalienable dignity	A state of value attached to human life that cannot be challenged or removed.
human person	For Catholics, a living being possessing both a physical body and spiritual soul.
relational	Concerning the way in which two or more people are connected; in Catholicism this is the relationship between humans, and between humans and God.
rational	Based on reason or logic.
volitional	Based on free choice or free will.
sanctity of life	The idea that human life is a holy gift from God.
marriage	In Catholicism, a binding lifelong relationship in which a man and a woman live by promises made to each other and to God.
Sacrament of Matrimony	The Sacrament at the Service of Communion in which a man and woman make the lasting commitment of marriage.

OPTIONS	
Ethical	**In vitro fertilisation (IVF)** is a method used to fertilise an egg outside of the woman's body. This technique is typically used when a couple cannot conceive naturally. The use of IVF raises serious ethical implications for Catholics because it **replaces the act of sex in marriage**, and because the procedure may bring about **selective abortion** or the **destruction of fertilised embryos**. Catholics believe this **goes against the sanctity of life**.
Artistic expression	The Catechism teaches that art is used by humans to **express their relationship with God**, and that it bears a **likeness to God's creation** because it is also inspired by truth and love. The **Sulawesi cave painting** shows animals being hunted by beings that are part human and part animal. This leads some people to think the artists had a sense of something greater than themselves. ***Cueva de las Manos*** is a cave painting of handprints the size of a teenager's hand. It might have been created as a rite of passage or a reminder of the gathering of a community.
Lived religion	Hospices are places that **provide palliative care** for people who are approaching death or have life-limiting illnesses. Christians often support hospices because they believe hospices recognise the **dignity and value of human life** by providing personalised care to vulnerable people. The hospice movement was founded by **Dame Cecily Saunders**. She believed that suffering could be **physical, spiritual, psychological and social** – hospices are places that respond to this.

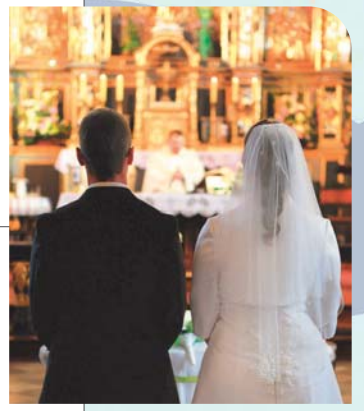
Genesis 1, creation *imago Dei* and the sanctity of life

- In **Genesis 1**, God creates humans ***imago Dei***.
- Humans are given the responsibility to care for God's creation and to reproduce to continue God's creation.
- Catholics believe that being created *imago Dei* means every person has **dignity and value**. It also means that every person is:
  - **someone, not something** (we are unique individuals)
  - **relational** (we need others)
  - **volitional** (we have free choice)
  - **rational** (we can think logically).
- Catholics believe that **human life is sacred** as it is created *imago Dei* and is blessed and holy.
- Catholics believe that **life begins at conception** and so **abortion is always wrong** because it ends a life created by God.

Genesis 2, relationships and morality

- In **Genesis 2**, man is made first from the dust of the earth and given life with God's breath. Woman is then created from man's rib. They are made to be in **relationship** with each other.
- The Church teaches that men and women are **created equally** and have **equal dignity**. Nothing can remove a person's dignity.
- Catholics believe **sexual relationships** should be **respected and valued** as a **gift from God**.
- Their purpose is to be an **expression of love between a married couple** and to **create new life**.
- The Church teaches that humans have the **freedom** and **responsibility** to make good moral choices.
- Moral actions have a '**communal dimension**': they have an impact on others and the wider community.
- The Catechism teaches that we can know what is moral by examining the:
  - **chosen object** (the act being carried out and the result of it)
  - **end view or intention** (the motivation behind the act)
  - **circumstances of the action** (the situation in which the decision is made).

The Sacrament of Matrimony



For Catholics, the **Genesis creation stories** show that marriage has always been God's plan for humans. It is a **gift from God** to **unite a man and woman**. Marriage is:

- **Exclusive:** the couple must be faithful to each other.
- **Life-giving:** the couple give their lives to each other and promise to try to have children.
- **Permanent:** a lifelong commitment until death.
- **A sacrament:** an outward sign of God's sacred love.
- **A Service of Communion:** Jesus becomes part of the relationship between husband and wife, helping them to live closely to him.

- Marriage was described as a sacrament by **St Augustine** in the fourth century AD.
- The Sacrament of Matrimony can happen in a **Nuptial Mass** or as a separate **wedding ceremony**.
- **Questions before the consent** ask the couple to confirm that they are freely choosing to get married; they will love and honour each other for the rest of their lives; and they will accept children from God and bring them up in the Church.
- In the **civil declaration of freedom** the couple confirm they are lawfully able to marry.
- In the **consent** the couple promise to love and care for each other no matter what challenges life may bring.
- The **blessing and giving of rings** is a sign of the couple's never-ending love.

CHAPTER 2:

PROPHECY AND PROMISE

Knowledge organiser

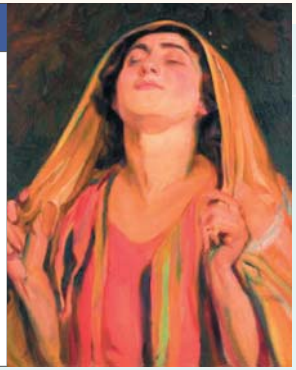
Key vocabulary	
typology	In Christianity, the study of Old Testament figures, objects, places or events which predict or hint at who or what is to come in the New Testament.
Protoevangelium	The 'first gospel'; this refers to Genesis 3:15 because it is the first messianic prophecy in the Bible.
Mary	The mother of Jesus.
Mother of God	A title given to Mary, because Jesus is God and she is Jesus' mother.
Immaculate Conception	A dogma (teaching) of the Catholic Church that states that Mary, the mother of Jesus, did not inherit the stain of Original Sin when she was conceived by her own mother.
Our Lady	A title of particular respect for Mary, reflecting her high status within the Church.
New Eve	Eve is the mother of all humans as the first woman; Mary, as the mother of Jesus, who offers redemption and new life to humanity, becomes the New Eve, or mother, for baptised Catholics.
Magnificat	Mary's prayer of praise in Luke 1:45–56.
the Rosary	A set of prayers said in honour of Mary during which Catholics will meditate on particular events in the life of Mary and Jesus.

OPTIONS	
Ethical	The **Magnificat** has inspired Christians through the years as it has a lasting message of **social justice**. It shows that God is on the side of people who are **humble, vulnerable or oppressed**, which gives them hope and encourages others to support them and fight against injustice.
Artistic expression	**Devotional images** of Mary show her importance within the Church. ***Our Lady of Guadalupe*** is a shrine dedicated to Mary in Mexico City, showing Mary pregnant with Jesus. ***Our Lady of Walsingham*** is the national shrine of Mary for Catholics in England, showing Mary sitting on a throne with baby Jesus. Both shrines use **symbols and imagery** to show Mary's importance.
Lived religion	**St Josephine Bakhita** was a religious sister who was enslaved as a child, and made a saint in 2000. She is seen as a **woman of the Magnificat** as she embodies the faith and qualities found within in it, such as humility, courage and hope.

Reading the Bible allegorically

- An **allegorical story** in the Bible is one that mirrors or symbolises the events of another time or place.
- **Typology** is part of the allegorical sense of scripture, as it is the study of how people or things in the Old Testament **foreshadow** those yet to come in the New Testament.
- **Adam and Eve** are **'types' of Jesus and Mary** because they foreshadow the redemption to come through Christ.

The importance of Hannah



- Hannah's story is found in **1 Samuel 1–2** in the Old Testament.
- She is unhappy to have no children but **vows to God** that if God will give her a son, she will give her son to God. She **gives birth to her son Samuel**, who goes on to become a priest and prophet.
- Hannah shows **faith and constancy** in God by trusting that God will give her a child, and by gifting her son back to God.
- In giving her a child, God saves Hannah and replaces her sadness and fear with joy and hope. Catholics believe this gives a glimpse of God's greater plan of salvation through Jesus. In this way, Hannah is seen as **keeping the hope of salvation alive**.
- Hannah's story is also one of **remarkable reversal** as she experienced a great change in fortune. It is an example of God **lifting up the humble over the powerful**.
- In Hannah's prayer (1 Samuel 2:1–10), Hannah shows her **praise and gratitude** for God.

Holy women and the hope of salvation

- **Sarah, Rebecca and Rachel** are three women in the Old Testament who helped to **keep alive the hope of salvation**. This means their stories showed that God had not abandoned humanity but was working to bring salvation.
- They are also **'types' of Mary** as their sons helped to **prepare the path to salvation** that Mary's son Jesus then fulfils.
- **Sarah** was the wife of Abraham. She was unable to have children until God blessed her with a son, **Isaac**, as part of God's covenant with Abraham. She became the mother of the **royal line of King David**, from which Jesus is descended.
- **Rebecca** was Isaac's wife. She faithfully followed God's wishes and this led her son **Jacob** to become the ancestor of all the people of Israel, continuing God's covenant with Abraham.
- **Rachel** was the favourite wife of Jacob. She struggled to have children until God blessed her with a son, **Joseph**. He was chosen to be the leader of the twelve tribes of Israel, from which the Messiah would be born.

The importance of Mary

- The Blessed Virgin Mary is **venerated** in the Church as both the Mother of God and the Mother of the Church. Catholics believe she is the **perfect disciple**.
- Mary was chosen by God to bear Jesus because of her **faith and purity**.
- In the **Magnificat**, Mary **praises and thanks God** for what God has done for her and for others who are vulnerable but show faith and humility.
- In the Magnificat, Mary made a **prophecy** that she would be remembered for many years. One way this prophecy is fulfilled is through her **titles**, such as 'Our Lady' and 'Mother of the Church'.
- The Church has **four Marian Dogmas** which explain the importance of Mary: that she is the **Mother of God**, the **Immaculate Conception**, **Ever Virgin** and that she was **Assumed** into heaven.