Knowledge Organisers

Year 10

Summer Term 2025

Name: _____

Using your Knowledge Organiserin Year 10

Examination boards

- It is important that you know which examination specification is used by each subject.
- The examination specification provides key information for you as students about the details of each examination paper.

Now that you have started your GCSE course, it is important that you begin to learn the key knowledge from your lessons. The timetable below tells you which subjects you could focus on each night. It doesn't matter if you don't have that particular subject on that day, just follow the timetable for your home learning. You should spend **half an hou**r on each subject, learning the key ideas from your lesson.

TIMETABLE OF SUBJECTS

Monday: English and Geography
Tuesday: Science and Art / DT / Fo
Wednesday: Maths and History
Thursday: RE and Computer Scienc
Friday: MFL and Music / Drama

Revising at home

There is also an expectation that
read over your notes from your
make sure that key knowledg
embedded. Your class teachers wil
when you have an assessment in
will also need preparation and
home.

How to learn knowledge from my knowledge organiser:

- Look at the work, cover it over, write it out again and check it.
- Look. Cover. Write. Check.
- Ask someone to test you and ask you questions about the topic
- Create mind maps on the topic
- Create flashcards on the topic
- Try writing out the key words or new vocabulary into new sentences
- Create a mnemonic
- Draw a diagram of the process
- Read further around the subject

Capitalist *Aloof* *Vulnerable* *Aristocrat* *Irresponsible* *Naive* *Conduit*

		Patriarch	*Supercilious*	*Exploited*	*Self-serving*	*Remorseful*	*Remorseful*	*Socialist*
Pre WWI and WWII	The world had experienced the trauma	 *Avaricious* *Ignorant*	 *Prejudiced* *Aristocratic*	 *Campaigner* *Outcast*	 *Cunning* *Capitalist*	 *Reticent* *Childish*	 *Reticent* *Childish*	 *Authoritative* *Methodical*
	of two world wars							
Class divide and little class Wars had led to increased class mixing *Ostentatious Covetous Socially inept Socially inept Socialist* mixing – evacuation/ fighting on the front lines **<u>Mr. Birling Mrs. Birling Eva Smith Gerald Croft Eric Sheila Inspector</u>**								
Fewer opportunities for Wars had given women increased 'hard headed 'girls of that class' 'Two hours ago a 'well-bred young 'why shouldn't 'Oh look mummy, 'It's better to ask women – confined to opportunities. practical man of 'No, of course not. young woman man about town' they try for higher isn't it a beauty' for the world than domestic sphere Suffragette movement had led to business' He's only a boy.' died in the 'we're respectable wages?' 'These girls aren't to take it'	increased opportunities for women	'Titanic… unsinkable, Meggarty! I must 'Lively good- criminals' and a good sport' they're people' 'burnt her insides Hopes for future prosperity Wars and financial	'Aldermand	infirmary'	citizens not	'She was pretty	cheap labour	'I don't play golf'
crises (such as wall absolutely say, we are learning looking girl' 'she was young 'I was in that state You mustn't try to out'	street crash) had led to re-evaluation of	unsinkable'	something tonight.'	'jealous of her'	and fresh and	where a chap	build up a kind of	;each of you
Limited opportunities for Class mixing had led to some bees in a hive… only herself to herself to blame' 'what about this 'you killed her! 'wonderful fairy 'members of one social mobility opportunity for social mobility community and all blame' ring' You killed them prince' body'	prosperity	'All mixed up like that nonsense'	'But I think she had 'As if a girl of that	'She only had both…'	charming' 'fire and bloody Titanic sank in 1912	turns nasty' the Titanic sank	wall' a key symbol of	helped to kill her' 'famous younger
sort would ever ' and anguish' night on which they play is set capitalism and the industrial revolution			generation'	refuse money!'				
Limited support for those in War highlighted the need for a welfare		need	state and centralised state support for					

the most vulnerable in society

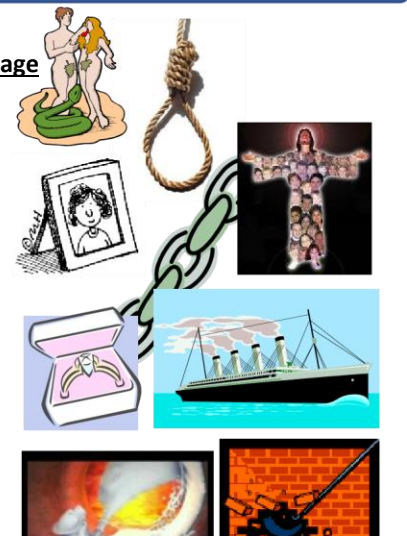
Capitalism - a person who uses their wealth to invest in trade and industry for profit When the

<u>Socialism</u> - means of production, distribution, and

should be owned or regulated by the something

<u>Key terms:</u> **<u>Dramatic Irony –</u>** **<u>Directions</u>** **<u>Stage</u>**

Helps the audience know actors to maintain exchange



tone as community

as a whole. that the

Priestley

Social class - a division of a society based on social character(s_

intended

and economic status don't

Industrial revolution - the rapid development of **Setting** industry that occurred in Britain in the late 18th and **Interruptions** Their

19th centuries Various household characters are reflects their **Discrimination** - the unjust or prejudicial treatment interrupted to growing

of different categories of people show power affluency and

Aristocracy - the highest class in certain societies, imbalances Mr. Birling's

and build desire to

typically comprising people of noble birth holding tension progress

hereditary titles and offices: further

English Year 10 Summer Term: An Inspector Calls

English Year 10 Summer: Power and Conflict Poetry – The Effects of War

War Photographer – Carol Rumens

Content, Meaning and Purpose -Tells the story of a war photographer developing photos at home in England: as a photo develops he begins to remember the horrors of war –

painting a contrast to the safety of his dark room. -He appears to be returning to a warzone at the end of the poem. -Duffy

conveys both the brutality of war and the indifference of those who might view the photos in newspapers and magazines:

those who live in comfort and are unaffected by war

Context -Like Tennyson and Ted Hughes, Duffy was the Poet Laureate. -Duffy was inspired to write this poem by her friendship with a war photographer. She was intrigued by the challenge faced by these people whose job requires them to

(tactile), smell or taste.

record terrible, horrific events without being able to directly help their subjects. -The location is ambiguous and therefore ("Belfast. Beirut. Phnom Penh.")

sarcasm.

Language "All flesh is grass": Biblical reference that means all human life is temporary – we all die eventually. "He has a job to do": like a soldier, the photographer has a sense of duty.

"running children in a nightmare heat": emotive imagery with connotations of hell. "blood stained into a foreign dust": lasting impact of war – links to Remains and 'blood shadow'.

"he earns a living and they do not care": 'they' is ambiguous – it could refer to readers or the wider world.

conversational tone or authentic voice. **Form and Structure** -Enjambment – reinforces the sense that the

sounds like its meaning. Alliteration – words that are close world is out of order and confused. -Rhyme reinforces the idea that he is trying to bring order

to a chaotic world – to create an together start with the same letter or sound. understanding. -Contrasts: imagery of rural England and

Sibilance – the repetition of s or sh sounds.

nightmare war zones. -Third stanza: A specific image – and a

consonant memory – appears before him.

Poppies Jane Weir

Content, Meaning and Purpose -A modern poem that offers an

deliberately ambiguous to give the poem a

focus on a soldier in battle but on the mother who is left

Context -Set around the time of the Iraq and Afghan wars, but

timeless relevance to all mothers and families. -There are hints

Enjambment – a sentence or phrase that runs onto

alternative interpretation of bravery in conflict: it does not

the conflict is

the

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a
n
d

LANGUAGE

- Metaphor – comparing one thing to another
- Simile – comparing two things with 'like' or 'as'
- Personification – giving human qualities to the non-human
- Imagery – language that makes us imagine a sight (visual), sound (aural), touch
- Tone – the mood or feeling created in a poem.
- Pathetic Fallacy – giving emotion to weather in order to create a mood within a text.
- universal:
- Irony – language that says one thing but implies the opposite eg.
- Colloquial Language – informal language, usually creates a
- Onomatopoeia – language that
- Assonance – the repetition of similar vowel sounds Consonance – repetition of
- Plosives – short burst of sound: t, k, p, d, g, or b sound.

STRUCTURE

Stanza – a group of lines in a poem.

Repetition – repeated words or phrases

must cope with his death. -The narration covers of a critical tone; about how soldiers can become intoxicated her visit to a war memorial, interspersed with images of the by the glamour or the military: "a blockade of yellow bias" and next line.

soldier's childhood and his departure for war "intoxicated".

Language -Contrasting semantic fields of home/childhood ("cat

Form and Structure -This is an Elegy, a poem of mourning. hairs", "play at being Eskimos", "bedroom") with war/injury

Strong sense of form despite the free verse, stream of

("blockade", bandaged", "reinforcements") -Aural (sound) imagery: "All my words flattened, rolled, turned into felt" consciousness addressing her son directly – poignant -No rhyme Anaphora – when the first word of a stanza is the scheme makes it melancholic -Enjambment gives it an anecdotal

shows pain and inability to speak, and "I listened, hoping to tone. -Nearly half the lines have caesura – she is trying to hold it same across different stanzas.

hear your playground voice catching on the wind" shows Epistrophe – when the final word of a stanza is the together, but can't speak fluently as she is breaking inside. -Rich longing for dead son. -"I was brave, as I walked with you, to the texture of time shifts, and visual, aural and touch imagery front door": different perspective of bravery in conflict. same across different stanzas.

Volta – a turning point in a poem.

Caesura – using punctuation to create pauses or stops.

Contrast – opposite concepts/feelings in a poem.

Juxtaposition – contrasting things placed side by side.

Oxymoron – a phrase that contradicts itself.

FORM

Speaker – the narrator, or person in the poem.

Free verse – poetry that doesn't rhyme.

Blank verse – poem in iambic pentameter, but with no rhyme.

Sonnet – poem of 14 lines with clear rhyme scheme.

Rhyming couplet – a pair of rhyming lines next to each other. Meter – arrangement of stressed/unstressed syllables. Monologue – one person speaking for a long time.

Reality of War

Key Themes:

Conflict Suffering Loss Regret Nature Bravery Patriotism

English Year 10 Summer: Power and Conflict Poetry – The Effects of War

Charge of the Light Brigade – Alfred, Lord Tennyson

Content, Meaning and Purpose - Published six weeks after a **Context** -As Poet Laureate, he had a responsibility to inspire in the (unpopular) the nation and portray the war in a positive light: propaganda. glorifies the soldiers who took part, he made a trench to charge directly at the enemy. -Steps inside draw attention to the hardships of trench warfare. -He speaker to show how this act draws a contrast between the idealism of patriotism over half were killed, injured or taken prisoner. -It is of fighting and killing. ("King, honour,

terrifying experience of 'going over the top': fixing bayonets (long knives) to the end of rifles and leaving a Gallipoli in World War 1, and so he may have wished of a long valley. -Of the 600 hundred who started the charge, a point to make in Victorian times when blind devotion to power

Bayonet Charge – Ted Hughes

Content, Meaning and Purpose -Describes the Context -Published in 1957, but most-likely set in World War 1. -Hughes' father had survived the battle of Crimean War -Describes a cavalry charge against Russians who -Although Tennyson to shoot at the lightly-armed British with cannon from three sides also draws attention to the fact that a commander had mistake: "Someone had blunder'd". -This was a controversial transforms a soldier from a living thinking person into a the body and mind of the and the reality

celebration of the men's courage and devotion to their country, symbols of the might of the British Empire.

Language -"Into the valley of Death": this Biblical imagery portrays war as a supremely powerful, or even spiritual, experience. -"jaws of Death" and "mouth of Hell": presents Enjambment maintains the momentum of the charge. - Brigade/Noble six hundred": language glorifies the soldiers, bewilderment and reflective thoughts. - imagery of battle with the whooshing sounds of battle. internal thoughts of the soldier = adds to the confusion.

was expected.

Form and Structure -This is a ballad, a form of poetry to remember historical events – we should remember their courage. -6 verses, each representing 100 men who took part. - First stanza tightly structured, mirroring the cavalry formation. Structure becomes awkward to reflect the chaos of battle and the fewer men returning alive. -Dactylic dimeter (HALF-a leaugue / DUM-de-de) mirrors the sound of horses galloping and increases the poem's pace. -Repetition of 'the six hundred' at the end of each stanza (epistrophe) emphasises huge loss.

dangerous weapon of war. -Hughes dramatises the struggle between a man's thoughts and actions.

Language "The patriotic tear that brimmed in his eye Sweating like molten iron": his sense of duty (tear) has now turned into the hot sweat of fear and pain. "cold clockwork of the stars and nations": the soldiers are part of a cold and uncaring machine of war. "his foot hung like statuary in midstride.": he is frozen with fear/bewilderment. The caesura (full stop) jolts him back to reality. "a yellow hare that rolled like a flame And crawled in a threshing circle": impact of war on nature

human dignity, etcetera")

Form and Structure -The poem starts 'in medias res': in the middle of the action, to convey shock and pace. - Time stands still in the second stanza to convey the soldier's Contrasts the visual and aural – the hare is distressed, just like the soldiers

Exposure – Wilfred Owen

Context -Written in 1917 before Owen went on to win the Speaker describes war as a Military Cross for bravery, and was then killed in battle in 1918: terrifying experience of 'going over the top': fixing battle against the weather and conditions. -Imagery of cold in World War 1, and so he may have wished to and warm reflect the delusional mind of a man dying from wanted to draw attention to the -Despite highlighting the tragedy of war and mistakes of senior commanders, he had a deep sense of duty: "not loath, we lie of war. -Hughes dramatises the human dignity, etcetera")

Language -"Our brains ache" physical (cold) suffering and

Content, Meaning and Purpose -Describes the the poem has authenticity as it is written by an actual soldier. - Of his work, Owen said: "My theme is war and the pity of war". the body and mind of the speaker to show how this act transforms a soldier from a living thinking person into a

Form and Structure -Contrast of Cold>Warm>Cold imagery

Bayonet Charge – Ted Hughes

Context -Published in 1957, but most-likely set in World War 1. -Hughes' father had survived the battle of Gallipoli in World War 1, and so he may have wished to draw attention to the hardships of trench warfare. -He suffering, monotony and futility of war and the reality of fighting and killing. ("King, honour, out here" shows that he was not bitter about his suffering

Content, Meaning and Purpose -bayonets (long knives) to the end of rifles and leaving a trench to charge directly at the enemy. -Steps inside hypothermia. -Owen draws a contrast between the idealism of patriotism dangerous weapon

struggle between a man's thoughts and actions.

Language "The patriotic tear that brimmed in his eye Sweating like molten iron": his sense of duty (tear) has

Form and Structure -The poem starts 'in medias res': in

mental (PTSD or shell shock) suffering. -Semantic field of now turned into the hot sweat of fear and pain. “cold the middle of the action, to convey shock and pace. -
coveys Suffering>Delusions>Death of the hypothermic soldier. -
weather: weather is the enemy. -“the merciless iced east winds clockwork of the stars and nations”: the soldiers are part of
that knive us…” – personification (cruel and murderous wind); Repetition of “but nothing happens” creates circular structure a cold and uncaring machine of war. “his foot hung like Enjambment maintains the momentum of the charge. implying never ending suffering -
Rhyme scheme ABBA and sibilance (cutting/slicing sound of wind); ellipsis (never- statuary in midstride.”: he is frozen with Time stands still in the second stanza to convey the
hexameter gives the poem structure and emphasises the ending). -Repetition of pronouns ‘we’ and ‘our’ – conveys fear/bewilderment. The caesura (full stop) jolts him back soldier’s bewilderment
and reflective thoughts. -
monotony. -Pararhymes (half rhymes) (“nervous / knife us”) only togetherness and collective suffering of soldiers. -‘mad gusts to reality. “a yellow hare that rolled like a flame And Contrasts the visual and
aural imagery of battle with the barely hold the poem together, like the men. tugging on the wire’ – personification crawled in a threshing circle”: impact of war on nature – internal thoughts of the soldier = adds to the confusion. the hare is distressed, just like the soldiers

Key Themes:

Conflict Suffering Loss Regret Nature Bravery Patriotism Reality of War

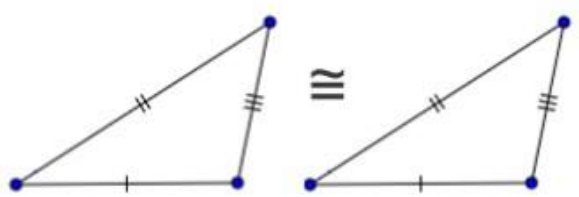
Maths Year 10 Higher Summer: FOUR RULES OF CONGRUENCE

Key Concepts

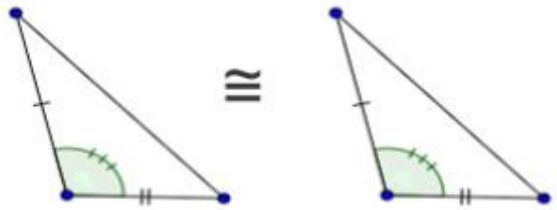
Congruent trianglesare triangles that have the **same size and shape** This means that the corresponding sides are equal and the corresponding angles are equal.

There are four rules of congruency that prove whether a triangle is congruent or not.

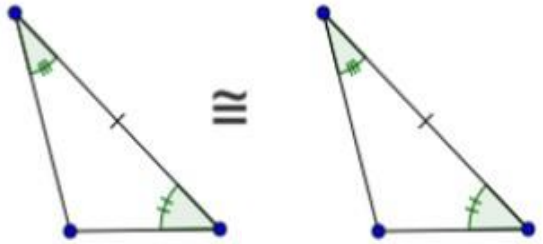
Examples



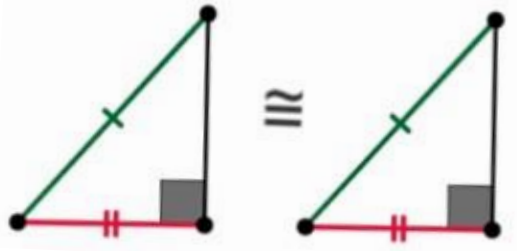
SSS = 3 sides on triangle A are equal to those on triangle B



SAS = 2 sides with the included angle on triangle A are equal to those on triangle B



ASA = 2 angles with the included side on triangle A are equal to those on triangle B



RHS = When the hypotenuse and another side on triangle A are equal to those on triangle B

MATHSWATCH

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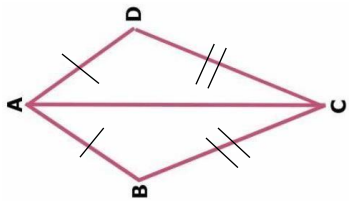
Key Words

Congruent
Angle
Side



Prove that triangle ACD and ABC are congruent to one another.

ANSWERS AD = AB, CD = BC, AC is common to both triangles, therefore they are congruent proved by the SSS rule.

Maths Year 10 Higher Summer: SIMILARITY - LENGTHS

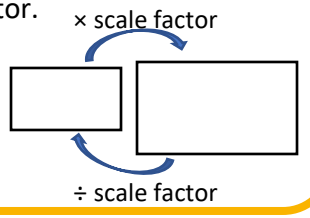
Key Concepts

Similar shapes are an enlargement of one another.

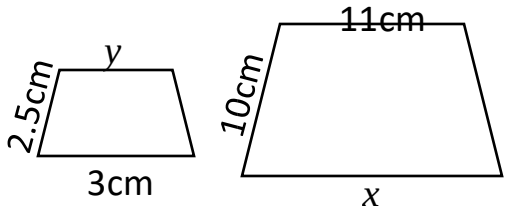
A **scale factor** is used, whereby all lengths are multiplied by the same number.

When finding a missing length on the larger shape we **multiply** by the scale factor.

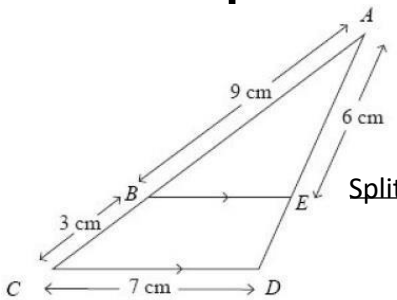
When finding a missing length on the smaller shape we **divide** by the scale factor.



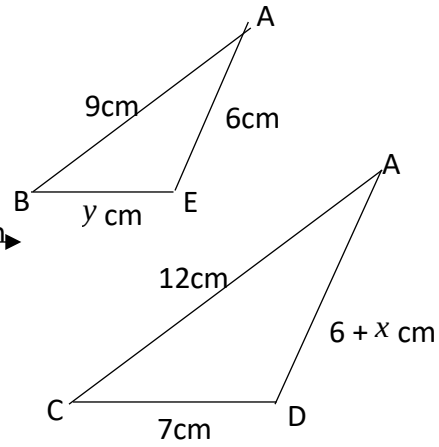
Examples



$$Scale\ factor = \frac{10}{2.5}$$
$$= 4$$
$$x = 3 \times 4$$
$$= 12cm$$
$$y = 11 \div 4$$
$$= 2.75cm$$



Split the diagram



$$Scale\ factor = \frac{12}{9}$$
$$= \frac{4}{3}$$

$$x + 6 = 6 \times \frac{4}{3}$$
$$x + 6 = 8$$
$$x = 8 - 6$$
$$x = 2cm$$

$$y = 7 \div \frac{4}{3}$$
$$= 5.25cm$$

MATHSWATCH

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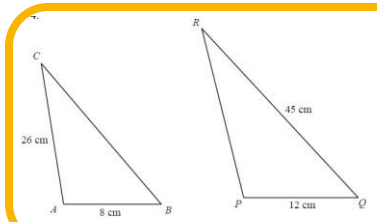
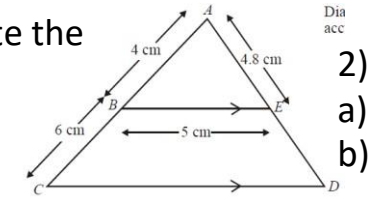
Key Words

Similar
Scale factor
Enlarge
Length



1) Calculate the length of:
a) PR
b) BC



2) Calculate the length of
a) CD
b) ED

ANSWERS 1a) 39cm b) 30cm 2a) 12.5cm b) 7.2cm

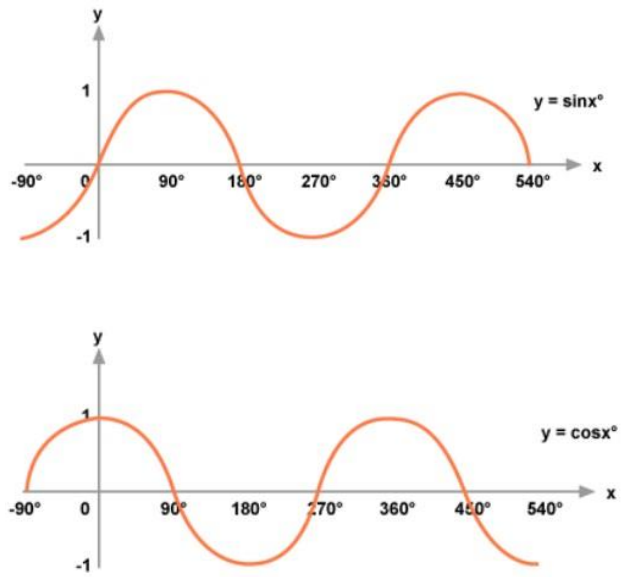
Maths Year 10 Higher Summer: TRIGONOMETRIC GRAPHS AND EXACT

Key Concepts

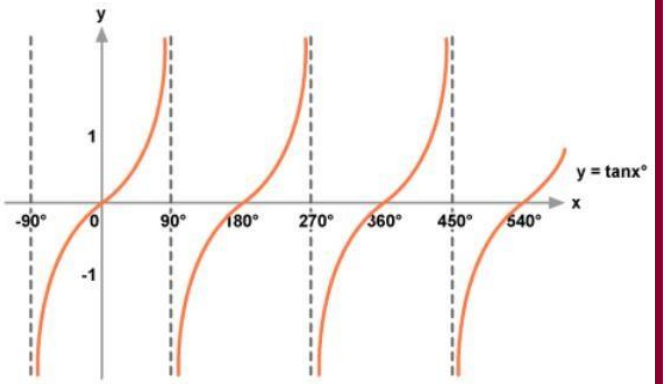
For some angles in a right angled triangle, there is an exact trigonometric value. These are shown in the table below.

	Sine	Cosine	Tangent
0°	0	1	0
30°	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{3}}$
45°	$\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{2}}$	1
60°	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	$\sqrt{3}$
90°	1	0	Undefined

Examples



Trigonometric graphs

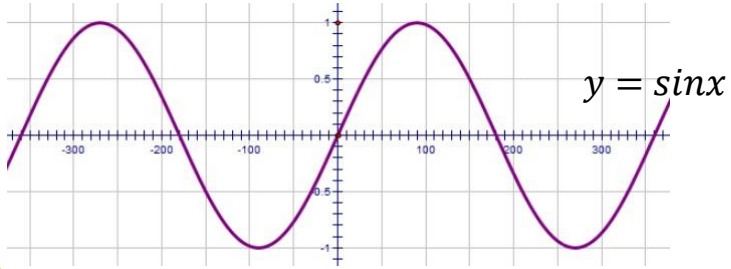


MATHSWATCH

173, 195a, 195b

Key Words

Sine
Cosine
Tangent
Function
Angle
Theta θ



$sin30 = 0.5$

What other angles have a value of 0.5?

ANSWERS: -330°, -210°, 150°

Maths Year 10 Higher Summer: TRANSFORMATIONS OF TRIGONOMETRIC GRAPHS

Key Concepts

All graphs can be transformed by applying different rules to their original function $y = f(x)$

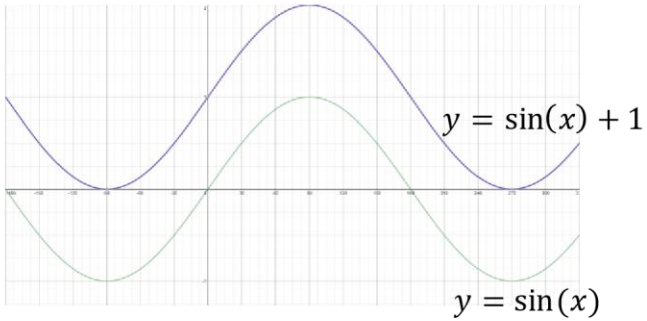
$\boldsymbol{y = -f(x)}$ This will reflect a function in the x axis.

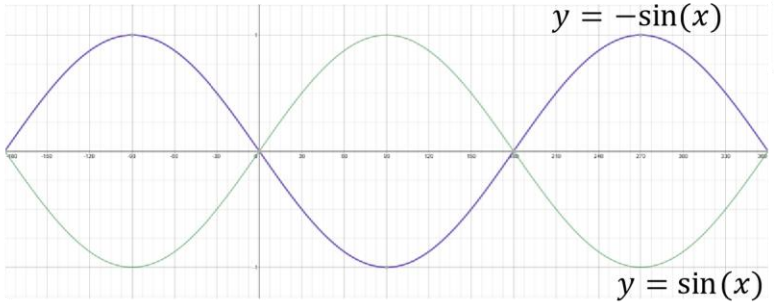
$\boldsymbol{y = f(-x)}$ This will reflect a function in the y axis.

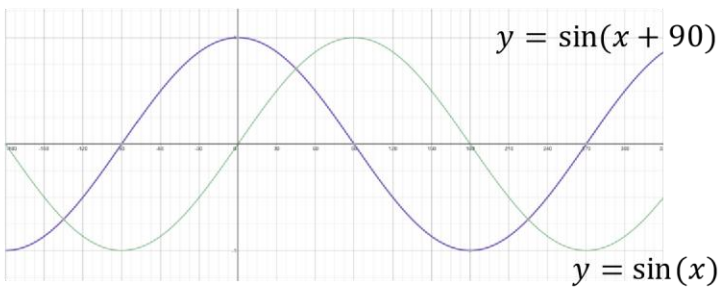
$\boldsymbol{y = f(x) \pm a}$ This will translate a function parallel to the y axis by $\binom{0}{\pm a}$.

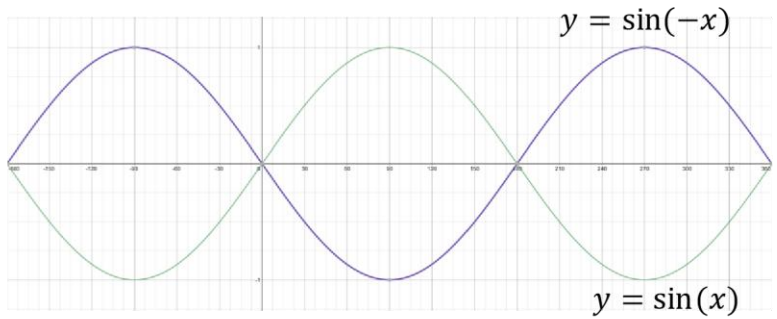
$\boldsymbol{y = f(x \pm a)}$ This will translate a function parallel to the x axis by $\binom{\mp a}{0}$.

Examples









MATHSWATCH

196b

Key Words

Sine
Cosine
Tangent
Function
Transform
Translate
Reflect

1) Transform the graph of $y = \cos(x)$ by:
a) $y = \cos(x) - 1$ b) $y = -\cos(x)$

2) Transform the graph of $y = \tan(x)$ by:
a) $y = \tan(x + 90)$ b) $y = \tan(-x)$

ANSWERS 1a) Translate $\cos(x)$ down by 1 b) Reflect in the x axis 2a) Translate $\tan(x)$ left by 90 b) Reflect in the y axis

Maths Year 10 Higher Summer: THE SINE AND COSINE RULE

Key Concepts

Sine rule

To calculate a missing side:

$$\frac{a}{sinA} = \frac{b}{sinB} = \frac{c}{sinC}$$

To calculate a missing angle:

$$\frac{sinA}{a} = \frac{sinB}{b} = \frac{sinC}{c}$$

Cosine rule

To calculate a missing side:

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

To calculate a missing angle:

$$cosA = \frac{b^2 + c^2 - a^2}{2bc}$$

Area of a triangle using sine

$$area = \frac{1}{2}absinC$$

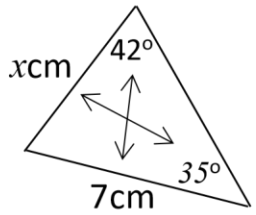
MATHSWATCH

202a, 202b, 203

Key Words

Sine
Cosine
Side
Angle
Inverse
2D

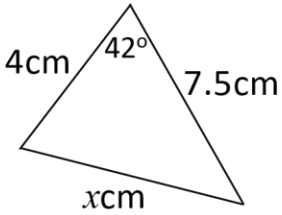
Examples



$$\frac{x}{sin35} = \frac{7}{sin42}$$

$$x = \frac{sin35 \times 7}{sin42}$$

$$x = 6.0cm$$

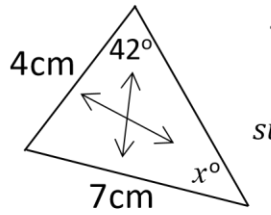


$$a^2 = b^2 + c^2 - 2bccosA$$

$$x^2 = 4^2 + 7.5^2 - 2 \times 4 \times 7.5 \times cos42$$

$$x^2 = 27.66$$

$$x = \sqrt{27.66} = 5.26cm$$

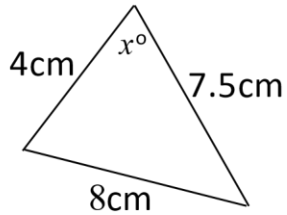


$$\frac{sinx}{4} = \frac{sin42}{7}$$

$$sinx = \frac{sin42 \times 4}{7}$$

$$x = sin^{-1}\left(\frac{sin42 \times 4}{7}\right)$$

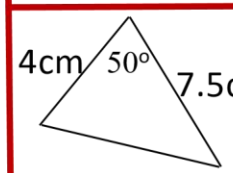
$$x = 22.5^o$$



$$cosA = \frac{4^2 + 7.5^2 - 8^2}{2 \times 4 \times 7.5}$$

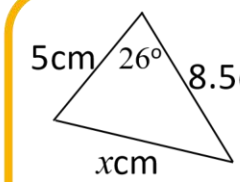
$$A = cos^{-1}\left(\frac{4^2 + 7.5^2 - 8^2}{2 \times 4 \times 7.5}\right)$$

$$A = 82.1^o$$

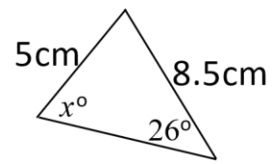


$$area = \frac{1}{2} \times 4 \times 7.5 \times sin50$$

$$area = 11.49cm^2$$



1a) Calculate x
b) Calculate the area of the triangle



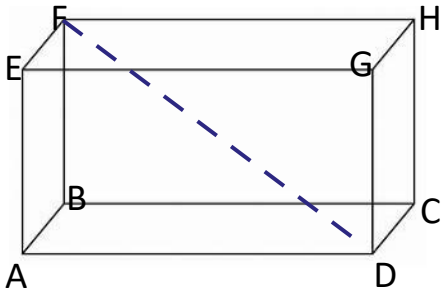
2a) Calculate x
b) Calculate the area of the triangle

ANSWERS 1a) 4.57cm b) 9.32cm² 2a) 48.18° b) 20.45cm²

Maths

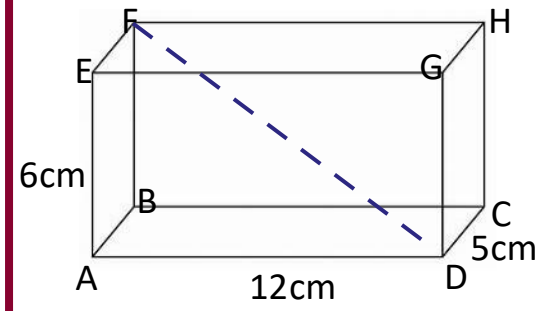
Year 10 Higher Summer: 3D TRIGONOMETRY

Key Concepts

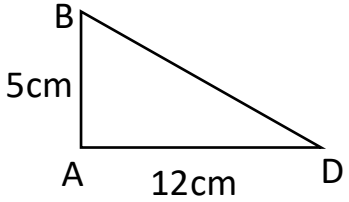


The **plane** of a cuboid is a flat 2 dimensional surface.
An example of a plane is ABCD.
An example of a **diagonal** in a cuboid is FD.

Examples

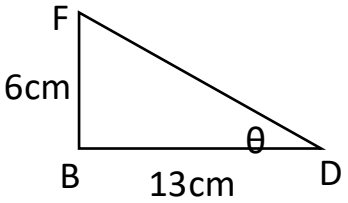


Calculate the length BD:



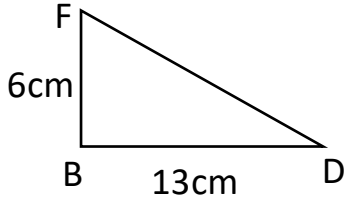
$$BD^2 = 12^2 + 5^2$$
$$BD = \sqrt{169}$$
$$BD = 13cm$$

Calculate the angle between FD and the plane ABCD:



$$tan\theta = \frac{6}{13}$$
$$\theta = tan^{-1}\left(\frac{6}{13}\right)$$
$$\theta = 24.78^o$$

Calculate the length FD:

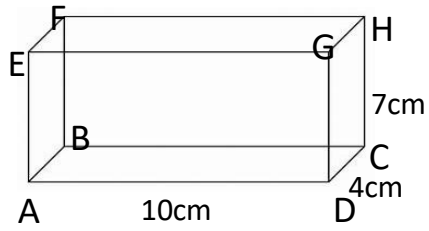


$$FD^2 = 13^2 + 6^2$$
$$FD = \sqrt{205}$$
$$FD = 14.32cm$$

MATHSWATCH

217, 218

Key Words
Sine
Cosine
Tangent
3D



1) Calculate the length AC
2) Calculate the length AH
3) Calculate the angle between AH and the plane ABCD.

Maths Year 10 Foundation Summer:

PLANS AND ELEVATIONS

Maths Year 10 Foundation Summer:

Key Concepts

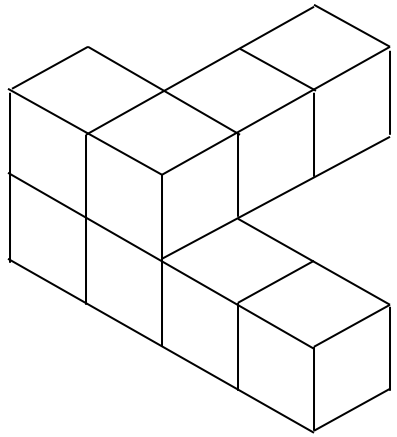
A 3 dimensional shape can be mathematically drawn from **three view points**:

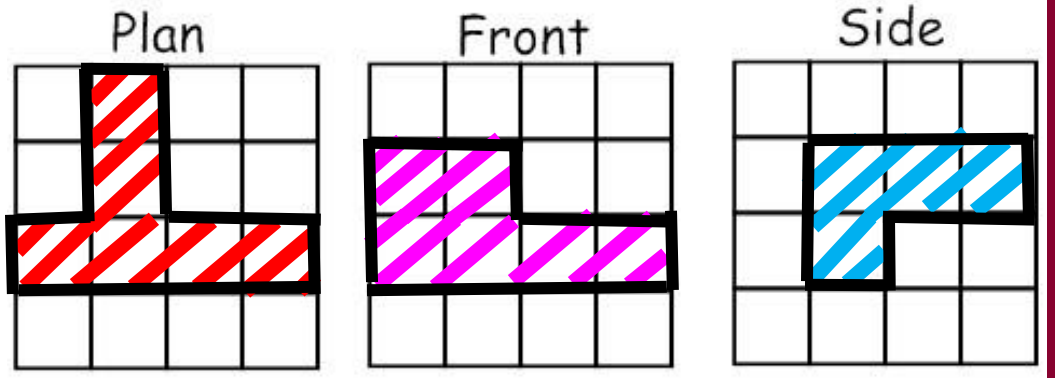
Side view
Front view
Plan view – from above

They are drawn as 2 dimensional representations

Examples

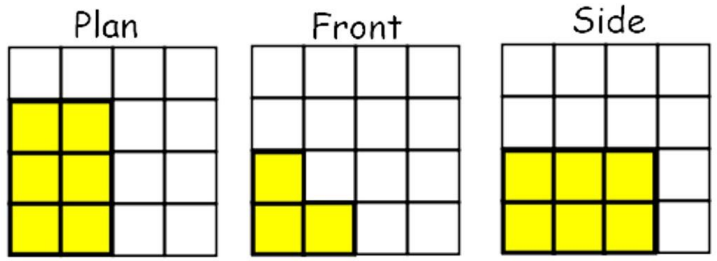
Draw this 3D shape from the side view, the front view and the plan view.





Key Words

Elevation
Plan
Side
Front



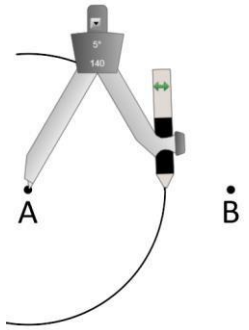
Sketch the 3D shape that has these three views.

ANSWERS

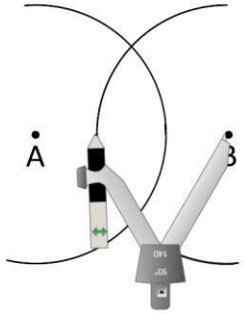
Maths Year 10 Foundation Summer: CONSTRUCTIONS

Examples

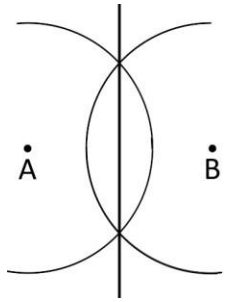
Bisect the distance between two points.



1) Open your compasses past halfway between the two points and draw an arc.

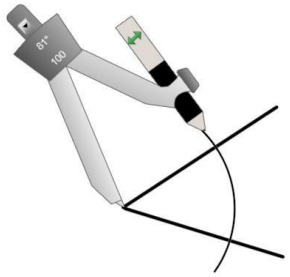


2) Keep your compasses at the same width and repeat from the other point.

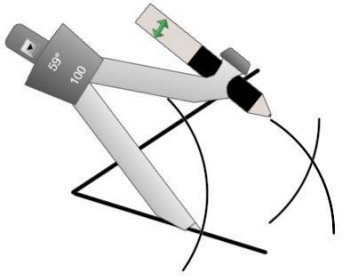


3) Draw a line joining the two points where the arcs cross

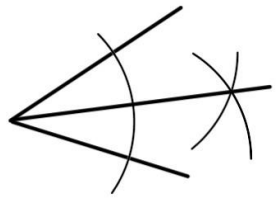
Bisect an angle.



1) Open your compasses and draw an arc over both lines from the angle



2) Keep your compasses at the same width and draw two further arcs with the point of your compasses at the intersections.



3) Draw a line joining the two points where the arcs cross and the angle point

MATHSWATCH

145a, 145b, 145c

Key Words

Compass
Bisect
Angle
Arc

Try and recreate the above two constructions on paper using a pair of compasses and a pencil and ruler.

ANSWERS

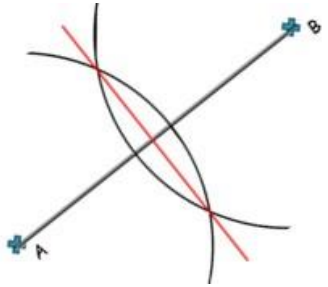
Maths Year 10 Foundation Summer:

CONSTRUCTIONS AND LOCI

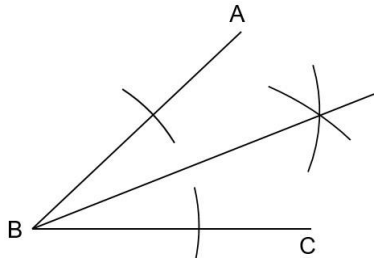
Maths Year 10 Foundation Summer:

Key Concepts

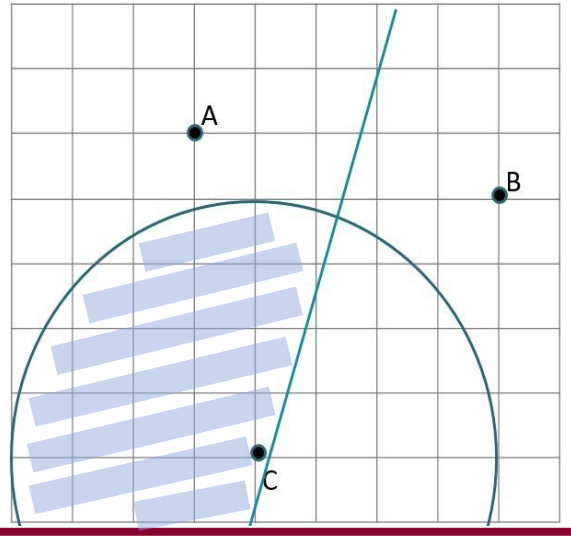
Line bisector



Angle bisector



Examples



Shade the region that is:

- closer to A than B
- less than 4 cm from C

Line bisector of A and B

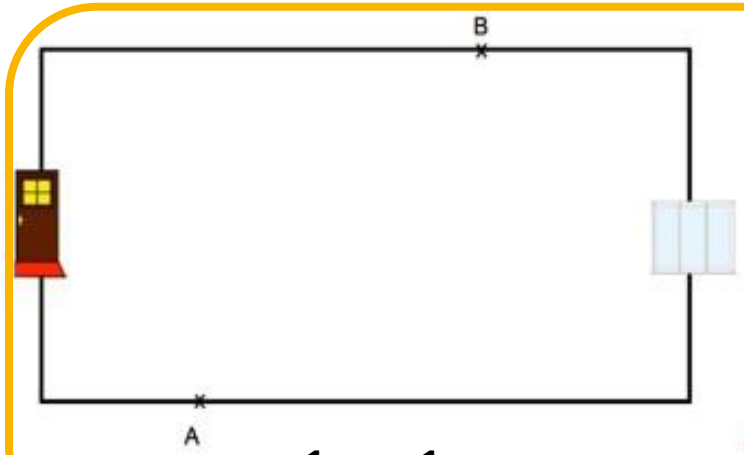
Circle with radius 4cm

MATHSWATCH

146

Key Words

Bisect
Radius
Region
Shade



1cm = 1m

There are two burglar alarm sensors, one at A and one at B.

The range of each sensor is 4m.

The alarm is switched on.

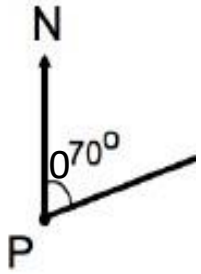
Is it possible to walk from the front door to the patio door without setting off the alarm?

Maths Year 10 Foundation Summer: SCALES AND BEARINGS

Key Concepts

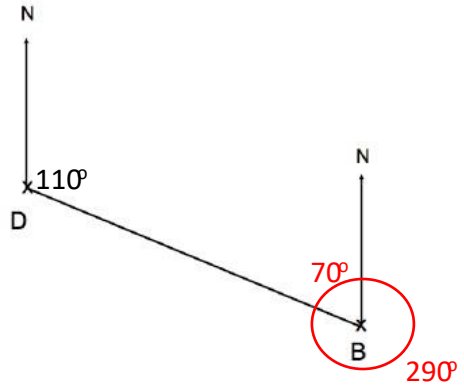
Scales are used to reduce real world dimensions to a useable size.

A **bearing** is an angle, measured **clockwise** from the **north** direction. It is given as a **3 digit** number.



Examples

The diagram shows the position of a boat B and dock D.



The scale of the diagram is 1cm to 5km.

a) Calculate the real distance between the boat and the dock.

$6cm = 6 \times 5$

$= 30km$

b) State the bearing of the boat from the dock.

110^o

c) Calculate the bearing of the dock from the dock.

$180^o - 110^o = 70^o$ because the angles are cointerior

$360^o - 70^o = 290^o$ because angles around a point equal 360^o

MATHSWATCH

124, G15

Key Words

Scale
Bearing
Clockwise
North

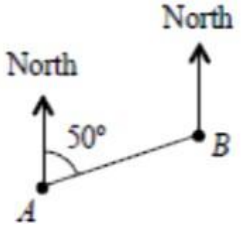
Links

Geography

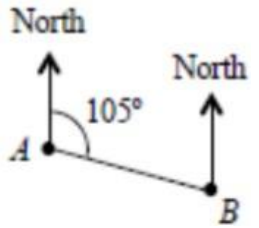
Find the bearing of A from B

(Diagrams not drawn to scale):

a)



b)



ANSWERS: (a)(230b) 285°

Maths Year 10 Foundation Summer: EXPAND AND SIMPLIFY BRACKETS, FACTORISING

ST TERESA of CALCUTTA Catholic Academy Trust

Key Concepts

Expanding brackets
Single: Where each term inside the bracket is multiplied by the term on the outside of the bracket.
Double: Where each term in the first bracket is multiplied by all terms in the second bracket.

Factorising expressions
Putting an expression back into brackets. To "factorise fully" means take out the HCF.

Difference of two squares
When two brackets are repeated with the exception of a sign change. All numbers in the original expression will be square numbers.

Examples

Linear expressions

Expand and simplify where appropriate

1) $7(3 + a) = 21 + 7a$

2) $2(5 + a) + 3(2 + a) = 10 + 2a + 6 + 3a$

$5a + 16$

3) Factorise $9x + 18 = 9(x + 2)$

4) Factorise $6e^2 - 3e = 3e(2e - 1)$

Quadratic expressions

Expand and simplify:

1) $(p + 2)(2p - 1)$

$= 2p^2 + 4p - p - 2$

$= 2p^2 + 3p - 2$

2) $(p + 2)^2$

$(p + 2)(p + 2)$

$= p^2 + 2p + 2p + 4$

$= p^2 + 4p + 4$

Factorise:

3) $x^2 - 2x - 3$

$= (x - 3)(x + 1)$

Factorise and solve:

4) $x^2 + 4x - 5 = 0$

$(x - 1)(x + 5) = 0$

Therefore the solutions are:

Either $x - 1 = 0$

$x = 1$

Or $x + 5 = 0$

$x = -5$

MATHSWATCH

97, 157

Key Words

Expand
Factorise
Simplify
Product
Solve

1) Expand and simplify (a) $3(2 - 7f)$ (b) $5(m - 2) + 6$ (c) $3(4 + t) + 2(5 + t)$

2) Factorise (a) $6m + 12t$ (b) $9t - 3p$ (c) $4d^2 - 2d$

3) Expand $(5g - 4)(2g + 1)$

4) (a) **Factorise** $x^2 - 8x + 15$ **(b) Factorise and solve** $x^2 + 7x + 10 = 0$

ANSWERS: 1) (a) $6 - 21f$ (b) $5m - 4$ (c) $22 + 5t$ 2) (a) $6(m + 2t)$ (b) $3(3t - p)$ (c) $2d(2d - 1)$ 3) $10g^2 - 3g - 4$ 4) (a) $(x - 3)(x - 5)$ (b) $x = -2$ or $x = -5$

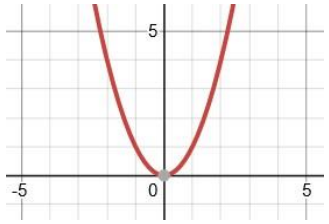
Maths Year 10 Foundation Summer: QUADRATIC GRAPHS

$y = x^2 + 2x - 8$

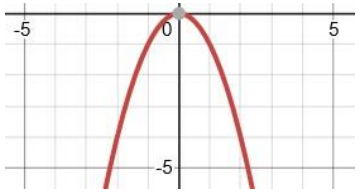
Key Concepts

A quadratic graph will always be in the shape of a parabola.

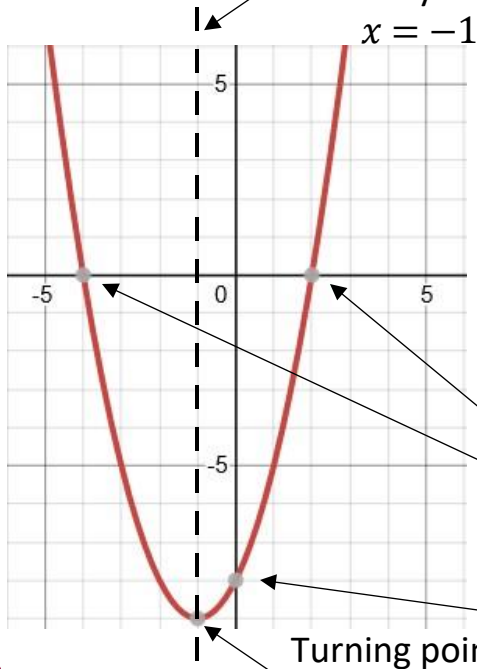
$y = x^2$



$y = -x^2$



The roots of a quadratic graph are where the graph crosses the x axis. The roots are the solutions to the equation.



Examples

$$y = x^2 + 2x - 8$$

A quadratic equation can be solved from its graph.
The roots of the graph tell us the possible solutions for the equation.
There can be 1 root, 2 roots or no roots for a quadratic equation. This is dependant on how many times the graph crosses the x axis.

Roots $x = -4$
$x = 2$

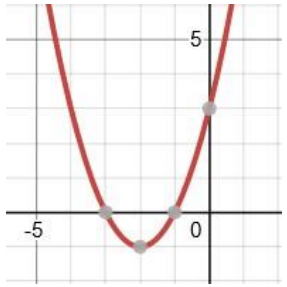
y intercept $= -8$

MATHSWATCH

98

Key Words

Quadratic
Roots
Intercept
Turning point
Line of symmetry



Identify from the graph of $y = x^2 + 4x + 3$:

1) The line of symmetry
2) The turning point
3) The y intercept
4) The two roots of the equation

ANSWERS 1) $x = -2$ 2) $(-2, -1)$ 3) 3 4) $x = -1$ and $x = -3$

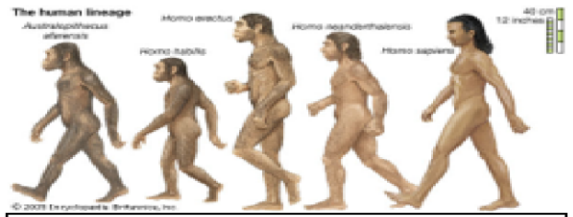
B4: Evolution

Lesson sequence

20. Human evolution
21. The theory of evolution
22. Resistance
23. Classification
24. How to modify species
25. Problems with modifying species
26. Genetic engineering of bacteria (HT)

1. Human evolution	
*Binomial naming	Two-part names, first part = genus, second part = species. Written in italics.
Homo sapiens	Our species. Evolved about 200,000 years ago. Skull volume 1450 cm^3.
****Ardipithecus ramidus***	Aka 'Ardi'. 4.4 million years ago, walked upright and climbed trees, 350 cm^3 skull volume.
****Australopithecus afarensis***	Aka Lucy. 3.2 million years ago, walked upright, skull volume 400 cm^3.
****Homo habilis***	2.4-1.4 million years ago, walked upright, skull volume 5-600 cm^3.
**8Homo erectus*	1.8 to 0.5 million years ago, walked upright, skull volume 850 cm^3.
*Fossil evidence	Many fossils have been found showing a gradual transition from 'ape-like' to 'human-like'.
**Stone tool evidence	Older stone tools are simpler requiring less intelligence to make, younger stone tools are more complex requiring more intelligence to make.

**The Leakeys	Mary and Louis discovered *Homo habilis*, their son Richard worked on *Homo erectus*.



2. The theory of evolution	
*Charles Darwin	Develop the theory of evolution.
*Evolution	The way that species develop by gradual changes over many generations due to natural selection.
*Variation	Natural differences between members of a species that affect the chance of survival.
**Mutations and evolution	Changes in DNA cause variation.
**Environmental change	Change to factors such as food supply, climate or predators.
*Competition	The fight to eat, survive and breed.
*Natural selection	Organisms with the best genes and characteristics are more likely to survive, breed and pass on their better genes.
*Inheritance	Gaining your genes from your parents.
**Well adapted	An organism has features that make it better able to survive and breed.
**Evolution and the individual	An individual does not evolve during its lifetime, populations of organisms evolve over many lifetimes.

**Human evolution	Humans did not evolve from chimpanzees, we both evolved from a common ancestor.

3. Resistance	
*Resistance	The natural ability of some members of a species to survive poisons that would kill the other members.
*Evolution of resistance	Evolution of organisms that stops them from being affected by poisons.
**Rats and warfarin resistance	Warfarin is used to kill rats. Some rats were naturally resistant, survived the warfarin, bred and passed on their resistance genes.
**Antibiotic resistance	Antibiotics are used to kill bacteria. Some bacteria were naturally resistant, survived the antibiotics, bred and passed on their resistance genes.
**The problems of resistance	Antibiotic resistance means that many infections that used to be simple to treat may become too resistant to treat, causing major health problems.

4. Classification	
*Carl Linnaeus	Developed the modern system of classification.
*How to classify	Based on similarities, group things into smaller and smaller groups with fewer and fewer similarities.
*Problems with classification	Sometimes organisms that look similar are not actually related.
*Kingdoms	Old idea, classifying living things into five kingdoms (including plants, animals and fungi)
**Carl Woese	Developed the modern system of classification with three domains.
*Domains	Modern idea of classifying living things into three main groups: bacteria, Archae, Eukarya.

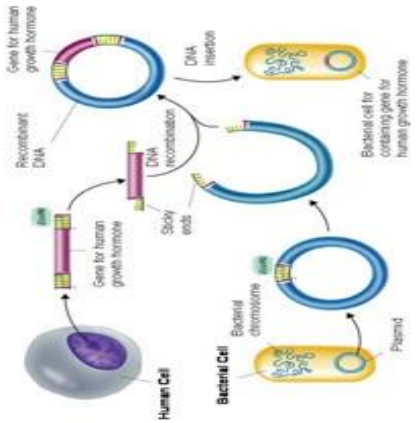
**Bacteria	Single-celled organisms with no nucleus and no unused sections of DNA.
**Archae	Single-celled organisms with no nucleus but with unused sections of DNA.
**Eukarya	(Often) multi-cellular organisms with a nucleus and unused sections of DNA. Includes plants, animals, fungi and protists.

5. How to modify species	
*Artificial selection	When humans (normally farmers) select the animals/plants to breed with the best characteristics.
*Selective breeding	Developing new breeds of plants or animals with better characteristics by selective breeding over many generations.
**Selective breeding in practice	Choose parents with the best characteristics, breed them together, choose from their offspring with the best characteristics, breed them together, repeat for many generations.
*Genetic engineering	Changing the characteristics of organisms by giving them genes from another organism.
*GMO	Genetically modified organism: an organism that has had its genes changed.
**Bt corn	Corn containing a gene from *Bocillus thuringiensis* that makes it produce a substance called Bt which kills insects.
*Medical GMOs	GM bacteria are used to make insulin (for diabetes) and some antibiotics.
**Pros and cons of GM	Quicker than selective breeding and can introduce more different characteristics but is expensive.

Biology Summer Term Year 10

6. Problems with modifying species	
Over-selection	Farmers focussing too much on breeding for one characteristic (such as chicken breast size), don't spot problems with other characteristics (such as weak leg bones) causing suffering.
Gene leakage	The concern GMOs could breed with wild relatives, enabling the modified genes to escape into the wild. This could have ecological impacts.
Resistance	The concern that in areas growing Bt corn, insects simply evolve resistance to Bt.
Insulin	Insulin made by GM bacteria is not identical to human insulin, and some people suffer bad reactions to it.

7. Genetic engineering of bacteria (HT)	
****Plasmid DNA**	Small loops of DNA containing a few genes.
*****Restriction enzyme**	Enzymes that cut DNA, leaving sticky ends at each end of the piece of DNA.
*****Sticky end**	A short sequence of unpaired bases at the end of a piece of DNA.
*****Ligase**	An enzyme that joins two pieces of DNA by matching up the bases on their sticky ends.
*****Recombinant DNA**	DNA produced by combining together two of more pieces of DNA.
*****How to genetically engineer bacteria**	Cut out gene using restriction enzymes, remove plasmids from bacteria and open with restriction enzymes, use ligase to join gene and plasmid together, return plasmids to bacteria.



B4: Natural selection and genetic modification

Lesson sequence

27. Human evolution
28. The theory of evolution
29. Resistance
30. Classification
31. Modifying life
32. Problems with modifying life

1. Human evolution	
Binomial naming	Two-part names, first part = genus, second part = species, written in italics.
Homo sapiens	Our species. Evolved about 200,000 years ago. Skull volume 1450 cm^3.
Ardipithecus ramidus	Aka 'Ardi'. 4.4 million years ago, walked upright and climbed trees, 350 cm^3 skull volume.
Australopithecus afarensis	Aka Lucy. 3.2 million years ago, walked upright, skull volume 400 cm^3.
Homo habilis	2.4-1.4 million years ago, walked upright, skull volume 5-600 cm^3.
Homo erectus	1.8 to 0.5 million years ago, walked upright, skull volume 850 cm^3.
Fossil evidence	Many fossils have been found showing a gradual transition from 'ape-like' to 'human-like'.
Stone tool evidence	Older stone tools are simpler requiring less intelligence to make, younger stone tools are more complex requiring more intelligence to make.
The Leakeys	Mary and Louis discovered *Homo habilis*, their son Richard worked on *Homo erectus*.

2. The theory of evolution	
Charles Darwin	Develop the theory of evolution.
Evolution	The way that species develop by gradual changes over many generations due to natural selection.
Variation	Natural differences between members of a species that affect the chance of survival.
Mutations	Changes in DNA that cause variation.
Environmental change	Change to factors such as food supply, climate or predators.
Competition	The fight to eat, survive and breed.
Natural selection	Organisms with the best genes and characteristics are more likely to survive, breed and pass on their better genes.
Inheritance	Gaining your genes from your parents.
Well adapted	An organism has features that make it better able to survive and breed.
Evolution and the individual	An individual does not evolve during its lifetime, populations of organisms evolve over many lifetimes.
Human evolution	Humans did not evolve from chimpanzees, we both evolved from a common ancestor.

3. Resistance	
Resistance	The natural ability of some members of a species to survive poisons that would kill the other members.
Evolution of resistance	Evolution of organisms that stops them from being affected by poisons.
Rats and warfarin resistance	Warfarin is used to kill rats. Some rats were naturally resistant, survived the warfarin, bred and passed on their resistance genes.
Antibiotic resistance	Antibiotics are used to kill bacteria. Some bacteria were naturally resistant, survived the antibiotics, bred and passed on their resistance genes.
The problems of resistance	Antibiotic resistance means that many infections that used to be simple to treat may become too resistant to treat, causing major health problems.

4. Classification	
Carl Linnaeus	Developed the modern system of classification.
How to classify	Based on similarities, group things into smaller and smaller groups with fewer and fewer similarities.
Linnaeus' classification system	Kingdom → phylum → class → order → family → genus → species
Problems with classification	Sometimes organisms that look similar are not actually related.
Carl Woese	Developed the modern system of classification with three domains.
Domains	The three main groups of life: bacteria, Archae, Eukarya.
Bacteria	Single-celled organisms with no nucleus and no unused sections of DNA.
Archae	Single-celled organisms with no nucleus but with unused sections of DNA.
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C9: Quantitative chemistry

Lesson sequence

31. Formula masses
32. Calculating empirical formulae
33. Conservation of mass
34. Calculating reacting masses
35. Moles (HT)
36. Stoichiometry of reactions (HT)

1. Formula masses

*Molecular formula	Gives the number of atoms of each element present in a molecule.
*Empirical formula	Gives the number of atoms of each element present in a compound as the simplest whole number ratio.
*Converting molecular to empirical formulae	Divide the number of each atom by the highest common factor of all of the atoms.
*Molecular to empirical formula examples	C_2H_4 → CH_2 (divided by 2) $C_6H_{12}O_6$ → CH_2O (divided by 6) H_2O → H_2O (divided by 1)
*Relative atomic mass, A_r	The mass of an atom relative to 1/12th the mass of carbon-12. No units.
**Relative formula mass, M_r	The mass of one unit of a formula, found by adding the relative atomic masses of all of the atoms in it.

2. Calculating empirical formulae

*To calculate empirical formulae from experimental data	- Write each element's symbol with a ratio (:) symbol between - Write out the amount of each element from the questions - Divide each amount by the A_r of the element - Divide each answer by the smallest answer to get a ratio - Write the empirical formula
**To find a molecular formula from an empirical formula	- Calculate M_r for the empirical formula - Divide the M_r of the molecular formula by this number - Multiply the empirical formula by your answer

*Empirical formula example

A compound contains 14.3% hydrogen by mass and 85.7% carbon. Determine its empirical formula.

Symbols:	C	:	H
Amounts:	85.7%		14.3%
by A_r:	85.7 ÷ 12 = 7.14		14.3 ÷ 1 = 14.3
÷ by smallest:	7.14 ÷ 7.14 = 1		14.3 ÷ 7.14 = 2
Write formula:	CH2		

**The relative formula mass of the compound is 28, determine its molecular formula.

M_r of empirical: $M_r(CH_2) = 12 \times 1 + 1 \times 2 = 14$
÷ molecular M_r by empirical M_r: 28 ÷ 14 = 2
Multiply empirical formula: $CH_2 \times 2 = C_2H_4$

3. Conservation of mass

**Conservation of mass	The total mass of products must equal the total mass of reactants.
*Precipitation reaction	A reaction that produces a solid precipitate by mixing two solutions.
*Closed system	A system in which no chemicals can enter or leave, such as a sealed test tube.
*Open system	A system in which chemicals can enter or leave – such as an open test tube.
**Conservation of mass in a closed system	No atoms are able to enter or leave, so the total mass stays the same – for example a precipitation reaction in a closed flask.
**Conservation of mass in an open system	For example, a carbonate reacting with acid producing CO_2 bubbles: the mass appears to decrease because you can't weigh the gas that goes into the air, however it is still there.

4. Calculating reacting masses

***Excess reactant	Any reactant which is not used up completely in a reaction because there is more of it than needed.
***Limiting reactant	Any reactant of which is completely used up in a reaction. The limiting reactant determines how much product is made.
**Calculating reacting masses	- Write out the balanced equation - Write the mass of the chemical you are given, and 'm' for the mass you are finding under their symbols - Draw a line underneath the masses to make it a division - Calculate the M_r of each, multiply by the big numbers and write under the line. - Put an equals sign between the two to form an equation. - Solve for 'm'

**Reacting masses example

What mass of iron can be produced from 50 g of iron oxide (Fe_2O_3)?

$$2Fe_2O_3 + 3C \rightarrow 4Fe + 3CO_2$$

$$\frac{50}{320^{*}} = \frac{m}{224^{*}}$$

$$\frac{50 \times 224}{320} = m$$

35 g = m

*2 Fe_2O_3: 2 x (2 x 56 + 3 x 16) = 320
*4 Fe: 4 x 56 = 224

5. Moles (HT)

***Moles	The unit of measurement of chemicals – one mole of any chemical is the same amount.
***One mole	An amount of a chemical such that one mole has a mass in grams that is the same as its relative formula mass.
***Avogadro's constant	6.02×10^{23}: the number of atoms/molecules present in one mole of a substance.
***Calculating moles from mass	Quantity in moles = mass / relative formula mass
***Calculating moles from a number of particles	Quantity in moles = number of particles / 6.02×10^{23}
***Calculating the number of particles from a mass of substance	Number of particles = (mass / relative formula mass) x 6.02×10^{23}

6. Stoichiometry (HT)

***Stoichiometry	The ratio of the number of moles of each substance involved in a reaction.
***Stoichiometric coefficient	The 'big' numbers written in a balanced equation.
***Deducing stoichiometry	- Calculate the number of moles present of each of the reactants (or products) - Find the simplest whole-number ratio - Balance in the normal way to find the numbers of products (or reactants)

C10-12: Electrolysis, metals and reversible reactions

Lesson sequence

37. Electrolysis
38. Half-equations (HT)
39. Products of electrolysis
40. Core practical – electrolysis of copper sulfate solution (CP10)
41. Reactivity
42. Displacement reactions
43. Extracting metals from their ores
44. Oxidation and reduction
45. Life-cycle assessment and recycling
46. Dynamic equilibrium
47. Changes to equilibrium systems (HT)

1. Electrolysis	
*Electrolysis	Using direct current to break compounds down into their elements.
*Electrolyte	Liquid used for electrolysis because ions can move – either molten or dissolved ionic compounds
**Electrolysis of solids	Does not work as ions can't move.
*Electrodes	Conducting rods placed in electrolyte, connected to power supply.
*Cathode	Negative electrode where cations (+) are discharged.
*Anode	Positive electrode where anions (-) are discharged.

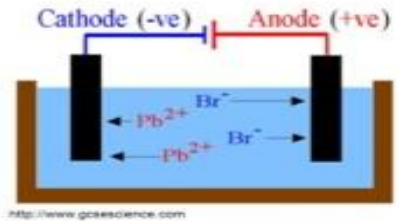
2. Half-equations (HT)	
Oxidation (HT)	Loss of electrons (OIL)
Reduction (HT)	Gain of electrons (RIG)
AnOx	Anode is for *ox*idation
CaRe	Cathode is for reduction

***Half-equations	An equation that shows what happens to just one of the ions during chemical reaction. Two half-equations combine to give the overall ionic equation
***Half-equations in electrolysis	Show electron transfer: Cathode (reduction): $M^+ + e^- \rightarrow M$ Anode (oxidation): $X^- \rightarrow X + e^-$
***Electrons in half equations	Cations will gain the same number of electrons as their charge. Anions will lose the same number of electrons as their charge.
***Non-metals in half-equations	Most non-metals will form molecules: O_2, F_2, Cl_2, Br_2, I_2 etc – so you will need two of them in the half-equation.

3. Products of electrolysis	
*Discharged	When an ion loses its charge to become an atom
*Electrolysis of molten salts	Cathode: metal Anode: non-metal
**Ions in salt solutions	Metal, non-metal and H^+ and OH^- because water partially ionises.
***Hydrogen half-equation	$2H^+(g) + 2e^- \rightarrow H_2(g)$
**Electrolysis of salt solutions - cathode	Metal, unless reactive metal such as K, Na, Li, Mg, Ca in which case hydrogen.
**Electrolysis of salt solutions - anode	Non-metal, unless sulphate salt in which case oxygen.
**Electrolysis of sulfuric acid	Cathode: hydrogen Anode: oxygen
**Purifying copper - setup	Anode: impure copper Cathode: pure copper Electrolyte: copper sulphate solution

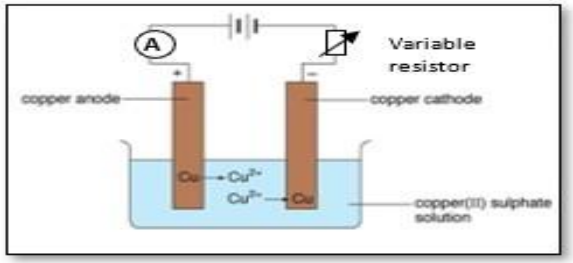
***Purifying copper - explanation	Copper atoms leave the anode ($Cu \rightarrow Cu^{2+} + 2e^-$), travel through solution and go to cathode ($Cu^{2+} + 2e^- \rightarrow Cu$). Impure atoms on the anode fall to the bottom as sludge.

Electrolysis of molten lead bromide

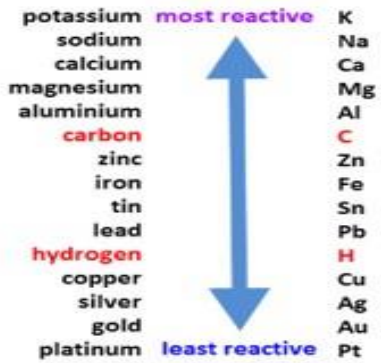


4. Core practical – electrolysis of copper sulfate solution (CP10)	
*CP10 - aim	To see how the changing the current affects the rate of electrolysis.
*CP10 – Prepare electrodes	Clean two copper electrodes, label one anode and one cathode, weigh each and record mass.
*CP10 - Setup	Connect a variable resistor to the negative terminal of a power supply then connect this to the cathode. Connect an ammeter to the positive terminal then connect this to the anode. Place both electrodes in a beaker of copper sulfate solution
*CP10 – Run the experiment	Switch the power supply on, adjust the variable resistor so the ammeter reads 0.2 A and leave for 20 minutes.
*CP10 – Record results	Carefully remove each electrode, rinse them with water and then with propanone. Re-weigh each and record.
*CP10 – Variations	Repeat the experiment with a current of 0.3 A, 0.4 A and 0.5 A.

*CP10 - Results	The anode loses mass whilst the cathode gains mass. The higher the current the greater the mass change.



5. Reactivity	
*Reactivity series (most to least)	Potassium, sodium, calcium, magnesium, aluminium, zinc, iron, copper, silver, gold.
**Forming cations	The more reactive metals more easily lose electrons to form cations.
**Reaction with cold water ($H_2O(l)$)	Metal + water → metal hydroxide + hydrogen - Potassium – violently - Sodium – very quickly - Calcium – slowly
**Reaction only with steam ($H_2O(g)$)	Metal + water → metal oxide + hydrogen Magnesium, zinc, iron
**No reaction with water or steam	Copper, silver, gold
**Reaction with acid	Metal + acid → salt + hydrogen - Sodium, potassium – violent - Calcium, magnesium, zinc, iron – steady - Copper, silver, gold – no reaction



6. Displacement reactions	
**Displacement reactions	Reactions in which a more reactive metal displaces a less reactive metal from a salt eg: *copper sulfate + zinc → zinc sulfate + copper* Does not work backwards as copper is less reactive than zinc.
***Redox reactions	Reactions in which an oxidation and reduction happen at the same time, such as displacement reactions.
***Redox during displacement	The more reactive metal gets oxidised, eg: • $Zn \rightarrow Zn^{2+} + 2e^-$ The less reactive metal gets reduced, eg: $Cu^{2+} + 2e^- \rightarrow Cu$
***Spectator ion	An ion that does not change during a chemical reaction.

7. Extracting metals from their ores	
*Native state	When metals are found naturally in their pure form, such as silver and gold.
*Ore	Rock containing enough of a metal compound to extract for profit. Normally oxides or sulphides of the metal.
*Extracting metals by heating with carbon	For extracting less reactive metals such as zinc, iron, copper. Works because carbon is more reactive, eg: iron oxide + carbon → carbon dioxide + iron
**Extracting metals by electrolysis	Done with metals more reactive than carbon such as potassium, sodium, calcium, magnesium, aluminium, eg: Aluminium oxide → aluminium + oxygen
*Bioextraction	Using living organisms to extract metals.
**Bioleaching	Growing bacteria on poor quality copper ore. The bacteria produce a solution of copper sulfate from which copper can be extracted by electrolysis.
**Phytoextraction	Plants are grown that absorb metal compounds as they grow. The plants are then burnt to produce ash that is rich in metal compounds.

8. Oxidation and reduction	
*Oxidation	Gaining oxygen
*Reduction	Losing oxygen
*Redox	When reduction and oxidation reactions happen together.
**Reduction of iron	Iron produced from iron oxide by heating with carbon: *iron oxide + carbon → carbon dioxide + iron* Iron is reduced, carbon is oxidised.
**Reduction of aluminium ore	Aluminium is produced from aluminium oxide by electrolysis: *Aluminium oxide → aluminium + oxygen* Aluminium is reduced, oxygen is oxidised
*Corrosion	When metals slowly react with oxygen, making them weaker.
**Rates of corrosion	More reactive metals corrode more quickly.
**Tarnish	A protective layer of oxide that stops the layers below from corroding.

9. Life-cycle assessment and recycling	
*Recycling	Converting old waste metal into new metal that can be reused
*Advantages of recycling	- Natural reserves last longer - Less pollution from mining - Less pollution from processing - Less waste in landfill - Often less energy used
*Disadvantages of recycling	- Can be expensive - Can use a lot of energy in transporting, collecting and sorting
**Life-cycle assessment (LCA)	Looks at environmental impact of all stages of a product's lifecycle. We should aim to reduce all damage.
**LCA stages	- Obtaining and processing raw materials - Making and packaging the product - Using the product - Disposal or recycling of the product

10. Dynamic equilibrium	
*Reversible reaction	Reactions that can go forwards as well as backwards (with products turning back into reactants)
*⇋	The arrow used for reversible reactions.
**Dynamic equilibrium	The point at which the rate of the forwards reaction and backwards reaction are equal, so the concentrations of reactants and products stops changing.
*Closed systems	Nothing can escape, so dynamic equilibrium can be reached.
*Open systems	Gases can escape so dynamic equilibrium can't be reached.
**Equation for making ammonia	Nitrogen + hydrogen ⇋ ammonia $N_2 + 3H_2 \rightleftharpoons 2NH_3$ exothermic
**Haber process	For making ammonia in factories: - 200 atm pressure – equilibrium shifts right, yield increases - 450°C – equilibrium shifts left, lower yield but MUCH faster reaction - Catalyst – increases reaction rate

11. Changes to equilibrium systems (HT)	
***Effect on equilibrium of increasing temperature	Exothermic reaction – equilibrium shifts left, yield decreases Endothermic reaction – equilibrium shifts right, yield increases
***Effect on equilibrium of decreasing temperature	Exothermic reaction – equilibrium shifts right, yield increases Endothermic reaction – equilibrium shifts left, yield decreases
***Effect on equilibrium of increasing gas pressure	Equilibrium shifts to side with fewer gas molecules
***Effect on equilibrium of decreasing gas pressure	Equilibrium shifts to side with more gas molecules
***Effect on equilibrium of increasing concentration...	...of products – equilibrium shifts left, yield decreases ...of reactants – equilibrium shifts right, yield increases
***Effect on equilibrium of decreasing concentration	...of products – equilibrium shifts right, yield increases ...of products – equilibrium shifts left, yield decreases

P5: Light and the electromagnetic spectrum

Lesson sequence

25. Electromagnetic waves
26. Core practical - Investigating refraction (CP14)
27. The electromagnetic spectrum
28. Using the long wavelengths
29. Using the short wavelengths
30. Dangers of EM radiation

1. Electromagnetic waves	
*Electromagnetic waves	Transverse waves that travel at the speed of light.
*Speed of light	300,000,000 m/s (3 x 10^8 m/s)
*Frequency	The number of waves that pass a point every second.
*Wavelength	The distance in m from the top of one wave to the top of the next.
*EM wave similarities	All are transverse, all travel at the speed of light.
*EM wave differences	Different frequencies, different wavelengths.
*Visible light	The only type of EM radiation that our eyes can detect.
**Interface	The boundary between two different materials.
***Refraction and wave speed	Light travels at different speeds in different materials causing it to refract when hitting the interface at an angle.
***Prisms and the colour spectrum	Different wavelengths slow down by different amounts when they hit glass causing each colour to refract differently.
**Infrared discovery	Light split into a spectrum. Thermometer placed on every colour plus next to red. Red was hot, next to red was hottest.

2. Core practical – Investigating refraction (CP14)	
**Angle of incidence	Angle between the incident ray and the normal
**Angle of refraction	Angle between the refracted ray and the normal.
*CP14 – Aim	To explore how changing the angle of incidence changes the angle of refraction
*CP14 - Setup	Place a glass block on a sheet of paper, point a beam of light from a ray box at it, trace around the block and draw in the light ray.
*CP14 - Measurement	Use a protractor to draw a normal, then measure the angles of incidence and refraction.
*CP14 - Variations	Repeat 5 times, from 5 different angles, including head-on.
*CP14 - Results	The greater the angle of incidence, the greater the angle of refraction.

3. The electromagnetic spectrum	
*EM spectrum mnemonic	**R**ubbish **M**emories **I**nclude **V**isiting **U**r **X** **G**irlfriend
*EM spectrum – lowest to highest frequency or energy	Radio waves, microwaves, infrared, visible light, ultraviolet, x-rays, gamma rays
*EM spectrum – lowest to highest wavelength	Gamma rays, x-rays, ultraviolet, visible light, infrared, microwaves, radio waves
*EM spectrum	The full range of types of EM radiation.
***EM Radiation and the atmosphere	Some EM radiation (visible, radio) passes through the atmosphere, most is absorbed.
***Space telescopes	For radiation absorbed by the atmosphere, a telescope must be placed in space.

4. Using the long wavelengths	
*Visible light uses	Illumination, photography
*Infrared uses	Short-range communications (TV remotes), fibre optics, cooking (grills and toasters), security cameras.
*Microwave uses	Microwave ovens, mobile phone and satellite communications.
*Radio wave uses	Radio and TV signals.
***Producing radio waves	Oscillating electricity in a metal rod produces radio waves.
***Receiving radio waves	Radio waves absorbed by a metal rod cause electrical oscillations.

5. Using the short wavelengths	
**Fluorescence	Absorbing ultraviolet and re-emitting it as visible light.
*Ultraviolet uses	Fluorescent security inks, fluorescent light bulbs, sterilising water.
*X-ray uses	Hospital x-rays, baggage scanners.
*Gamma ray uses	Killing bacteria on food or surgical instruments, detecting and treating cancer.

6. EM radiation dangers	
**Infrared dangers	Surface heating causing burns.
**Microwave dangers	Absorbed by water causing it to heat up → burns under the skin.
**Ionisation	High energy radiation causes ions to form in our cells, damaging DNA and causing cancer.
*Ultraviolet dangers	Skin cancer, snow blindness.
*X-ray dangers	Cancer
*Gamma ray dangers	Cancer

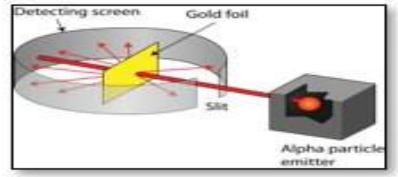
Physics Summer Term Year 10

P6: Radioactivity

Lesson sequence

31. Atomic structure
32. Subatomic particles
33. Electron orbits
34. Radiation from unstable atoms
35. Nuclear reactions
36. Half-life
37. Background radiation
38. Dangers of radioactivity

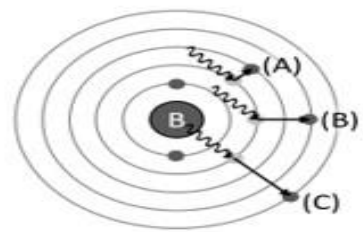
1. Atomic structure	
*Atom	Smallest stable particle of matter.
**Size of atoms	2.5 x10^{-10} m in diameter
*Element	Pure substance made of a single type of atom.
*John Dalton	Pictured atoms as tiny hard round balls, with different elements having atoms of different sizes.
*J.J Thomson	Discovered negative particles smaller than atoms called electrons.
**Plum-pudding model	Atoms as a sphere of positively charged matter with negative electrons scattered throughout it.
**Rutherford's experiment	Fired alpha particles at very thin gold leaf and used a special screen to record where they went.
**Rutherford's results	Most alpha particles went straight through, some scattered (changed path).
**Rutherford's explanation	Scattered particles hit a nucleus. Nucleus must be small because most went straight through without hitting it.



2. Subatomic particles	
*Subatomic particle	Particles smaller than atoms: protons, neutrons and electrons.
*Protons	+1 charge, mass = 1, located in the nucleus
*Neutrons	0 charge, mass = 1, located in the nucleus
*Electrons	-1 charge, mass = 1/1835, located around nucleus in shells
**Relative mass	Not the actual mass because no units. Protons and neutrons have same relative mass: their mass is 1.
*Nucleons	Subatomic particles found in the nucleus: protons and neutrons.
*Determining the element	The number of protons determines which element an atom is.
*Atomic number	The number of protons in an atom. Also electrons.
*Mass number	The number of nucleons (protons and neutrons) in an atom.
*Number of neutrons	Mass number – atomic number
**Isotopes	Versions of an element with the same number of protons, but different number of neutrons.
**Naming isotopes	Name followed by mass, e.g. carbon-13, or symbol preceded by mass, e.g. ^{13}C.

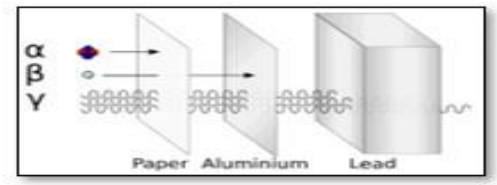
3. Electron orbits	
**Orbits	The shells of electrons around an atom.
**Orbits and energy	Higher orbit = higher energy

**Excited electrons	When an electron has absorbed energy and jumped to a higher orbit.
***How to excite electrons	- When atoms absorb light - When electricity is passed through gases - Strongly heating a material
***Emitting light	Electrons emit light when they drop back down an orbit. A bigger drop down releases higher energy light.
***Absorbing light	Light absorbed at specific wavelengths corresponds to energy gap in orbits: jumping up one orbit = redder light, jumping up several orbits = bluer light.
***Emission spectrum	Pattern of bands of light at specific wavelengths caused by exciting a gaseous element with electricity.
***Absorption spectrum	Pattern of dark band in a 'rainbow' spectrum caused by a gaseous element absorbing some of the light passed through it.
***Forming ions	When an electron is given so much energy it leaves the atom entirely creating a positive ion.
**Ionising radiation	Radiation that causes ionisation: (high energy) UV, x-rays, gamma rays.



4. Radiation from unstable atoms	
*Unstable atom	An atom whose nucleus contains too much energy becomes unstable.

*Decay	When an unstable atom releases its excess energy by changing. Releases ionising radiation.
*Alpha radiation	Made of alpha particles: two protons and two neutrons. Symbol: α or ^4_2He.
*Beta-minus radiation	Made of beta particles: a fast-moving electron. Symbol: β^- or $^0_{-1}e$.
*Beta-plus radiation	Made of positrons: particles with same mass as electrons but a positive charge. Symbol: β^+ or ^0_1e.
*Gamma radiation	Extremely short wavelength / high frequency / high energy electromagnetic radiation. Symbol: γ.
*Neutron radiation	Fast-moving neutrons. Symbol: n.
*Ionising power	From most to least is alpha, beta gamma.
*Penetrating power	From most to least is gamma, beta, alpha.
**Ionising vs penetrating power	When the radiation ionises an atom it loses some of its energy. Alpha ionises particles most easily so loses it energy most quickly, and vice versa for gamma.

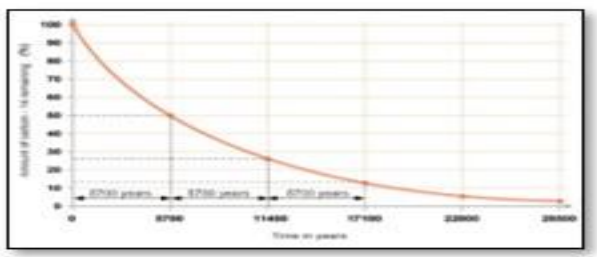


5. Nuclear reactions	
**Alpha decay	Atomic number decreases by two, mass number decreases by four.
**Beta-decay	Atomic number increases by one, mass number stays the same.
**Beta+ decay	Atomic number decreases by one, mass number stays the same.
**Gamma decay	Atomic number and mass number unchanged.

Physics Summer Term Year 10

**Neutron decay	Atomic number stays the same, mass number decreases by one.
***Writing nuclear equations	- Write in what you know - Balance the mass and atomic number - Work out the symbols to match the numbers

6. Half-life	
*Half-life	The time taken for half of the undecayed atoms in a sample to decay. Stays constant for each isotope.
*Half-life and stability	Less stable → shorter half-life More stable → longer half-life
*Half-life and radioactivity	Shorter half-life → more active Longer half-life → less active
*Becquerels, Bq	The unit of radioactivity: 1 Bq = one decay per second.
**Half-life graph	x-axis = time, y-axis = radioactivity. The line curves downwards but never touches the x-axis.
**Determining half-life from a graph	Pick two points on the y-axis, one half of the other, trace along to the line and down to the time. Half-life is the difference in the time.
**Calculations with half-life	- Divide time by half-life to give a number of half-lives - Forwards in time: halvings - Back in time: doublings



7. Background radiation	
*Background radiation	Low levels of ionising radiation that we are constantly exposed to.
*Radon gas	The biggest source of background radiation: a radioactive gas produced by some rocks in the ground
*Other sources	Food, hospitals, nuclear power industry, space (cosmic rays)
*Artificial sources	15%: 14% hospitals, 1% nuclear industry
**Geiger-Müller (GM) tube	Used to measure radioactivity, produce a click each time radiation passes through it.
**Count-rate	The number of time a GM tube detects radiation each second.
**Measuring background radiation	Use a GM tube to take several readings and then calculate the average (mean).
**Measuring the activity of a source	Measure the source, subtract the background radiation.
*Dosimeter	A badge that changes colour in response to radiation exposure.
*Dose	The amount of radiation received.

8. Dangers of radioactivity	
*Mutations	DNA damage caused by ionising radiation, can lead to cancer.
**Repairing damage	Cells contain proteins that can repair DNA damage as long as the radiation dose is low enough.
**Minimising radiation risk	- Wear protective clothing - Handle with tongs - Don't point at people - Limit time - Use protective shielding - Wear dosimeter badges
**Nuclear power risks	There is a small chance of accidents causing radioactive sources to escape
**Irradiation	Exposure to radiation, stops when the source of radiation is removed.

**Contamination	When particles of radioactive substances are on or in the body.
**Risks in perspective	Using radioactivity carries serious risks, but so do many other things, so it is safe to use as long as it is treated with caution.

Geography Year 10 Summer: Physical Landscapes

Knowledge Organiser... Changing Landscapes of the UK

@birchall_miss

Overview

Types of rock

Metamorphic - formed from other rocks changed by heat and pressure e.g. slate.
Sedimentary - formed of small eroded particles that have been eroded, transported and deposited in layers or animal remains e.g. limestone.
Igneous - created by volcanic activity when magma or lava cools making crystals.

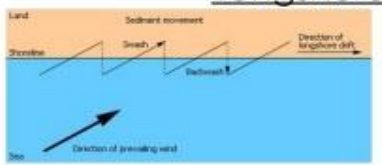
UK Upland and lowland landscapes

Relief is the way the landscape changes in height. Upland areas are above sea level and often mountainous such as Cairngorm mountains, the Pennines. Lowland areas are often flat e.g. Lincolnshire, the London Basin.
These are created by glaciation where ice eroded the land producing higher regions. Rivers also alter this landscape.

Landscapes from human activity – the South Downs

Agriculture – 85% of the national park is farmed. This helps generate an income but has damaged habitats and reduced the amount of grassland.
Forestry – Coniferous and deciduous forest covers 23.8% of the park. Large areas have now been cleared. Timber is used for construction and fuel but clearance is reducing biodiversity.
Settlements – new builds don't reflect the character of the area.

Longshore Drift



How material is transported along the coast in a zigzag pattern.

Weathering

The breakdown of rocks at or near the surface of the ground (in situ).

Mechanical – the disintegration of rocks. Freeze-thaw is caused by repeated freezing or thawing of water in a crack or hole.

Chemical – caused by chemical changes. Rainwater is slightly acidic and can cause rocks to weaken/breakdown.

Biological – the action of flora and fauna widening cracks.

Transportation

The movement of eroded material.

Solution – dissolved minerals are carried in solution. This is not visible.

Suspension – small particles are suspended in the flow of the water.

Saltation – small material bounced along the river or sea bed.

Traction – larger material rolls along the river or sea bed.

Deposition

When a sea/river looses it's energy, it drops the load. The heaviest material is deposited first. This occurs when:

- There is shallow water (discharge reduction)
- There is a sheltered areas
- A reduction in velocity
- There is a good supply of material.

Mass Movement

The downslope movement of rocks and soil from the cliff top under the influence of gravity.

Rock Falls – when pieces of rock from a weather cliff fall. Normally due to undercutting leading to a lack of support.

Slumping – caused by rainfall. Permeable rock slumps and slides in a rotational manner when saturated.

Sliding – movement of material along a flat surface, usually a bedding plane.

Erosion

The wearing away and removal of material by force.

Abrasion – material rubs together or against surfaces to grind down.

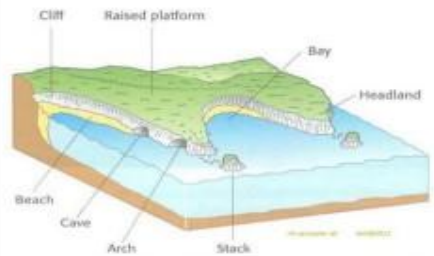
Attrition – material smashes into each other or cliff faces/river beds and breaks.

Hydraulic Action – the sheer force of the water wearing away at the rocks.

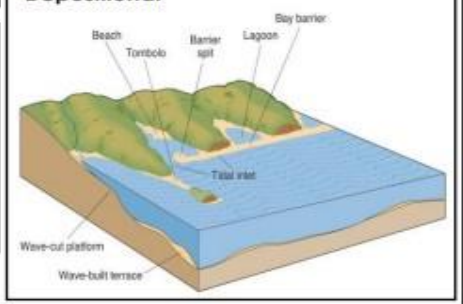
Solution – slightly acidic water wears away at the rocks.

Coastal Landforms

Erosional



Depositional



River Landforms

Upper Course

Near the source, the river flows over steep gradient from the hill/mountains. This gives the river a lot of energy, so it will erode the riverbed vertically to form narrow valleys.

Middle Course

Gentler gradient so less energy and slower flow. Lateral erosion starts to occur.

Lower Course

Near the river's mouth, the river widens further and becomes flatter. Material transported is deposited

Geography Year 10 Summer: Physical Landscapes

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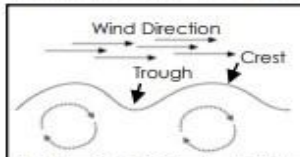
Waves



Waves are created by wind causing friction and movement within the water.

What affects wave size/strength?
The fetch, water depth and strength of the wind.

Constructive waves – these waves have a strong swash and a weak backwash. They deposit material on the beach.

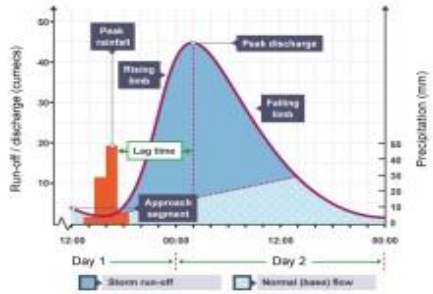
Destructive waves – the opposite. These waves remove material from the beach.

Coastal Erosion and Recession

Rising sea levels – Sea levels along the English channel have risen 12cm in 100years. This leads to erosion and coastal retreat.

Storm surges – a large-scale increase (3m) in sea level caused by gale force winds. This results in widespread damage and flooding.

Human causes
- Groynes cause beaches to be starved of sediment.
- Dredging can lead to more powerful waves.



Hydrographs

A hydrograph shows how the water flow in a drainage basin responds to a period of rain.

1. **Peak discharge** is the discharge in a period of time.
2. **Lag time** is the delay between peak rainfall and peak discharge.
3. **Rising limb** is the increase in river discharge.
4. **Falling limb** is the decrease in river discharge to normal level

Flooding

Physical causes:
1. Intense rainfall – less infiltration more surface runoff.
2. Duration of rainfall – longer periods = saturation.
3. Snowmelt – causes meltwater release.
4. Impermeable rocks – create runoff.
5. Relief – water reaches the channel quicker when slopes are steep.

Human causes:
1. Deforestation – vegetation collects and stores water through inception. Once removed, more water will reach the channel.
2. Urbanisation – concrete and tarmac are impermeable, causing more runoff.

Climate Change
With warmer weather, more extreme weather events are likely. Warmer air holds more water, leading to an increase in precipitation.

Management Strategies

Hard engineering – building artificial structures which try to control natural processes.
Soft engineering – does not involving building but takes a more sustainable and natural approach.

Coasts		Rivers	
Hard Engineering	Soft Engineering	Hard Engineering	Soft Engineering
Sea walls – concrete walls that prevent erosion and reflect sea energy.	**Reprofiling** – moving sediment from the lower to the upper part of the beach.	**Dams and reservoirs** – barriers constructed to hold back water.	**Washlands** – areas on the floodplain that are allowed to flood.
Rock Armour – large boulders used to break waves and absorb energy.	**Beach nourishment** – sand is used to build up an existing beach.	**Channelisation** – deepening or straightening a river.	**River restoration** – restoring the rivers original course.
Gabion – rocks in mesh cages to prevent erosion.	**Dune nourishment** – marram grass to stabilise dunes and trap sand.	**Flood relief channels** – extra channels built next to rivers.	**Floodplain zoning** – governments allocate land to different uses based on their flood risk.
Groynes – wooden structures built at right angles into the sea.		**Embankments/ Levees** – high banks built on or near riverbeds.	

Case study – Dawlish Warren sand spit

Location = south coast of Devon.
Spit information = extends 2km north-eastwards of the Exe estuary. Popular tourist destination. Local Nature Reserve 1978 which became national in 2000.
Physical factors altering the spit = originally two spits which joined due to erosion enclosing the Greenland lake. High spring tides and strong winds (storm surges) move sediment to create the southern/eastern extent. Erosion has caused the spit to retreat. 2013-14 storms caused 5m of sand to be lost.
Human factors altering the spit = housing developments since 1930. A range of coastal defences employed due to storms including a sea wall, sand dune stabilisation, rock armour, gabions and groynes.
Protecting the spit = Dawlish Warren Beach Management Scheme spending £14million to prevent flooding to 2900 properties and shelter the railway.

Case study – The River Dee (Afon Dyfrdwy)

The upper course of the River Dee is 460m above sea level on the slopes of Ddaullt in Snowdonia. After 110km, the River Dee meets the Irish Sea near Chester.
Importance of the River Dee = 94% of the catchment is rural used for farming, pasture and forestry. Source of water for 3million people. Supports habitats. Estuary is famous for fishing.
Human factors changing the river = two reservoirs were created to meet water demands, removing water from the river to control the flow and be stored. Embankments created to protect farmland. 8km of the river experienced channelization to increase discharge.
Physical factors changing the river = periods of drought and heavy rainfall alter the amount of erosion and discharge in the river. This is set to change with climate change.
Flooding in the River Dee catchment = the Environmental Agency predicts that by 2100 flood risk in the area will increase due to an increasing population, urban development and climate change. This will cause the number of properties at risk from a 1% fld event to rise from 4200 to 6400.

Judaism Unit 2 Practices: Public acts of worship

'How can I repay the Lord for all his goodness to me? I will lift up the cup of salvation and call on the name of the Lord. I will fulfil my vows to the Lord in the presence of all His people. I will sacrifice a thank-offering to you and call on the name of the Lord. I will fulfil my vows to the Lord in the presence of all His people, in the courts of the house of the Lord'

'Avodat Hashem'means worship of God.

- Prayer is the most important part of Jewish worship.
- Shabbat, festivals and the daily prayers are important services that take place in the synagogue.
- Public prayer brings the community together.

Since the destruction of the temple Jewish worship happens in a synagogue with a congregation.

For an act of worship in most Orthodox synagogues there needs to be 10 men for worship, this called a minyan.

<u>Worshipping in public has lots of purposes:</u>

- Gives a sense of belonging to a community.
- Chance to make friends.
- Some prayers can only be said when others are present so it gives you chance to say these.

- Rabbi's teach that there is more merit to praying in a group.
- It fulfils what is asked in scripture.

<u>Festivals</u>

Rosh Hashanah to prepare for

this Jewish people should go to the synagogue each day for the month of Ellul (first month of the Jewish year) for the blowing out of the shofar.

Yom Kippur is the holiest day and so there will be five prayer services in the synagogue.

Simchat Torah must be celebrated in the synagogue to parade the Torah around the congregation.

Purim there will be a special worship service in the synagogue.

Daily Prayers

Jewish people are expected to pray three times a day, morning, afternoon and evening.

There are usually prayers in the synagogue if there is a minyan (10 men present.

Orthodox vs Reform

- Not allowed music vs can have music in the service
- Torah is the word of God vs Torah must be interpreted

Men and women sit separately vs men and women sit together will be synagogue.

Shabbat

- **On Friday evening** there will be prayers in the synagogue to welcome in the Sabbat to say required needed for certain prayers) present.
- **On Saturday morning** go to the synagogue for families morning prayer, the main service of the week.
- **On Saturday afternoon** there - afternoon prayers in the - Prayers are said in Hebrew vs prayers said in native language

thank you to God.

Judaism Unit 2 Practices: Tenakh and Talmud

- The Torah is the most important and holy book. It contains the law of Moses, and is part of the Tenakh.
- Talmud = oral law, contains information on how laws should be interpreted.
- Food that is acceptable is called Kosher.
- Orthodox observe kosher laws strictly, reform do not.

Tenakh

- This forms the basis of essential Synagogue worship.
- The Torah is important in the synagogue but also in daily living.
- Parts of the Ketuvim form the basis of worship in the synagogue at festivals like Yom Kippur.
- People meditate on the teachings and it allows them to understand their relationship with God.

Talmud

Explains the meaning of the modern day and how it should be applied today.

The teachings have been written with mitzvot living in mind and it is still being added to today.

The Halakhah is the foundation of Orthodox Jewish living today.

K → Ketuvim (Holy writings)

H

KOSHER FOOD: The purpose of the food laws is to follow the Mitzvot about food which God gave to Moses and for many they are an opportunity to bring holiness. As a result, Judaism developed quite complicated food laws known as **Kosher** which means fitting or correct.

KOSHER: any bird which eats grain (chicken, duck, turkey), any animal with split hooves (cow, lamb etc), fish with scales and fins. All meat must be killed by slitting the throat and draining the blood.

NON KOSHER: pork, mixing meat with diary, shellfish, meat and dairy.

"Do not cook a young goat in its Mother's milk"

Orthodox Jews are very strict about their food laws because they eat anything you find dead

"Do not cook eat God, and not already

"Any Israelite who hunts any animal, bird that may be eaten must drain out the blood"

They have separate cooking utensils, dishwashers, fridges etc.

for meat and dairy!

every time they should think of break any of the mitzvot.

- Jews are encouraged to pray daily, if not in the synagogue at least at home in private.
  - Formal, personal and constant prayers are important every day.
  - Prayers are also known as reflections, to help them become better people.

Prayer at home

- **Wake up** and thank God for waking them, pour water on their hands to purify themselves for the coming day.
- **Day ends** praising God the Shema prayer is said then*; 'may it be Your will that You should lay me down in peace and raise me up to good life and peace. Blessed are You God who lights up the whole world with His glory'*
- The **Mezuzah** on each door is a reminder of the presence of God and His blessings.
- **Before and after food** requires a blessing *'Blessed are you Lord our God, King of the universe who brings food out of the ground*' this is said before eating.

Judaism Unit 2 Practices: Private prayer

We should pray to God to strengthen our relationship and become closer to him.

- **Set** your God, and to serve Him with all with all prayers aren't

'What is service of the That is prayer.' brings

express

find

Private prayer

Judaism teaches a person must pray to develop a **relationship** with God. God will listen and answer.

Prayer **should not be restricted** to set prayer or set times.

Jewish people pray whenever they feel the need to **communicate** with God.

People can express **their own thoughts and feelings** and use their own words too.

They might **ask for Gods help** for themselves or others

Why is prayer important?

Prayer: traditional, part of history, easier to 'To love the Lord the words, brings community together, your heart and selfish. your soul' Dt 11:13

- **Informal prayer**: ask for help, can say what you want, emotions, thoughts and feelings.

Prayers at home: can contact God whenever, heart? the family together.

Judaism Unit 2 Practices: Shema and Amidah

- The Shema is the most important prayer, which describes the core beliefs about God.
- The Amidah is made up of three sections; praise, request and thanks. It contains blessings from God.

Prayer three times a day

- These prayers are said in an **Orthodox synagogue**, but many Jews say these prayers at **home**.
- Orthodox men will **wear tefillin and tallit** for the morning prayers and will pray as a family group.
- The format for daily prayer is set out in the **Siddur (formal prayer book)** and includes like the Shema and Amidah
- Readings from the **Torah** and **Nevi'im** are used.
- In orthodox families prayers are in **Hebrew**, in Liberal/ Reform the prayers are usually said in **English.**

- Prayers are kept within the Tefilllin and the Mezuzah.

Shema

It emphasises a key belief -there is only one God.

It reminds Jewish people to love God and follow his commands.

The Shema states Jewish people who serve God will receive blessings.

The Shema reminds Jewish people to fulfil the commands.

Amidah

Fulfils prayer requirements set out by the great Rabbis.

udaism Unit 2 Practices: Rites of passage

It is part of the Siddur, Jewish prayer book and so it is a major prayer for Jewish people.

It helps Jewish people fulfil their service to God.

Asking God for help to fulfil their spiritual and physical needs.

- Amidah means standing and so the prayer should be said **standing, facing Israel.**
- The prayer is said **daily** including on the Sabbath and festivals.

- It is tradition to take three steps backwards and then forwards to symbolise entering **God's presence.**
- It is said in the synagogue, repeated out loud by a cantor, the **congregation recite 'Amen'** to every section.
- To the second section, after the request to God, the congregation with say **'holy, holy, holy is the Lord of hosts, the whole world is filled with his glory'** .
- The final section finishes with blessings of **thanksgiving to God** requesting him to grant **peace, goodness and compassion** on everyone.

Birth and Brit Milah

- Life doesn't begin until the baby is half way out of the mothers womb.
- Babies are sinless and pure.
- Jewish children have two names, one Hebrew and one in their native language. A baby girl is given her names in the synagogue after her father has performed a special reading from the Torah. Boys are names after eight days, during the circumcision.
- **BRIT MILAH**: symbolises the covenant made by Abraham.
- The baby boy has his foreskin removed at eight days old buy a specifically trained Mohel.

Bar/Bat Mitzvah

- When boys and girls 'come of age' they have a ceremony called a Bar Mitzvah (boys, 13) or a Bat Mitzvah (girls, 12).
- They are then responsible for their own actions and religious path.
- Boys can now lead a synagogue service, included in a minyan or read from the Torah. REFORM = girls also can do this.
  - One of the most observed mitzvot, ancient ritual.
  - Shows God their loyalty and faith.
- Boys must study and prepare a passage from the Torah to read during the ceremony. This means they must learn Hebrew. Girls must spend more time learning how to prepare for Shabbat, as well as learning a prayer to recite.
- After the service a special meal is eaten and shared, with big celebrations and parties for families and friends.
- They are now adults in the eyes of Judaism.

Funerals and Mourning

Traditionally the bodies are buried. Reform may use cremation.

'Then Jacob tore his clothes, out on sackcloth and mourned for his son for many days.'

Genesis 37:34

'Abraham circumcised his son Isaac at the age of eight days as God had commanded him.' ***Genesis 21:4***

Use a simple wooden coffin/white cloth.

Should take place within 24 hours of death and the body should never be left alone.

Family and friends pay respects, to the body covered in a shroud and tallit for the men.

Can take place in a synagogue, at home or the cemetery.

Services include readings, singing psalms and a eulogy.

Everyone washes their hands in a ritual outside, symbolising leaving death behind.

Mourning the dead is an important ritual. They might wear a torn black ribbon or cut tie.

After the funeral there is a meal of consolation.

Stones are left instead of flowers, because stones are permanent.

The seven days after are an intense mourning period, where they stay at home, reject luxuries and fun activities,

Special candles are lit to show respect.

Marriage

The Torah does not provide Jews with much guidance about marriage. However, the Talmud explains how to find a partner, how a wedding ceremony should be conducted and how a husband and wife should treat each other.

There are two stages to a Jewish marriage:

1. Kiddushin – the engagement between the couple
2. Nisuin – the full and complete marriage

- The ceremony usually lasts about half an hour.
- During the ceremony the couple stand underneath a canopy called a Chuppah, representing a new home.
- The Rabbi talks and offers advice.
- Seven blessings are said and then the plain metal rung is placed on the bride's finger.
- Orthodox: must be witnessed by two men. Reform: Men or women.
- After the contract is signed the groom stamps on a glass as a reminder of the destruction of the temple.
- The couple then have some time together before the meal and party.

Judaism Unit 2 Practices: Rites of passage

DAY OF REST

- Once a week Jews stop normal life and have a day of rest.
- Begins Friday evening at sunset and ends one hour after sunset on Saturday evening. Times depend on the time of year.
- Shabbat come from Genesis – God created the world in six days and rested on the seventh.
- Moses gave the Ten Commandments, 'Keep the Sabbath day holy.'
- Part of following God's law.

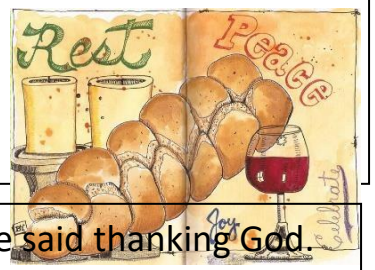
everyone connected and gives • Reform Jews are less strict about following the Sabbath.

by the women.

'God blessed the seventh day and sanctified it because on it he abstained from all His work, which God created to make.' ***Genesis 2:3***

What happens at home?

- The Torah describes 39 actions as work, and all of these are forbidden.
- Orthodox Jews follow the rules very strictly.
- Jews must not work, drive, take public transport, use electricity or any electronic devices, as well as use or exchange money.
- They must visit the synagogue, walking, not carrying anything.
- This helps build a strong community, keeps more time with the family.
- Special meals are eaten and prepared beforehand
- The family home is cleaned and best plates are used.
- The father bless the wine- Kiddush
- Mother lights the candles and says a special prayer.
- Bread is blessed and passed around.
- Blessings and prayers are said thanking God.



Shabbat in the Synagogue

during Shabbat. One is at sunset on Friday; the other is on Saturday morning.

- There are usually two services in the synagogue
- Some Jews will attend both; others will attend one.

The Saturday service can last up to two hours.

- Shema is recited and Torah is read.
- The Torah is then returned to the Ark and a sermon

is given by the rabbi.

- Following this, more prayers are said, including

'Aleinu', which reminds Jews that it is their duty to praise God.

- The service finishes with the singing of a hymn to

God called, 'Master of the World.

Judaism Unit 2 Practices: Festivals

Key Facts

- Festivals happen within set times on the Jewish calendar, but dates may vary year to year.
- Based on the history of the Jewish people.
- Joyful events to celebrate God's involvement and help.
- Celebrated by the entire community, at home and in the synagogue.

Sukkot

- Sukkot begins four days after Yom Kippur but it is very different in mood and content.
- It marks the end of summer and brings in the autumn fruit harvest.

Rosh Hashanah

- It is sometimes known as the feast of tabernacles or the feast o booths.

- Jewish New Year - It is a reminder of the dwellings the Jewish people lived in
- On this day God writes down his judgement on each person depending on their behaviour. during the wilderness years.
- They spend time reflecting on their past year and making peace with others. - It is celebrated for eight days and this is seen as a holiday period - Visit the Synagogue and then return home to celebrate with a special meal. for Jews observing it and a time of particular hospitality to - Eat apples dipped in honey to symbolise a sweet new year. others.
- Shofar (ram's horn) is blown to remind Jews that God will judge them. - They must eat and sleep in a Sukkah.
- Tashlikh: Jews empty their pockets to symbolise getting rid of sin.

'Everything has its season, and there is a time for everything under the heaven… a time to weep and a time to laugh.'

Ecclesiastes 3:1-4

important ?

Why are festivals

- Helps connect the community and bring them together
- Strengthens their faith, and brings them closer to God
- Time to remember key parts of history
- Orthodox = continuing tradition is vital

Passover

- Reminds them of the Angel of Death passing over during their time of slavery in Egypt. (Ten plagues)
- Reminds them of God's mercy, power and their covenant relationship.
- Eat unleavened bread – doesn't rise – shows the hurry of the Jews leaving slavery.
- Sedar meal – everything is symbolic e.g. bitter herbs – to symbolise the bitterness of slavery.
- Sedar wine is drunk to remember God's four promises to Moses.
- Day of Atonement

Yom Kippur

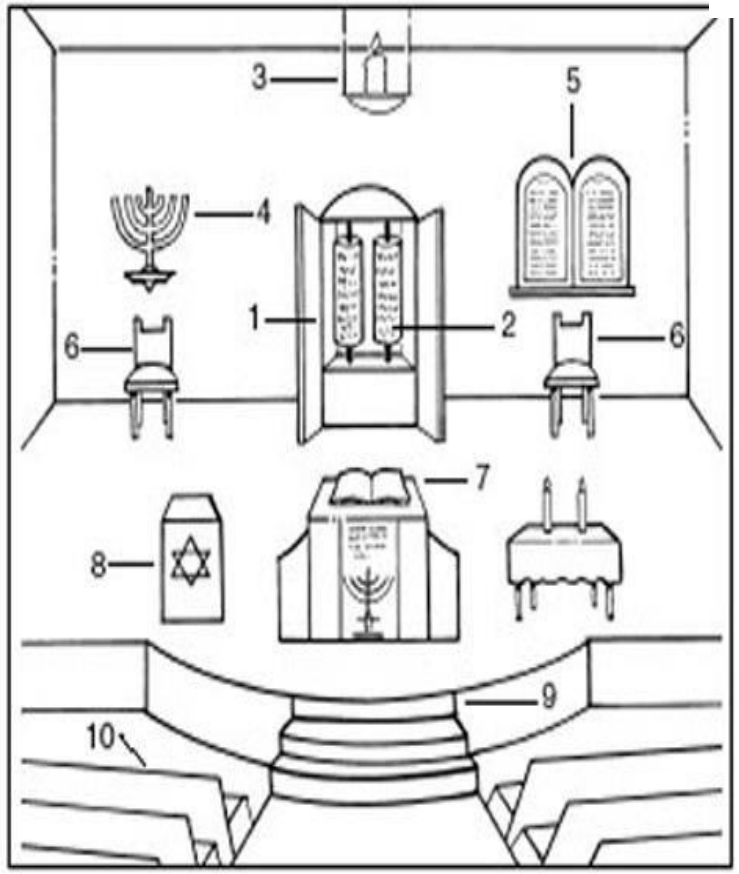
- Holiest day of the year, 10 days after Rosh Hashanah
- God makes his final judgement on whether they have been good/bad.
- Confessing wrongdoing is very important.
- Fast (don't eat or drink) for 25 hours. - Wear white to show purity.
- Avoid make-up/perfume and bathing.
- Pray a lot of the day in the synagogue.

Judaism Unit 2 Practices: The synagogue

- The word synagogue means meeting place or place to gather together.
- Appeared sixth century BCE when Jewish people were in exile in Babylon and away from the temple in Jerusalem.
- Places for prayer, worship and study.
- Synagogues have features and a layout like the temple did, especially the Ark of the Covenant, a box containing the Ten Commandments.
- After the destruction of the temple (second time) in 70 CE synagogues became more and more important, they were used for daily prayer, learning Hebrew and studying the Jewish scriptures.
- Shul =school.
- Today they are a place of worship, an education centre and a community centre.
- Most synagogues run Hebrew classes for children and have a hall for weddings, Bar Mitzvah's, youth clubs, cubs, scouts, guides etc.

A synagogue can be any type of building and so the exterior can be of any design however a synagogue must…

1. **Have a Star of David or a Menorah to show that it is Jewish.**
2. **Have windows letting in light in so worship is not a retreat from the world to pour in light as a sign of God's strength and guidance.**
3. **Be built facing Jerusalem**



9 - Stairs

1- Ark

2 - Torah (sefer Torah)

7 - Bimah

6 - Cantor and rabbi chair

3 -Ner Tamid

4 - Menorah

5 - Ten Commandments

10 – Seating

8 – Star of David

Orthodox vs Reform

- Only men read the Torah and lead the service vs Men and women can take part.
- No music on Shabbat vs music in the service.
- Men and women sit separate vs they sit together.
- Walk to the synagogue vs may drive
- Service in Hebrew vs in the local language.