



CREATING A CLIMATE FOR GREAT LEARNING,
SUCCESS AND OPPORTUNITY

Name: _____

Home Learning Number: _____

Benton Park School
Year 10 Knowledge Organiser
Semester 1B
2023-2024

Creating a climate for great learning, success and opportunity

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Endeavour



Resilience



Inspiration

Collaboration

Compassion

All Benton Park students follow three simple expectations:

- Work hard
- Be kind and respectful
- Follow staff instructions first time

To drive students' success, we actively encourage all learners to adopt the Benton Park Values

Student Support Sheet

Organisation and Planning Sheets

Use the organisation and planning sheets to record your home learning each day.

It is your responsibility to solve any issues you may have with your home learning before the due date.

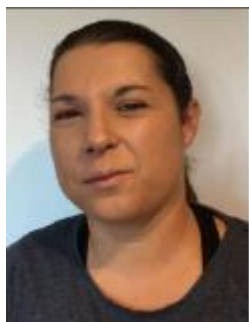
Always have your learning number and full name on your work.

Year 7 Homework Timetable

Day	Homework Due
Monday	English
Tuesday	Humanities
Wednesday	Science
Thursday	Languages
Friday	Maths (Sparx)

Where can I go if I need to do my work or get help?

My Key Stage Leader:
Miss Dobby



My Year Leader:
Miss Downing



**Any of my
Subject
teachers or
Subject
Directors or
Leaders**

In the Library you can:

- Access books and resources
- Use the internet to complete any online home learning
- See staff who can give you any advice and guidance you may need
- Study independently in a quiet place

Emails and Passwords

School Email: _____

Password: _____

Other Usernames and Passwords:

Who else can I get support from?

Year Leaders



**Mrs
O'Donoghue**
Year 7



Miss Ratcliffe
Year 8

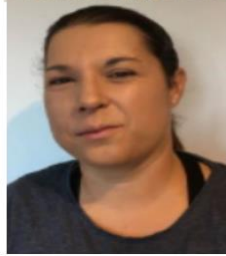


Mr Nicholls
Year 9

Key Stage Leaders



Mrs Collins
Key Stage 3



Miss Dobby
Key Stage 4

**You can also speak to all of your subject teachers, your
PD teacher and all of your pastoral staff:**

Miss Howe, Miss Leonard, Miss Downing, Mrs Owen, Miss
Moss, Miss Webster, Miss Charlton

Safeguarding



Mrs Howard
Designated
Safeguarding
Lead (DSL)



Mrs Bentley
Deputy
Designated
Safeguarding
Lead (DDSL)

Other support



**Miss
Tizard**
SENDCo

SLT Links

Year 7 – Mr Coltman
Year 8 – Miss Tyldsley
Year 9 – Miss Smith
Year 10 – Mr Bownass
Year 11 – Mr Marsh
KS3 – Miss Taylor
KS4 – Mr Hackshaw

Creating a climate for great learning, success and opportunity



Organisation, Planning & Home Communication

CREATING A CLIMATE FOR GREAT LEARNING,
SUCCESS AND OPPORTUNITY

Date set	Task/Note	Date due	Tick when complete

Date set	Task/Note	Date due	Tick when complete



Organisation, Planning & Home Communication

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SUCCESS AND OPPORTUNITY

Date set	Task/Note	Date due	Tick when complete

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Word Revolution	Conflict	A serious argument, clash or disagreement; a clash of opposing ideas or feelings
	War	An armed conflict between different countries or groups
	Enjambment	A poetic technique where lines run on with no punctuation at the end

1: Key Context	"Remains" published in 2015 by Simon Armitage is a poem which explores the psychological impact of war on soldiers.
	Armitage wrote "Remains" during a time when the UK was involved in military operations in Iraq and Afghanistan. The poem reflects the broader context of the War on Terror and the complex dynamics of warfare in contemporary conflicts.
	The context of "Remains" by Simon Armitage is rooted in the experiences and aftermath of war, particularly the conflict in Iraq. The poem draws upon the real-life experiences of soldiers deployed in war zones and explores the psychological and moral implications of their actions.
	Poem coincided with increased awareness of PTSD (Post Traumatic Stress Disorder) amongst the military, and aroused sympathy amongst the public – many of whom were opposed to the war.
	The poem was originally published in a collection called <i>The Not Dead</i> which was developed after a Channel 4 documentary of the same name. The documentary and the poems are based on interviews with returned soldiers.
	"These are poems of survivors – the damaged, exhausted men who return from war in body but never, wholly, in mind."

2. Content	The poem narrates a haunting incident involving the shooting of a looter, in the context of a military deployment.
	The speaker describes shooting a looter dead in Iraq and how it has affected him on his return home. The poet demonstrates to the reader that mental suffering can persist long after physical conflict is over.
	The poem consists of eight stanzas, each with a varying number of lines. The lines within the stanzas are generally short and fragmented, creating a sense of urgency and intensity. The poem is a monologue, told in the present tense to convey a flashback (a symptom of PTSD).

Questions	1. What idea does the poem <i>Remains</i> explore?
	2. What conflicts was the UK involved with at the time it was written?
	3. What is the central event described in the poem?
	4. When does the speaker describe the effects of this event happening?
	5. How is the poem structured?
	6. How has the experience had an impact on the soldier?

Word Revolution	Enjambment	A poetic technique where lines run on with no punctuation at the end
	Caesura	A poetic technique where there is a punctuation break in the middle of a line
	Colloquial	Language used in ordinary everyday conversation; not formal or literary

Language and Structure	<p>In media res: "On another occasion". The poem opens in media res, or mid – action, which serves to confuse the reader as they initially don't know what's going on. This also mirrors the experience of the soldier as they are not prepared for what comes next.</p>
	<p>Colloquial language: Informal language like "Legs it up the road," and, "Then he's carted off in the back of a lorry" reflects the voices of the soldiers themselves. This imagery suggests a reduction of humanity to waste or cattle, with the colloquial language adding realism to the soldier's narrative, allowing readers to connect with the character on a more personal level.</p>
	<p>Violent imagery such as: "the image of agony" and "his bloody life in my bloody hands" and "tosses his guts back into his body" create powerful mental images that intensify the emotional and physical experiences portrayed in the poem. "dug in behind enemy lines" - metaphor for a war in his head; the PTSD is entrenched. "his bloody life in my bloody hands"</p>
	<p>Enjambment: The poem utilises enjambment, where lines run into each other without punctuation, carrying the thought or sentence across multiple lines. Creates a sense of flow and continuity, mimicking the soldier's racing thoughts and adding to the poem's urgent and fast-paced tone.</p>

Language and Structure	<p>Repetition: The repetition of "probably armed, possibly not" creates a haunting refrain that lingers in the reader's mind, underscoring the lasting impact of the soldier's actions and the terrible guilt arousing from not knowing whether the looter was a true threat. The cyclical structure and return to this phrase shows how he is forced to keep coming back to this question. The crux of his suffering is unresolved guilt.</p>
	<p>Caesura: The use of punctuation breaks mid line, such as "Then I'm home on leave. But I blink". The caesura interrupts the sentence, just as his memories of conflict interrupt his everyday. This forces the reader to pause and think and consider conflict through the speaker's perspective.</p>

Questions	1. What does it mean that the poem starts 'in media res'?
	2. What is one effect of the use of colloquial language?
	3. What metaphor suggests the soldier is suffering a war in his head?
	4. What might the use of enjambment reflect in the soldiers experience?
	5. What emotion is at the centre of the soldier's suffering?
	6. What is one effect of the use of caesura?

Word Revolution	Patriotic	Having or expressing devotion or love for one's country
	Metaphor	A way of describing something figuratively, as if it <i>is</i> something else
	Caesura	A poetic technique where there is a punctuation break in the middle of a line

Key Context	Written by Ted Hughes and published in 1957, Bayonet Charge is most-likely set in World War 1. Hughes' father had survived the battle of Gallipoli in World War 1, although Hughes himself never saw combat first-hand.
	The context of the poem is deeply rooted in the historical events of World War I (1914-1918), a conflict that had a profound impact on society, culture, and literature. The war was characterised by trench warfare, where soldiers would face intense, close-range combat, often charging at the enemy with bayonets (long sword-like weapons) fixed to their rifles.
Language and Structure	Imagery: The poem is rich in vivid imagery, describing the soldier's surroundings, actions, and emotions in detail. For example, "Bullets smacking the belly out of the air" and "King, honour, human dignity, etcetera / Dropped like luxuries" evoke powerful visual and sensory images.
	Metaphor: The bayonet charge itself becomes a metaphor for the senseless violence and chaos of war. It symbolizes the dehumanizing nature of conflict and the soldier's loss of individuality as he becomes a mere instrument of destruction.
	Caesura jolts the soldier back to reality. "Then the shot slashed furrows / Threw up a yellow hare that rolled like a flame And crawled in a threshing circle". Also highlights the impact of war on nature – the hare is distressed, just like the soldiers.
Content	The poem starts 'in media res': in the middle of the action, to convey shock and pace and mirror the experience of the soldier suddenly thrust into bewildered action.
	Steps inside the body and mind of the speaker to show how this act transforms a soldier from a living thinking person into a dangerous weapon of war. Hughes dramatises the struggle between a man's thoughts and actions.
	"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.
Questions	1. What is the effect of the poem starting 'in media res'?
	2. What does it mean to be patriotic?
	3. What does Hughes depict the soldier being metaphorically transformed into?
	4. What do you know about the context of the poem?
	5. Why does Hughes use the image of a hare suffering?
	6. What emotions does the soldier experience in this poem?



Word Revolution	Conflict	A serious disagreement
	Patriotic	Having or expression devotion and support for your country
	Nature	The collective physical world including plants, animals, landscape and other features and products of the earth

1: Context	War photography involves taking photos of armed conflict and the effect on people and places. The photographers often have to put themselves in harms way and can be injured or killed themselves. In the Iraq war 36 photographers were abducted or killed.	3: Techniques	Metaphors- Duffy uses metaphors to suggest the deeper pain suffered by the war photographer.
			Religious Imagery- ‘mass’, ‘priest’, ‘church’, ‘red light’, ‘ghost’ all a semantic field of religion. Both the priest and the war photographer have to cope with death
			Sibilance- ‘spook’ ‘suffering’ and ‘set’ used to emphasise the pain of war
			Verbs- ‘running’ cries’ ‘twist’ all allow the reader to create their own imagery
			Alliteration- the repeated harsh ‘b’ sound in Belfast and Beirut increase the intensity of war.
2: Conflicts	‘Belfast’ refers to the ‘troubles’ in Northern Ireland, more than 3,500 people were killed. ‘Beirut’ may be referring to the Lebanon war in 1982. ‘Phnom Penh’ refers to the Cambodian Capital – this was affected by the Cambodian genocide between 1975 and 1979 killing approximately 1.3 to 3 million Cambodians.	Questions	1. What is the job of a war photographer?
			2. What happened in Cambodia between 1975 and 1979?
3. To be patriotic is to be what?			
4. Is being a war photographer dangerous?			
5. List three techniques use in the poem			
6. Words about the same topic are known as?			



Word Revolution	Patriotic	Having or expressing devotion or love for one's country
	Conflict	A serious argument, clash or disagreement; a clash of opposing ideas or feelings
	Posthumously	After death

Context	"Exposure" is a powerful war poem written by Wilfred Owen, an English poet and soldier during World War I. The poem vividly captures the harsh reality and conditions experienced by soldiers on the Western Front.
	The poem describes soldiers huddled in trenches during a winter night, exposed to a hostile environment. It emphasizes the extreme cold, relentless wind, and freezing snow faced by the soldiers. The poem highlights the soldiers' struggle to survive and their vulnerability to the elements. It explores the physical, mental, and emotional toll of war on the soldiers.
	Throughout the poem, Owen criticizes the authorities and the leaders who send young men to their deaths, questioning the purpose and justification of war. He challenges the idealized notions of heroism and exposes the harsh reality faced by soldiers on the front lines
	In the end, "Exposure" leaves the reader with a sense of hopelessness and despair, illustrating the futility and senselessness of war. It serves as a poignant reminder of the sacrifices made by soldiers and the devastating consequences of conflict.

Context	Exposure" is a war poem written by Wilfred Owen, a renowned British poet and soldier who served in World War I. Owen's experiences as a soldier deeply influenced his poetry, which often depicted the horrors and disillusionment of war.
	During World War I, soldiers faced unimaginable hardships, both physical and psychological, as they fought in the trenches and endured extreme weather conditions. "Exposure" reflects Owen's own experiences on the front lines, where soldiers were exposed to freezing temperatures, constant danger, and the constant threat of death.
	Published posthumously in 1920, following Owen's tragic death in action a week before the end of the war. "Exposure" is considered one of Owen's most famous and powerful poems, highlighting the themes of suffering, disillusionment, and the human cost of war.

Language	Personification (cruel and murderous wind); sibilance (cutting/slicing sound of wind).
	Repetition of pronouns 'we' and 'our' – conveys togetherness and collective suffering of soldiers. -'mad gusts tugging on the wire' – personification.
	Our brains ache" physical (cold) suffering and mental (PTSD or shell shock) suffering.
	Semantic field of weather: weather is the enemy. -"the merciless iced east winds that knife us..."
	Repetition of "but nothing happens" creates circular structure implying never ending suffering.
	Rhyme scheme ABBA and hexameter gives the poem structure and emphasises the monotony. Pararhymes (half rhymes) ("nervous / knife us") only barely hold the poem together, like the men.

Key Questions:	1. What are the main weather conditions described in the poem "Exposure,"?
	2. What is personified in the poem and why?
	3. Why is it sad that the poem was published posthumously? What does it tell us about the poet?
	4. What is the significance of the repeated refrain "But nothing happens"? How does it reflect the soldiers' sense of disillusionment and their feelings of being forgotten in the war?



Word Revolution	ANALYSE	To examine something methodically and in detail in order to explain and interpret it
	EVALUATE	Assess or form an idea of something.
	PERSPECTIVE	A particular attitude towards or way of regarding something

THE QUESTIONS	SECTION A: 50% of the paper: (1 hour) Q1: List 4 things about... Identifying information from the start of the text. [4 marks]
	Q2: How does the writer use language to... Exploding quotes / unpicking meanings. [8 marks]
	Q3: How does the writer use structure to interest the reader? How does the writer put the text together? [8 marks]
	Q4: Evaluate to what extent you agree with a statement. Unpicking language and structure to support your opinion. [20 marks]
	SECTION B: 50% of the paper (45 mins) Q5: Creative Writing A choice of either descriptive or narrative writing. [40 marks]

LANGUAGE TECHNIQUES	Use PEAL to help you structure your answers. (Point Evidence Analyse Link)
	EXTENDED METAPHORS When a metaphor is used more than once across the length of the text
	SEMANTIC FIELDS Words / phrases that are related to each other through similar meanings or topics
	PERSONIFICATION Attributing something human to non-human things
	PATHETIC FALLACY When the weather represents the human emotions in the text
	SIMILES The comparison of one thing to another to make the description more vivid

STRUCTURAL TECHNIQUES	STOPSEC (Setting Time Openings Perspective Shift Endings Characters)
	SETTING: Where is the text set? Does it change? What mood does it create?
	TIME: Era in which the text is set. Time of year? Time of day. Does this change? Flashback / flashforward / ellipsis / cyclical structure?
	OPENINGS AND CLOSINGS: How are these important? What does the writer draw our attention to?
	PERSPECTIVE: Whose perspective are we given? Is there more than one? Is it in first or third person?
	SHIFT: Where and why does the writer shift the focus? What do they want the reader to pay attention to?

QUESTIONS	1. What skills are you being asked to demonstrate if you have to 'evaluate'?
	2. How much is section B worth of the whole exam and how long should you spend on it?
	3. What is an extended metaphor?
	4. What is a semantic field?
	5. What do we mean by 'perspective'?
	6. What different types of information do we look for when we discuss TIME?



Word Revolution	NARRATIVE	A spoken or written account of connected events; a story
	DESCRIPTIVE	To describe a person, place, thing or event and capture it through paying close attention to the details by using all of your five senses
	STRUCTURE	The arrangement of the ideas and description in the text

USEFUL SENTENCE STARTERS	The word / phrase / subject term '...' creates an impression of...	SUBJECT TERMINOLOGY: NARRATIVE STYLES	Limited 3 rd person	External narrator with knowledge of one character's feelings
	The writer has used a [language device] to suggest/imply/create		Omniscient 3 rd person	External narrator- knowledge of more than one character's feelings
	The writer opens the text by introducing/using [insert STOPSEC feature] in order to suggest/create...		1 st person	Told from a character's perspective (I).
	Throughout the extract the writer creates a ... tone / atmosphere.		2 nd person	Directed to the reader (you).
	To some extent I agree with... I certainly agree that... However, it could also be argued that... Overall I agree that...		Unreliable Narrator	When the perspective offered makes us question the narrator's credibility.
SECTION B WRITING TECHNIQUES	Descriptive writing structure - 5 paragraphs using this perspective: Panoramic Zoom Zoom Zoom Panoramic		Linear	Events are told chronologically.
	Narrative writing structure – 5 paragraphs using this structure: Hook / Setting Character description Development – build up of tension Event / Climax Character – how has the event changed them?		Non-Linear	Events are not told chronologically.
	Vary your sentence openers with verbs, adverbs, prepositions, adjectives.		Dual	Told from multiple perspectives.
	Vary the length of your sentences and your paragraphs.		Cyclical	Ends the same way it begins.
		QUESTIONS	1. What is the difference between descriptive and narrative writing?	
			2. If you were unpicking meanings from a text, what sentence starters could you use? Can you think of at least three?	
			3. How can you vary the opening of your sentences?	
			4. What is an unreliable narrator?	
			5. What do we mean by the 'structure' of a text?	
			6. What is an omniscient narrator? Can you think of any examples of where you have seen this in action?	

Word Revolution	Structural device	Techniques used by writers in order to shape or create effects in the text
	Stage directions	Instructions for technical aspects of the play
	Dialogue	Spoken words

1: Sheila and Mrs. Birling	<p>Mr. Birling wants to excuse Gerald's affair, Sheila isn't convinced. Gerald plans to leave. The photograph is not seen by Gerald but the Inspector said he didn't need to, Mrs. Birling is however and claims not to know her. Mr. Birling wants the Inspector to apologise but the Inspector impresses upon him that power still has responsibilities as well as privileges. Sheila recounts the events so far and urges Mrs. Birling to tell the truth. Sheila wants her parents to avoid making the situation worse.</p>
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3: Stage directions	<p>‘angrily’</p> <p>‘massively’</p> <p>The Inspector's authority</p> <p>‘calmly’</p> <p>‘severely’</p>
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2: Context and Structure	Powerful social positions were down to wealth and connections. The Birlings make their money through business
	The Crofts are higher on the social scale, due to their wealth they have stronger influences on society.
	The Inspector though does not let anyone's social position affect him. He does not seem to fear the sense of hierarchy that Edwardian Society has.
	The photograph is not shown to everyone, but is controlled by the Inspector. Is it even the same photograph?
	Just when Mrs. Birling is able to reinforce her denial, the ‘front door slams’ another structural device to distract characters and audience.

Questions	1. What do the stage directions above suggest about how Priestley wants the Inspector to be seen?
	2. What have we learnt Sheila?
	3. What do we know about the Crofts?
	4. How does Sheila feel about Gerald now?
	5. How is the photograph used by the Inspector?
	6. Why is Mrs. Birling an unsympathetic character?

Word Revolution	Inferior	A person who is lower in position or rank than someone else
	Edwardian	Period of history marking King Edward VII reign, often extended up to WW1
	Euphemism	A word or phrase used instead of an offensive or frank word

1: Gerald confesses	Gerald admits to the Inspector how he knew Daisy Renton. At first he tries to deny any knowledge but then mentions the Palace Theatre Bar. Sheila stays to listen. Gerald 'rescued' Daisy from Alderman Meggarty and then became Gerald's mistress. The affair was ended by Gerald, Mr and Mrs Birling are shocked at what they hear. Sheila is pleased with his honesty but returns the engagement ring.
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2: Useful Quotes	'As soon as I mentioned the name Daisy Renton, it was obvious you'd known her'
	'Women of the town'
	'this disgusting affair'
	'over-excitement'
	'gave me a glance that was nothing less than a cry for help'

3: Respectability	Gerald's affair with Daisy would have caused a scandal in society.
	Daisy Renton was poor, working class and a prostitute.
	Mrs. Birling refers to the affair as 'disgusting' highlighting her hatred of the knowledge and not wanting to know any more.
	The questions continue to be asked by the Inspector as he exposes the hypocrisy of the 'social crime'
	Gerald and Sheila, for their marriage to work need to confront the double standards and be honest with each other.

Questions	1. What do we know about Daisy Renton?
	2. What does Sheila do with the ring?
	3. What is a euphemism? What does the term 'women of the town' imply?
	4. Will Gerald and Sheila's marriage work?
	5. How does Mrs Birling refer to the affair?
	6. When was the Edwardian era?

Word Revolution	Sympathy	To understand of other people's feelings or opinion
	Responsibility	To accept your own decisions
	Inferior	Beneath you

Mrs Birling	<p>Mrs Sybil Birling is Arthur Birling's wife and right from the opening of the play she is cold-hearted and snobbish despite being a prominent member of local women's charity. Throughout dinner she tells Sheila and Eric off for things that she considers impolite whilst ignorantly turning a blind eye to her son drinking too much. It is clear that despite Eric being old enough to drink and Sheila getting married, she sees them both as children, not as a young man and woman.</p>	<p>3: A student's response</p> <p><i>Priestley indicates how little Mrs. Birling knows about her son through her ignorance of his drinking. She excuses him to the Inspector by saying that Eric has 'had rather too much to drink tonight'. Sheila immediately tells her mother the truth in an attempt to 'stop these silly pretences' because she is aware that the Inspector is concerned about truth and Mrs. Birling is not facing the truth. When Gerald supports Sheila, Mrs Birling responds 'bitterly' complaining about the unsuitability of the occasion to give her the news.</i></p>
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2: The importance of this moment	The audience realise the big difference between Mrs. Birling and Sheila	Questions	1. How does Mrs Birling see the inspector?
	Mrs. Birling wants to highlight her status to over throw the Inspector... but this fails		2. What does the student response tell us about Mrs Birling?
	The audience realise that Mrs. Birling is insensitive and not aware of her son's behaviour		3. How does she treat her children?
	Sheila notices that the Inspector is in control and can break down people easily.		4. What doe we know about Eric?
	Mrs. Birling sees the Inspector as her social inferior.		5. How does Sheila Compare to her mother?
			6. 'We often do on the young ones. They're more impressionable' What does this quotation suggest?

Word Revolution	Pathogens	Micro-organisms that cause disease
	Antigens	Proteins on the surface of a cell that trigger an immune response.
	Antibodies	Proteins produced by a type of white blood cell called a lymphocyte.

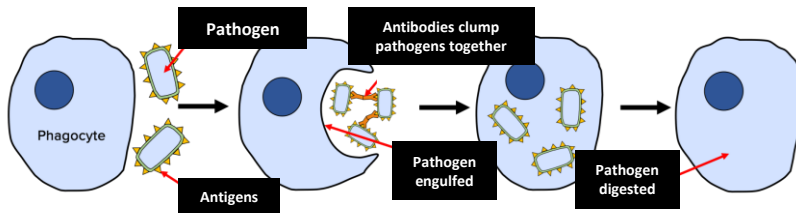
1: Human Defence systems

Barriers to pathogens:

1. The skin
2. Hairs and mucus in the nose
3. Mucus and cilia in the airways
4. Hydrochloric acid in the stomach

Defending against pathogens:

1. Phagocytosis - white blood cells engulf and digest pathogen such as bacteria.
2. Producing antibodies - antibodies bind to pathogens so they can be found and destroyed by the immune system. Antibodies are specific to a particular pathogen.
3. Antitoxins - these stop toxins made by bacteria having an effect.



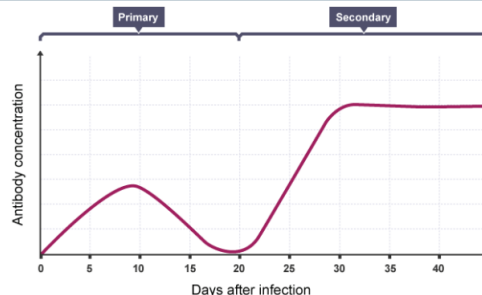
2: Vaccinations

How a vaccine works:

- A small amount of dead or inactive pathogen is injected.
- The antigens on the pathogen cause the white blood cells to produce specific antibodies to attack it.
- Memory cells are created that allow antibodies to be created faster and in large quantities next time.

Primary response - the first time your body sees the pathogen. Slow and low amount of antibodies made.

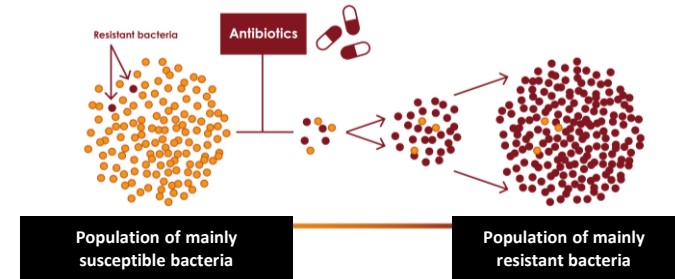
Secondary response - The second time the pathogen is seen. Faster response and more antibodies made.



3: Antibiotic and painkillers

An antibiotic is a drug that kills bacteria. Penicillin is an example of an antibiotic. Antibiotics can be used to treat disease caused by bacteria only. Specific antibiotics are used for specific bacteria.

Antibiotics have reduced deaths from bacterial diseases significantly. However there are antibiotic resistant strains of bacteria that have evolved that is very worrying because we do not have ways of treating those infections



Painkillers do not kill pathogens, they only treat the symptoms of disease. It is hard to develop drugs that kill viruses as viruses live inside host cells so it is difficult to kill viruses without also killing the body's cells.

Questions

1. Name 3 ways white blood cells can defend against pathogens.
2. Name 4 barriers that stop pathogens getting into the body.
3. What does a vaccination contain?
4. How is the secondary response different to the primary exposure?
5. What does an antibiotic do?
6. Why is it hard to develop drugs that kill viruses?

Word Revolution	Atom	The smallest part of an elements that can exist
	Element	A substance made of one type of atom only
	Molecule	A collection of two of more atoms held together by chemical bonds
	Avogadro's constant	The number of particles in one mole of a substance is 6.02×10^{23}
	Relative atomic mass	The mean relative mass of the atoms of the different isotopes in an element, it is the number of times heavier an atom is than one-twelfth of a carbon-12 atom

1: Relative formula mass

Atoms have very little mass so their relative atomic masses are used. The relative atomic mass of an element, A_r , is the relative mass of its atoms compared to the mass of a carbon-12 atom. The A_r values for elements are given in the periodic table. Since A_r is a measure of relative mass, it has no units.

The relative formula mass of a substance made up of molecules is the sum of the relative atomic masses of the atoms in the numbers shown in the formula.

Relative formula mass has the symbol, M_r . To calculate the M_r for a substance:

- work out how many atoms of each element there are in the chemical formula
- add together the A_r values for all the atoms of each element present.

Example

The formula for carbon dioxide is CO_2 . It consists of one carbon atom ($A_r = 12$) and two oxygen atoms ($A_r = 16$):

$$M_r \text{ of } \text{CO}_2 = 12 + 16 + 16 = 44$$

It could also be calculated this way:

$$M_r \text{ of } \text{CO}_2 = (1 \times 12) + (2 \times 16) = 12 + 32 = 44$$

3: Limiting reactants

A reaction finishes when one of the reactants is all used up. The other reactant has nothing left to react with, so some of it is left over:

- the reactant that is all used up is called the limiting reactant
- the reactant that is left over is described as being in excess

The mass of product formed in a reaction depends upon the mass of the limiting reactant. This is because no more product can form when the limiting reactant is all used up.

2: Conservation of mass

The law of conservation of mass states that no atoms are lost or made in a chemical reaction. Instead, the atoms join together in different ways to form products. This is why, in a balanced symbol equation, the number of atoms of each element is the same on both sides of the equation.



Since atoms are not lost or made in a chemical reaction, the total mass of the products is equal to the total mass of the reactants. The sum of the relative formula masses of the reactants is equal to the sum of the relative formula masses of the products.

Questions

- What is the relative formula mass of N_2O ? (A_r or $\text{N}=14$ and of $\text{O}=16$)
- What is the relative formula mass of $\text{Ca}(\text{NO}_3)_2$? (A_r of $\text{Ca}=40$, $\text{N}=14$ and $\text{O}=16$)
- What does the law of conservation of mass state?
- What is the definition of the Avogadro constant?
- What is the relative atomic mass?
- What is a molecule?

Word Revolution	Radioactive decay	The process in which unstable atomic nuclei break apart or change, releasing radiation as they do.
	Radiation	Energy carried by particles from a radioactive substance, or spreading out from a source.
	Radioactive	When unstable atoms give off particles that can be harmful to humans.
	Beta	A type of ionising radiation consisting of a single electron.
	Alpha particle	Subatomic particle comprising of two protons and two neutrons (the same as a helium nuclei).

1: Half life

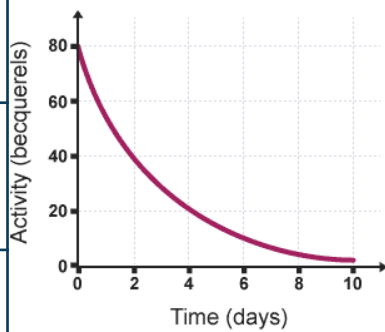
A block of radioactive material will contain many trillions of nuclei and not all nuclei are likely to decay at the same time so it is impossible to tell when a particular nucleus will decay.

Radioactive decay is a random process. You don't know which nuclei in an unstable isotope will decay or when.

Half life is the time taken for the number of nuclei in a radioactive isotope to half.

Count-rate is the number of decays recorded each second by a detector, such as the Geiger-Muller tube.

Activity is the rate of decay and is measured in becquerel (Bq).



2: Properties of nuclear radiation

	Symbol	Penetrating Power	Ionising Power	Range in air
Alpha	α	Skin, paper, smoke	High	A few cm
Beta	β	Thin Aluminium	Low	A few metres
Gamma	γ	Lead, concrete	Very low	A few km

All types of radioactive decay can be detected by a Geiger-Muller tube, or G-M tube.

Questions

- Which form of radiation has the highest ionising power?
- What is an alpha particle?
- Which type of radiation can reach the furthest?
- What is radioactive decay?
- What is meant by the half-life of a radioactive source?
- What is count-rate?

Word Revolution	Placebo	A substance given to someone who is told that it is a particular medicine.
	Cancer	Uncontrolled cell growth and division leading to tumours.
	Efficacy	How well something works.

1: Drugs

Traditionally drugs were extracted from plants and microorganisms. Examples are:

- The heart drug digitalis originates from foxgloves.
- The painkiller aspirin originates from willow.

Most new drugs are synthesised by chemists in the pharmaceutical industry. However, the starting point may still be a chemical extracted from a plant.

New medical drugs have to be tested and trialled before being used to check that they are safe and effective. New drugs are extensively tested for toxicity (if it is toxic), efficacy (how well does it work) and dose (how much should be given).

Preclinical testing is done in a laboratory using cells, tissues and live animals, not patients.

Clinical trials use healthy volunteers and patients.

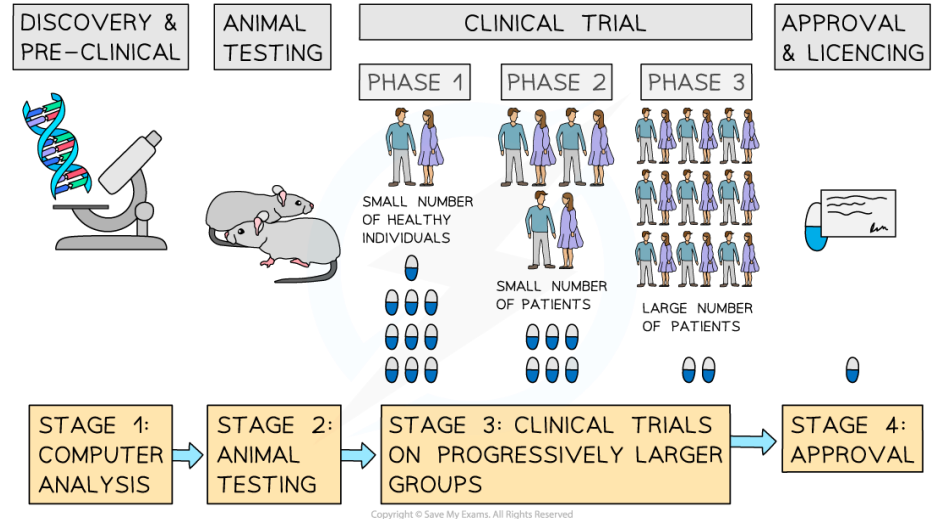
- Very low doses of the drug are given at the start of the clinical trial.
- If the drug is found to be safe, further clinical trials are carried out to find the optimum dose for the drug.
- In **double blind trials**, some patients are given a **placebo**. Doctors and patients don't know who has been given the placebo.

2: Cancer

Cancer happens as the result of changes in cells that lead to uncontrolled growth and division.

Benign tumours are growths of abnormal cells which are contained in one area, usually within a membrane. They do not invade other parts of the body. Malignant tumour cells invade neighbouring tissues and spread to different parts of the body in the blood where they form secondary tumours.

Scientists have identified lifestyle risk factors for various types of cancer. There are also genetic risk factors for some cancers.



Questions

- Name 2 drugs that were extracted from plants and microorganisms.
- What is the difference between clinical and preclinical testing?
- What 3 things are drugs tested for?
- What are the differences between benign and malignant tumours?
- Which phase of drug development involves the most people?
- Which phase of drug development involves healthy people?



Word Revolution	Concentration	Tells us how much of a substance is dissolved in water. The higher the concentration, the more particles of the substance present.
	Mole	The amount of substance that contains the same amount of particles in 12g of carbon-12.
	Limiting reactant	The reacting substance that is completely used up in a chemical reaction and which determines how much product is made.
	Mass	The amount of matter an object contains. Mass is measured in kilograms (kg) or grams (g).
	Excess	A substance is in excess if there is more than enough to react with another reactant.

1: Calculating moles	$\text{amount (mol)} = \frac{\text{mass(g)}}{\text{molar mass (g/mol)}}$
	Use A_r instead of M_r for metals or separate atoms.
	<p>Example Calculate the amount of carbon atoms in 6.0 g of carbon. (A_r of C = 12)</p> <p>Amount: $\frac{\text{mass}}{A_r}$</p> <p>Amount = $\frac{6.0}{12}$</p> <p>Amount = 6.012 = 0.5 mol</p>

2: calculating the number of particles	<p>The number of particles in a substance can be calculated using:</p> <ul style="list-style-type: none"> the Avogadro constant (6.02×10^{23}) the amount of substance in mol <p>Number of particles = Avogadro constant \times the amount of substance in mol</p>	<p>Example Calculate the number of water molecules in 0.5 mol of water.</p> <p>Number of water molecules = Avogadro constant \times amount of substance in mol $= 6.02 \times 10^{23} \times 0.5$ $= 3.01 \times 10^{23}$</p>
	<p>It is important to state the particles involved. For example, 3.01×10^{23} water molecules contain 9.03×10^{23} atoms. This is because one water molecule, H₂O, is made up of three atoms.</p>	

3: Concentration	$\text{CONCENTRATION} = \frac{\text{MASS OF SOLUTE IN g}}{\text{VOLUME IN dm}^3}$
	<p>A solution forms when a solute dissolves in a solvent. The concentration of a solution is a measure of how 'crowded' the solute particles are. The more concentrated the solution, the more particles it contains in a given volume.</p> <p>Example 8 g of sodium hydroxide is dissolved in 2 dm³ of water. Calculate the concentration of the sodium hydroxide solution formed.</p> <p>concentration = $\frac{\text{mass of solute in g}}{\text{volume in dm}^3}$</p> <p>concentration = $\frac{8 \text{ g}}{2 \text{ dm}^3}$</p> <p>concentration = 4 g/dm³</p>

Questions	1. What is the equation to calculate the amount or number of moles (mol) of a substance?
	2. What is the equation to calculate the number of particles in a substance?
	3. What is the equation to calculate concentration in g/dm ³ ?
	4. 2.0g of copper sulfate is dissolved in 0.5g/dm ³ of solution. What is the concentration of the solution? Show your working.
	5. What is Avogadro's constant?
	6. What is a limiting reactant?

Word Revolution	Radioactive Decay	The process in which unstable nuclei break apart or change, releasing radiation as they do so.
	Nucleus	The central part of the atom that contains protons and neutrons. It makes up most of the mass of the atom. Plural: Nuclei.
	Unstable	An unstable atom has excess internal energy, with the result that the nucleus can undergo a spontaneous change towards a more stable form

1: Alpha Decay

An unstable nucleus can decay by emitting an alpha particle. An alpha particle contains 2 protons and 2 neutrons.

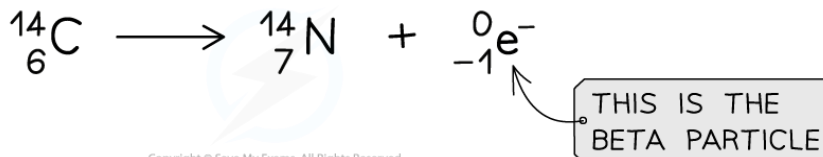
An alpha particle has a mass number of 4 and an atomic number of 2. As an isotope decays by alpha radiation, the mass number will reduce by 4 and the atomic number by 2.



2: Beta Decay

An unstable nucleus can decay by emitting a beta particle. A beta particle contains 1 high speed electron.

A beta particle has a mass number of 0 and an atomic number of -1. As an isotope decays by beta radiation, the mass number will stay the same and the atomic number will increase by 1.



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3: Using Nuclear Decay Equations

Both sides of the nuclear decay equation must balance. The mass numbers and atomic numbers must have an equal total on both sides.

Remember the difference in structure between alpha particles and beta particles. You may need to work out what kind of decay is happening.

Alpha particles will REDUCE the atomic and mass numbers of the parent atom. Beta particles will INCREASE the atomic number only.

Gamma radiation is an emission of energy only. There is no change to the atomic or mass numbers during gamma decay.

You may need to work backwards to work out a parent atom using the products of a nuclear decay equation, use the same rules but in the other direction.

Questions

1.What is the structure of an alpha particle?

2.What is the structure of a beta particle?

3.Complete the decay equation below with all missing information ${}_{92}^{238}\text{U} \longrightarrow \square \text{Th} + \alpha$

4.Identify the element X and the radiation given off in the equation ${}_{91}^{234}\text{Pa} \rightarrow {}_{92}^{234}\text{X} + \text{radiation}$

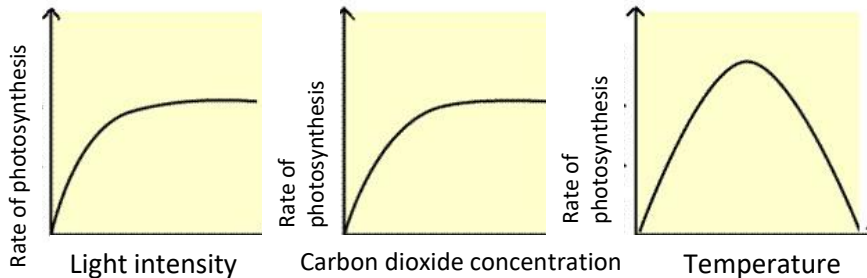
5.Why do isotopes decay?

6.Why does gamma radiation not change the structure of atoms?

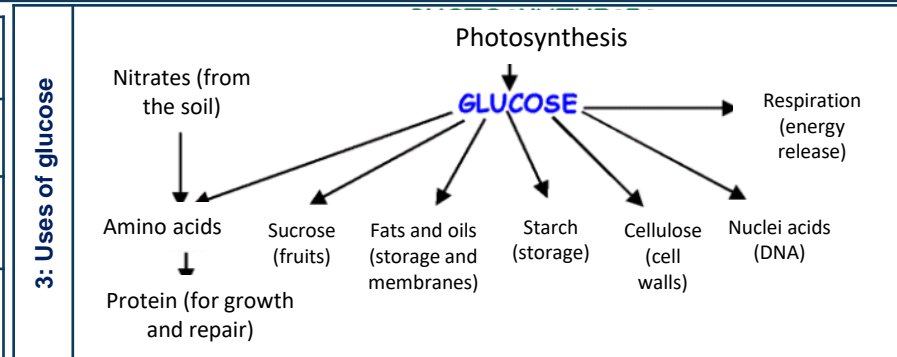
Word Revolution	Glucose	A simple sugar made by photosynthesis and used in respiration
	Limiting factor	A limiting factor is a condition, that when in shortage, slows down the rate of a reaction
	Respiration	The process of transferring energy from glucose. This happens in every cell

1: Photosynthesis	Photosynthesis happens in the chloroplasts of plant cells. The majority of photosynthesis happens in palisade cells in the leaf.
	Chlorophyll is a green pigment that absorbs light. It is found in the chloroplasts
	$\text{carbon dioxide} + \text{water} \xrightarrow{\text{light}} \text{glucose} + \text{oxygen}$
	$6CO_2 + 6H_2O \xrightarrow{\text{light}} C_6H_{12}O_6 + 6O_2$
	Photosynthesis is an endothermic reaction in which energy is transferred from the environment to the chloroplasts by light.

2: Rate of photosynthesis	The rate of photosynthesis is affected by temperature, concentration of carbon dioxide, light intensity and amount of chlorophyll. A limiting factor is something that stops the rate of a reaction getting any faster. For example, the rate of photosynthesis may not increase any more, even though light intensity is increasing, because it is being limited by the concentration of carbon dioxide of temperature.
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When the line is going up, the rate of photosynthesis the limiting factor is the factor that is being increased. When the line is flat, the rate of photosynthesis is being limited by a different factor that has not been changed. When temperature is increased too high, enzymes used in photosynthesis have been denatured.

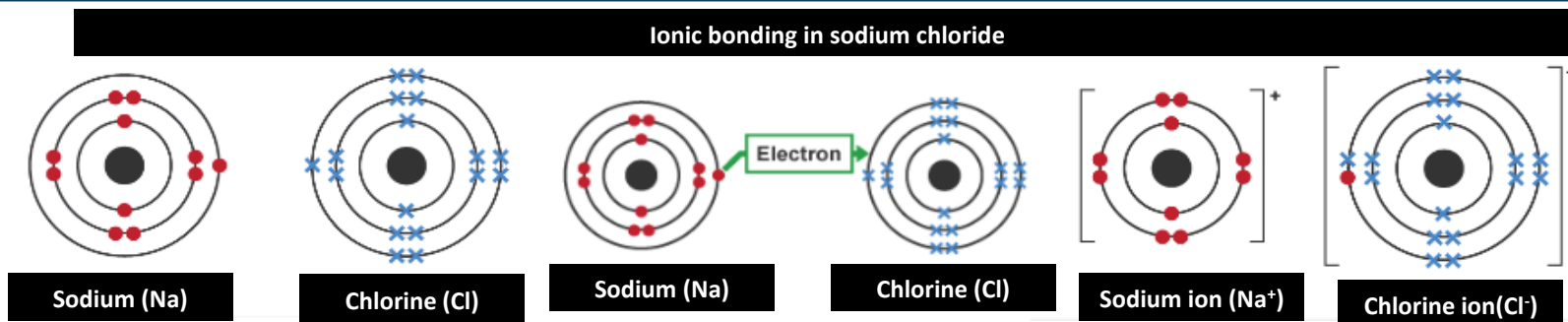


4: Maximising photosynthesis	<p>The ideal environment for photosynthesis can be created in a greenhouse.</p> <ol style="list-style-type: none"> 1. Trap the heat in the greenhouse. Heaters used to make it warm or blinds used to make it cooler 2. Burn paraffin heaters to increases temperature and supply carbon dioxide 3. Use artificial light at night 4. Add fertiliser 5. Keep plants inside to avoid pests and disease <p>All of this costs a lot but can give more crops which can be sold.</p>
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Questions	1. What is the word equation for photosynthesis
	2. What is the symbol equation for photosynthesis
	3. What 4 things could deceases the rate of photosynthesis?
	4. What 2 things are needed to make amino acids?
	5. What are 3 forms that glucose can eb stored in?
	6. Why are paraffin heaters useful in greenhouses?

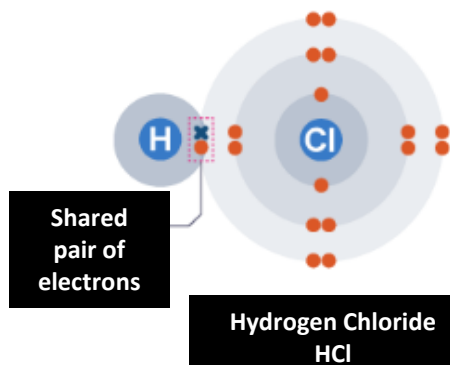
Word Revolution	Ionic bonding	Ionic bonding forms between two atoms when an electron is transferred from one atom to the other, forming a positive-negative ion pair
	Ionic compound	An ionic compound occurs when a negative ion (an atom that has gained an electron) joins with a positive ion (an atom that has lost an electron)
	Covalent bond	A bond between atoms formed when two atoms share electrons to achieve a full outer shell of electrons
	Double bond	A covalent bond resulting from the sharing of four electrons (two pairs) between two atoms
	Intermolecular forces	The attraction between the individual molecules in a covalently bonded substance

1: Ionic Bonding



Positive and negative ions form when a metal reacts with a non-metal, by transferring electrons. Metal ions lose electrons to form positive ions. Non metals gain electrons to form negative ions. The oppositely charged ions are strongly attracted to each other, forming ionic bonds.

2: Covalent Bonding



A covalent bond forms when two non-metal atoms share a pair of electrons. The electrons involved are in the outer shells of the atoms. An atom that shares one or more of its electrons will complete its outer shell.

Covalent bonds are strong – a lot of energy is needed to break them.

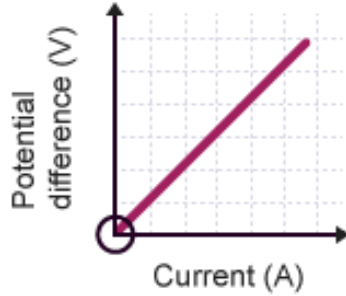
Questions

1. How do metal atoms form ions
2. Why are ions attracted to each other?
3. Draw the full diagram showing how NaCl is formed.
4. Why are covalent bonds strong?
5. How many electrons are shared between hydrogen and chlorine?
6. Draw the dot and cross diagram of HCl.

Word Revolution	Potential difference	The energy transferred per coulomb of charge. Measured in volts.
	Current	The flow of electrons (charge) per unit time – measured in amps using an ammeter.
	Ohms Law	Potential Difference = Current \times Resistance ($V = I \times R$)

1: Ohm's law	$V = I \times R$
	V is the potential difference in volts, V
	I is the current in amperes (amps), A
	R is the resistance in ohms, Ω

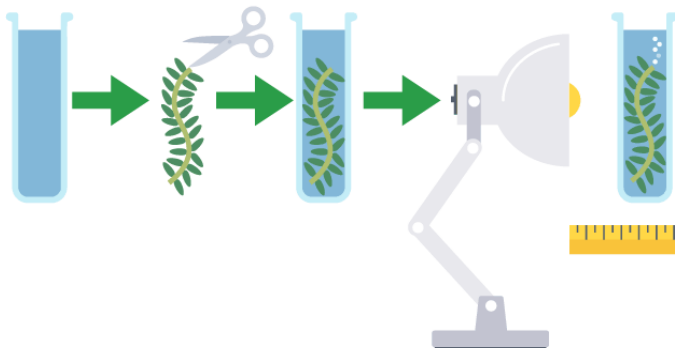
2: Resistance	There is a resistance to the flow of an electric current through most conductors. An electric current flows when electrons move through a conductor, such as a metal wire. The moving electrons can collide with the ions in the metal. This makes it more difficult for the current to flow and causes resistance.
	The resistance in a wire increases as: <ol style="list-style-type: none"> the length of the wire increases the thickness of the wire decreases
	The longer a wire the more metal ions there are for the electrons to collide with so the greater the resistance. The thicker a wire the more space there is for the electrons to move round the metal ions so the lower the resistance.

3: Graph skills	 <p>Potential difference (V)</p> <p>Current (A)</p> <p>Graph of potential difference (V) against current (A)</p> <p>This is described as a directly proportional relationship. You know this as the graph is a straight line starting from the origin.</p>
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Questions	1. How do you calculate resistance (rearrange Ohm's law to make R the subject)?
	2. What is potential difference measured in?
	3. What relationship is between potential difference and current – how do you know?
	4. What 2 factors increase the resistance flowing through a wire.
	5. Why does resistance happen?
	6. What piece of equipment measures current?

Word Revolution	Photosynthesis	The process by which plants use light energy to convert carbon dioxide and water into glucose and oxygen.
	Valid Result	A result that is repeatable, reproducible and answers the original question.
	Mean	A type of average found by adding up all the data and dividing by the number of values.

1: Required Practical Diagram



Distance of lamp from pondweed in cm	Number of bubbles produced per minute			
	Trial 1	Trial 2	Trial 3	Mean
10	67	66	69	67
20	61	64	62	62.3
30	53	51	52	X
40	30	32	31	31
50	13	15	15	14

2: Required practical

- Independent variable – distance from the light source/light intensity.
- Dependent variable – the number of oxygen bubbles produced per minute.
- Control variables – concentration of sodium hydrogen carbonate solution, temperature, amount of pondweed.

Risk Assessment
Care must be taken when using water near electrical equipment. Ensure that your hands are dry when handling the lamp.

The adapted practical is more valid because the volume of oxygen can be measure instead of the number of bubbles. This gives a better indication of how fast photosynthesis is happening

As the distance between the lamp and the pondweed increases, the light intensity will decrease. Distance and light intensity are **inversely proportional** to each other.

The inverse square law is used to calculate light intensity form distance. If you half the distance, the light intensity will be four times greater. Or if you double the distance, the light intensity will be four times smaller.

$$\text{Light intensity} = \frac{1}{\text{Distance}^2}$$

Questions

1. Complete the hypothesis for the required practical- 'As light intensity increases _____',
2. How can the student measure the rate of photosynthesis?
3. State one factor that should be kept constant during this experiment.
4. The teacher suggests to set up the experiment using the diagram above (Diagram 3). Suggest why this would make the results more valid.
5. Calculate value X in the results table. Show your working.
6. State one error the student has made when completing the table at 20cm.

Timetable:

Please stick a copy of your timetable here.



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