Year 11 Knowledge Organiser

Core

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Table of Contents

English

English – Year 11 – HT1 – Macbeth (Part 1)

Summary- Position in the Curriculum

Act 1: The play opens with three witches chanting on a bleak moorland. In the next scene we hear a battle report in which a soldier Macbeth bravely fought in a battle to defend Scotland. On a bleak Scottish moorland, Macbeth and Banquo, two of King Duncan's generals, discover three strange women (witches). The witches prophesy that Macbeth will be promoted twice: to Thane of Cawdor and King of Scotland. Banquo's descendants will be kings, but Banquo isn't promised any kingdom himself. Macbeth and Banquo want to know more, but the "weird sisters" disappear. Soon afterwards, King Duncan names Macbeth Thane of Cawdor as a reward for his success in the recent battles. The promotion seems to support the prophecy. The King then proposes to make a brief visit that night to Macbeth's castle. Lady Macbeth receives news from her husband about the prophecy and his new title. She vows to help him become king by whatever means are necessary...

Act 2: Macbeth returns to his castle, followed almost immediately by King Duncan. The Macbeths plot together to kill Duncan and wait until everyone is asleep. At the agreed time, Lady Macbeth gives the guards drugged wine so Macbeth can enter and kill the King. He regrets this almost immediately, but his wife reassures him. She leaves the bloody daggers by the dead king just before Macduff arrives. When Macduff discovers the murder, Macbeth kills the drunken guards in a show of rage and retribution. Duncan's sons, Malcolm and Donalbain, flee, fearing for their own lives; but they are, nevertheless, blamed for the murder.

Act 3: Macbeth becomes King of Scotland but is plagued by feelings of insecurity. He remembers the prophecy that Banquo's descendants will inherit the throne and arranges for Banquo and his son Fleance to be killed. In the darkness, Banquo is murdered, but his son escapes the assassins. At his state banquet that night, Macbeth sees the ghost of Banquo and worries the courtiers with his mad response. Lady Macbeth dismisses the court and unsuccessfully tries to calm her husband.

(This text will be assessed at the end Year 11/GCSE Examinations)

Key Vocabulary	Characters	Core Knowledge/Key Themes	Preparing for Assessment
Hubris (excessive pride/ ego) remorse paranoia deception manipulation supernatural treason/treachery valiant regicide duplicity soliloquy	Macbeth Lady Macbeth Banquo Macduff King Duncan Malcolm The Witches	**Ambition** —Despite being a loyal and brave soldier at the beginning of the play, Macbeth cannot resist the power of his ambition (his fatal flaw). Lady Macbeth's ambition also knows no bounds. Both characters are willing to disobey God to fulfil their ambitions. But consider where ambition leads these characters. **Appearance and Reality** - Shakespeare introduces this theme immediately when the Witches chant 'Fair is foul and foul is fair' in the very first scene. This is a play where people's outward appearances cannot be trusted. What might initially appear good, often turns out to be evil. **Guilt**— Both Macbeth and Lady Macbeth are plagued by guilt after the regicide. As a result of this, the mental stability of both characters suffers a dramatic decline. Lady Macbeth grossly underestimates the power of guilt and is made to pay for this with her life. In the play the motif of blood represents guilt.	1. *How does Shakespeare present Macbeth in Act 1 of the play?* 2. *How is Lady Macbeth presented as an ambitious character?* 3. *How does Shakespeare present the differences between appearance and reality in Act 1-3 of the play?* 4. *To what extent is Banquo an ambitious character?* 5. *How is the theme of guilt presented in Acts 1-3 of the play?*

Key Quotations:

'Look like the innocent flower but be the serpent underneath it' 'A little water clears us of this deed'
'Be innocent of the knowledge, dearest chuck, until thou applaud the deed' '
'Fair is foul and foul is fair;'
'So foul and fair a day I have not seen'
'Pour my spirits in thine ear' 'come you sprits...unsex me here'
'I have no spur to prick the sides of my intent., only vaulting ambition'
'Unseam'd him from the nave to the chaps'
'smoked with bloody execution'
'Stars hide your fires, let not light see my black and deep desires'
'Some say the Earth was feverous and did shake'
'Macbeth has murdered sleep'
'Look on it again, I dare not'

Useful Exam Phrases

Shakespeare presents... / shows... / hints... / creates... / uses ...
Through the character of... Shakespeare shows / explores / questions...
Shakespeare challenges the belief that...
Shakespeare asks his reader to question / consider...
Shakespeare reinforces this idea earlier / later in the play...

Shakespeare	James I	Witchcraft	Blood	Macbeth
				

English – Year 11 – HT2 – Macbeth (Part 2)

Summary- Position in the Curriculum

Act 4: Macbeth seeks out the witches who say that he will be safe until a local wood, Birnam Wood, marches into battle against him. He also need not fear anyone born of woman. They also prophesy that the Scottish succession will still come from Banquo's son. Macbeth embarks on a reign of terror, slaughtering many, including Macduff's family. Macduff had gone to seek Malcolm (one of Duncan's sons who fled) at the court of the English king. Malcolm is young and unsure of himself, but Macduff, pained with grief, persuades him to lead an army against Macbeth.

Act 5: Macbeth feels safe in his remote castle at Dunsinane until he is told that Birnam Wood is moving towards him. Malcolm's army is carrying branches from the forest as camouflage for their assault on Macbeth's stronghold. Meanwhile, an over wrought and guilty Lady Macbeth walks in her sleep and tells her secrets to her doctor. She commits suicide. As the final battle commences, Macbeth hears of Lady Macbeth's suicide. In the midst of a losing battle, Macduff challenges Macbeth. Macbeth learns Macduff is the child of a caesarean birth (loophole!), realises he is doomed, and submits to his enemy. Macduff triumphs and brings the head of the traitor Macbeth to Malcolm. Malcolm declares peace and goes to Scone to be crowned king

This text will be assessed at the end Year 11/GCSE Examinations.

Key Vocabulary

dramatic
irony
Hamartia
(fatal flaw)
tragic hero
role reversal
betrayal
manipulation
courage
nihilism
inevitability
equivocator
Machiavellian
tyrant/
malevolent
macabre
Natural order
regicide
catharsis

Characters

Macbeth
Lady Macbeth
Banquo
Macduff
King Duncan
Malcolm
The Witches

Core Knowledge/Key Themes

Chaos and Disorder— At the beginning of the play, everything is in order. However, when Divine Right is challenged, with the murder of King James, the balance of The Great Chain of Being is offset. The play's events that succeed the regicide are marked by chaos and disorder, be it the mental state of the play's protagonists: Macbeth and Lady Macbeth; the state of Scotland or the weather / nature. Order is only restored at the very end of the play when the King is returned to its rightful owner: Malcolm (the eldest son of Duncan).

Power—The battle for power can be seen throughout the play. Arguably, some of the most powerful characters are female: Lady Macbeth and the Witches. Both forces are able to manipulate the play's protagonist: Macbeth. However, the power of God cannot be ignored. Are Macbeth and Lady Macbeth punished for committing regicide (a sin against God)?

Preparing for Assessment – Example Questions

1. *How does Shakespeare present the theme of the supernatural?*
2. *How does Shakespeare present ideas about kingship?*
3. *To what extent is Lady Macbeth a powerful character?*
4. *How does Shakespeare present Malcolm as a good leader?*
5. *How are the themes of masculinity and femininity presented in the play?*

Key Quotations:

'Out, damn spot!' '
The Thane of Fife had a wife' 'Hell is murky' 'O full of scorpions is my mind, dear wife'
'Be innocent of the knowledge, dearest chuck, until thou applaud the deed' '
Amen stuck in my throat'
'This dead butcher and his fiend-like queen'
'To be thus is nothing but to be safely thus'
'Would all great Neptune's ocean wash this blood from my hands?'
'I am in blood, stepped in so far...'
'Macduff, this noble passion, child of integrity'
'For none of a woman born/shall harm Macbeth'
"All the perfumes of Arabia will not sweeten this little hand'
'Macduff was from his mother's womb /Untimely ripp'd'
'Macbeth shall never vanquished be until. Great Birnam Wood to high Dunsinane Hill. Shall come against him'

Useful Exam Phrases

Shakespeare presents... / shows... / hints... / creates... / uses ...
Through the character of... Shakespeare shows / explores / questions...
Shakespeare challenges the belief that...
Shakespeare asks his reader to question / consider...
Shakespeare reinforces this idea earlier / later in the play
Shakespeare sends a clear message to his audience...

Macduff

Lady Macbeth

Malcolm

Macbeth's Castle – Dunsinane

Birnam Wood

English Language GCSE – Paper 1 Question 5

Summary: This question tests your creative writing skills and technical skills. There are 40 marks available. Of this total, 24 marks are for the quality of your ideas and 16 marks are for the accuracy and variety of your technical skills, which include word choice, spelling, punctuation, and sentence types. Time available: 45 minutes

Creative writing skills – 24 marks:

- Make sure everything you write is clear and makes sense.
- Engage your reader with interesting ideas. Spend time planning how you will use setting, character, or events to make your response engaging.
- Show that you can phrase your response in interesting ways. Take time to craft what you are writing. Use interesting words.
- Plan the sequence of your response – what will happen in what order. Show that you can 'shape' a response by giving it an interesting structure.

Technical skills – 16 marks:

- Make sure that spelling, punctuation, and expression are as accurate as possible.
- Show that you can use a range of punctuation and sentence types.

Format of question:

- 'Write a description of...from your imagination: You may choose to use the picture provided for ideas'
- 'Write (part of) a story about...'

Literary techniques:

Sensory: Evoking the five senses – touch, taste, smell, sight, sound.	**Personification:** A device which gives inanimate things human qualities.	**... Ellipsis** can express hesitation, changes of mood, suspense, or thoughts trailing off.
Simile: A phrase that compares one thing to something else using the words 'like' or 'as'.	**Imagery:** Visually descriptive language; describes what something looks like very clearly.	**! Use an exclamation point** (at the end of a sentence) to show emotion, emphasis, or surprise.
Metaphor: Describing something by saying it is something else that has some of the same qualities.	**Alliteration:** Repetition of the same sound or letter at the beginning of multiple words in a sentence/ phrase.	**: Use a colon** to introduce an item or a series of items. Do not capitalise the first item after the colon (unless it's a proper noun).
Sibilance: A repeated 's' sound.	**Emotive:** Language which evokes a clear emotion	**? Question marks** should only be used after a direct question.
Onomatopoeia: A word that imitates, suggests, or resembles the sound it's describing.	**Anaphora:** The repetition of a word or phrase at the beginning of a sentence or sentences.	**; A semicolon** can replace a full stop to combine two closely linked sentences (they must make sense on their own).

Structural devices:

- Echoes – using a similar phrase or idea at both the start and end of your response
- Repetition – of an image or phrase
- Withholding information – gradually revealing it, giving hints or clues
- Focus shift – introducing a new idea, character, or problem
- Flashback in time to something that happened earlier
- **Flashforward** in time to something that happens later
- Tension – building the suspense by suggesting a growing danger
- Climax – a 'high' point of drama

Paragraphing:

When do you start a new paragraph? A new paragraph should be added when you:

→ New topic: start a new topic

→ New person: whenever you talk about a new person or have a new person talking

→ New time: whenever you change the time in your writing (so back to the past or move forwards to the future)

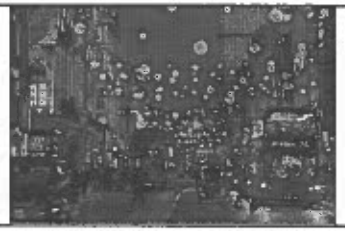
→ New place: whenever you switch places/settings in a piece of writing

Preparing for assessment:

1. *Plan a variety of responses to descriptive and narrative prompts.*
2. *Take a previously written response and improve your use of literary techniques/structural devices/sentences/punctuation/paragraph structures, etc.*
3. *Plan settings and characters (in advance) that can be used in a variety of narratives.*
4. *Write an opening, focusing on 'showing' not 'telling'.*
5. *Create word banks for differing moods and tones.*

Describing mood – negative adjectives: disgusting, sickening, repulsive, abominable, awful, distasteful, gruesome, hateful, horrific, loathsome, nasty, objectionable, obnoxious, odious, outrageous, repugnant, scandalous, shocking, vile, vulgar, foul, gross, nauseating, revolting, stinking, detestable, frightful, ghastly, hideous, horrid, lousy, monstrous, offensive, repellent, rotten

Describing mood – positive adjectives: amazing, awesome, incredible, marvellous, stunning, surprising, unbelievable, wonderful, delightful, fantastic, peaceful, pleasant, thrilling, joyful, alluring, appealing, charming, dazzling, elegant, exquisite, gorgeous, graceful, grand, handsome, magnificent, pleasing, splendid, superb, breathtaking, outstanding, sublime, admirable, exceptional

Descriptive writing examples: "Write a description of...as suggested by this picture:"				
				
Narrative writing examples:				
Write a story set in a dangerous place.	Write a story with the title 'Abandoned'.	Write a story about a new beginning.	Write a story with the title 'The Present'.	Write a story about an unexpected event.
Interesting sentence structures:				
2Ad – Two adjectives before the first noun + **two adjectives** before the second.	**2 Pairs** – Begins with **two pairs of related adjectives:** Each pair is followed by a comma and separated by <u>and</u>.	**3-ed** – Starts with **three adjectives that end in –ed** and describe emotions. The –ed words MUST be followed by commas.	**De: de** – Two independent clauses are separated by a semi-colon (;). The first clause is **descriptive**; the second clause adds further **detail.**	**Verb, person – Starts with a verb**, always followed by a comma and then a **name or personal pronoun** (he, she, they, it) followed by the rest of the sentence.
E.g. He was a kind, intelligent boy with tattered, disheveled clothes.	E.g. Exhausted and worried, cold and hungry, they did not know how much further they had to go.	E.g. Excited, elated, thrilled, she won the dance competition.	E.g. She was exhausted; she hadn't slept for several days.	E.g. Tiptoeing, he tried to sneak out across the landing without waking anybody up.
Interesting paragraph structures:				
No, no, no, no...But there was	A year ago. A month ago. Today.	Near, far, near, far	Outside – Inside – Outside	Zoom in, zoom in, zoom in **OR** Zoom out, zoom out, zoom out
E.g. No sign of civilisation could be seen for miles around. No sounds of modern life invaded the tranquil atmosphere. No hustle and bustle destroyed the peaceful island. No place could be more isolated and remote. But there was one small house, standing strong in the middle of the tiny island.	E.g. A year ago, the fairground was alive with the sound of happy families enjoying a day out. A month ago, it was caught in the middle of Hurricane Otis. A day ago, the owners had to decide. Today, it was abandoned, a shadow of its former self.	E.g. I could hear my friend's breathing behind me. The enemy was on the outskirts of the city, getting closer to us by the minute. My friend's eyes showed fear and terror. The footsteps of the soldiers echoed as they entered the city looking for us.	E.g. There was hardly space to navigate the crowded city street, filled with desperate, rushing, last-minute Christmas shoppers. Inside the cosy coffee shop, one family was trying to warm up after finally finding the perfect gifts for Grandma Helen. As they sipped on their hot chocolate, the first swirling snowflakes started slowly falling, melting as soon as it reached the ground.	E.g. The train hugged the mountain like a dragon hoarding its gold. Each carriage carried excited travellers closer and closer to the holiday destination of dreams. One carriage was filled with the Smith family. Amelia Smith glared out of the window at the forest far down below. For her, this was the holiday destination of nightmares.

English – Year 11 – HT4 – English Language Reading Paper 1

Summary- Position in the Curriculum

Section A of Paper 1 is titled 'Explorations in Creative Writing.' You will be given an unseen literary extract from either the 19th, 20th or 21st century and must answer four questions about it. You will spend 15 minutes reading and 45 minutes answering the questions. The total number of marks for Section A Paper 1 is 40.

Question 1: 4 marks (5 minutes)

Four multiple choice questions

Before answering:

- Check that you are focusing on the correct part of the text and the correct subject matter

Answering:

- Only tick one box for each part of the question

Assessment Objectives

AO1
identify and interpret implicit and explicit information and ideas

AO2
explain, comment and analyse how writers use language and structure to achieve effects using subject terminology

AO4
Evaluate texts critically and support with textual evidence

Preparing for Assessment (use the text on the next page)

1. *Read again the first part of the source, from lines 1 to 6.*

   List four things about Drew's journey from this part of the source
2. *Look again at lines 7 to 14. How does the writer use language here to describe the slaves?*

Question 2: 8 marks (10 minutes)

How does the writer use language to describe _____?

Before answering:

- Highlight three/ four **language-rich** quotations

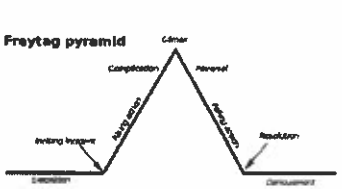
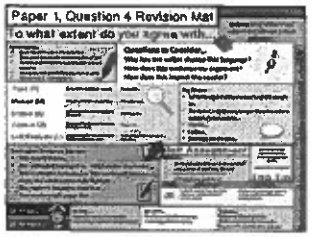
Answering:

- Start with a Big Idea
  The writer uses language to describe _____ as _____
- Introduce first quotation
- Name device if applicable
- Analyse overall effects of language
- Zoom in on individual word and explore multiple connotations
- Repeat with second and third quotation

Example: The writer uses language to present the weather as destructive. The opening paragraph consists of a single, complex sentence perhaps reflecting the onward movement of the coach. The adjective 'exposed' and the noun 'force', evoke the idea of vulnerability, danger, and how little control man has over the power of nature. The verb 'rocking', progresses the cumulative effect of the list of verbs, 'shaking', 'trembled', 'swayed' leading to the simile, 'rocking between the high wheels like a drunken man' suggesting the coach is lurching haphazardly, its movement out of control

Simile * Metaphor * Imagery * Personification * Verb * Adjective * Adverb * Semantic field * Suggests * Explores * Implies * Shows

3. *You now need to think about the whole of the source. How has the writer structured the text to create tension?*
4. *Focus this part of your answer on the second part of the source, from line 15 to the end.*
   A student said, "I like how the writer creates a vivid picture of the place, not only describing what we can see in detail but using the other senses too."
   To what extent do you agree?
5. *Find a past paper online and complete questions 1 to 4 in timed conditions. (if it's an old paper, question 1 might be different)*

AQA	Question 1	Question 2	Question 3	Question 4
				

Question 3: 8 marks (10 minutes)

How has the writer structured the text to create... (an effect, such as tension)?

Before answering:

- Highlight the **structurally rich moments** looking at the movement / journey of the text

Answering:

- Explain WHAT is happening at the first structurally rich moment, using evidence / examples
- Analyse WHY this moment is structurally rich and interesting – HOW does it affect the reader / change the mood, tone, pace / WHY here WHY now / WHY is it effective?
- Repeat for your structurally rich second and third moments, noting any changes and differences from previous moments
- Don't analyse language and don't re-tell the story

Example: *The text, about a journey, is structured to also take the reader on a journey: from the general to the specific; from the outside to the inside; from the weather, through the coach, the driver and horses, to the passengers. There is also a constant reminder of the weather which permeates each part – the 'little drips of rain' that came through the roof and, later, 'the rain oozed through the crack in the roof' onto Mary's shoulder – so the reader is constantly made wet and uncomfortable, just like the passengers. Around the middle of the extract, the outside and the inside are made to coincide when the old man opens the window – this also moves the focus of the reader to the inside of the coach The text narrows down to take the reader from the countryside of Cornwall – the wide 'granite sky' and the evening which 'closed upon the hills', to the inside of Mary Yellan's head as she contemplates the weather and hopes for 'blue heaven'.*

The writer develops/builds * The focus shifts * The action moves * The scene switches * The focus narrows down * The focus widens * The writer returns to * The pace increases / slows * The writer contrasts

Question 4: 20 marks (20 minutes)

Focus this part of your answer on the second part of the source, from line_____ to the end.

You will be given a statement

To what extent do you agree or disagree with this statement?

Before Answering:

- Put a * next to the line you have been asked to start with
- Look at the statement: does it have two parts? Do you agree totally or is there some room for disagreement (not compulsory)?
- Generate three Big Ideas and identify language / structure rich quotations and moments

Answering:

Example: *I agree that we might think that the passengers are a unified group because the writer refers to them collectively: 'The few passengers huddled together for warmth', but their actions suggest how different they are. The 'old fellow' is short tempered and pompous with a sense of his own importance, but also ridiculous in his actions. The writer's choice of the word 'petulant' shows how his behaviour was childish. He also makes rash statements – that he would 'never travel by coach again' which the reader knows is of no interest to the driver he is swearing at. In the end, he is reduced to muttering. These complexities help the reader understand the stresses of the journey and the different sides to the man.*

Text: 'Wereworld: The Shadow of the Hawk' (Jobling, 2012)

The drivers cracked their whips, urging the procession of wagons and horses onwards and away from the curving cliff edge. The wagon wheels found their way into the ancient ruts worn into the dark rock road by centuries of traffic. To the people of the island the circling road was known as the Black Staircase, running all the way from the harbour below, through the city, around the mountainous island.

Drew pushed his face against the bamboo bars, looking down the cliff as the wagon he travelled in drove ever higher. There were six of them in the jail wagon, each equally miserable. No doubt Drew's fellow slaves had been picked up by Kesslar on his travels, and each bore the scars of the journey. Battered and beaten, the men were weary with exhaustion and the long time spent in the hold of the slave ship. The Goatlord Kesslar travelled at the front of the procession in a sumptuous[1] caravan, his ill-gotten gains of blood, flesh and bone following miserably behind.

The Black Staircase had risen from the docks through the strange city, past bazaars and merchants' stalls, before winding through the town houses higher up. Far below in the harbour Drew spied the Banshee, bobbing lazily in the crystal clear water, her cargo delivered.

At the highest point of the Black Staircase there was no sign of vegetation, the slopes of the mountain were covered with rocks and boulders as dark as jet. The road levelled out briefly as they reached the summit, turning in toward the mountain's centre. Here the wagons passed through a tall, white gatehouse. Lightly armoured guards stood to either side, inspecting the carts and their slaves as they trundled past. The people of the island reminded Drew of Djogo, Kesslar's captain, tall and rangy with dark, leathery skin. Perhaps this is where the brute hails from?

The wagons were moving downhill now into a bowl-shaped valley that marked the mountain's summit, a palace sitting at its centre. An outer wall curved round the grand palace structure, echoing the concentric circles of the Black Staircase. Terracotta rooftops dipped in towards its centre, the courtyard beyond not yet visible on the approach. Towers thrust up from the outer wall towards the clouds, their brickwork an ornate tapestry of black and white banded marble. The heat was oppressive; Drew felt it roll over him in waves. Occasional jets of steam broke through fissures in the ground on either side of the road, and hot gases belched violently from the earth. He held his hand to his mouth, gagging at a familiar scent in the air.

"Brimstone," he said, as much to himself as to anyone who might listen.

"That's right," said another slave, leaning against the bars on the opposite side of the wagon. "Sulphur. What else would you expect from a volcano?"

If the heat outdoors was stifling, inside the palace it was unbearable. Guards had led the shackled slaves into the colossal building, past crowds of onlookers into a huge, circular hall. Stone tables ringed the room, littered with food from the previous night's feasting. Flies buzzed over discarded pieces of meat, adding to the grim atmosphere. Torches burned along the wall, while a large metal grille covered the centre of the chamber, riveted in place to the polished basalt floor. A steady flow of steam emerged through the grating, turning the chamber into a sauna. A metal brazier, stacked with red-hot coals, stood beside the grille, long-handled brands buried deep within the glowing embers. Drew winced as he spied it, imagining what they might be used for.

• Introduce your first Big Idea and establish if you agree or disagree and, most importantly, WHY • Support with a range of quotations, which you also analyse for their use of methods • Repeat for a second and third Big Ides • Make evaluative comments on the effect on the reader	**Simile * Metaphor * Imagery * Personification * Verb * Adjective * Adverb * Repetitions * Contrasts * Semantic field * Suggests * Explores * Implies * Shows * The impact of this is * We are shocked by * This helps the reader understand**	

English – Year 11 – HT5 – English Language Reading Paper 2

Summary- Position in the Curriculum

Section A of Paper 2 is titled 'Writer's Viewpoints and Perspectives.' You will be given two unseen non-fiction extracts from either the 19th, 20th or 21st century and must answer four questions about them. You will spend 15 minutes reading and 45 minutes answering the questions. The total number of marks for Section A Paper 2 is 40.

Question 1: 4 marks (5 minutes)

Choose four statements below that are true

Before answering:

- Read all statements before shading

Answering:

- If you make a mistake, follow the advice on the paper to correct

Assessment Objectives

AO1

identify and interpret implicit and explicit information and ideas

AO2

explain, comment and analyse how writers use language and structure to achieve effects using subject terminology

AO3

Compare writer's ideas and perspectives

AO4

Evaluate texts critically and support with textual evidence

Preparing for Assessment (use the sources on the next page)

1. *Choose four statements below that are true:*
   - The refugees are seeking safety from Uganda.
   - 44,000 refugees have crossed the border this year.
   - The refugees have brought cholera with them.
   - The refugee camps are becoming overcrowded.
   - Désiré believes the refugee camps should be helped
   - The cholera outbreaks can kill people in the camp.
   - The volunteers are doing nothing to improve hygiene
   - They have left their home country to seek new jobs.
2. *Write a summary of the differences between the people described in each source.*
3. *In source A how does the writer use language to describe his surroundings?*
4. *Compare how the writers convey their attitudes to disease and sanitation in each source.*
5. *Find a past AQA English Language Paper 2 and complete section A in timed conditions*

Question 2: 8 marks (10 minutes)

What can you infer about the differences / similarities between ___.

Before answering:

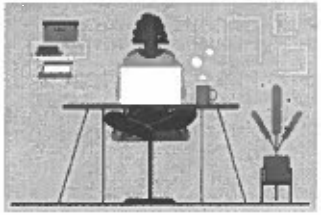
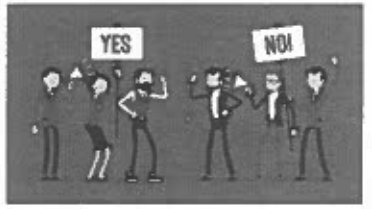
- You are focusing on people, places and things – NOT the writer's view about these
- Create a simple table and find links and connections that act as your categories for comparison

Answering:

- Use categories of comparison, evidence and importantly offer **interpretation** of evidence
- Do NOT analyse writer's methods here

Example: *Both elephants behave in a conscious way to achieve their aims, showing how intelligent elephants are and how they are misunderstood by their owners and keepers. The elephant in Source A appears to behave in a violent and destructive way, by taking fruit as he 'raided' the market stall, but his behaviour is instinctive, as there is no other way for him to survive without food. Similarly, in Source B, the elephant 'destroy[s] the doors' of the cage which confines him. This suggests his behaviour is both rational and deliberate, motivated by an attempt to escape from captivity, as he 'was perfectly quiet as soon as he was able to be free'.*

Similarly * Likewise * Also * However * In contrast * This shows * This suggests

Speeches	Letters	Diaries	Blogs	Opinions and arguments
				

Question 3: 12 marks (12-15 minutes)

How does the writer use language to _____?

Before answering:

- Make sure you are looking at the correct source and the correct section of the source
- Identify the focus of the question
- Highlight four **language rich** quotations

Answering:

- Start with a Big Idea
  The writer uses language to describe _____ as
- Introduce the first quotation and name device
- Analyse overall effects of language
- Zoom in on an individual word and explore multiple connotations
- Repeat with second, third (and fourth) quotation
- If there are any contrasts in the description, use another Big Idea

Example: *The writer describes the crowd as aggressive, powerful and large. He uses the metaphor 'sea of faces' to describe how the crowd of people has come together to form one single mass, each of their faces indistinguishable from one another. The image of the 'sea' suggests they have swept in behind him, almost like the tide, and are a powerful and irresistible force of nature which he cannot withstand.*

Simile * Metaphor * Imagery * Personification * Verb * Adjective * Adverb * Semantic field * Suggests * Explores * Implies * Shows

Question 4: 16 marks (20 minutes)

Compare how the writers convey their different / similar thoughts and feelings about _____.

Before Answering:

- This question is about comparing how writers think and feel about a subject
- Underline the key focus of the question
- Create a simple table to link the writer's views
- Identify language / structurally rich quotations

Answering:

- Start with a category for comparison
- Start with the first source, stating *'In Source A the writer feels / thinks / believes'*
- Support with multiple quotations. Offer interpretation and then analyse from a language / structure
- Use a discourse marker to move to the second source i.e. *'However, in Source B the writer feels / thinks / believes'*
- Support with multiple quotations. Offer interpretation and then analyse from a language / structure point of view, exploring connotations
- Repeat with a second (and third) category
- Look out for any shifts in perspectives

Example: *The writers have opposing attitudes towards having to kill an animal. From the start, Orwell establishes that he is indecisive in his attitude towards the elephant, as he 'did not know what [he] could do,' arming himself with a weapon that could only shock not kill it. Orwell structures the text in order to lead the reader gradually from his position of 'perfect certainty' that he 'ought not to shoot' the elephant, through his repeated statements, 'but I did not want to shoot the elephant' to the inevitable conclusion where the reader shares his realisation that 'there was only one alternative,' reinforcing Orwell's reluctance. His indecision contrasts with Bartlett's certainty that he must be prepared to kill the elephant. His factual language 'I made an application to the council to be supplied with a powerful enough rifle...' reinforces the rational approach he takes to this task, again contrasting with Orwell's more emotional response. Bartlett, despite the emotional attachment he has to Jumbo, considers it his official duty to protect the public from the violent and unpredictable behaviour of the elephant in a decisive plan to shoot him.*

The writer thinks * The writer feels * The writer believes * The writer argues * Both writers * Similarly * On the other hand * Whereas * However * Just as x does,

Source A: Article 'Cholera District' (1849)

Source B: Nasho Tado reports on Cholera 2018

A. We then journeyed on to London-street, down which the tidal ditch continues its course. In No. 1 of this street the cholera first appeared seventeen years ago, and spread up it with fearful virulence; but this year it appeared at the opposite end, and ran down it with like severity. As we passed along the reeking banks of the sewer the sun shone upon a narrow slip of the water. In the bright light it appeared the colour of strong green tea, and positively looked as solid as black marble in the shadow - indeed it was more like watery mud than muddy water; and yet we were assured this was the only water the wretched inhabitants had to drink. As we gazed in horror at it, we saw drains and sewers emptying their filthy contents into it; we saw a whole tier of doorless privies in the open road, common to men and women, built over it; we heard bucket after bucket of filth splash into it, and the limbs of the vagrant boys bathing in it seemed, by pure force of contrast, white as Parian marble. And yet, as we stood doubting the fearful statement, we saw a little child, from one of the galleries opposite, lower a tin can with a rope to fill a large bucket that stood beside her. In each of the balconies that hung over the stream the self-same tub was to be seen in which the inhabitants put the mucky liquid to stand, so that they may, after it has rested for a day or two, skim the fluid from the solid particles of filth, pollution, and disease. As the little thing dangled her tin cup as gently as possible into the stream, a bucket of night-soil was poured down from the next gallery.

In this wretched place we were taken to a house where an infant lay dead of the cholera. We asked if they really did drink the water? The answer was, "They were obliged to drink the ditch, without they could beg a pailfull or thieve a pailfull of water. But have you spoken to your landlord about having it laid on for you? "Yes, sir; and he says he'll do it, and do it, but we know him better than to believe him." "Why, sir," cried another woman, who had shot out from an adjoining room, "he won't even give us a little whitewash, though we tell him we'll willingly do the work ourselves: and look here, sir," she added, "all the tiles have fallen off, and the rain pours in wholesale."

****

B. Violence has forced thousands of Congolese to seek safety in neighbouring Uganda, with overcrowded refugee camps there putting pressure on hygiene and sanitation facilities, increasing the risk of deadly cholera outbreaks. Violence in the Democratic Republic of the Congo (DR Congo) has forced nearly 44,000 people to cross Uganda's south-west border out of the country so far this year. This has put pressure on sanitation facilities in refugee settlements, and has led to deadly cholera outbreaks.

With hundreds of people arriving in Uganda every day, aid organisations are striving to prevent the disease from spreading across the settlements. Our teams work around the clock building hygiene and sanitation facilities to help alleviate and prevent the suffering of these displaced people.

Désiré is among the thousands who has been forced to adapt to a new life in Maratatu settlement in south-west Uganda. "There are people everywhere in the settlement. It's a big risk in terms of the spreading of cholera. Something should be done to ease the congestion," he says.

Those who have made it to Uganda now face this new life-threatening situation. Désiré worries about the conditions he and his fellow arrivals face in the packed settlement as a threat to public health: "With so many people crowded in one location, the risk of spreading of contagious diseases such as cholera is very high, and many people can be severely affected within a short time."

Maths

Yr. 11 (F) Maths Knowledge Organiser: Autumn 1 – Probability, Multiplicative reasoning and Constructions

By the end of this half-term, you should be able to:

Chapter 13 – Probability

- Distinguish between events which are impossible, unlikely, even chance, likely, and certain to occur;
- Mark events on a probability scale of 0 to 1;
- Using $1 - p$ as the probability of an event not occurring
- Use and draw sample space diagrams;
- Compare experimental and theoretical probabilities;
- Use tree diagrams to calculate the probability of two dependent events.

Chapter 14 – Multiplicative reasoning

- Understand and use compound measures:
- Express a given number as a percentage of another number
- Calculate percentage profit or loss;
- Use compound interest;
- Interpret equations that describe direct and inverse proportion.

Chapter 15 – Constructions, loci and bearings

- Draw circles and arcs to a given radius or given the diameter;
- Understand congruence, as two shapes that are the same size and shape;
- Measure and draw angles, to the nearest degree;
- Draw sketches of 3D solids;
- Given the front and side elevations and the plan of a solid, draw a sketch of the 3D solid.
- Draw and construct diagrams from given instructions

Keywords

Probability: The likelihood of an event occurring, from 0 to 1.
Dependent: Events where one affects the outcome of the other.
Independent: Events where one does not affect the outcome of the other.
Sample Space: All possible outcomes of an experiment.
Outcomes: Possible results of an experiment.
Relative Frequency: Ratio of event occurrences to total trials.
Fairness: Equal likelihood of all outcomes.
Ratio: A comparison of two quantities.
Proportion: An equation stating that two ratios are equal.
Proportional Change: Change where quantities increase or decrease at the same rate.
Compound Measure: A measure involving two or more different units.
Density: Mass per unit volume.
Mass: The amount of matter in an object.
Volume: The amount of space an object occupies.
Time: Duration of an event.

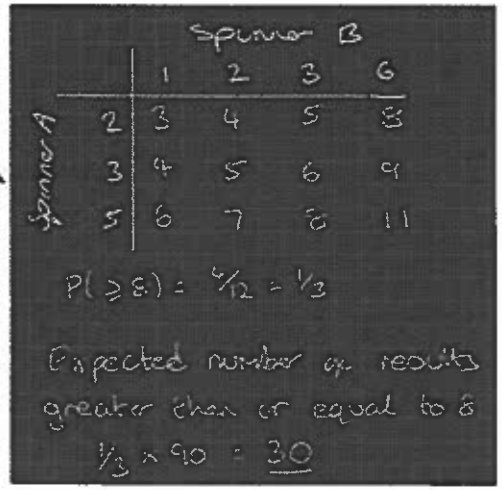
Preparing for Assessment

- Login to **Maths Watch** and complete your independent tasks each week. Attempt all questions and aim to get at least 80% correct. Remember, you can watch the videoclip attached to each question to help you understand the topic better.
- Use **'Read, Cover, Write, Check'** to test your understanding on the key words and core knowledge in this organiser.

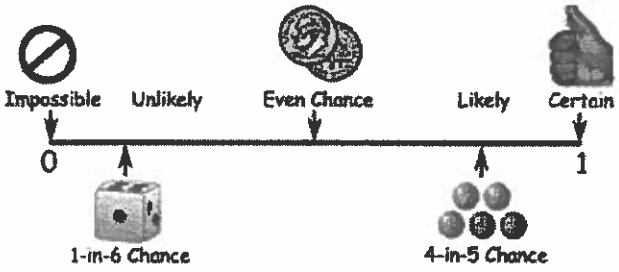
Core Knowledge

Spinner A

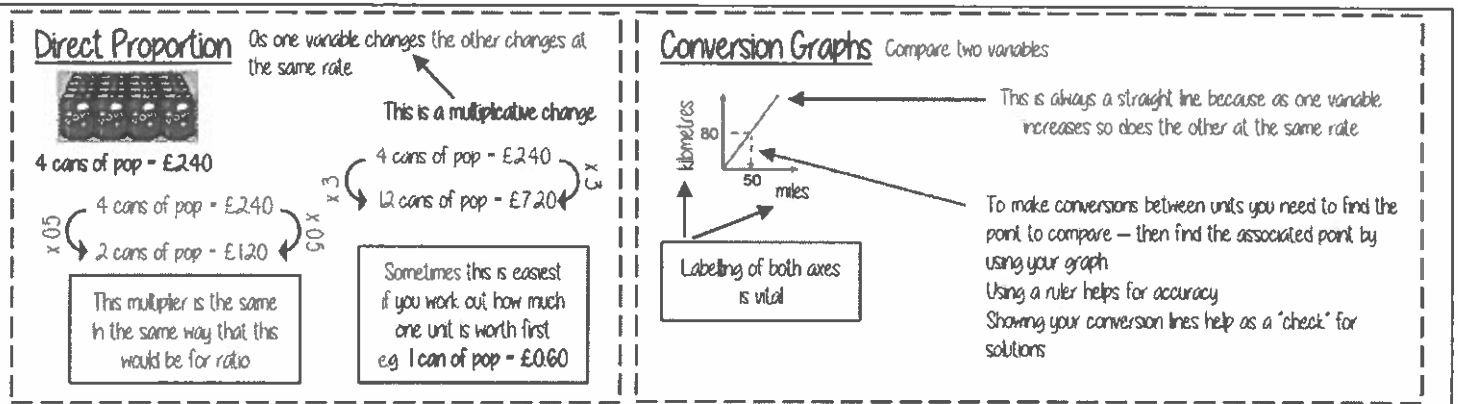
Spinner B

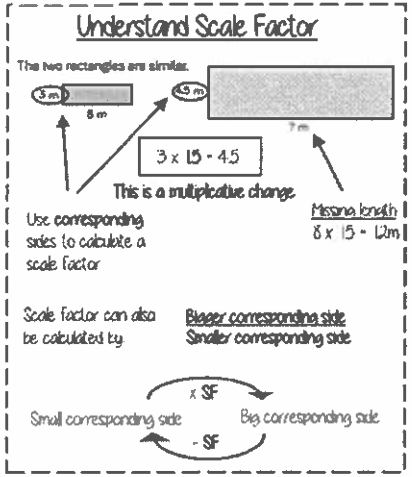


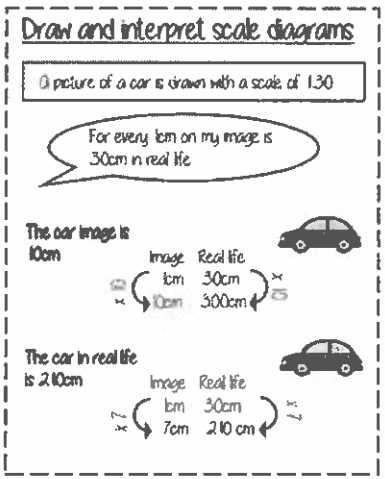
$$\text{Probability} = \frac{\text{number of desired outcomes}}{\text{total number of outcomes}}$$

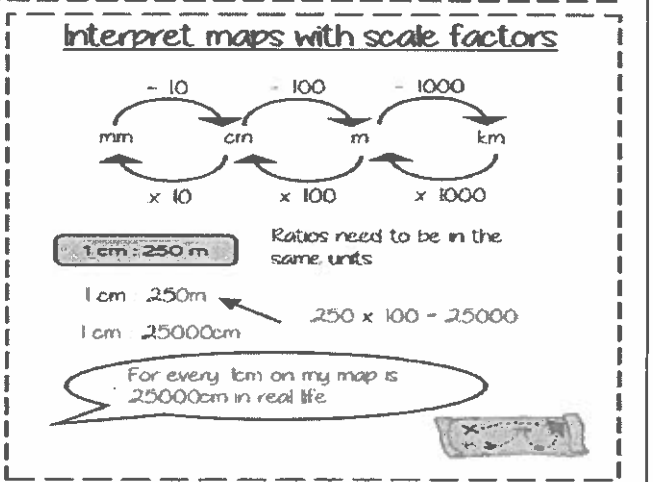


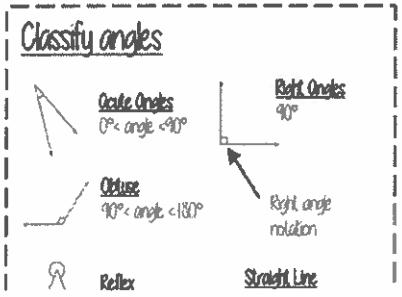
Acceleration: Rate of change of velocity.
Velocity: Speed in a given direction.
Inverse proportion: Opposite or reverse relationship between two variables.
Direct proportion: A straight proportional relationship between two variables.
Construct: To draw a shape accurately using a set of tools.
Arc: A part of the circumference of a circle.
Sector: A region enclosed by two radii and an arc.
Face: A flat surface on a three-dimensional shape.
Edge: The line where two faces meet on a three-dimensional shape.
Vertex: A point where two or more edges meet on a shape.
Three-dimensional: Having length, width, and height.
Congruent: Having the same size and shape.
Angles: The space between two intersecting lines, measured in degrees.
Regular: A shape with all sides and angles equal.
Irregular: A shape with sides and angles not all equal.
Bearing: Direction or position of something, usually given in degrees.
Degree: A unit of measurement for angles.
Bisect: To divide into two equal parts.
Perpendicular: Two lines that intersect at a right angle (90 degrees).
Loci: The set of points satisfying a particular condition.
Scale: The ratio of a distance on the map to the corresponding distance on the ground.
Plan: A detailed drawing of a structure, viewed from above.
Region: A defined area or space.

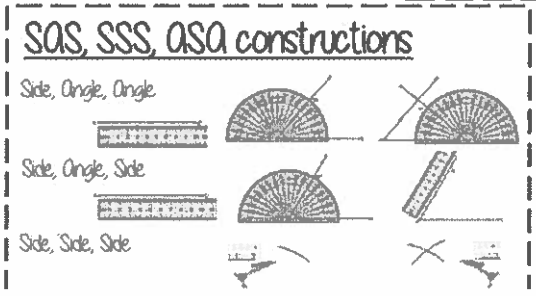


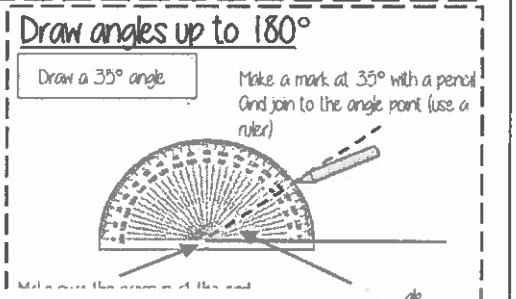












Principled **Resilient** **Open** **Understanding** **Disciplined**

Yr. 11 (F) Maths Knowledge Organiser: Autumn 2 – Algebra and Geometry

By the end of this half-term, you should be able to:

Chapter 16 – Quadratic equations and graphs

- Define a 'quadratic' expression;
- Multiply together two algebraic expressions with brackets;
- Factorise quadratic expressions of the form $x^2 + bx + c$;
- Factorise a quadratic expression $x^2 - a^2$ using the difference of two squares;
- Solve quadratic equations by factorising;
- Find the roots of a quadratic function algebraically.
- Generate points and plot graphs of simple quadratic functions, then more general quadratic functions;
- Identify the line of symmetry of a quadratic graph;
- Find approximate solutions to quadratic equations using a graph;
- Interpret graphs of quadratic functions from real-life problems;
- Identify and interpret roots, intercepts and turning points of quadratic graphs.

Chapter 17 – Perimeter, area and volume 2

- Recall the definition of a circle and identify, name and draw parts of a circle including tangent, chord and segment;
- Recall and use formulae for the Circumference of a circle = $2\pi r$ or πd, Area of a circle = πr^2;
- Use $\pi = 3.142$ or use the π button on a calculator;
- Find radius or diameter, given area or perimeter of circles;
- Find the perimeters and areas of semicircles and quarter-circles;
- Calculate perimeters and areas of composite shapes made from circles and parts of circles;
- Calculate arc lengths, angles and areas of sectors of circles;
- Find the surface area and volume of a cylinder;
- Find the surface area and volume of spheres, pyramids, cones and composite solids;

Chapter 18 – Fractions, indices and standard form

- Add and subtract mixed number fractions;
- Multiply mixed number fractions;
- Divide mixed numbers by whole numbers and vice versa;
- Find the reciprocal of an integer, decimal or fraction;
- Understand 'reciprocal' as multiplicative inverse,
- Use index laws to simplify and calculate the value of numerical expressions involving multiplication and division of integer powers, fractions and powers of a power;
- Use numbers raised to the power zero, including the zero power of 10;
- Convert large and small numbers into standard form and vice versa;
- Add, subtract, multiply and divide numbers in standard form;
- Interpret a calculator display using standard form and know how to enter numbers in standard form.

Keywords

Quadratic: A polynomial of degree 2, typically in the form $ax^2+bx+c=0$.
Function: A relation where each input has exactly one output.
Solve: To find the value(s) of variables that satisfy an equation.
Expand: To distribute and simplify expressions, especially involving brackets.
Factorise: To rewrite an expression as a product of its factors.
Expression: A combination of variables, numbers, and operators without an equality sign.
Curve: A smooth, continuous line that represents a function on a graph.
Factor: A number or expression that divides another without a remainder.
Coefficient: A numerical or constant factor in front of a variable in an expression.
Area: The amount of space inside a two-dimensional shape.

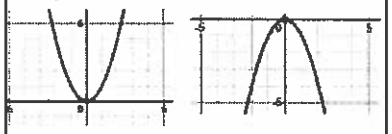
Preparing for Assessment

- Login to **Maths Watch** and complete your independent tasks each week. Attempt all questions and aim to get at least 80% correct. Remember, you can watch the videoclip attached to each question to help you understand the topic better.
- Use **'Read, Cover, Write, Check'** to test your understanding on the key words and core knowledge in this organiser.

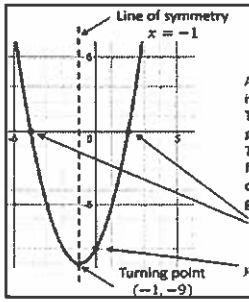
Core Knowledge

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

$y = x^2$ $\quad$ $y = -x^2$



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



Examples

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

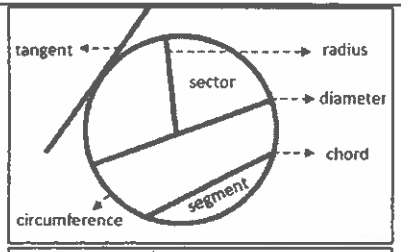
A quadratic equation can be solved from its graph.
The roots of the graph tell us the possible solutions for the equation.
There can be 1 root, 2 roots or no roots for a quadratic equation. This is dependant on how many times the graph crosses the x axis.

Roots $x = -4$
$x = 2$
y intercept $= -8$

Definition/Tips	Example
Multiply every term in the first bracket by every term in the second bracket Be careful with negatives	e.g. $(x+2)(x+7)$ $x^2 + 2x + 7x + 14$ $= x^2 + 9x + 14$

	x	$+2$
x	x^2	$+2x$
$+7$	$+7x$	$+14$

Perimeter: Total length around a 2-dimensional shape.
Formula: A mathematical equation or rule expressed in symbols.
Volume: The amount of space occupied by a three-dimensional object.
Circle: A round plane figure whose boundary is equidistant from its centre.
Segment: A part of a circle bounded by an arc and a chord.
Arc: A part of the circumference of a circle.
Sector: A region bounded by two radii and an arc of a circle.
Cylinder: A three-dimensional shape with two parallel circular bases connected by a curved surface.
Circumference: The distance around a circle.
Radius: The distance from the centre of a circle to any point on its circumference.
Diameter: The distance across a circle through its centre, twice the radius.
π: ratio of the circumference of a circle to its diameter
Sphere: A three-dimensional shape where all points are equidistant from its centre.
Cone: A three-dimensional shape with a circular base tapering to a point called the apex.
Hemisphere: Half of a sphere,
Surface Area: The total area of the exterior surfaces of a three-dimensional object.
Mixed (Fraction): A number consisting of an integer and a proper fraction.
Improper (Fraction): A fraction where the numerator is greater than or equal to the denominator.
Fraction: A part of a whole, expressed as a ratio of two integers.
Indices: Exponents or powers that indicate how many times a number is multiplied by itself.
Standard Form: A way of writing numbers, especially very large or very small ones, using powers of 10.
Reciprocal: The inverse of a number, e.g. the reciprocal of a is 1/a.



Sectors	Fraction of areas
Semi-circle	Area = $\pi \times r^2 \times \frac{180°}{360°}$
Quarter-circle	Area = $\pi \times r^2 \times \frac{90°}{360°}$
30°	Area = $\pi \times r^2 \times \frac{30°}{360°}$

Example 1

Calculate the area of a circle with a radius of 5cm

Area = $\pi \times radius^2$
$= \pi \times 5^2$
$= 78.5cm^2$

MathsWatch Clip Number 116, 117, 118, 149, 167

Formulae

Area = $\pi \times radius^2$

Circumference = $\pi \times diameter$

Example 2

Calculate the **circumference** of a circle with a **radius** of 12cm

Circumference = $\pi \times$ diameter
$= \pi \times 24$
$= 75.4cm$

Example 3

Calculate the area of a **sector** with a **radius** of 7cm and an angle of 50°

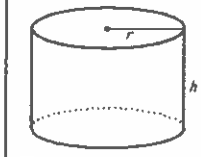
Area = $\pi \times radius^2 \times \frac{50°}{360°}$
$= \pi \times 7^2 \times \frac{50°}{360°}$
$= 21.4cm^2$

Remember

Radius = ½ diameter
Diameter = 2 x radius

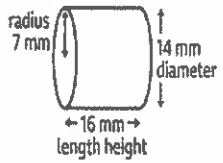
Cylinder

Surface Area — We will need to calculate the surface area of the top, base and sides.
Area of the top is πr^2
Area of the bottom is πr^2
Area of the side is $2\pi rh$
Therefore the Formula is: $A = 2\pi r^2 + 2\pi rh$



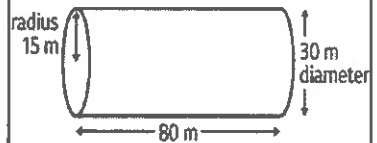
Volume $V = \pi r^2 h$

Surface area = $2\pi r^2 + 2\pi rh$



$2 \times \pi \times r^2 + 2 \times \pi \times r \times h$
$2 \times 3.14 \times 7^2 + 2 \times 3.14 \times 7 \times 16 = 1011.08$

Total surface area = 1011 mm² to the nearest mm²



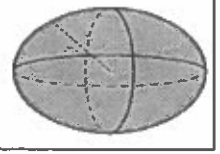
$V = \pi r^2 h$
$= \pi \times 15^2 \times 80$
$= 3.14 \times 15^2 \times 80$
$= 56,520$

Volume = 56,520 m³

Surface Area and Volume of Sphere

Surface Area = $4\pi r^2$

Volume = $\frac{4}{3}\pi r^3$



Addition

$\frac{1}{4} + \frac{1}{2} = \frac{1}{4} + \frac{2}{4} = \frac{3}{4}$

Subtraction

$\frac{3}{5} - \frac{1}{5} = \frac{3-1}{5} = \frac{2}{5}$

Multiplication

$\frac{2}{3} \times \frac{3}{4} = \frac{2 \times 3}{3 \times 4} = \frac{6}{12} = \frac{1}{2}$

Division

$\frac{3}{4} \div \frac{2}{5} = \frac{3}{4} \times \frac{5}{2} = \frac{3 \times 5}{4 \times 2} = \frac{15}{8}$

Powers/Indices

2^4 is a short way of writing $2 \times 2 \times 2 \times 2$.

Index laws

1. $a^m a^n = a^{m+n}$
2. $\frac{a^m}{a^n} = a^{m-n}$ e.g. $b^5 \times b^3 = b^{5+3} = b^8$
3. $(a^m)^n = a^{mn}$
4. $(ab)^m = a^m b^m$ e.g. $(a^2)^5 = a^{2 \times 5} = a^{10}$
5. $\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}$
6. $a^0 = 1$
7. $a^{-n} = \frac{1}{a^n}$

Standard Form

Standard form, or standard index form, is a system of writing numbers which can be very large or very small numbers. It is based on using powers of 10.

Convert to
50,000 can be written as: $5 \times 10,000$
$10,000 = 10 \times 10 \times 10 \times 10 = 10^4$
So, $50,000 = 5 \times 10^4$
0.0005 can be written as 5×0.0001.
$0.0001 = 10^{-4}$
So, $0.0005 = 5 \times 10^{-4}$.

Convert from
1.34×10^3 is 1,340, since $1.34 \times 10 \times 10 \times 10 = 1,340$.
4.78×10^{-3} is 0.00478, as $4.78 \times 0.001 = 0.00478$.

Principled **Resilient** **Open** **Understanding** **Disciplined**

Yr. 11 (F) Maths Knowledge Organiser: Spring 1 – Geometry and Algebra

By the end of this half-term, you should be able to:

Chapter 19 – Congruence, similarity and Vectors

- Use the basic congruence criteria for triangles (SSS, SAS, ASA and RHS)
- Identify shapes which are similar
- Identify the scale factor of similar shapes
- Solve problems to find missing lengths in similar shapes
- Understand and use column notation in relation to vectors;
- Be able to represent information graphically given column vectors
- Calculate using column vectors, and represent graphically, the sum of two vectors, the difference of two vectors and a scalar multiple of a vector.

Chapter 20 – More Algebra

- Know the difference between an equation and an identity
- Change the subject of a formula involving complex expressions
- Recognise, sketch and interpret graphs of simple cubic functions
- Recognise, sketch and interpret graphs of the reciprocal function
- Solve simultaneous equations (linear) algebraically and graphically
- Answer 'show that' questions using consecutive integers (n, $n+1$), squares a^2, b^2, even numbers $2n$, and odd numbers $2n+1$

Keywords

Vector: a quantity represented by an arrow with both direction and magnitude.

Magnitude: is the length of the vector.

Scalar: a scaler is a number you multiply the vector by.

Column vector: in a column vector the top number moves left (-) or right (+) and the bottom number moves up (+) or down (-).

Congruence: same size and same shape.

Scale factor: the ratio of corresponding sides of two similar shapes.

Enlargement: the shape will get bigger or smaller. Multiply each side by the scale factor.

Preparing for Assessment

- Login to **Maths Watch** and complete your independent tasks each week. Attempt all questions and aim to get at least 80% correct. Remember, you can watch the videoclip attached to each question to help you understand the topic better.
- Use **'Read, Cover, Write, Check'** to test your understanding on the key words and core knowledge in this organiser.

Core Knowledge

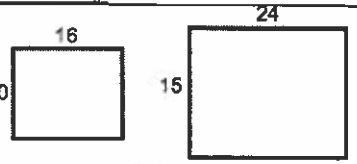
Congruence

4 ways of proving that two triangles are congruent:

1. **SSS** (Side, Side, Side)
2. **RHS** (Right angle, Hypotenuse, Side)
3. **SAS** (Side, Angle, Side)
4. **ASA** (Angle, Side, Angle) or **AAS**

ASS does not prove congruency

Similarity



Scale Factor = $15 \div 10 = 1.5$

Finding missing lengths in similar shapes

1. Find the **scale factor**.
2. **Multiply or divide** the corresponding side to find a missing length.

Vectors

A vector can be written in 3 ways:

$\mathbf{a}$ or $\overrightarrow{AB}$ or $\begin{pmatrix}1\\3\end{pmatrix}$

$\begin{pmatrix}2\\3\end{pmatrix}$ means '2 right, 3 up'

if $\underline{\mathbf{a}} = \begin{pmatrix}4\\4\end{pmatrix}$ and $\underline{\mathbf{b}} = \begin{pmatrix}2\\-2\end{pmatrix}$

then $\underline{\mathbf{a}} + \underline{\mathbf{b}} = \begin{pmatrix}4\\4\end{pmatrix} + \begin{pmatrix}2\\-2\end{pmatrix} = \begin{pmatrix}6\\2\end{pmatrix}$

Similar shapes: shapes are similar if they are the same shape but different sizes.

Reciprocal: the reciprocal of a number is 1 divided by the number.

Linear graph: straight line graph.

Gradient: the change in the y coordinates divided by the change on the x coordinates.

Functions: a function is a relationship between 2 numbers.

Cubic: a number or a letter to the power of 3.

Asymptote: a straight line that a graph approach but never touches.

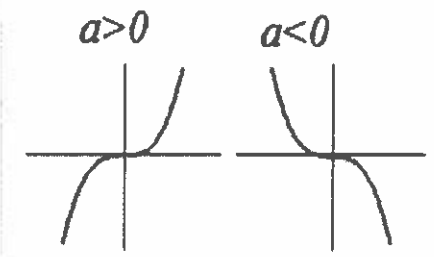
Subject: it is the letter on its own on one side of the equal's sign.

Rearrange: using inverse operations to make one variable the subject of the formula.

Simultaneous Equations: a set of two or more equations, each involving two or more variables (letters).

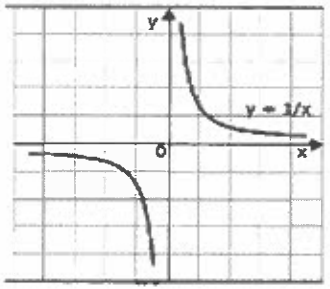
Substitution: replace letters with numbers.

Cubic graph



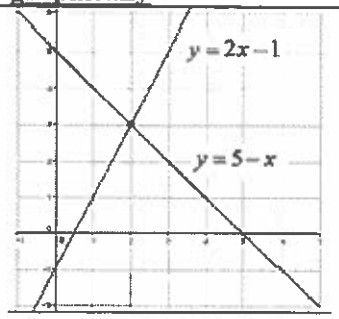
The equation is of the form $y = ax^3 + k$, where k **is a number.**
If $a > 0$, the curve is **increasing**.
If $a < 0$, the curve is **decreasing**.

Reciprocal graph



The equation is of the form $y = \frac{A}{x}$, where A **is a number** and $x \neq 0$.
The graph has **asymptotes** on the **x-axis and y-axis.**

Solve Simultaneous equations graphically



They meet at the point with coordinates (2,3) so the answer is $x = 2$ and $y = 3$

Solve Simultaneous equations algebraically

$$5x + 2y = 9$$
$$10x + 3y = 16$$

Multiply the first equation by 2.

$$10x + 4y = 18$$
$$10x + 3y = 16$$

Same Sign Subtract (+10x on both)

$$y = 2$$

Substitute $y = 2$ in to equation.

$$5x + 2 \times 2 = 9$$
$$5x + 4 = 9$$
$$5x = 5$$
$$x = 1$$

Solution: $x = 1, y = 2$

Rearrange a formula

Make x the subject of $y = \frac{2x-1}{z}$

Multiply both sides by z

$$yz = 2x - 1$$

Add 1 to both sides

$$yz + 1 = 2x$$

Divide by 2 on both sides

$$\frac{yz + 1}{2} = x$$

We now have x as the subject.

Proof

Show that $(x-3)^2 - 2 \equiv x^2 - 6x + 7$

$$\text{LHS} \equiv (x-3)^2 - 2 \equiv (x-3)(x-3) - 2$$
$$\equiv x^2 - 6x + 9 - 2$$
$$\equiv x^2 - 6x + 7 \equiv \text{RHS}$$

Principled **Resilient** **Open** **Understanding** **Disciplined**

Yr. 11 (H) Maths Knowledge Organiser: Autumn 1 – Trigonometry and Statistics

By the end of this half-term, you should be able to:

Chapter 13 – More Trigonometry

13 a. Graphs of trigonometric functions

13 b. Further trigonometry

- Recognise, sketch and interpret graphs of the trigonometric functions (in degrees) for angles of any size.
- Know the exact values of Sin, Cos, and Tan for specific angles and find them from graphs.
- Apply to graphs of y = f(x) a variety of transformation (such as y = -f(x), y = f(-x), y = f(x) + a and y = f (x + a)
- Understand, recall and use area = ½ ab Sin C, Pythagoras theorem in triangles for 2D and 3D shapes.
- Know and use the sine and cosine rules to solve 2D and 3D problems

Chapter 14. – Further Statistics

14 a. Collecting data

14 b. Cumulative frequency, box plot and histograms

- Understand what is meant by a sample and a population and how different sample sizes may affect the reliability of conclusions drawn.
- Identify possible sources of bias and plan to minimise it.
- Construct and interpret cumulative frequency tables, cumulative frequency/diagrams and estimate median, quartile values and interquartile range.
- Produce box plots from new data and when given quartile, median and identify any outliers.
- Construct and interpret histograms from class intervals with unequal width.

Keywords

Area of any Triangle: use when given the length of two sides and the included angle.

Pythagoras Theorem: it states that in any right-angled triangle, the square of the length of the hypotenuse (the side opposite the right angle) is equal to the sum of the square of the lengths of the other two sides.

Preparing for Assessment

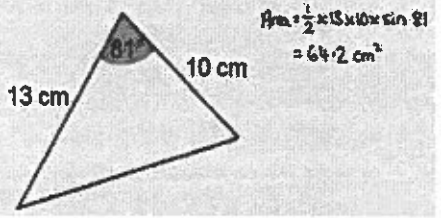
- Login to **Maths Watch** and complete your independent tasks each week. Attempt all questions and aim to get at least 80% correct. Remember, you can watch the videoclip attached to each question to help you understand the topic better.
- Use **'Read, Cover, Write, Check'** to test your understanding on the key words and core knowledge in this organiser.

Core Knowledge

Area of any Triangle

$\text{Area} = \frac{1}{2}ab\sin C$

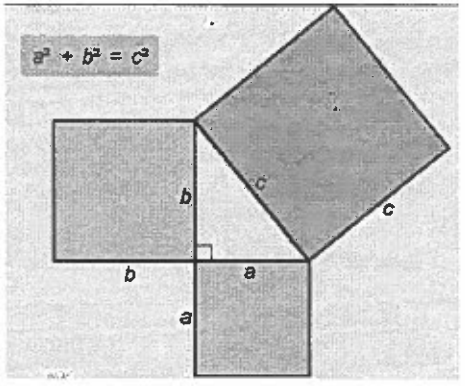
Work out the area of the triangle.



$\text{Area} = \frac{1}{2} \times 13 \times 10 \times \sin 81$

$= 64.2\ cm^2$

Pythagoras Theorem



Cumulative Frequency

The first table gives information about the number of minutes pupils spent on homework.
Use it to complete the cumulative frequency table.

No. of minutes (t)	Frequency
$0 < t \leq 10$	2
$10 < t \leq 20$	6
$20 < t \leq 30$	10
$30 < t \leq 40$	9
$40 < t \leq 50$	3

No. of minutes (t)	Cumulative Frequency
$0 < t \leq 10$	2
$0 < t \leq 20$	8
$0 < t \leq 30$	18
$0 < t \leq 40$	27
$0 < t \leq 50$	30

Cumulative Frequency: a chart showing the running total of the number of times an event or value occurs.

Box plot: a diagram that shows the five-number summary of a distribution.

Outlier: a value that stands apart from the data set.

Sine rule (SIN): use with non-right-angle triangles. Use when the question involves 2 sides and 2 angles.

Cosine rule (COS): use with non-right-angle triangles. Use when the question involves 3 sides and 1 angle.

Interquartile Range (IQR): the range of the middle 50% of a distribution. IQR = upper quartile (75%) – lower quartile (25%).

Spread: the distance/how spread out/variation of data.

Random Sampling: selecting a sample in such a way that every member of a population has an equal chance of being chosen.

Stratified Sampling: making a selection by dividing a population into groups (called strata) according

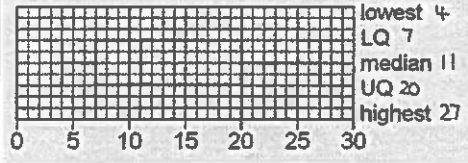
Box Plot

Below are the scores achieved by 11 pupils in a test:

27, 11, 15, 20, 9, 6, 4, 18, 7, 23, 11

④ 6, ⑦ 9, 11, ⑪ 15, 18, ⑳ 23, ㉗

Draw a boxplot to show this data.



Sine Rule

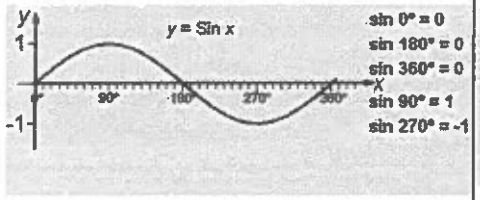
In any triangle ABC where a, b and c are the length of the sides:

sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine Rule

$a^2 = b^2 + c^2 - 2bc\cos A$

Sine Function (y = sin x)



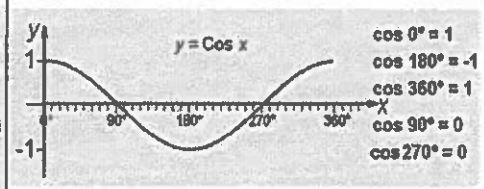
In the interval $0° \le x \le 360°$, find the values of x for which $\sin x = 0.9397$

Give your answers to the nearest degree.

$\sin x = 0.9397$

$\sin^{-1} 0.9397 = 70°$ and $110°$

Cosine Function (y = cos x)

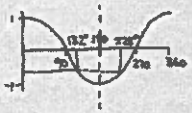


In the interval $0° \le x \le 360°$, find the values of x for which $\cos x = -0.6691$

Give your answers to the nearest degree.

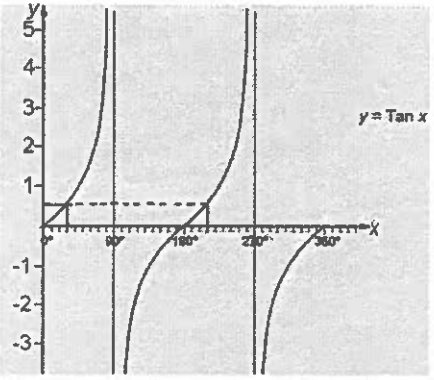
$\cos x = -0.6691$

$\cos^{-1}(-0.6691) = 132°$ and $228°$



$x = 132°, 228°$

Tangent Function y = tan x



In the interval $0° \le x \le 360°$, find the values of x for which $\tan x = 1.1918$

Give your answers to the nearest degree.

$\tan x = 1.1918$

$\tan^{-1} 1.1918 = 50°$

$50 + 180 = 230°$

$x = 50°, 230°$

to certain characteristics, such as gender.
[Number from each stratum = (Stratum / population) x Total sample]

Sample: a part of a whole set.

Population: the whole set from which a sample is taken.

Bias: an influence that might prevent results from fairly representing the truth.

Lower quartile or first quartile: the value that lies one quarter of the way through a distribution, arrange in ascending order [(n+1)/4].

Upper quartile or third quartile: the value that lies three-quarters of the way through a distribution, arranged in ascending order [3(n+1)/4].

Exact Trig Values

Sine and Cosine

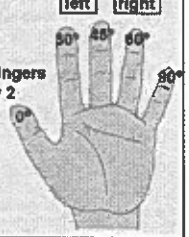
Memorising the exact values of:

$\sin 0° = 0$ $\cos 0° = 1$
$\sin 30° = \frac{1}{2}$ $\cos 30° = \frac{\sqrt{3}}{2}$
$\sin 45° = \frac{\sqrt{2}}{2}$ $\cos 45° = \frac{\sqrt{2}}{2}$
$\sin 60° = \frac{\sqrt{3}}{2}$ $\cos 60° = \frac{1}{2}$
$\sin 90° = 1$ $\cos 90° = 0$

Sin on left | Cos on right

Square root the fingers and divide by 2

$\sin 0 = \frac{\sqrt{0}}{2} = 0$ $\cos 0 = \frac{\sqrt{4}}{2} = \frac{2}{2} = 1$
$\sin 45 = \frac{\sqrt{2}}{2}$ $\cos 45 = \frac{\sqrt{2}}{2}$
$\sin 90 = \frac{\sqrt{4}}{2} = \frac{2}{2} = 1$



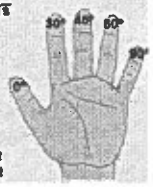
Tangent

Memorising the exact values of:

$\sin 0° = 0$ $\cos 0° = 1$ $\tan 0° = 0$
$\sin 30° = \frac{1}{2}$ $\cos 30° = \frac{\sqrt{3}}{2}$ $\tan 30° = \frac{1}{\sqrt{3}}$
$\sin 45° = \frac{\sqrt{2}}{2}$ $\cos 45° = \frac{\sqrt{2}}{2}$ $\tan 45° = 1$
$\sin 60° = \frac{\sqrt{3}}{2}$ $\cos 60° = \frac{1}{2}$ $\tan 60° = \sqrt{3}$
$\sin 90° = 1$ $\cos 90° = 0$

$\tan 45 = \frac{\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{4}}{\sqrt{2}} = 1$
$\tan 60 = \frac{\sqrt{3}}{\sqrt{1}} = \frac{\sqrt{3}}{1} = \sqrt{3}$

Tan? Divide fingers on left by fingers on right and square root



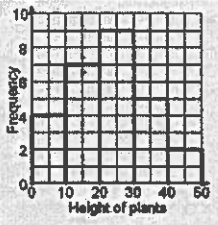
Histogram

A histogram is like a frequency diagram, apart from 3 main differences:

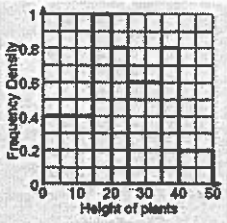
The class intervals are often not equal

The vertical axis is labelled frequency density

It is the area of the bars, rather than the height, which matters



Frequency Diagram

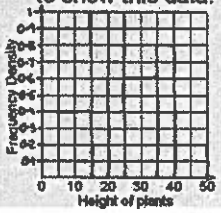


Histogram

$$\text{Frequency density} = \frac{\text{Frequency}}{\text{Class width}}$$

Height (cm)	Frequency	FD
$0 < h \leq 15$	$6 \div 15$	0·4
$15 < h \leq 20$	$5 \div 5$	1
$20 < h \leq 25$	$4 \div 5$	0·8
$25 < h \leq 35$	$6 \div 10$	0·6
$35 < h \leq 40$	$4 \div 5$	0·8
$40 < h \leq 50$	$2 \div 10$	0·2

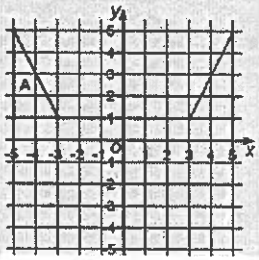
Draw a histogram to show this data.



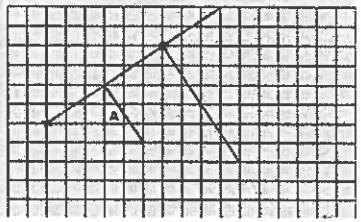
Transformations

- **Reflection**
- **Enlargement**
- **Rotation**
- **Translation**

Reflect triangle A in the y-axis.



Enlarge triangle A by scale factor 2 using the cross as the centre of enlargement.



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Yr. 11 (H)

Maths Knowledge Organiser: Autumn 2 – Equations, Graphs, Circle Theorem, and More Graphs

By the end of this half-term, you should be able to:

Chapter 15 – Equations and Graphs

- Sketch a graph of a quadratic or cubic function, by factorisation, formula, identifying roots, y-intercept, and turning point by completing the square.
- Expand the product of more than two linear expressions
- Solve simultaneous equations graphically.
- Solve quadratic inequalities in one variable by factorising and sketching the graph to find critical values.
- Use iteration with simple converging sequences

Chapter 16 – Circle Theorem

- Recall the definition of a circle and identify and draw parts of a circle including sector, tangent, chord and segment.
- Prove and use the facts of circle theorems.
- Understand and use the fact that the tangent at any point on a circle is perpendicular to the radius at the point.
- Find and give reasons for missing angles on diagrams using circle theorem and angle facts.

Chapter 17 – More Algebra

- Rationalise the denominator involving surds.
- Multiply, divide, simplify Algebraic fractions and solve quadratic equations arising from Algebraic fractions equations.
- Change the subject of a formula.
- Solve 'show that' and proof questions using consecutive integers, squares, even and odd numbers.
- Use function notation.

Keywords

Quadratic Formula: used to solve any equation in the form $ax^2 + bx + c = 0$.

Roots: the two solutions of a quadratic equation.

Completing the Square: making the left-hand side of a quadratic equation into a perfect square- (x + y)^=z.

Simultaneous Equation: a pair of equations in which the variables

Preparing for Assessment

- Login to **Maths Watch** and complete your independent tasks each week. Attempt all questions and aim to get at least 80% correct. Remember, you can watch the videoclip attached to each question to help you understand the topic better.
- Use **'Read, Cover, Write, Check'** to test your understanding on the key words and core knowledge in this organiser.

Core Knowledge

$$x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$$

Solve $3x^2 + 2x - 13 = 0$

Give your solutions correct to 1 decimal place.

$a = 3 \quad b = 2 \quad c = -13$

$$x = \frac{-(2) \pm \sqrt{(2)^2 - 4(3)(-13)}}{2(3)}$$

$= 1.8$ (1dp) and -2.4 (1dp)

Express $x^2 + 4x - 3$ in the form $(x + a)^2 - b$ where a and b are integers.

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

$(x+2)^2 - 7$

$(x+2)(x+2)$

$x^2+2x+2x+4$

x^2+4x+4

Expand and simplify:

a) $x(2x - 1)(3x + 5)$

$x(6x^2 + 10x - 3x - 5)$

$x(6x^2 + 7x - 5)$

$6x^3 + 7x^2 - 5x$

b) $(2x - 3)(x - 4)(3x - 2)$

$(2x-3)(3x^2 - 2x - 12x + 8)$

$(2x-3)(3x^2 - 14x + 8)$

$6x^3 - 28x^2 + 16x - 9x^2 + 42x - 24$

$6x^3 - 37x^2 + 58x - 24$

represent the same numbers in each equation [Graphical Solution(s)].

Quadratic Inequalities: a mathematical statement that two algebraic expressions are not equal and root(s) for solution(s).

Iterative Process: a repetitive process, where an answer is put back into a formula to get the next answer.

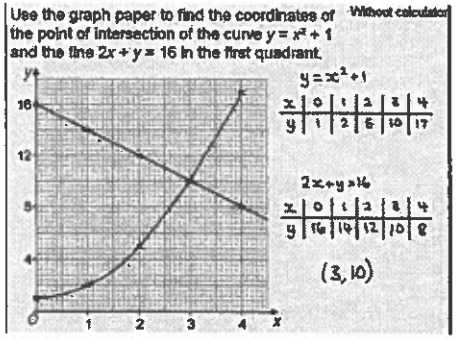
Chord: a straight line joining any two points on a circle.

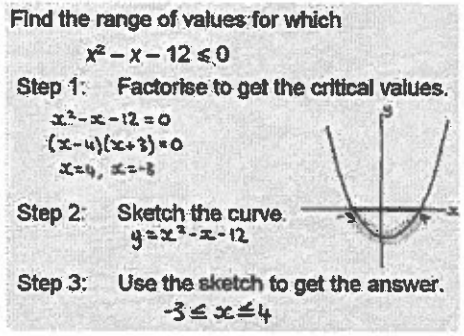
Cyclic Quadrilateral: a quadrilateral that has each of its vertices on the circumference of a circle.

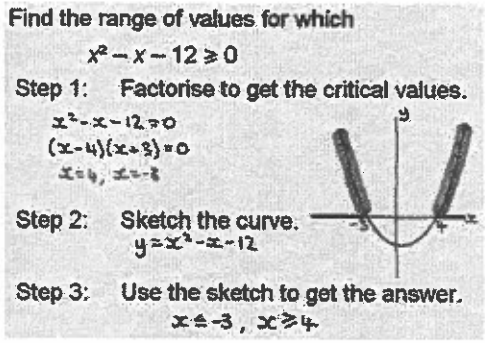
Segment: part of a circle formed either side of a chord. The larger part is called the major segment and the smaller part the minor segment.

Subject: rearranging the expression in an equation, so that one of the terms is on its own to the left of the equal sign.

Estimate: round the number to 1 significant figure. Result will either







Solve the simultaneous equations

$x^2 + y^2 = 41$

$y = 2x - 3$

$x^2 + (2x-3)^2 = 41$

$x^2 + (2x-3)(2x-3) = 41$

$x^2 + 4x^2 - 6x - 6x + 9 = 41$

$5x^2 - 12x + 9 = 41$

$5x^2 - 12x - 32 = 0$

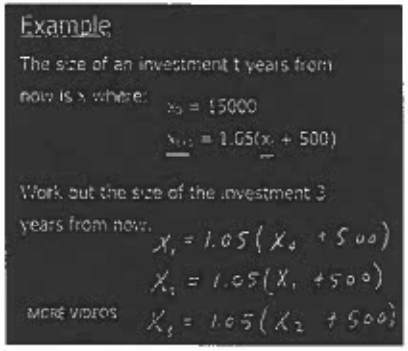
$(5x + 8)(x - 4) = 0$

$x = -\frac{8}{5}$ $\quad x = 4$

$y = 2(-\frac{8}{5}) - 3$ $\quad y = 2(4) - 3$

$= -\frac{16}{5} - 3$ $\quad = 5$

$= -\frac{31}{5}$



The number of people living in a town t years from now is P_t where

$P_0 = 55000$

$P_{t+1} = 1.05(P_t - 800)$

Work out the number of people in the town 3 years from now.

$P_1 = 1.05(55000 - 800) = 55826$

$P_2 = 1.05(\text{Ans} - 800) = 56677$

$P_3 = 1.05(\text{Ans} - 800) = 57553$ (nearest integer)

57553

Prove that $(3n+1)^2 - (3n-1)^2$ is always a multiple of 12, for all positive integer values of n.

$((3n+1)(3n+1)) - ((3n-1)(3n-1))$

$(9n^2 + 3n + 3n + 1) - (9n^2 - 3n - 3n + 1)$

$(9n^2 + 6n + 1) - (9n^2 - 6n + 1)$

$9n^2 + 6n + 1 - 9n^2 + 6n - 1$

$12n$

be an under or over estimate of the actual answer.

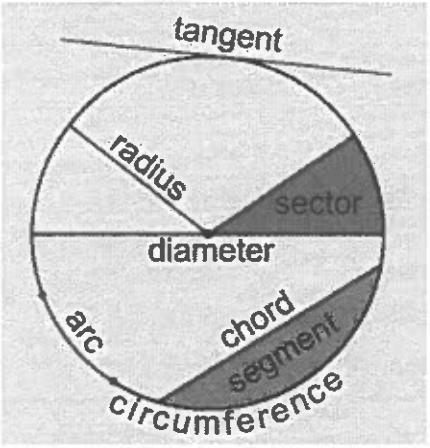
Reciprocal: the reciprocal of 'n' is '1/n' or n to the power of -1.

Surds: a number written exactly using square and cube roots. To rationalise a surd, multiply by the denominator to get an integer as the denominator.

Function: a rule that is applied to one set of values to give another set of values.

Rational numbers: any number that can be written as a fraction using whole number (+ or -) but terminates.

Irrational numbers: numbers that can-not be written exactly as a fraction or a decimal. The number of decimal places is infinite and there is no recurring pattern. Such as the value of 'pi'.



$\sqrt{a} \times \sqrt{a} = a$ | $\sqrt{a \times b} = \sqrt{a} \times \sqrt{b}$

The simplest form of a surd is when the number under the root sign is as small as possible.

Simplify the following surds

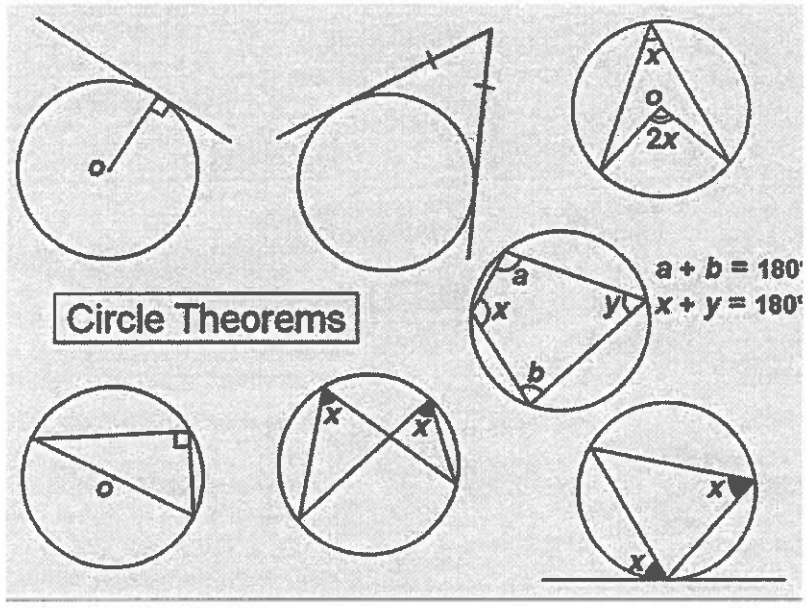
a) $\sqrt{8} = \sqrt{4}\sqrt{2} = 2\sqrt{2}$ d) $\sqrt{32} = \sqrt{16}\sqrt{2} = 4\sqrt{2}$

b) $\sqrt{75} = \sqrt{25}\sqrt{3} = 5\sqrt{3}$ e) $\sqrt{48} = \sqrt{16}\sqrt{3} = 4\sqrt{3}$

c) $\sqrt{200} = \sqrt{100}\sqrt{2} = 10\sqrt{2}$ f) $\sqrt{180} = \sqrt{36}\sqrt{5} = 6\sqrt{5}$

Rationalise the denominator and simplify if possible

$$\frac{35}{\sqrt{7}} \times \frac{\sqrt{7}}{\sqrt{7}} = \frac{35\sqrt{7}}{\sqrt{7}\sqrt{7}}$$
$$= \frac{35\sqrt{7}}{7}$$
$$= 5\sqrt{7}$$



a) Make x the subject of the formula

$$\frac{3x}{y} - 5 = y$$

$\frac{3x}{y} = y + 5$

$3x = y(y+5)$

$x = \frac{y(y+5)}{3}$

b) Rearrange the formula $4(2x + 1) - t = y$ to make x the subject.

$8x + 4 - t = y$

$8x = y - 4 + t$

$x = \frac{y-4+t}{8}$ $\quad x = \frac{y+t-4}{8}$

1) Complete the table of values for $y = 2x + 1$

x	-2	-1	0	1	2	3
y	-3	-1	1	3	5	7

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

x	-2	-1	0	1	2	3
y	0	-1	0	3	8	15

Yr. 11 (H) Maths Knowledge Organiser: Spring 1 – Vectors, Proportion and Graphs

By the end of this half-term, you should be able to:

Chapter 18 – Vectors and geometric proof

- Understand and use vector notation
- Understand that 2**a** is parallel to **a** and twice its length, and that **a** is parallel to −**a** in the opposite direction
- Calculate the resultant of two vectors.
- Solve geometric problems in 2D where vectors are divided in a given ratio.
- Produce geometrical proofs to prove points are collinear and vectors/lines are parallel.

Chapter 19 – Proportion and Graphs

- Write and use equations to solve problems involving direct and inverse proportionality.
- Use and recognise graphs showing direct and inverse proportionality
- Recognise, sketch and interpret graphs of exponential functions
- Interpret the gradient of a linear or non-linear graph
- Interpret and analyse transformations of graphs of functions.

Keywords

Vector: a quantity represented by an arrow with both direction and magnitude.

Magnitude: is the length of the vector.

Scalar: a scaler is a number you multiply the vector by.

Parallel vectors: vectors that are multiples of each other.

Collinear: vectors that are on the same line.

Proof: use of maths facts to show that a statement is true not true.

Column vector: $\begin{pmatrix}2\\3\end{pmatrix}$ means '2 right, 3 up'

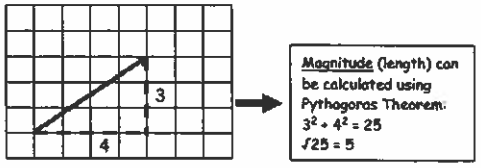
Reciprocal: the reciprocal of a number is 1 divided by the number.

Preparing for Assessment

- Login to **Maths Watch** and complete your independent tasks each week. Attempt all questions and aim to get at least 80% correct. Remember, you can watch the videoclip attached to each question to help you understand the topic better.
- Use **'Read, Cover, Write, Check'** to test your understanding on the key words and core knowledge in this organiser.

Core Knowledge

Vectors

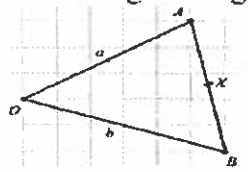


If two vectors have the **same magnitude and direction**, they are **equal.**

2**a**+**b** and 4**a**+2**b** are parallel as they are multiple of each other

Geometric proof

Example 1: X is the midpoint of AB. Find $\overrightarrow{OX}$
Answer: Draw X on the original diagram



Now build up a journey.

You could use $\overrightarrow{OX} = \overrightarrow{OA} + \frac{1}{2}\overrightarrow{AB}$.

This will give: $\overrightarrow{OX} = a + \frac{1}{2}(b-a)$.

This will simplify to $\frac{1}{2}a+\frac{1}{2}b$ or $\frac{1}{2}(a+b)$

Linear Graph: straight line graph.

Gradient: the change in the y coordinates divided by the change on the x coordinates.

Quadratic function:
$y = ax^2 + bx + c$, where a, b and c are numbers, $a \neq 0$.

Exponential: when we multiply a number repeatedly by the same number.

Functions: a function is a relationship between 2 numbers.

Direct proportionality: if two quantities are in direct proportion, as one increases, the other increases by the same percentage.

Indirect proportionality: if two quantities are inversely proportional, as one increases, the other decreases by the same percentage.

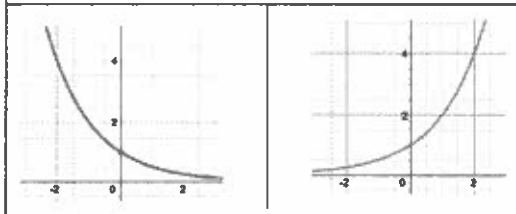
Rate of change: is what degree one variable changes in relation to another.

Velocity: is a speed in particular direction.

Transformations: is the change of position or size of a shape.

Cubic: a number or a letter to the power of 3.

Exponential graph



The equation is of the form $y = a^x$, where a is a number called the **base**.
If $a > 1$ the graph **increases**.
If $0 < a < 1$, the graph **decreases**.
The graph has an **asymptote** which is the **x-axis**.

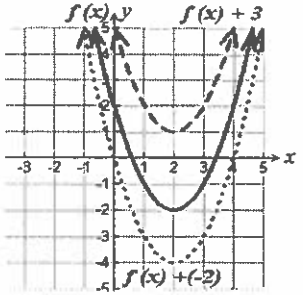
Growth and Decay

1, 2, 4, 8, 16, 32, 64, 128 ... is an example of exponential growth, because the numbers are being multiplied by 2 each time.

1000, 200, 40, 8 ... is an example of exponential decay, because the numbers are being multiplied by $\frac{1}{5}$ each time.

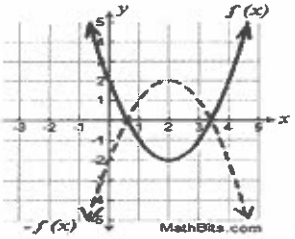
Graph transformation $f(x) + a$

Vertical translation up **a** units. $\begin{pmatrix} 0 \\ a \end{pmatrix}$



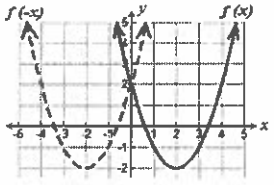
Graph transformation $-f(x)$

Reflection over the **x-axis**



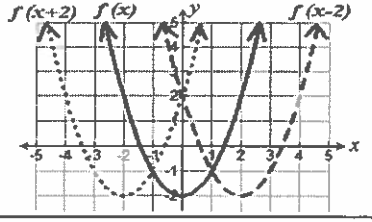
Graph transformation $f(-x)$

Reflection over the **y-axis**.



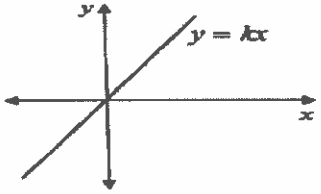
Graph transformation $f(x + a)$

Horizontal translation <u>left</u> **a** units. $\begin{pmatrix} -a \\ 0 \end{pmatrix}$



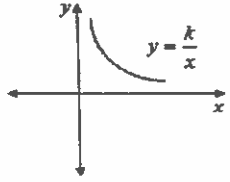
Direct proportionality

If y is directly proportional to x, this can be written as $y = k\,x$



Inverse proportionality

An equation of the form $y = \frac{k}{x}$ represents inverse proportion.



Direct proportion graphs will always start at the origin.

p is directly proportional to q.
When p = 12, q = 4.
Find p when q = 20.
1. p = kq
12 = k x 4, so k = 3
2. p = 3q
3. p = 3 x 20 = 60, so p = 60

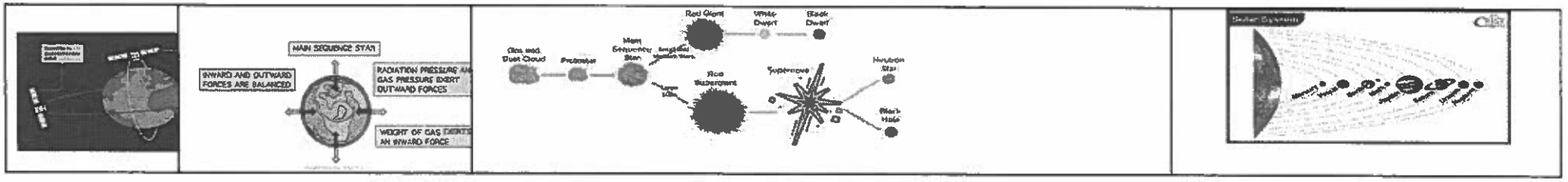
Science

Physics 8 – Space (Triple only)

Summary- Position in the Curriculum

Questions about where we are, and where we came from, have been asked for thousands of years. In the past century, astronomers and astrophysicists have made remarkable progress in understanding the scale and structure of the universe, its evolution and ours. New questions have emerged recently. 'Dark matter', which bends light and holds galaxies together but does not emit electromagnetic radiation, is everywhere – what is it? And what is causing the universe to expand ever faster?

Terminology	Definitions	Core Knowledge	Preparing for Assessment
The big bang theory	The theory that the universe was created in a massive explosion (the Big Bang), and that the universe has been expanding ever since	Within our **solar system** there is one star, the Sun, plus the eight planets and the dwarf planets that orbit around the Sun. Natural satellites, the moons that orbit planets, are also part of the solar system. Our solar system is a small part of the **Milky Way galaxy**	Revision and self-study questions are below. Answer 1 per week for Self-Study, you can draw on your notes, this organiser, your memory and your own research.
Supernova	The explosion of a massive star after fusion in its core ceases and the matter surrounding its core collapses on to the core and rebounds	**A star** goes through **a life cycle**. The life cycle is determined by the size of the star. The Sun was formed from a cloud of dust and gas (nebula) pulled together by gravitational attraction.	*1. The earth moves around the Sun in a circular orbit at a constant speed. Explain why the velocity of the Earth changes and why it accelerates as it moves around the Sun.*
Centripetal force	The resultant force towards the centre of a circle acting on an object moving in a circular path	**Fusion processes** in stars produce all of the naturally occurring elements. Elements heavier than iron are produced in a supernova. The explosion of a massive star (supernova) distributes the elements throughout the universe.	*2. Describe how the Sun is formed from dust and gas clouds in space.*
Black hole	An object in space that has so much mass that nothing, not even light, can escape from its gravitational field	**Gravity** provides the force that allows planets and satellites (both natural and artificial) to maintain their circular orbits.	*3. Explain why a comet cannot be seen when it is far away from the Sun.*
Dark matter	Matter in a galaxy that cannot be seen. Its presence is deduced because galaxies would spin much faster if their stars were their only matter	There is an observed increase in the wavelength of light from most distant galaxies. The further away the galaxies, the faster they are moving and the bigger the observed increase in wavelength. This effect is called **red-shift**. The observed red-shift provides evidence that space itself (the universe) is expanding and supports the **Big Bang theory**	*4. Some of the nearest galaxies to Earth have different redshifts and some have different blue shifts. Use the information to describe these galaxies.*
Cosmic background radiation CMBR	Electromagnetic radiation that has been travelling through space ever since it was created shortly after the Big Bang	**The Big Bang theory** suggests that the universe began from a very small region that was extremely hot and dense. Since 1998 onwards, observations of supernovae suggest that distant galaxies are receding ever faster.	*5. Describe what will happen to a star that has much more mass than the Sun.*

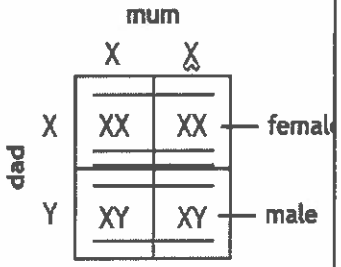

MAIN SEQUENCE STAR
INWARD AND OUTWARD FORCES ARE BALANCED
RADIATION PRESSURE AN GAS PRESSURE EXERT OUTWARD FORCES
WEIGHT OF GAS EXERTS AN INWARD FORCE
Red Giant
White Dwarf
Black Dwarf
Gas and Dust Cloud
Protostar
Main Sequence Star
Supergiant
Neutron Star
Black Hole

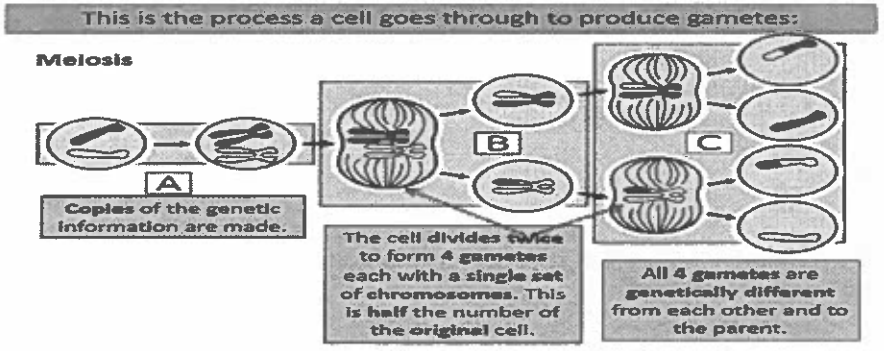
AQA B6 Inheritance, Variation and Evolution Knowledge Organiser

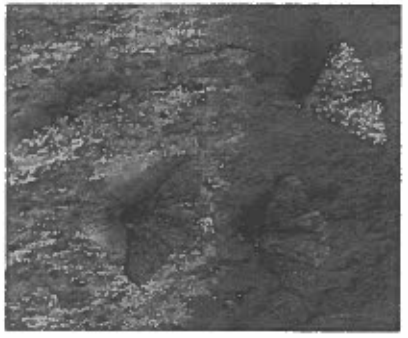
Summary- Position in the Curriculum

In this section we will discover how the number of chromosomes are halved during meiosis and then combined with new genes from the sexual partner to produce unique offspring. Gene mutations occur continuously and on rare occasions can affect the functioning of the animal or plant. These mutations may be damaging and lead to a number of genetic disorders or death. Very rarely a new mutation can be beneficial and consequently, lead to increased fitness in the individual. Variation generated by mutations and sexual reproduction is the basis for natural selection; this is how species evolve. An understanding of these processes has allowed scientists to intervene through selective breeding to produce livestock with favoured characteristics. Once new varieties of plants or animals have been produced it is possible to clone individuals to produce larger numbers of identical individuals all carrying the favourable characteristic.

Terminology	Definitions	Core Knowledge	Preparing for Assessment
DNA	A polymer that is made up of two strands that form a double helix.	The genetic material in the nucleus of most cells is made from a chemical called DNA. DNA is a polymer made from two strands which twist around each other making a spiral ladder. DNA is arranged in structures called chromosomes inside a cell's nucleus. In human body cells the chromosomes are normally found in pairs. Each cell has 23 pairs of chromosomes. The chromosome number varies from one organism to another.	Answer 1 per week for Self-Study, you can draw on your notes, this organiser, your memory and your own research. 1. Describe the structure of DNA
Meiosis	The two-stage process of cell division that reduces the chromosome number of the daughter cells. It makes gametes for sexual reproduction.	Produces four daughter cells. Daughter cells are not genetically identical. The cell divides twice. The chromosome number is reduced by half. In humans, this is 23 chromosomes. Produces gametes for sexual reproduction.	*2. Describe the process of meiosis and explain why this cell division is important*
Sexual reproduction	The production of offspring by combining genetic information from the gametes of two parents.	Leads to variation in the offspring. Females carry two X chromosomes. Males carry one X and one Y chromosome.	*3. Describe the importance of sexual reproduction and why variation is important*
Evolution	A change in the inherited characteristics of a population over time through a process of natural selection.	All species of living things have evolved from simple life forms by natural selection. If a variant/characteristic is advantageous in an environment, then the individual will be better able to compete. This means they are more likely to survive and reproduce. Their offspring will inherit the advantageous allele.	*4. Describe how evolution occurs and how natural selection is important to survival of the fittest.*
Genetic engineering	The process by which scientists manipulate and change the genotype of an organism.	In genetic engineering, genes from the chromosomes of humans and other organisms are cut out of the DNA using enzymes. The genes are then transferred to the cells of the organism to be genetically modified. Plant crops have been genetically engineered to be resistant to diseases, or be resistant to insect attack, resistant to herbicides or to produce bigger better fruits. These are known as genetically modified or GM crops. GM crops usually show an increased yield.	*5. Evaluate the benefits and drawback of genetic engineering*







Chemistry – Rate of Reaction

Summary- Position in the Curriculum

Understanding the rate and extent of chemical reactions is vital for controlling industrial processes, optimizing reaction conditions, and maximizing yield. Chemical reactions occur at different rates and can be influenced by various factors. Reversible reactions can reach a state of dynamic equilibrium where the rates of the forward and reverse reactions are equal.

Terminology	Definitions	Core Knowledge	Preparing for Assessment
Rate of Reaction	The speed at which reactants are converted into products.	**Factors Affecting Rates of Reaction**: Several factors can affect the rate of a reaction including temperature, concentration, pressure, surface area, and the presence of a catalyst. Increasing temperature or concentration generally increases the rate of reaction.	Revision and self-study questions are below. Answer 1 per week for Self-Study, you can draw on your notes, this organiser, your memory and your own research.
Collision Theory	A theory that states chemical reactions can occur when particles collide with sufficient energy and proper orientation.	**Collision Theory and Activation Energy**: Reactions occur when particles collide with sufficient energy (activation energy). Factors that increase the frequency or energy of collisions can increase the reaction rate.	1. Describe the role of activation energy in chemical reactions and how catalysts affect it.
Dynamic Equilibrium	The state in which the rate of the forward reaction equals the rate of the reverse reaction in a reversible reaction	**Catalysts**: Catalysts provide an alternative pathway with a lower activation energy, increasing the rate of reaction without being consumed.	2. Draw and interpret reaction profiles for catalyzed and uncatalyzed reactions.
Le Chatelier's Principle	A principle stating that if a system at equilibrium is disturbed, the system will adjust to counteract the disturbance.	**Reversible Reactions**: Reactions where products can revert back to reactants. Represented by the double arrow (⇌).	3. Explain the concept of dynamic equilibrium and how it can be achieved in reversible reactions.
Reversible Reaction	A reaction where the products can react to reform the reactants.	**Energy Changes in Reversible Reactions**: In a reversible reaction, the forward and reverse reactions have opposite energy changes. If the forward reaction is exothermic, the reverse reaction is endothermic.	4. Use Le Chatelier's Principle to predict the effects of changes in conditions on the position of equilibrium
Equilibrium Constant (Kc)	A number that expresses the ratio of the concentrations of products to reactants at equilibrium	**Dynamic Equilibrium**: In a closed system, reversible reactions can reach a state where the rates of the forward and reverse reactions are equal, and the concentrations of reactants and products remain constant	5. Explain how various factors affect the rate of chemical reactions using collision theory

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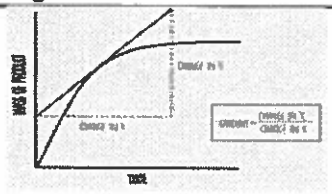
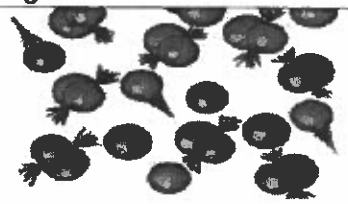
$\text{Rate} = \frac{\Delta[B]}{\Delta t} = -\frac{\Delta[A]}{\Delta t}$			

Physics 6 – Waves

Summary- Position in the Curriculum

Wave behaviour is common in both natural and man-made systems. Waves carry energy from one place to another and can also carry information. Designing comfortable and safe structures such as bridges, houses and music performance halls requires an understanding of mechanical waves. Modern technologies such as imaging and communication systems show how we can make the most of electromagnetic waves.

Terminology	Definitions	Core Knowledge	Preparing for Assessment
Amplitude	The amplitude of a wave is the maximum displacement of a point on a wave away from its undisturbed position.	**Waves** may be either transverse or longitudinal. The ripples on a water surface are an example of a transverse wave. Longitudinal waves show areas of compression and rarefaction. Sound waves travelling through air are longitudinal.	Revision and self-study questions are below. Answer 1 per week for Self-Study, you can draw on your notes, this organiser, your memory and your own research.
Wavelength	The wavelength of a wave is the distance from a point on one wave to the equivalent point on the adjacent wave	Period = 1 / frequency T = 1 / f T = period in seconds, s f = frequency measured in Hertz, Hz **The wave speed** is the speed at which the energy is transferred (or the wave moves) through the medium. Wave speed = frequency × wavelength $v = f \times \lambda$	***1.*** Describe and explain the motion of a small ball floating on a pond when waves travel across the pond.
Frequency	The frequency of a wave is the number of waves passing a point each second.	The waves that form the **electromagnetic spectrum** are grouped in terms of their wavelength and their frequency. Going from long to short wavelength (or from low to high frequency) the groups are: radio, microwave, infrared, visible light (red to violet), ultraviolet, X rays and gamma rays	***2.***HT -Sunglasses have lenses made of dark glass that reduce the amount of daylight entering your eyes. Design a test using a light meter and a lamp to find out if the two lenses are effective.
Electromagnetic wave	Electric and magnetic disturbances that transfer energy from one place to another	**(HT only)** Different substances may **absorb, transmit, refract or reflect** electromagnetic waves in ways that vary with wavelength. Some effects, for example refraction, are due to the difference in velocity of the waves in different substances	***3.*** The fisherman calculates the frequency of the waves as 0.5 Hz. He estimates the speed of the waves as 1.5 m/s. Calculate the wavelength.
Longitudinal wave	Waves in which the vibrations are parallel to the direction of energy transfer	Ultraviolet waves, X-rays and gamma rays can have **hazardous effects** on human body tissue. The effects depend on the type of radiation and the size of the dose. **Radiation dose** (in sieverts) is a measure of the risk of harm resulting from an exposure of the body to the radiation. **1000 millisieverts (mSv) = 1 sievert (Sv)**	***4.*** Draw a diagram of a transverse wave and label the wavelength, amplitude, crest and trough. Draw a longitudinal wave and label compression and rarefaction.
Transverse wave	A wave where the vibration is perpendicular to the direction of energy transfer	**Applications**: radio waves – television and radio, microwaves – satellite communications, cooking food, infrared – electrical heaters, cooking food, infrared cameras, visible light – fibre optic communications, ultraviolet – energy efficient lamps, sun tanning, X-rays and gamma rays – medical imaging and treatments	***5.*** The speed of sound in air is 340 m/s. Plan how a group of students can use a large musical drum to investigate the speed of sound in air.

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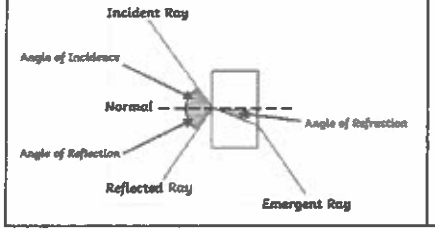

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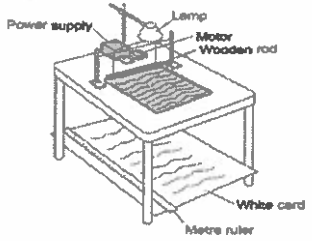

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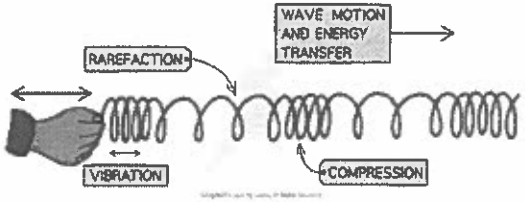

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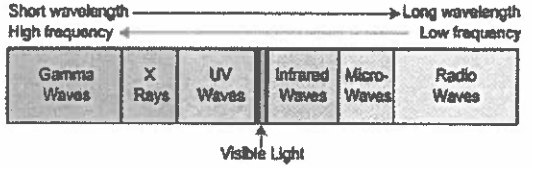

Physics 7 – Magnetism and electromagnetism

Summary- Position in the Curriculum

Electromagnetic effects are used in a wide variety of devices. Engineers make use of the fact that a magnet moving in a coil can produce electric current and also that when current flows around a magnet it can produce movement. It means that systems that involve control or communications can take full advantage of this.

Terminology	Definitions	Core Knowledge	Preparing for Assessment
Magnetic field	The region around a magnet where a force acts on another magnet or on a magnetic material (iron, steel, cobalt and nickel).	**The poles** of a magnet are the places where the magnetic forces are strongest. When two magnets are brought close together, they exert a force on each other. Two like poles repel each other. Two unlike poles attract each other. Attraction and repulsion between two magnetic poles are examples of **non-contact force**.	Revision and self-study questions are below. Answer 1 per week for Self-Study, you can draw on your notes, this organiser, your memory and your own research.
Induced magnetism	Magnetism of an unmagnetised magnetic material by placing it in a magnetic field	**A magnetic compass** contains a small bar magnet. The Earth has a magnetic field. The compass needle points in the direction of the Earth's magnetic field.	*1.* Sketch the pattern of the magnetic field lines near a vertical wire carrying current upwards.
Fleming's left-hand rule	A rule that gives the direction of the force on a current-carrying wire in a magnetic field according to the directions of the current and the field	**Electromagnetism** - When a current flows through a conducting wire a magnetic field is produced around the wire. The strength of the magnetic field depends on the current through the wire and the distance from the wire. An electromagnet is a solenoid with an iron core.	*2* Design an experiment using a compass and a ruler to find out which of the two bar magnets is stronger. Draw a diagram to aid your explanation.
Solenoid	A long coil of wire that produces a magnetic field in and around the coil when there is a current in the coil	**Solenoid** - Shaping a wire to form a solenoid increases the strength of the magnetic field created by a current through the wire. The magnetic field inside a solenoid is strong and uniform. The magnetic field around a solenoid has a similar shape to that of a bar magnet.	*3.* Describe the differences between a permanent magnet and an induced magnet.
Motor effect	When a current is passed along a wire in a magnetic field, and the wire is not parallel to the lines of the magnetic field, a force is exerted on the wire by the magnetic field	**Magnetic flux density** – This is the measure of the strength of the magnetic field. force = magnetic flux density × current × length $F = B \times I \times l$ force, F, in newtons, N magnetic flux density, B, in tesla, T current, I, in amperes, A (amp is acceptable for ampere) length, l, in metres, m	*4.* The force on the conductor is 0.039 N. The length of the conductor in the field is 45 mm. The current through the conductor is 2.5 A. Calculate the magnetic flux density from this information.
Split ring commutator	This reverses the current around the coil every half turn of the coil.	**An electric motor** is designed to use the motor effect. The speed of the motor can be controlled by changing the current, changing the number of turns on the coil and changing the strength of the permanent magnet. Reversing the current can reverse the direction of the rotation of the coil. HT only	*5.* Explain why the coil of simple electric motor rotates continuously when the motor is connected to a battery.

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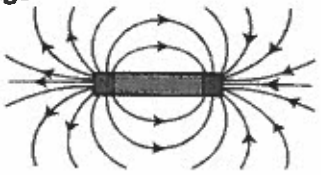

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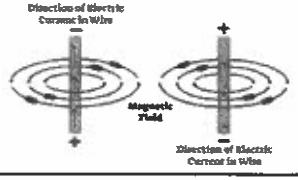

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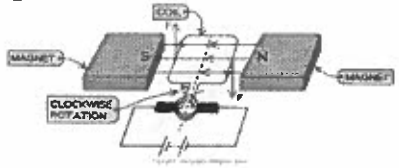

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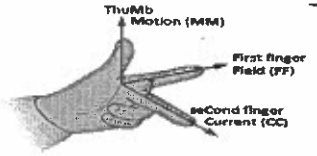


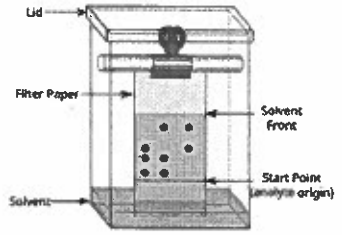
Chemistry C8- Chemical analysis

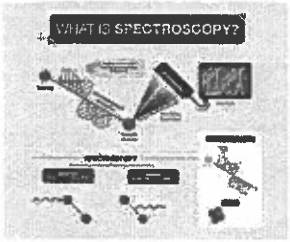
Summary- Position in the Curriculum

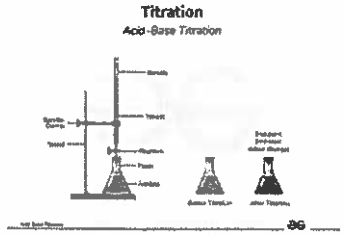
Chemical analysis involves determining the composition of substances. This topic covers methods of qualitative and quantitative analysis, including the identification of ions, gases, and compounds. Techniques such as chromatography and spectroscopy are also explored.

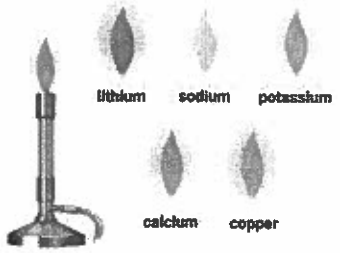
Terminology	Definitions	Core Knowledge	Preparing for Assessment
Chromatography	A method for separating and identifying substances in a mixture based on their movement through a stationary phase.	Paper Chromatography is used to separate mixtures of soluble substances. Procedure: Spots of the sample are placed on a piece of chromatography paper, which is then placed in a solvent. As the solvent travels up the paper, different substances move at different rates, allowing them to be separated.	Revision and self-study questions are below. Answer 1 per week for Self-Study. You can draw on your notes, this organiser, your memory and own research.
Rf Value	The ratio of the distance moved by a compound to the distance moved by the solvent front in chromatography.	Rf Value calculation: Rf=Distance moved by substance/ Distance moved by solvent	*1. Explain how paper chromatography can be used to separate and identify substances in a mixture. What is an Rf value, and how is it calculated in chromatography?*
Spectroscopy	Analytical techniques that use the interaction of light with matter to identify and quantify substances.	Used in analysis. It identifies elements and compounds by measuring the wavelengths of light absorbed or emitted. Types: Infrared (IR) spectroscopy- identifies functional groups based on absorption of infrared light, Mass Spectrometry (MS)- determines the mass-to-charge ratio of ions to identify and quantify substances, Nuclear Magnetic Resonance (NMR) Spectroscopy- identifies molecular structure based on the magnetic properties of atomic nuclei.	*2. What are the main types of spectroscopy used in chemical analysis, and what does each type measure?*
Flame Test	A qualitative test used to identify metal ions based on the colour of flame they produce when heated	Flame Tests are used to identify metal ions based on the colour of the flame. Common Results: Lithium- crimson flame, Sodium- yellow flame, Potassium- lilac flame, Calcium- orange-red flame, Copper- green flame.	*3. Describe how a flame test can be used to identify metal ions. Include examples with the corresponding flame colours.*
Precipitate	An insoluble solid that forms when two solutions are mixed.	Precipitation Reactions are used to identify ions in solution. Common Tests: Chloride ions- white precipitate with silver nitrate solution, Sulfate ions- white precipitate with barium chloride solution, Carbonate ions- effervescence with dilute acid (CO_2 gas produced).	*4. How can precipitation reactions be used to identify different ions in a solution? Provide specific examples.*

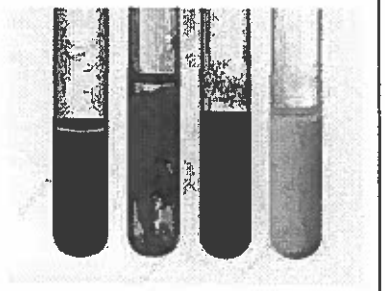
Titration	A quantitative analytical technique used to determine the concentration of a solution by reacting it with a solution of known concentration.	Titration: Used to determine the concentration of an unknown solution. Procedure: A solution of known concentration (titrant) is added from a burette to a known volume of the unknown solution until the reaction reaches completion (indicated by a colour change or pH change).	*5. Outline the steps involved in a titration experiment and explain how the concentration of an unknown solution is determined.*











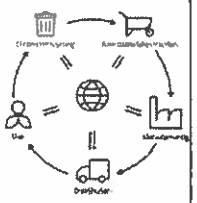
Chemistry C10- Using resources

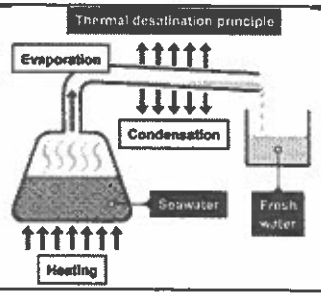
Summary- Position in the Curriculum

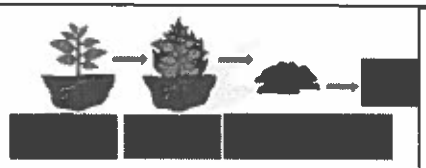
Chemistry C10 explores the Earth's resources, their extraction, use, and impact on the environment. This includes studying sustainable development, life cycle assessments, and the treatment of wastewater. It emphasizes the importance of reducing resource consumption, recycling, and sustainable management of natural resources. Triple students also study Haber process.

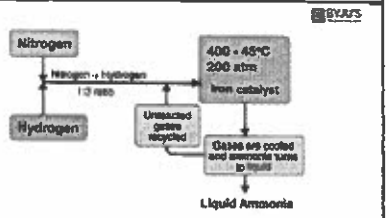
Terminology	Definitions	Core Knowledge	Preparing for Assessment
Sustainable Development	Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.	**Natural Resources**: Resources that occur naturally in the environment, such as water, minerals, and fossil fuels. **Renewable Resources**: Resources that can be replenished naturally over short periods, such as solar energy and wind power. **Non-renewable Resources**: Resources that do not replenish quickly enough to be considered sustainable, such as coal, oil, and natural gas. **Importance**: Balancing resource use and conservation to ensure future availability. **Practices**: Using renewable energy, reducing waste, and promoting recycling and conservation.	Revision and self-study questions are below. Answer 1 per week for Self-Study. You can draw on your notes, this organiser, your memory and own research.
Life Cycle Assessment (LCA)	A process to evaluate the environmental impacts associated with all the stages of a product's life from cradle to grave.	**Stages**: Raw material extraction, manufacturing, use, and disposal. **Purpose**: To assess the environmental impact and identify opportunities to improve sustainability.	*1. Explain the concept of sustainable development and its importance in managing Earth's resources.*
Recycling	The process of converting waste materials into new materials and objects, which can reduce the consumption of fresh raw materials.	**Methods**: Recycling, composting, and energy recovery. **Benefits**: Reduces the need for raw materials, saves energy, and reduces pollution.	*2. Describe the stages involved in a Life Cycle Assessment (LCA) and its significance. What are the advantages and disadvantages of recycling materials? Provide examples.*
Potable Water	Water that is safe to drink or to use for food preparation.	**Steps**: Screening, sedimentation, filtration, and disinfection. **Desalination**: Used in areas where freshwater is scarce, involving distillation or reverse osmosis.	*3. Outline the steps involved in treating wastewater to make it potable.*
Desalination	The process of removing salt and other impurities from seawater to produce potable water.		
Phytomining	A method of extracting metals from soil by growing plants that accumulate metal compounds in their tissues.	**Traditional Methods**: Mining and smelting. **New Methods**: Phytomining and bioleaching, which are more environmentally friendly.	*4. Compare and contrast traditional mining methods with newer methods like phytomining. Discuss the environmental impact of extracting and using non-*

			renewable resources. How can these impacts be mitigated?
Haber process (triple only)	The process which converts atmospheric nitrogen (N2) to ammonia (NH3) by a reaction with hydrogen (H2) using an iron metal catalyst under high temperatures and pressure.	Ammonia is an important industrial product used to make *fertilisers*, explosives and dyes. It is manufactured using the *Haber process*. This involves a *reversible reaction* between nitrogen and hydrogen: $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$ The reaction can reach a dynamic *equilibrium*.	*5. Describe the Haber process. Explain what conditions are needed to gain highest yield.*







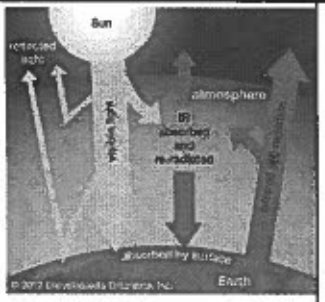


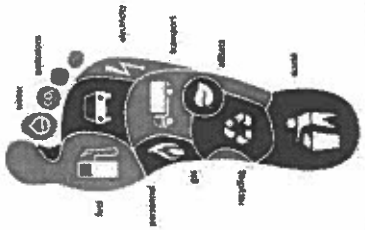
Chemistry C9- Chemistry of the atmosphere

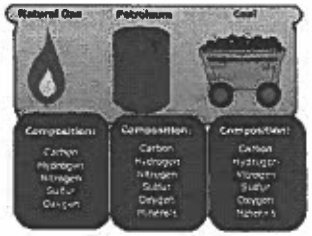
Summary- Position in the Curriculum

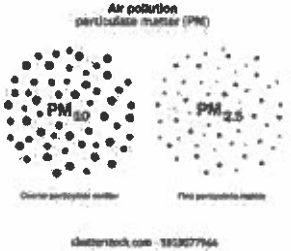
This topic explores the composition and evolution of the Earth's atmosphere over time. It covers the greenhouse effect, human activities that affect the atmosphere, and the consequences of these changes. The impact of pollutants, including carbon dioxide and methane, on climate change is also discussed.

Terminology	Definitions	Core Knowledge	Preparing for Assessment
Greenhouse Effect	The trapping of heat in the Earth's atmosphere by greenhouse gases, which keeps the Earth warm enough to support life.	**Early Atmosphere**: Primarily composed of carbon dioxide with little or no oxygen, similar to the atmospheres of Mars and Venus today. **Development of Oxygen**: Photosynthetic organisms such as cyanobacteria began producing oxygen, leading to an increase in oxygen levels and the formation of the ozone layer. **Current Composition**: Nitrogen (~78%), Oxygen (~21%), Argon (~0.9%), Carbon Dioxide (~0.04%), trace amounts of other gases.	Revision and self-study questions are below. Answer 1 per week for Self-Study. You can draw on your notes, this organiser, your memory and own research.
Global Warming	The gradual increase in the Earth's average surface temperature due to human activities that increase levels of greenhouse gases.	**Greenhouse Gases**: Water vapor, carbon dioxide, methane, and nitrous oxide, **Mechanism**: Greenhouse gases absorb infrared radiation from the Earth's surface and re-radiate it back towards the Earth, warming the atmosphere, **Enhanced Greenhouse Effect**: Human activities increase concentrations of greenhouse gases, leading to more heat being trapped and contributing to global warming.	*1. Describe the changes in the Earth's atmosphere from its early composition to its current composition.*
Carbon Footprint	The total amount of greenhouse gases emitted by an individual, organization, event, or product, expressed as carbon dioxide equivalent	**Burning Fossil Fuels**: Releases carbon dioxide and other pollutants, **Deforestation**: Reduces the number of trees that can absorb carbon dioxide, **Agriculture**: Produces methane from livestock and rice paddies, **Industrial Processes**: Emit various greenhouse gases and particulates.	*2. Explain the greenhouse effect and how it contributes to global warming.*
Fossil Fuels	Natural fuels such as coal, oil, and natural gas, formed from the remains of living organisms over millions of years.		*3. What are the main human activities that contribute to an increase in greenhouse gases?*
Climate Change	Significant and lasting change in the statistical distribution of weather patterns over periods ranging from decades to millions of years.	**Rising Temperatures**: Increased global temperatures affect weather patterns, sea levels, and ecosystems, **Extreme Weather**: More frequent and severe weather events such as hurricanes, droughts, and floods, **Ocean Acidification**: Increased CO_2 levels lead to more carbonic acid in oceans, harming marine life, **Melting Ice Caps**: Leads to rising sea levels and loss of habitat for polar species.	*4. Discuss the potential impacts of climate change on the environment and human society.*
Particulates	Tiny particles or droplets in the air that can be harmful to human health and the environment.	**Common Pollutants**: Sulfur dioxide, nitrogen oxides, carbon monoxide, particulates, and volatile organic compounds, **Health Impacts**: Respiratory problems, cardiovascular disease, and cancer, **Environmental Impacts**: Acid rain, smog, and damage to ecosystems.	*5. How does deforestation contribute to climate change?*


Sun
reflected light
atmosphere
IR absorbed and re-radiated
absorbed by surface
Earth




Natural Gas
Petroleum
Coal
Composition:
Carbon
Hydrogen
Nitrogen
Sulfur
Oxygen


Air pollution
particulate matter (PM)
PM10
PM2.5


OF CLIMATE CHANGE

Notes

	Monday	Tuesday	Wednesday	Thursday	Friday
Form					
P1					
P2					
P3					
P4					
P5					