Y11 KNOWLEDGE ORGANISER

SEPTEMBER 2024 TO FEBRUARY 2025

If you are not willing to learn, no one can help you.
If you are determined to learn, no one can stop you.

United Learning
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Name: ....

Tutor Group: ....

Tutor & Room: ....

Contents

Your Knowledge Organiser and Self-Quizzing Book

Remember!

You **must** bring your Knowledge Organiser and Self-Quizzing Book to every lesson and place it on your desk at the beginning of each lesson.

You **must** keep all of your Knowledge Organisers and Self- Quizzing Books because the fundamental knowledge required in Year 10 will also be required in Year 11.

Knowledge Organisers are **NOT** a replacement for revision guides but they include the fundamental knowledge that ALL students in Year 11 require.

Knowledge Organisers

Knowledge Organisers contain critical, fundamental knowledge that you MUST know in order to be successful in Year 11 and subsequent years.

They will help you recap, revisit and revise what you have learnt in lessons in order to move the knowledge within from your short-term memory to long-term memory.
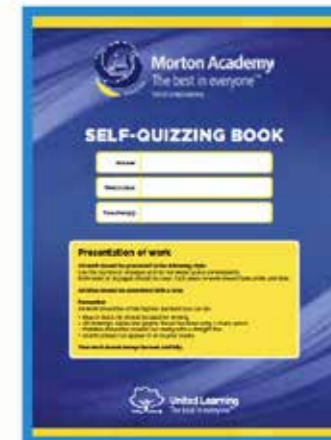
Self-Quizzing Book

This is the book that all Knowledge Organiser homework is to be completed in. You must follow the simple rules as to how they are to be used.

How do I complete Knowledge Organiser homeworks?

You will be set a MINIMUM of 2 Knowledge Organiser homeworks in every subject each half term

STEP 1
Check SMHW and identify what words/definitions/facts you have been asked to learn.

STEP 2
Write today's date and the title from your Knowledge Organiser.
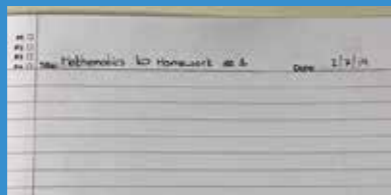
STEP 3
Write out the key words/definitions/facts you have been set from SMHW in FULL.

STEP 4
Cover the definitions in your SELF-QUIZZING BOOK, apart from the first. Read it, Cover it, Say it in your head, Check it... REPEAT until confident.

STEP 5
Cover up ALL the definitions/facts and write them out from memory in your SELF-QUIZZING BOOK.

STEP 6
Check your answers and correct where required. Repeat Steps 4 to 6 until you are confident.

You will be tested on the 10 words/definitions/facts as a starter activity in your lesson on the day that the homework is due.

This will be completed in your self-quizzing book and you will mark it in class.

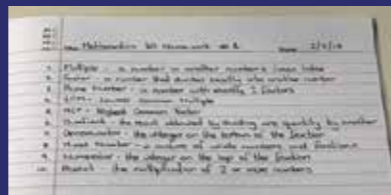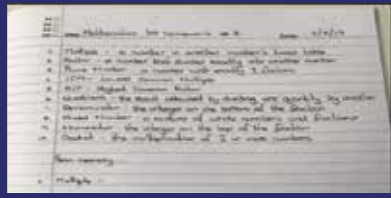## Can I write in paragraphs?

The TIPTOP rule

You move onto a new paragraph when you change **Ti**me, **Pl**ace, **To**pic or **P**erson.

1. I always start an essay with **an introduction** which addresses the question.
2. I finish an essay with **a conclusion** to summarise the main points of my argument and to address the question again.
3. I use **connectives** in each paragraph to link my ideas and to put them in a logical order.

Furthermore	But	Meanwhile
Whereas	Since	Nonetheless
Nevertheless	Yet	However
Alternatively	Therefore	Although
Consequently	Besides	Moreover

Have I used the correct grammar?

I am aware that I must use language that is appropriate to my reader.
- **No slang** that lesson was ~~bangin'~~
- **No informal language** I'm ~~gonna~~ do my homework now

Other things to consider:
- ✓ I am clear about the **purpose** of this piece of writing
- ✓ I know who my **audience** is
- ✓ I will use a suitable **layout** and **text type**

I am proud of my work because...
- I have written clearly so that my reader can understand my writing easily.
- I have checked my **spelling** and corrected any errors.
- I have used full sentences with a subject and a verb.
- I have used correct **punctuation** and **grammar**.
- I have paragraphed my work using **TIPTOP**.
- My writing is suitable for the person I am writing for.

Can I spell familiar words accurately?

Common contractions

We must use an apostrophe to replace any letter(s) we have left out.

11 o'clock	How's	They'd	Where'll
Aren't	I'd	They'll	Where's
Can't	I'll	They're	Who'd
Couldn't	I'm	Wasn't	Who'll
Didn't	Isn't	We'd	Who's
Doesn't	It'd	We'll	Why'd
Don't	It'll	We're	Why'll
Hadn't	It's	Weren't	Why's
Hasn't	Mightn't	What'd	Won't
Haven't	Mustn't	What'll	Wouldn't
He'd	Shan't	What's	You'd
He'll	She'd	When'd	You'll
He's	She'll	When'll	You're
How'd	She's	When's	
How'll	Shouldn't	Where'd	

Can I use different sentence types?

Simple sentences: Contains a subject and a verb and can contain an object
- **Sarah likes to read in the library.**
- **Tom enjoys reading at home.**

Compound sentences: Joins two simple sentences using the connectives: *for, and, nor, but, or, yet, so.*
- **Sarah likes to read in the library but Tom prefers to read at home.**

Complex sentences: A complex sentence contains a conjunction such as *because, since, after, although,* or *when.*
- **Because Robert felt tired, he only studied for an hour.**
- **Although the rain had stopped, the pitch was still water-logged.**
- **Paul enjoys Music, however, he is more proficient in Art.**

Homophones

I have checked that I have not mixed up my homophones.

Affect/effect	One/won
Bare/bear	Passed/past
Brake/break	Peace/piece
Buy/by	Practice (n)/practise (v)
For/four	Read/red
Flour/flower	Sea/see
Grate/great	Sight/site
Hair/hare	Son/sun
Hole/whole	To/too/two
Hour/our	Wait/weight
Knight/night	Weak/week
Know/no	Wear/where
Meat/meet	

Basics:

- Every sentence must start with a capital letter.
- Every sentence must finish with some form of punctuation: .?!
- Proper nouns need capital letters. These are **unique** people, places or things e.g. there are many cities so 'city' doesn't take a capital letter. However there is only one London, therefore it takes a capital letter.

➔ **When writing titles of works such as books, films or plays:**

- Capitalise the first word
- Capitalise any main/important words
- Don't capitalise minor words such as 'and', 'of' or 'the' e.g. The Sound of Music, The Wizard of Oz, Harry Potter and the Goblet of Fire

➔ **When writing speech:**

- Go to a new line when a different person speaks e.g. *"Good morning,"* said the headteacher. *"It's the afternoon!"* replied the student.
- Each person's speech is marked with speech marks e.g. *"Walk on the left,"* said Mr Mathews.

Can I spell accurately?

1. Sound out the word.
2. Think about how it looks.
3. Think about a similar word.
4. Is there a memory sentence for this word? (e.g. big elephants cannot always use small exits).
5. Find the word in a list –
   - Key words list.
   - Frequently used words list.
   - Your own word bank.
6. Look it up in a dictionary/ spellchecker.
7. Ask a friend or teacher.
8. To learn it: look, cover, write, check.
9. Once you've solved it, add the correct spelling to your own word bank.

Can I use punctuation?

The Apostrophe

I always aim to use apostrophes correctly.

There are two main reasons why we use apostrophes: for possession and to replace a letter or letters.

Note: Apostrophes are **NEVER** used to denote plurals

Full stop	.	indicates that a sentence has finished.
Comma	,	indicates a slight pause in a sentence, separates clauses in a complex sentence and items in a list.
Question mark	?	goes at the end of a question.
Exclamation mark	!	goes at the end of a dramatic sentence to show surprise or shock.
Apostrophe	'	shows that letter(s) have been left out or indicates possession.
Speech marks	" "	indicate direct speech, the exact words spoken or being quoted.
Colon	:	introduces a list, a statement or a quote in a sentence.
Semicolon	;	separates two sentences that are related and of equal importance.
Dash / hyphen	-	separates extra information from the main clause by holding words apart.
Brackets	()	can be used like dashes, they separate off extra information from the main clause.
Ellipsis	...	to show a passage of time, to hook the reader in and create suspense.

Can I use punctuation?

Apostrophe for Possession

(To show that something belongs to another)

If a single thing/person owns anything, add an apostrophe + 's'.

- The dog's bone
- The boy's homework
- Jones's bakery
- Yesterday's lesson

However, if it is plural (more than one), an apostrophe comes after the 's'.

- The dogs' bones
- The boys' homework
- Joneses' bakeries (lots of Jones families)
- Many websites' content is educational

There/their/they're

Note: special care must be taken over the use of there, their and they're as they sound the same but are used quite differently:

- **There** shows position Your seat is over there.
- **Their** shows that 'they' own something *Their blazers are navy blue.*
- **They're** is short for **they are** as in *They're revising every day.*

Its

Note: its, which shows that something owns something (like our, his etc), **does not** take an apostrophe: the dog ate its bone and we ate our dinner.

Your/you're

Note: special care must be taken over the use of **your** and **you're** as they sound the same but are used quite differently:

- **Your** is possessive as in *this is your pen.*
- **You're** is short for you are as in *you're coming over to my house.*

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1. The Formal Elements

- **Line:** Creates shape; the outer edge of something.
- **Tone:** Levels of dark or light on an object, shape or face.
- **Highlight:** The lightest areas on an object, shape or face.
- **Texture:** The feel or appearance of a surface; how rough or smooth it is.
- **Shape and Form:** What is created when a line is enclosed and further techniques are used to make an object, shape or face look 3D.
- **Colour:** When light is reflected off an object, colour is what the eye sees.

2. Colour Theory

- **Colour:** When light is reflected off an object, colour is what the eye sees.
- **The Primary Colours** are red, blue and yellow. The primary colours are combined to create secondary colours.
- **The Secondary Colours** are green, purple and orange.
  Red + Blue = Purple.
  Blue + Yellow = Green.
  Yellow + Red = Orange.
- **Warm Colours:** Colours that give the feeling of warmth – red, orange, yellow.
- **Cool colours:** Colours that give a cool feeling – blue, green, purple.

- **Complementary colours:** These colours are *opposite each other* on the colour wheel. When placed together these colours *complement* each other - they contrast and make each other stand out.
- **Harmonious colours:** These colours are *next to each other* on the colour wheel. When these colours are placed together they work in harmony with each other - these colours look similar to each other.
- **Tint:** When *white* is mixed with a colour to make it lighter.
- **Shade:** When *black* is mixed with a colour to make it darker.

3. The Colour Wheel

4. Basic Art Forms and Associated Terms

- **Portraiture:** The artistic process of creating a painting, drawing, photograph, or engraving of a person, especially one depicting only the face or head and shoulders.
- **Features:** Eyes, nose, mouth, ears, eyebrows etc.
- **Composition:** the arrangement or layout of features, shapes or objects on the page.
- **Proportion:** The size, shape or position of one element of a portrait in comparison to another.
- **Foreground, mid-ground, background:** The areas at the front, middle or back of a drawing or painting.
- **Negative Space:** An area of the portrait without detail.

- **Still life:** Art depicting mostly inanimate objects, typically common objects which are either natural (food, flowers, dead animals etc.) or man-made (books, vases, jewellery etc.).
- **Cylinder:** A 3D shape with straight parallel sides and a circular or oval cross section.
- **Cuboid:** A 3D shape with six sides at right angles to each other.
- **Landscape:** Landscape painting or drawing refers to an artwork whose primary focus is scenery, such as mountains, trees, rivers, as well as man-made structures such as houses and bridges.
- **Perspective:** This is a drawing method that shows how things appear to get smaller as they get further away. This gives the painting depth and makes the scene look more realistic.

Landscape painting by Vincent van Gogh

Still Life painting by Philippe de Champaigne

Portrait painting by Françoise Nielly

Assessment Objective 1 - DEVELOP

Develop ideas through investigations, demonstrating critical understanding of sources.

This Means:

• The creation of **'Artist Research Pages'** in your sketchbooks.

• You need to research the art work of **a wide range** of artists or cultures; these are known as sources e.g. 'the source' or 'the beginning' of your own ideas.

• Your page should include the artist's name - this will form your title; this should either be handwritten in **suitable lettering** or printed from the computer.

• Your 'Artist Research Page' should be a piece of **artwork** in its own right and should reflect the style of the artist that you are studying. See the examples on the right.

• Present examples (pictures) of your chosen artist's work. These should be printed off, **carefully** cut out and stuck into your book; they need to be **high quality** and not **pixelated**. Presentation is important - you can mount the pictures to create frames or present them creatively.

• **Write about the artist** and present the information creatively. See the guide on how to do this.

Assessment Objectives are what your work is marked against.

Your body of work must include elements of each of the following four Assessment Objectives.

Examples of Artist Research Pages

Assessment Objective 2 - REFINE

Refine work by exploring ideas, selecting and experimenting with appropriate media, materials, techniques and processes.

This Means:

• Look at the artists that you have researched and try to **imitate their style.**

You can do this by:

• Copying a section or small part of a piece of artwork by your chosen artist.

• Work from your own photographs (primary sources) or photographs found in books, magazines or online (secondary sources) trying to imitate your chosen artist's style.

• You should experiment with different **materials and/or techniques.**

• **Refine** your work by repeating processes trying to show **improvements** in your technique.

Assessment Objective 3 - RECORD

Record ideas, observations and insights relevant to intentions as work progresses.

This Means:

• Now that you have studied artists and practised their style, you need to record your **own ideas** - these should be **visual** (drawing/painting), and **written** (explanation of ideas).

• You also need to record your findings from the work you did for AO2 - how well did your experiments go? How effective were your chosen techniques and materials?

• What you write should be purposeful, thoughtful and meaningful.

• You will need to use, **specific art-related** language - use the guide to help you do this.

Assessment Objective 4 - PRESENT

Present a personal and meaningful response that realises intentions and demonstrates understanding of visual language.

This Means:

• Produce **your own**, **imaginative**, **high quality** final piece/pieces.

• Your final piece/pieces must show a clear connection to your previous work.

• Your final piece/pieces must show an insightful and meaningful journey from your starting point.

• Your final piece should bring together all the work you have produced for the other three AOs.

Guide to writing about the work of other artists

Use this guide when working on Assessment Objective 1. Study the work of your chosen artist and then try to answer, in order, as many of the questions as you can. Some questions you will be able to answer just by studying the artist's work; others may require you to do further online research. Each of the questions has an example answer and a picture relating to the answer.

1. Start by introducing the artist and how they create their art e.g.

"Vladimir Gvozdev is a Russian artist who mainly works in paint and presents his images on collaged backgrounds. He often uses objects as part of the collage to add to the general feel of the paintings."

2. Tell us about the common themes running through the artist's work. You can do this by studying a collection of their images and highlighting the things in common. Try to be as descriptive as possible e.g.

"My chosen artist is best known for his images of mechanical animals presented on worn out, sometimes burnt, backgrounds surrounded by annotations and small objects."

3. Describe what you like about the artist's work e.g.

"What I find most interesting about James Prosek's paintings is the way that he takes elements from two or more animals and puts them together to create a new creature."

4. Choose one or two pieces that you particularly like and describe them in detail. Describe how the artist has used formal elements - look at how we write about formal elements on the next page e.g.

*"I love Sonny's use of **contrasting lights and darks**, the way the lighter **subject matter contrasts** with the jet-black background really makes the image jump off the page. His **graduated** use of **tone** around the edges of the skull and eye generates effective **shape and form** and a **realistic 3D illusion**. The **flowing texture** of the fur gives the painting **movement**, like the gorilla is facing into the wind."*

5. Look at your chosen pieces. What do you think the meaning behind the artwork is? Is there a message? If the artist is contemporary (alive and working now), is there something happening in the world today that is reflected in the art? If the artist is from the past, what was happening in the world when they were working e.g.

"I think that there is a strong message behind this painting by Richard Ahnert. We see a creature that is part animal, part ship, something natural and something man-made. I think that the artist is trying to tell us that if humans and animals work together then we can live in harmony."

6. Look at your chosen pieces. What is the mood or atmosphere of the artwork? What emotions do you experience looking at it? Look at the list of words to describe moods on the next page e.g.

"I find this to be a particularly powerful piece. It has a very sad and sombre mood to it with both the rider and the horse bowing their heads. The horse seems to be struggling to walk as it pulls a heavy load and it has been sculpted in such a way to give movement and the illusion of a slow, plodding walk."

7. Finally, describe how your chosen artist can influence and inspire your own work e.g.

"I would like to take the idea of using scrap metal to create my own sculpture in the way that Mark Gibbs has here. I also like the way he has put movement into the animal and given it emotion, this is something I'd like to achieve in my own piece."

KEY ART TERMS, 'FORMAL ELEMENTS' AND HOW TO USE THEM

When recording your thoughts about your own experiments and ideas (AO3) and when writing about the work of other artists (AO1), you need to be using some of the terms that we see described on this page. These terms are known as 'formal elements'. Look at your own work and ask yourself which of these terms below applies to your work. Now look at the list of adjectives highlighted in bold italics beneath each description. Select the adjectives that apply to the art you are studying. Can you think of other descriptors to add?

COLOUR

Think about your overall impression of the colours used, how they look and feel, how the colours work together (or not).

Natural, lively, stimulating, subtle, artificial, clashing, depressing, garish, gaudy, violent, bright, brilliant, deep, earthy, intense, rich, strong, vibrant, vivid, dull, flat, pale, muted, subdued, cool, cold, warm, hot, light, dark, blended, muddled, complementary, contrasting, harmonious.

MARK MAKING

Mark making means making marks on a surface with any tool or material e.g. paint, paintbrush, pencil, pastel etc. In some styles of painting, all brush marks are carefully hidden by the artist; in others, the marks are purposely made clearly visible. Think about words that can be used to describe marks made by any means.

Visible, impasto, blended, smooth, thick, thin, bold, timid, heavy, light, edgy, stippling, hatching, splatters, drips, layered, flat, precise, refined, regular, straight, quick, sketchy, uneven, irregular, vigorous, violent, loose, patterned, movement.

SHAPE AND FORM

Think about the overall shapes in the artwork and the way forms (things) are depicted.

2D, flat, abstracted, simplified, stylised, 3D, realistic, natural, sharp, detailed, blurred, obscured, overlapping, distorted, exaggerated, geometric, hard-edged, soft-edged.

TEXTURE

This is to do with the surface quality of something, the way something feels or looks like it feels. There are two types of texture: actual texture and visual texture. Actual texture really exists, so you can feel it or touch it. You can create actual texture in an artwork by changing the surface, such as sticking things down or applying paint thickly. Visual texture is created using marks to represent and give the illusion of actual texture. You can create visual texture by using lines, shapes, colours or tones.

Flat, smooth, raised, rough, coarse, pitted, scratched, uneven, uniform, hairy, sticky, soft, hard, shiny, glossy, flowing, movement.

TONE

This refers to the lightness or darkness of something. This could be a shade or how dark or light a colour appears. Tones are created by the way light falls on a 3D object. The parts of the object on which the light is strongest are called highlights and the darker areas are called shadows. There will be a range of tones in between the highlights and the shadows. The wider the range of tones, the more 3D an object looks.

Dark, light, mid, flat, uniform, broken, constant, changing, graduated, fade, gradual fade, subtle, contrasting, dramatic.

COMPOSITION

Look at how the elements in the painting are arranged, the structure and relationships between the different parts, and how your eye moves around the composition.

Arrangement, layout, structure, position, landscape format, portrait format, horizontal, vertical, diagonal, foreground, background, middle ground, centred, asymmetrical, symmetrical, balanced, unbalanced, lopsided, off-centre, overlapping, cluttered, chaotic, spacious, empty, negative space.

WORDS TO DESCRIBE THE GENERAL MOOD OF A PIECE OF ART

Calm, content, peaceful, relaxed, tranquil. / Cheerful, happy, joyful, romantic. / Depressed, gloomy, miserable, sad, sombre, tearful, unhappy. / Aggressive, angry, chilling, dark, distressing, frightening, violent. / Energetic, exciting, stimulating, thought-provoking. / Dream-like, surreal, ethereal, mysterious. / Strange, bizarre, confusing. / Retro, historical, from the past. / Modern, ultra-modern, futuristic. / Industrial, fantasy, sci-fi. / Playful, childish, comical
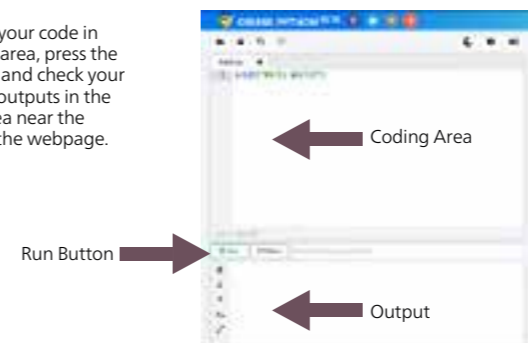

Programming

Programming Keywords

Variable	Variables store information and can be compared to a box that stores things, for example: Name = "Claude"
Algorithm	A set of step by step instructions used to solve a problem.
Flowchart	A visual representation of an algorithm.
Assignment	The process of storing a value inside a variable, for example: Password = "OXJ91mau"
Expression	A combination of operators and operands that is interpreted to produce some other value.

Comparison Operators

Operator	Meaning	Example	Evaluates to
==	Equal to	7==7	True
!=	Not equal to	6!=7	True
>	Grander than	7>6	True
<	Less than	5>6	False
>=	Greater than or equal to	6>=8	False
<=	Less than or qual to	7<=7	True

Accessing Python Development Environment

To access our Python programming environment, open your web browser and go to **www.online-python.com**

Then, type your code in the coding area, press the run button and check your program's outputs in the outputs area near the bottom of the webpage.

Coding Area

Run Button

Output

Arithmetic Operators

Operator	Meaning	Example
+	Addition	num1 = num2 + num3
-	Subtraction	num1 = num2 - num3
*	Multiplication	num1 = num2 * num3
/	Division	num1 = num2 / num3

Data Types

Data Type	Example	Description
String	x = "Hello"	Stores combinations of any characters – letters, numbers and symbols
Integer	x = 11	Stores whole numbers
Float	x = 11.5	Stores decimals
Boolean	x = True	Stores values True or False

Selection

If Statements

Python	Pseudocode

x = 3
if x == 1:
    print("x is 1")
	store value 3 in variable x
	if value in x is equal to 1, then:
	                    display string "x is 1" on screen

If...else Statements

Python	Pseudocode

x = 3
if x == 1:
    print("x is 1")
else:
    print("x is not 1")
	store value 3 in variable x
	if value in x is equal to 1, then:
	    display string "x is 1" on screen execute if the previous
	condition is not true
	                    display string "x is not 1" on screen

if...elif...else statements

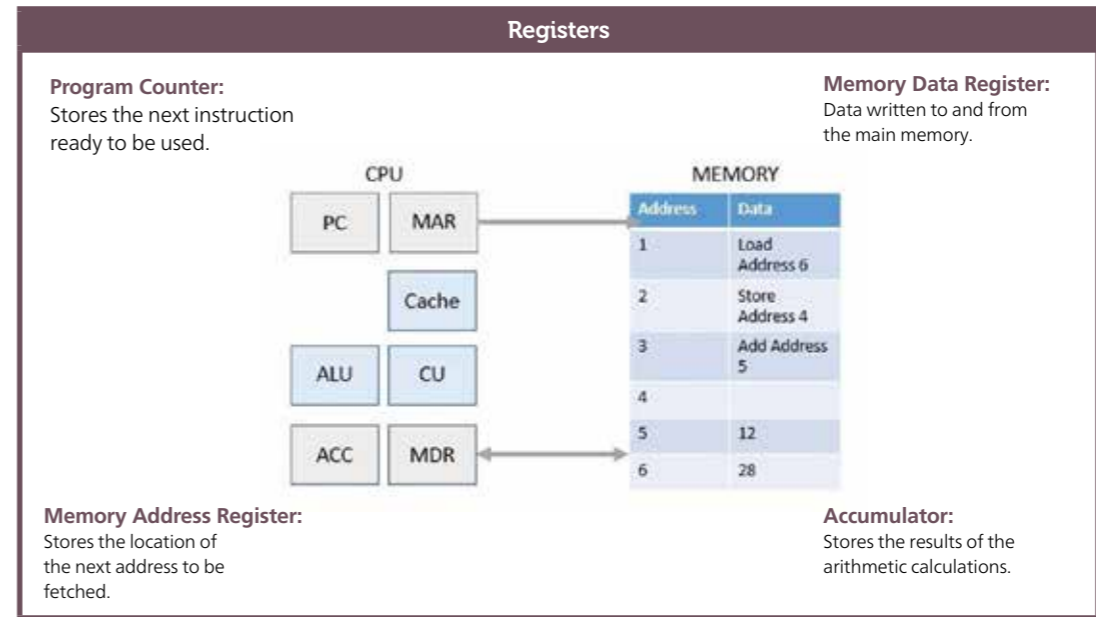| Python	Pseudocode

x = 10
if x >= 100:
    print("x is >= 100")
elif: x >= 50:
    print("x is >= 50")
elif: x >= 10::
    print("x is >= 10")
else:
    print("x is < 10")
	store value 10 in variable x
	if x is equal to or larger than 100, then:
	    display string "x is >= 100" on screen if x is equal to or larger
	than 50, then:
	    display string "x is >= 50" on screen if x is equal to or larger
	than 10, then:
	    display string "x is >= 10" on screen
	execute if the previous conditions are not true
	                    display string "x is < 10" on screen

Loops

While Loops		For Loops	

count = 0
While count < 9:
    print("The count is:", count) count =
    count + 1
print("Thank you")
	While loop repeats while the given condition is true. It tests the condition every time.	Fruits =
		["orange","apple","mango"] for i in fruits: print(i)
		    print(i)
			For loop repeats a set number of times. In this case, it will happen 3 times – one for each fruit.

Flowchart Symbols

Symbol	Meaning
	Start/End
	Controls the flow of the program
	Input/Output
	Process
	Selection/Decision
	Subprogram

Comments

To write a comment that will be omitted by Python when the program is running, use # symbol, for example:

If x >100: #This is an if statement

Architecture of the CPU

Purpose

The Von Neumann Architecture consists of the CPU and Memory which are interconnected and can both store instructions and data. The CPU itself consists of different components: Registers, Cache, Control Unit and Arithmetic Logic Unit. The purpose of the CPU is to fetch, decode and execute instructions.

Purpose

Control Unit	Cache	Arithmetic Logic Unit
Decodes instructions and sends signals the other components on how to respond to this instruction.	Stores frequently used instructions.	Used to find similarities and make problems easier to solve.

Registers

Program Counter:
Stores the next instruction ready to be used.

Memory Data Register:
Data written to and from the main memory.

Memory Address Register:
Stores the location of the next address to be fetched.

Accumulator:
Stores the results of the arithmetic calculations.

What is a register?

A location within the CPU that stores addresses and data which can be accessed quickly.

Did you know?

The clock is another component found in the CPU. This controls the rate in which cycles are processed every second. The rate is determined by the **Clock Speed.**

Key terms

Fetch Decode Execute Instructions Data Signals

CPU Performance

Purpose

To get the best out of a CPU, there are a number of characteristics that can determine how well it performs:
- Clock Speed
- Cores
- Cache

Did you know?

CPU's can run at a higher clock speed then it was designed to run. This is known as **overclocking** and is commonly done with PC's designed to play video games.

Revision tip!

If you struggle to remember any of the characteristics that impact the performance of the CPU, remember they all begin with the letter C.

Cache Size

Definition / Meaning:

The cache stores instructions that are previously used or frequently used. It acts as the intermediary between the CPU and Main Memory.

How does an increase in Cache Size impact CPU performance?
- More instructions used can be stored on the CPU.
- This means that data stored in the cache doesnt need to be fetched from main memory.
- As a result, creating a more efficient process

Clock Speed

Definition / Meaning:

This controls how many cycles can be processed per second. The higher the clock speed, the more instructions executed per second.
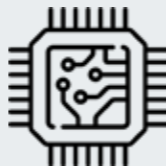
How does an increase in Clock Speed impact CPU performance
- An increase in Hz (Hertz) can lead to more tasks being executed per second.
- As a result, programs/software will respond faster.

Cores

Definition / Meaning:

It acts as the brain of the CPU and is responsible for executing instructions. Modern CPU's will use a multi-core processor. (i.e. multiple cores)

How does an increase in cores impact CPU performance
- It allows instructions to be split up between the processors.
- As a result, they can be executed simultaneously.
- This will help to reduce the amount of time required to run a program.


Primary Storage

Purpose

A primary storage device is a medium that holds memory for short periods of time while a computer is running. There are two types of primary storage used by computer systems: RAM and ROM.

Virtual Memory

Description:

When the RAM becomes full, the overflow of data normally stored in the RAM will be stored in Virtual Memory which is located on the hard drive. Once space becomes available, data will move from VM and back to RAM. However this is a slow process.
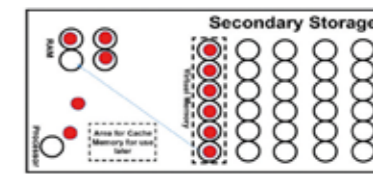
Flowchart Symbols

RAM (Random Access Memory) and ROM (Read-Only Memory) both store data but there are a number of key differences between the two.

RAM	ROM
Volatile memory	Non-volatile memory
Read and write data	Reads data
Stores programs/data currently in use	Stores instructions required to boot up the computer (BIOS)
Expandable	Soldered onto the motherboard
Contents change frequently (Temporary)	Contents hardly ever change. (Permanent)

Difference between volatile and non-volatile memory

Volatile memory means when the computer is switched off, data is lost. Whereas, non-volatile memory has the ability to retain data even when the computer is switched off.

BIOS

BIOS stands for Basic Input/Output System. It designed to boot up the computer using a POST (Power on self-test) and determine what hardware is connected to the system.

Key terms

Volatile Non-volatile Storage
Read Write

Secondary Storage

Definition/Meaning

Secondary storage has the ability to store files even when the computer is switched off. Therefore, it's a non-volatile form of storage.

Magnetic Storage

Description:
The most common example of magnetic storage is a **Hard Drive.** The hard drive contains a number of moving mechanical parts such as a spinning platter with a thin magnetic coating. A "head" moves over the platter, writing 0's and 1's on the platter.

Revision tip!

A common misconception is that secondary storage backs up data. If a duplicate copy is created then the device used to back it up would be classed as tertiary storage.

Review

Cost	Capacity	Reliability
Expensive from the outset, but cost per MB represents value for money.	Enough capacity to store different types of files. You can buy hard drives that can hold 4TB of data.	Can perform well for a long period of time but performance will eventually deteriorate.
Durability	**Portability**	**Speed**
If it's external then it can become damaged if dropped because it has moving parts.	Would have to be detached from the computer and it's heavy.	Uses a head that moves over a platter to read and write data so it's not instant.

Key terms

Cost	How much the device costs per MB.
Capacity	How much space is available on the storage device.
Reliability	Longevity – how well it can maintain the same level of performance over time.
Durability	How resistant it is to external factors such as being dropped, scratched and how it responds to being in extreme conditions.
Portability	How easy is it to transport from one place to another.
Speed	How quickly the data can be read and transferred from the storage device.

Units

Why do computers use bits?

Binary is a number system that only uses two digits: 1 and 0. All information that is processed by a computer is in the form of a sequence of 1s and 0s. Therefore, all data that we want a computer to process needs to be converted into binary. These digits 1 and 0 are often referred to as bits.

Units of data storage

Order (Smallest to largest)	Unit	Equivalent
1	Bit	0 or 1
2	Nibble	4 bits
3	Byte	8 bits
4	KB	1,000 Bytes
5	MB	1,000 KB
6	GB	1,000 MB
7	TB	1,000 GB
8	PB	1,000 TB

Sound file size:

Formula:
Sound file size = sample rate x duration (s) x bit depth

Worked example:

Sample rate = 3
Duration = 1 minute 30 seconds
Bit depth = 2

3 x 90 x 2 = 540 bits

Image file size:

Formula:
Image file size = colour depth x image height (px) x image width (px)

Worked example:

An image that is 400 x 400 with a colour depth of 4 bits.

(400 x 400) x 4 = 640000 bits

640000/8 = 80,000 bytes

Text file size:

Formula:
Text file size = bits per character x number of characters

Worked example:

Document that consists of 56 characters.

50 x 8 = 400 and 6 x 8 = 48

(400 + 48 = 448 bits)

Exam tip!

Use of 1,024 for conversions and calculations would be acceptable. Allowance for metadata in calculations may be used

Component 1: Exploring Media Products

What are the different types of creative media product?

Audio / Moving Image	1. TV Programmes 2. Films 3. Music Videos 4. Animations 5. TV and Radio Adverts 6. Radio Broadcasts 7. Podcasts
Publishing Products	1 Newspapers 2 Magazines 3 Comics 4 Brochures 5 Print Advertisements
Interactive Media Products	1 Websites 2 Mobile Apps 3 E-Magazines 4 Mobile Games 5 Online Games 6 Video Games 7 Advertisements

How can you identify the audience for a media product?

1. Gender	Is it aimed more at a male or female audience? Or both?
2. Age	Is it aimed at a particular age group? E.g. children/teenagers.
3. Lifestyle	Is it for a specific group with a shared interest? E.g. extreme sports, knitting, cars.
4. Socio-Economic	Is it aimed at aparticular class of people?E.g. upper class -Tatler magazine.
5. Primary Audience	Who is the product mainly aimed at?
6. Secondary Audience	Who else might be interested in the product or be attracted to it?

What are the purposes of different media products?

To inform the audience
To inspire the audience
To entertain the audience
To benefit the audience
To raise awareness for a cause
To promote a product/service/person
To innovate
To provide escapism
For the benefit of the community
For profit
For experimentation

What are the purposes of different media products?

The features of media products which are common to most similar products.

For example - Most Magazine covers feature: A title, a larger central image, information about the articles in the magazine, the price, a barcode etc.

What are the different types of creative media product?

1. Genre	The recognisable type/style of product. • **For Film this includes**: Sci-Fi, Horror, Thriller, Comedy, Animation. • **For Games**: 1st Person Shooter, Driving, Sports, PVP, Strategy
2. Sub-Genre	Different versions within a genre - perhaps combining two genres to make a new one (Hybrids) e.g. Animated Sci-Fi, First Person Driving Game.
3. Repetition/ Difference	How similar/different is the magazine, TV programme, website, game to other similar products in the same genre.

Representation of people and places: How does the media product portray people and places?

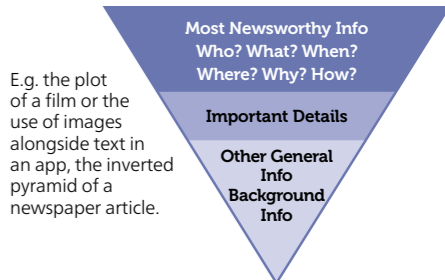| Are there positive or negative portrayals of the characters and places? |
|---|
| Are there stereotypical images/descriptions? |
| Does the producer consider the perspective of the audience? |

Audience interpretation: How does the audience interact with the product?

1. **Passive interaction:** Accepting the message without question.

2. **Active interaction:** Questioning the message given or using interactive features e.g. the Red Button, voting on celebrity shows like "I'm a Celebrity".

3. **Preferred Readings:** Where the producer wants to give a particular message or point of view.

Narrative: What are the different ways that media producers develop the story?

1. Storytelling	E.g. the plot of a film or the use of images alongside text in an app, the inverted pyramid of a newspaper article.	Most Newsworthy Info Who? What? When? Where? Why? How? / Important Details / Other General Info Background Info
2. Narrative Structure	Does the story have a linear structure? (Start, middle, end) Or a non-linear structure? Is it interactive? Is the storyline circular?	
3. Point of view (POV)	From whose point of view is the story told/ experienced? 3rd person? 1st person?	
4. Characterisation	This helps in creating a picture of the protagonist and others, in the reader's mind. It talks about the characters - Persona, Looks, Mannerisms, Language, Type of Person, Background etc.	
5. Themes	Does the product have an identifiable theme? E.g. Post-apocalyptic, Romance, Zombie invasion, Western, Detective etc.	
6. Setting	Where is the product based? This could be the location or background, or in games it could be open-world.	
7. Mode of address	There are different ways to address the audience: formal (e.g. a news broadcast), direct (e.g. the cover of a magazine) or informal (e.g. a game).	

Media production techniques

How are media production techniques combined to create meaning for audiences?

Audio/moving image media products:

- **Camera work** e.g. set-up, framing, shot type/length, camera angle, movement of the camera in a shot
- **Mise en scène** e.g. use of costume, hair, makeup, props, setting and expression
- **Lighting set-up** e.g. under, overhead lighting, side lighting, fill, use of shadows
- **Use of sound** e.g. sound effects, voice-overs, dialogue, incidental music, bridges, sound mixing
- **Editing techniques** e.g. flashbacks, transitions, pace, continuity, montage

Publishing media products:

- **Using different layouts and design techniques** e.g. balance, contrast, proximity, repetition, rule of odds, use of white space
- **Style of typography** e.g. serif and sans serif typefaces, fonts and font size, letter spacing and line height, readability
- **Photographic techniques** e.g. composition, image quality, lighting effects, depth of field, aesthetic, rule of thirds
- **Image editing techniques** e.g. adding filters, colour and contrast, layering images, distorting images

Interactive media products:

- **Interactive features** e.g. image galleries, option menus, navigation screens, levels
- **User interface** e.g. screen, interaction, graphics, buttons, layout, colour
- **Usability/playability** e.g. accessibility, navigation, controls, rules, challenge
- **Mise en scène and lighting** e.g. sprites, character models, 3D environments, interactive objects, textures, lighting schemes
- **Sound design** e.g. soundtracks, sound effects, sounds triggered by game events

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Start of the exam - 15 minutes

1. Read the glossary.
2. Read the information box and underline:
    - Character
    - Setting
    - Place in Story
3. Read the passage WITHOUT looking at the questions. Focus on just understanding what is going on.

Question 1 – 5 minutes – Information Retrieval

Planning the answer:
1. Read the question and highlight the focus.
2. On the question draw a box around which lines to focus on.
3. Highlight the correct answers in the text.
4. When writing the answer:
    - Use full sentences
    - Start each sentence with the focus from the question
    - Be careful not to repeat points.

Question 2 - 10 minutes - Language

Planning the answer:
1. Read the question and highlight the focus.
2. Highlight powerful words and phrases linked to the question focus.
3. Pick three examples to use and circle your zoom word.
4. Label your examples with subject terminology.
When writing the answer:
1. Write an establishing sentence outlining your three ideas linked to the focus – in your own words.
2. Write three paragraphs.
3. Always use quotation marks.
4. Always zoom in.
5. Always explain why the language feature/word class has been used. Features or structural features. Consider the writer's intention.

Explorations in Creative Reading and Writing Paper 1 - 1 hour 45 minutes

Question 3 - 10 minutes - Structure

Planning the answer:
1. Decide what the writer focuses on at the beginning, middle and end of the extract and highlight a quotation (piece of evidence) that supports this.
2. Jot down the tone next to the evidence, any questions that come to mind and the effect of the section on the reader.
3. When writing the answer:
    - Write three paragraphs – each one must contain a quotation and structural feature.
    - Do not make reference to language features or zoom in.

Question 4 - 20 minutes - Evaluation

Planning the answer:
1. Draw a box around the section on the extract.
2. Highlight the key words in the statement.
3. Find three pieces of evidence to show that you agree with the statement.
4. Circle your zoom words and label with subject terminology.
When writing the answer:
1. Write an introduction stating how much you agree and give two reasons why – in your own words.
2. Write three paragraphs.
3. The last sentence of each paragraph should always refer back to the statement.

Question 5 - 45 minutes - Writing

Planning the answer: 10 mins
1. Plan your ideas before you start.
2. Order your ideas to show the examiner that you are attempting to structure and craft your work.
3. Write a punctuation list at the top (!?,.;-).

When writing the answer: 30 mins
1. Write your description / story
2. Start each paragraph in a different way:
    - Verb: 'ing' / 'ed' word
    - Adverb: 'ly' word
    - Preposition/Place word: 'on' / 'next to' / 'near'
    - Adjectives: describing word.
3. Vary your sentence starts.
4. Litter your work with techniques and use ambitious vocabulary.
5. Use a range of punctuation and sentence types for effect.
6. Proofread each paragraph as you work.
7. Complete a final proofread of your work (5mins).
    - Correct spelling errors.
    - Add missing words and punctuation.
8. Remember that it is okay to cross out and write a better word above a piece of dull or repeated vocabulary.

Writers' Viewpoints and Perspectives Paper 2 - 1 hour 45 minutes

Start of the exam - 15 minutes

1. Read both extracts – do not forget to read the glossaries.
2. Focus on understanding what is going on.

Question 1 – 5 minutes - True or False

Read the INSTRUCTIONS about how to shade VERY carefully (this is marked electronically and must be shaded right!).
Before you answer:
1. Circle the lines you have been directed to.
2. Read each statement.
3. If you find evidence in the extract for the statement, underline it. Answering the question:
1. Shade only the true statements.
2. Choose a maximum of four.
3. Double-check your answers.

Question 2 - 8 minutes - Summary

1. Read the question and highlight the focus.
2. On the sources underline quotations (evidence) that link to the focus of the question.
3. Match the pairs of quotations that allow you to show the most inference (3 pairs).
4. Do not make reference to language or structure.
5. Embed quotations where possible.

Question 3 - 12 minutes - Language

Planning the answer:
1. Read the question and highlight the focus.
2. Highlight powerful words and phrases linked to the question focus.
3. Pick three examples to use and circle your zoom word.
4. Label your examples with subject terminology.

When writing the answer:
1. Write an establishing sentence outlining your three ideas linked to the focus – in your own words.
2. Write three paragraphs.
3. Always use quotation marks.
4. Always zoom in.
5. Always explain why the language feature/word class has been used. Always explain why the language feature/word class has been used. Features or structural features. Consider the writer's intention.

Question 4 - 20 minutes - Viewpoints

Planning the answer:
1. Read the question and highlight the focus of the question. This is the comparison focus.
2. Highlight quotations (evidence) in both sources that answer the question. You need three per source.
3. Next to the evidence, label with correct subject terminology.
4. Pair up the three ideas from Source A with the three from Source B.

When writing the answer:
1. Write an opening statement that clearly refers to the question – name both writers and make reference to each source.
2. Write three paragraphs.
3. Use a comparison word in each paragraph.
4. Zoom into the language feature used and explore why it has been used in relation to the question.
5. Explore the tone of both extracts.
6. Use the writers' names through your response.

Question 5 - 45 minutes - Writing

Planning the answer: 10 mins
1. Underline the purpose/audience/form (PAF) in the question.
2. Plan your ideas before you start.
3. Order your ideas to show the examiner that you are attempting to structure and craft your work.
4. Write the techniques for the purpose (explain, argue, persuade, instruct/advise) at the top of the page.
5. Write a punctuation list at the top (!?,.;-).

When writing the answer: 30mins
1. Write your response.
2. Start each paragraph in a different way:
   • Rhetorical question
   • Use the word 'Imagine'
   • Discourse markers.
3. Vary your sentence starts.
4. Litter your work with techniques and use ambitious vocabulary.
5. Use a range of punctuation and sentence types for effect.
6. Proofread each paragraph as you work.
7. Complete a final proofread of your work (5mins).
   • Correct spelling errors.
   • Add missing words and punctuation.
8. Remember that it is okay to cross out and write a better word above a piece of dull or repeated vocabulary.

An Inspector Calls

Characters		
Inspector Goole	Goole Priestley's mouthpiece; advocates social justice; serves as the Birlings' conscience	Socialist, moralistic, righteous, powerful, intimidating, unconventional, mysterious, imposing, sardonic, omnipotent
Mr Arthur Birling	Businessman; capitalist; against social equality; a self-made man (new-money)	Capitalist, arrogant, foolish, Panglossian, emasculate, prejudice, ignorant, selfish, stubborn, vainglorious
Mrs Sybil Birling	Husband's social superior; believes in personal responsibility	Arrogant, cold-hearted, insincere, prejudice, naïve, conformist, bitter, controlling, remorseless
Sheila Birling	Young girl; comes to change views and pities Eva; feels regret	Transformative, remorseful, socialist, pseudo-inspector, sensitive, astute, strong-minded, empowered
Eric Birling	Young man, drinks too much; forces himself on Eva Smith; regrets actions	Rebellious, reckless, immature, insubordinate, compulsive, desperate, disgraced, dualistic, irresponsible
Gerald Croft	Businessman; engaged to Sheila; politically closest to Birling	Aristocratic, evasive, secretive, dishonest, disingenuous, oleaginous, chivalric, privileged, pragmatic
Eva Smith	Unseen in play; comes to stand for victims of social injustice (changes her name to Daisy Renton)	Suffragist, victim, emblematic, allegorical, vulnerable, desperate, socialist, moralistic, principled Theatrical

Theatrical Stagecraft: Dramatic Devices	
Dramatic irony	Birling's speeches, Mrs. Birling's witless implication of Eric
Stage directions	Instructions for the actors; often revealing – such as the lighting change when the Inspector arrives: "Pink and intimate then brighter and harder"
Setting	Constant throughout but subtle changes e.g. lighting; characters on/off stage
Tension	Builds up throughout the play ; interrogation of characters, personal relationships, secrecy
Cliff-hanger	Eric's reappearance in Act 3; the ending allows the audience to make up their minds
Foreshadowing	Symbolism (The Titanic), Mr. Birling's "knighthood", war
Time-lapse	Set in 1912, written in 1945; audience in a privileged position.
The 4th Wall	The Inspector's final speech addressed directly to audience.

Social, Historical and Literary Allusions	
"the Titanic"	The Titanic sailed from Southampton and sank in the early hours of 15th April 1912. Priestley clearly wants his audience to see his drama play out against a background of real historical events and he has also chosen a moment in time when Birling's comments appear particularly ironic.
"Nobody wants war"	In reality, economic rivalry between the British Empire and the new German Empire was one of the many causes of the First World War.
"Russia"	The irony here suggests that Russia will have progressed further than other European countries by the 1940s.
"Bernard Shaws and H. G. Wellses"	Both the noted Irish playwright George Bernard Shaw (1856-1950) and the father of sciencefiction H. G. Wells (1866-1946) were well-known and outspoken socialists.

Plot

Act 1	Set in April 1912, Brumley, Midlands, UK. The Birling family and Gerald Croft are celebrating Sheila Birling's engagement to Gerald with a dinner. Mr Birling lectures his son, Eric Birling, and Gerald about the importance of every man looking out for himself if he wants to get on in life. Edna (the maid) announces that an inspector has arrived. Inspector Goole says that he is investigating the death of a young woman who committed suicide, Eva Smith. Mr Birling is shown a photograph of Eva, after initially denying recognising the woman in the photo, he remembers firing her in 1910 for organising a strike over workers pay. Sheila recalls also having Eva sacked about her manner when served by her in an upmarket department store. The Inspector reveals that Eva Smith changed her name to Daisy Renton. Gerald reveals to Sheila he had an affair with Daisy Renton.
Act 2	Gerald explains to The Inspector that he had an affair with Eva, but hasn't seen her since he ended their relationship back in Autumn 1911. Sheila gives her engagement ring back to Gerald. The Inspector turns his attention to Mrs Sybil Birling, she confesses that she also had contact with Eva, but Eva gave herself a different name to Mrs Birling. Eva approached a charity chaired by Mrs Birling to ask for help. Eva was desperate and pregnant but help was refused by Mrs Birling because she was offended by the girl calling herself 'Mrs Birling'. She tells Eva that the baby's father should be made entirely responsible. She also tells Inspector Goole that the father should be held entirely responsible and should be made an example of.
Act 3	Eric is revealed as the father. He stole money from Mr Birling's office to provide money to Eva. The Inspector delivers his final speech. After he leaves, the family begin to suspect that he was not a genuine police inspector. A phone call to the Chief Constable confirms this. Next, they phone the infirmary to be informed that no suicide case has been brought in. Mr Birling, Mrs Birling and Gerald congratulate themselves that it was all a hoax and they continue can continue as before. This attitude upsets Sheila and Eric. The phone rings. Mr Birling announces to the family that a girl has just died on her way to the infirmary, a police inspector is coming to question them

Key Concepts and Context: Think About...

1912	Set just before WWI and the sinking of the Titanic. A moment of rising international tensions and industrial expansion. End of Victorian era saw the demise of the rigid class system. Labour Party, founded in 1900, gaining momentum. The Russian Revolution began in 1917.
1945	People were recovering from six years of warfare, danger and uncertainty. Class distinctions greatly reduced as a result of two world wars. Women had a more valued place in society. Desire for social change. Following WW2, Labour Party won a landslide victory over Winston Churchill and the Conservatives.
Wealth, Power and Influence	The Birlings and the Crofts are representative of the wealthy upper-class. They all misuse their social influence to benefit themselves. Their actions adversely affect the vulnerable people in society.
Blame and Responsibility	Who is to blame for Eva's death? Each of the Birlings contribute to a chain of events leading to the destruction of Eva Smith. What responsibilities do the characters have to each other? To society?
Public v Private	How do the public lives, the facades, of the Birlings juxtapose their private personas? What are their motivations for this? What are the repercussions, and for who?
Morality and Legality	What are the moral and legal laws of the society depicted in the play? How do they interweave? What actions do the characters undertake that are wrong, morally or legally?
Class Politics	How do the ideologies of capitalism and socialism collide in the play? Which characters are representative of which political allegiance? Is there a correlation between a character's political beliefs and their behaviours?
Prejudice	What are the prejudices held by the Birlings? What are their inherent views regarding class and status? How do they act on these prejudices, and what are the consequences?
Young v Old	What differences are evident between the younger and older generation? They react and behave differently throughout the play – why? What are their attitudes towards each other? What do they learn? Which characters change, and how?

Act	Order of Order of the Inspector's Questioning
1	Sheila and Gerald's engagement is celebrated.
1	Birling says there will be no war; references Titanic
1	Inspector arrives; a young girl has committed suicide.
1	Birling threw her out after strike; Sheila had her fired for laughing.
2	Gerald had an affair with Daisy Renton
2	Mrs. Birling refused to give charity to Eva; blames father.
3	Eric's involvement revealed; possible rape hinted at.
3	Inspector leaves. Gerald returns; met policeman, no Inspector G
3	Telephone rings; an inspector is coming.

Thematic Quotes

Social responsibility	"We are responsible for each other" Inspector "Public men, Mr Birling, have responsibilities" Inspector "It's what happened to the girl and what we all did to her that mattered." Eric
Capitalism	"These silly capital vs labour agitations." Birling "A man has to make his own way" Birling
Class	"A girl of that class" Mrs Birling "Well, we've several hundred young women there, y'know, and they keep changing." Birling
Age	"the famous younger generation" Birling "What's the matter with that child?" Birling "Just keep quiet, Eric" Birling
Gender & attitudes to women	"I hate those hard-eyed dough-faced women" - Gerald "And you think young women ought to be protected against unpleasant and disturbing things?" Inspector "She had far too much to say, far too much" Birling

Key Notes

Priestley asks his audience to examine their individual and collective responsibility to society. He wants a welfare state.

The hypocrisy of middle-class Edwardian society is uncovered: appearance & reputation matter more than reality & morality.

Priestley criticises the selfishness of capitalism and wants a fairer, socialist future after the horrors of two world wars..

Priestley shows the older generation to be set in their ways, while the young are open to change.

Eva Smith is the embodiment of young, working-class women who were oppressed by the middle/upper classes.

The play demonstrates that when workers do not have full employment rights they cannot fight back

Character Quotes

Birling's Confidence	''We're in for a time of steadily increasing prosperity'
Birling on society	''The way some of these cranks talk and write now, you'd think everybody has to look after everybody else'
Shelia's recognition	'but these girls aren't cheap labour – they're people''
Sheila's regret	'it's the only time I've ever done anything like that, and I'll never, never do it again to anybody'
Sheila on the inspector	'we all started like that – so confident, so pleased with ourselves until he began asking us questions'
Sheila on Eric	''he's been steadily drinking too much for the last two years'
Inspector on guilt	'I think you did something terribly wrong – and that you're going to spend the rest of your life regretting it'
Mrs Birling defends herself	'she was claiming elaborate fine feelings and scruples that were simply absurd in a girl in her position'
Eric explains	'I'm not very clear about it, but afterwards she told me she didn't want me to go in but that – well, I was in that state when a chap easily turns nasty – and I threatened to make a row'
The inspector says	'but each of you helped to kill her. Remember that'
Inspector's message	'there are millions and millions and millions of Eva Smiths and John Smiths still left with us, with their lives, their hopes and fears, their suffering, and chance of happiness, all intertwined with our lives, with what we think and say and do. We don't live alone.'

Power and Conflict Poetry

Ozymandias	"Colossal wreck"	"Look on my works"
The Prelude	"a huge peak, black and huge"	"trouble to my dreams"
Remains	"his bloody life in my bloody hands"	"the drink and drugs won't flush him out"
London	"mind-forged manacles"	"marks of weakness"
Tissue	"might fly our lives like paper kites"	"turned transparent with attention"
Poppies	"Gelled blackthorns of your hair"	"leaned against it like a wishbone"
The Emigree	"sunlight"	"time rolls its tanks"
Kamikaze	"powerful incantations"	"which had been the better way to die"
Exposure	"merciless iced east winds that knive us"	"But nothing happens"
My Last Duchess	"I gave commands; then all smiles stopped"	"I choose never to stoop"
Bayonet Charge	"His terror's touchy dynamite"	"listening between footfalls for the reason"
Checking out me History	"Blind me to me own identity"	"Carving out me own identity"
Charge of the Light Brigade	"The jaws of Death"	"theirs not to make reply"
Storm on the Island	"a huge nothing that we fear"	"spits like a tame cat turned savage"
War Photographer	"A hundred agonies in black and white"	"a half-formed ghost"

Structure and form

First person	The speaker tells the story using 'I' and 'we'
Third person	The story is told by someone watching the action (omniscient narrator)
Stanza	A paragraph in a poem
Irregular Rhyme Scheme	The rhyme scheme changes
Regular Rhyme Scheme	The rhyme scheme remains consistent
Enjambment	There isn't punctuation at the end of a line or sentence making ideas run into each other
Caesura	There is an excess of punctuation increasing the pauses and separating the ideas.
Dramatic monologue	A story told in first person and chronological order
Sonnet	A fourteen-line poem that often has a mood change between lines 9 and 11.

KS4 Macbeth – Topic Guide

1. Context	
Playwright: Shakespeare (April 23rd 1564 - April 23rd 1616) Dates: Written around 1606 Published: In 'the First Folio, 1623 Era: Jacobean Genre: Tragedy = A play ending with the suffering and death of the main character. Set: Scotland. Structure: Five Act Play	Macbeth. The plot is partly based on fact. Macbeth was a real 11th Century king who reigned Scotland from 1040- 1057. Shakespeare's version of the story originates from the Chronicles of Holinshed (a well known historian). The play was most likely written in 1606 – the year after the Gunpowder Plot of 1605 – and reflects the insecurities of Jacobean politics.
The Divine Right of Kings says that a monarch is not subject to earthly authority and that they have the right to rule directly from the will of God. It implies that only God can judge an unjust king and that any attempt to depose, dethrone or restrict his powers runs contrary to the will of God and may constitute a sacrilegious act. The action of killing a king is called regicide and is considered a terrible crime.	King James I of England (and VI of Scotland) came to the throne in 1603 following the death of Queen Elizabeth I. The play pays homage to the king's Scottish lineage. The witches' prophecy that Banquo will found a line of kings is a clear nod to James' family's claim to have descended from the historical Banquo. James was convinced about the reality of witchcraft and its great danger to him leading to witch trials. The play is probably not written simply to please James, but certainly looks at relevant ideas.
Shakespearean Tragedy. Macbeth is one of Shakespeare's tragedies and follows specific conventions. The climax must end in a tremendous catastrophe involving the death of the main character; the character's death is caused by their own flaw(s) (hamartia) yet the character has something the audience can identify with.	The Great Chain of Being was a belief in a strict religious hierarchy (see key vocabulary) of all things which was believed to have been decreed by God. This idea was important in Elizabethan and Jacobean beliefs. The chain starts from God and progresses downward to angels, demons (fallen/renegade angels), stars, moon, kings, princes, nobles, commoners, wild animals, domesticated animals, trees, other plants, precious stones, precious metals, and other minerals.

Conventions of a Shakespearean Tragedy		
A tragic hero who falls from greatness through a flaw of their own **character.**	**Hamartia** – the flaw in the tragic hero that destroys them.	**A hero of status** – the central characters are people of importance, with power and status to lose.
External conflict – his tragedies feature conflict between characters, and always lead to death.	**Internal conflict** – there are frequent moments of selfdoubt or internal torment.	**Supernatural elements** – Many of Shakespeare's tragedies feature supernatural influences.

2. Key Characters
Macbeth: The eponymous protagonist is the tragic hero of this play. He is both ambitious and ruthless. He falls from loyal and respected warrior to a paranoid, tyrannical king, before dying in battle in Act V.
Lady Macbeth: A strong, ambitious and manipulative woman who exerts pressure on Macbeth to pursue his ambition of becoming king by murdering Duncan. Unable to deal with the guilt of these actions and is driven to madness and suicide.
The Witches/Weird Sisters: Supernatural and manipulative beings who seem to be able to predict the future. They are unearthly and omniscient.
Banquo: Macbeth's close friend and ally is astute and loyal. Macbeth sees him as a threat. He is virtuous, admired by audiences, and mistrustful of the supernatural witches.
Duncan: King of Scotland at the beginning of the play. He is a virtuous, strong and respected leader, held up as the model of good kingship by others in the play. He is murdered by Macbeth in Act 2.
Macduff: A soldier who is loyal to Duncan and is suspicious of Macbeth. His family is murdered by Macbeth's soldiers and he eventually exacts revenge by killing Macbeth. He was born by caesarean section and therefore was "not of woman born".
Malcolm: Duncan's son and next in line to the throne. He is described as a good man in the play.

KS4 Macbeth – Topic Guide continued...

3. Central Themes

Ambition	The play is about the corrupting power of ambition. Both Lady Macbeth and Macbeth are urged to action by the prophecies of the witches, but they still commit their crimes themselves because they want greater power. Their ambition leads them to violence and death.
Kingship and Tyranny	The play contrasts the kind and wise rule of Duncan, who is described as a virtuous (good) king, with the brutal rule of Macbeth, who quickly becomes called a tyrant. The play shows how Macbeth has no divine right to rule and upsets the natural order by killing Duncan.
Order and Disorder	The play subverts the natural order of the world. Macbeth's actions are based on a supernatural belief in a prophecy. It depicts an anarchic world: Macbeth inverts the order of royal succession; his wife inverts the patriarchal hierarchy; the unnatural world disrupts the natural. The disruption underpins the conflict that is not only external and violent but internal as Macbeth and his wife come to terms with what they've done.
Appearance and Reality	Characters in the play are often not what they seem. Lady Macbeth and Macbeth are duplicitous towards Duncan, the witches equivocate (not say what they really mean) and cannot be trusted, Lady Macbeth seeks to manipulate Macbeth.

4. Key Vocabulary

Ambition	A desire to achieve something e.g. Macbeth and kingship
Hubris	Having excessive pride or self-confidence
Tyrant	A ruler who rules through fear and violence
Corrupt	Acting dishonestly OR being in a state of decay
Patriarchal	A society where power is in the hands of men
Duplicitous	Lying and being false. Two-faced. Deceitful
Façade	A false front, mask or illusion. Hiding one's true feelings
Prescient	Having knowledge of things before they happen – the witches
Nihilistic	The belief that everything is meaningless
Courageous	Being very brave
Supernatural	Things that are not a part of the natural world
Fate	Events being already decided and out of a person's control
Treachery	Betraying someone's trust
Regicide	The killing of a king

5. Key Terminology, Symbols and Devices

Motif	A recurring image or idea that has symbolic importance. The best example in Macbeth would be blood.
Soliloquy	When a character is alone on stage and speaks their thoughts aloud to themselves.
Iambic Pentameter	A line of a play or poem that has ten syllables organised into five pairs of syllables, where the second in each pair is emphasised. e.g. "When you durst do it then you were a man".
Foreshadowing	When a hint or warning is given about a later event.
Dramatic Irony	When a character is unaware of something that the audience is aware of, so they don't know the full significance of their words.
Symbolism	When something symbolises a set of ideas e.g. "The raven himself is hoarse" – raven symbolic of death, supernatural.
Aside	When a character pauses in a conversation to speak only to the audience or another character, unheard by the rest.

GCSE English Literature – Paper 1 – Shakespeare and the 19th Century Novel – 1 hour, 45 minutes
'The Strange Case of Dr. Jekyll and Mr. Hyde'
English Literature 7 of 7

Jekyll and Hyde

What will I need to do in the examination?

Answer TWO questions.

For this paper, you will be given an extract for each text with a question to answer.

Use the extract as a "springboard" to help you answer the question, including events and evidence

from the whole of the text.

By the end of the examination, you will have written TWO essays.

For each question, spend 10 minutes annotating the extract and planning your answer, then 40

minutes writing your essay.

That leaves you with 5 minutes to read through your answers at the end.

Section A – 30 + 4 marks;

Section B – 30 marks.

'The Strange Case of Dr. Jekyll and Mr. Hyde' Context

Stevenson's father wanted him to be a scientist and Stevenson rejected this, just like Jekyll rejects traditional Science in the novella.

In the late 1800s, London was a city of extremes of wealth and poverty, with a lot of violent crime. It was plagued by thick fog.

Advances in Science in the 19th century changed the way people saw the world and humanity. Psychology – the science of the mind – was just beginning.

Darwin's theory of evolution changed the way some people thought about the origin of humans.

Many people became interested in the paranormal and spirits in the 19th century. Some, like Lanyon, thought it all nonsense. Others remained undecided.

How will I gain marks?

AO1 – Show the examiner that you have read the text and can write about it clearly, using evidence to support your points.

AO2 – Write about the effect of the language and structural features, linking these to the question and using subject terminology.

AO3 – How did people live at the time? What do you know about the writer? What was happening in society and the world at the time? You must link this knowledge to the question.

AO4 – Write accurately and use a variety of vocabulary and sentence structures.

Some Key Terminology

Couplet – a pair of rhymed lines.

Dramatic Irony – when the audience knows more about what is happening than some of the characters.

First-person perspective – a narrative which is told from a character's viewpoint using 'I'.

Foil – something which provides a contrast.

Foreshadow – a warning of something that will follow later.

Gothic Genre – a literary genre originating from the 18th century, which describes a sinister, grotesque or mysterious atmosphere. Such novels are often set in dark places or ruined buildings.

Juxtaposition – when two ideas or events are placed one after the other to create a dramatic effect.

Oxymoron – when contradictory terms are brought together.

Sonnet – a poem of 14 lines generally concerned with a single thought.

Tragedy – a drama dealing with tragic events.

'The Strange Case of Dr. Jekyll and Mr. Hyde' Quotations

"It wasn't like a man; it was like some damned Juggernaut" – Hyde is presented as out of control, almost inhuman in his first appearance when he tramples the young girl.

"If he be Mr. Hyde,' he had thought, 'I shall be Mr. Seek." – Utterson decides to solve the mystery of Hyde to protect his friend, Jekyll.

"the moment I choose, I can be rid of Mr. Hyde" – Early in the novella, Jekyll believes that he can control Hyde – it becomes apparent that Hyde is gradually taking over as the novella progresses.

"with ape-like fury, he was trampling his victim under foot" – Hyde's attack on Sir Danvers Carew is savage and violent; it links to Darwin's theory.

"there's a rather singular resemblance" – When Mr. Guest says that the two sets of handwriting are quite similar, this is an early clue that Jekyll and Hyde are the same person, which creates mystery, suspense and tension.

"He had his death-warrant written legibly upon his face" – Dr. Lanyon is shocked to death by his experience of watching Hyde transform into Jekyll.

"as froze the very blood of the two gentlemen below" – Utterson and Enfield are shocked and quite traumatised when they witness the transformation of Jekyll into Hyde, although they don't know this has happened.

"Nowhere was there any trace of Henry Jekyll dead or alive" – Utterson and Poole cannot find Jekyll, either dead or alive. This is when Utterson stops narrating the novella, creating mystery, suspense and tension.

"My life is shaken to its roots; sleep has left me" – Lanyon explains his reaction to seeing Hyde transform – he cannot continue to live.

"The powers of Hyde seemed to have grown with the sickness of Jekyll" – Jekyll explains that the more Hyde was released, the stronger he became.

The challenge in the human environments: Urban issues and challenges

A growing number of people across the world live in urban areas

Urban = towns and cities   **Rural** = countryside
Urbanisation is the growth in the proportion of a country's population living in urban areas. The rate of urbanisation differs between countries that are richer than those that are poorer.
HIC have very slow rates of urbanisation: in richer parts of the world, urbanisation happened historically and most of the population now already live in urban areas. Many people in urban areas in HICs desire a better quality of life and are moving to rural areas. Here, they can commute to cities (because of better transport) or work from home (better communication).

LIC are less economically developed e.g. Ethiopia. Not many of the population live in urban areas. However, people are starting to move away from jobs in farming (rural areas) to urban areas.

They are experiencing rapid urban growth.

NEE are those where economic development is increasing rapidly e.g. Brazil, India, Nigeria - they are experiencing rapid urban growth.

Factors affecting the rate of urbanisation

1. Rural-urban migration is the movement of people from rural to urban area. The rate is affected by push-pull theory:
Push factors – things that encourage people to leave (Push them out)   **Pull factors** - things that encourage people to move to an area (Pull them to an area).

Pull Factors	Push Factors
More jobs in urban areas that are often better paid, access to better health care and education, join family members, people think they will have a better quality of life and standard of living.	Less well paid jobs, natural disasters, mechanisation of agriculture – farms require fewer workers so there aren't as many jobs, Desertification, conflict/war, shortage of services (education, water and power).

2. Natural increase - birth rate is higher than death rate so population growth.
3. Young people move to urban areas to find work. These people then have children, which increases the proportion of people living in urban areas.
4. High rates of urbanisation leading to the growth of **megacity** (a city with more than 10 million people living there). **Two third of megacities are in LIC + NEEs.**

## Urban Growth – Opportunities and Challenges - LIC and NEEs

Often seen as overcrowded, polluted, with slums, inadequate services (water sanitation) but a centre of economic activity.

	Social	Economic
Opportunities	• Better access to services e.g. health care and education • Better access to resources such as clean water supply and electricity	• Increased economic development • As industry develops (industrialisation), more people move to urban areas to work in factories – there are more jobs and better wages than rural areas • Industries create and sell goods on the **international market.** Manufactured goods make greater profits than unprocessed goods so industrialised countries get wealthier
	Social and economic (HEWE)	**Environmental (WART)**
Challenges	Many people who move to urban areas from rural areas end up living in **squatter settlements** - settlements that are built illegally in and around the city, by people who can't afford formal housing. • Badly built and over-crowded • No access to basic services (running water, sanitation, electricity) • Unclean conditions and lack of access to medical services mean people often have poor health • No access to education • High levels of unemployment and crime	If cities grow rapidly, waste disposal services, sewage systems and environmental regulation for factories can't keep up with the growth. • Rubbish isn't collected so it leaves toxic rubbish heaps, which damage the environment • Air pollution comes from burning fossil fuels from vehicles and factories • Sewage and toxic chemicals can get into rivers, causing health problems and harming wildlife • Infrastructure like road systems may not be able to cope with the growing number of vehicles. Congestion causes an increase in greenhouse gas emissions which cause global problems. Locally, problems with health and acid rain also occur

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The challenge in the human environments: Urban issues and challenges

Overview of the distribution of population and the major cities in the UK

• The United Kingdom is a country with a high level of urbanisation and a number of large cities and towns. It has no megacities. London, the capital, has by far the biggest population at over 8.6 million inhabitants.

• **The population is very unequally distributed over the four parts of the UK:** England makes up about 84 per cent of the total population, Wales around 5 per cent, Scotland roughly 8.5 per cent, and Northern Ireland less than 3 per cent. This is because the south east has good transport links, and is close to the city of London which is the financial heart of England.

• Across the UK the highest population densities are found in major cities. Broadly speaking, as we move south through the UK, population density increases, with the exception of the Edinburgh to Glasgow corridor. Regionally, the upland areas of the UK have low population densities and the highest population density is found to the south east, in the area around London. The cities of the UK owe their origins to many different reasons. For example, Sheffield is famous for its steel industry, Newcastle coal and then ship building and Manchester once produced a third of all the world's cotton garments.
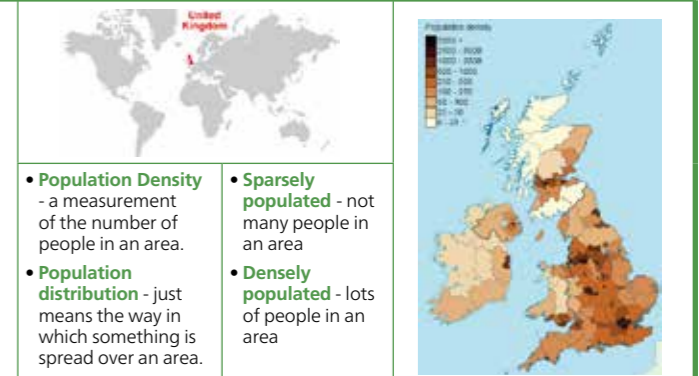
• **Population Density** - a measurement of the number of people in an area.
• **Population distribution** - just means the way in which something is spread over an area.
• **Sparsely populated** - not many people in an area
• **Densely populated** - lots of people in an area

Case study: London	Urban change in cities in the UK leads to a variety of social, economic and environmental challenges and opportunities		Key terms	Definition
Location and importance of city in UK and wider world	• South East England on either side of the River Thames • Capital city – centre of trade, manufacturing and finance • Hub for transport networks • Wealthy city • House prices and earnings increasing • Headquarters of TNCs • Universities, research, tourism, culture, media, communications		Brownfield site	Land that has been used, abandoned and now awaits some new use
			Dereliction	Abandoned buildings and wasteland
			Greenfield site	A plot of land that has not yet been subject to any building development
			Inequalities	Differences between poverty and wealth as well as in peoples' wellbeing and access to services
Impacts of national and international migration on the growth and character of the city	• 8.6 million in 2015 • Increased during industrial revolution, decreased after WWII, increased since 1991 • Young population in 20s and 30s moving for work. Also pushing up the rate of natural increase • Migrants from worldwide • Multicultural – current influx from Eastern Europe • White British 46%, White other 15%, South Asian 18%, Black 13%, Mixed 5% and other 3%		Integrated transport systems	When different transport systems connect together making journeys smoother and public transport more appealing
			Rural urban fringe	Zone of transition between the built up area and the countryside
			Social deprivation	The degree to which an individual or an area is deprived of services, decent housing, adequate income and local employment
			Urban greening	The process of increasing and preserving open space such as public parks and gardens
			Urban regeneration	The revival of old parts of the built up area by renewal or redevelopment
			Urban sprawl	Unplanned growth of urban areas into the surrounding countryside

A Timeline of Ideas and Treatments of Disease

MEDIEVAL: 500 - 1450

The ideas of **Hippocrates** (460-370 BC) and **Galen** (129-216 AD) are dominant throughout the Medieval period and Renaissance.

The 'Four Humours' theory is that the body is made of four 'elements': blood, black bile, yellow bile and phlegm and these need to be balanced.

As Galen believed in the idea of one God (Monotheism) his ideas are championed by the Church, which means to criticise his theory is to criticise the Church itself.

Treatments include: blood-letting, vomiting, drinking wine and using certain diets.

The power of the Church in everyday life also means that many people understand that **illness is a punishment from God.**

Treatments include: prayer, pilgrimage, confession and acceptance that death is part of 'God's Plan'.

Another supernatural idea is that the signs of **the Zodiac influence the body and the Four Humours.** For example, certain illnesses are likely under certain Zodiac signs.

Treatments include: consulting with the stars and balancing the Humours at different times based on the position of the stars.

Medieval understanding of **natural remedies** is fairly advanced. In particular, Islamic medicine had used many natural remedies such as those included in Ibn-Sina's 'The Canon'

Treatments include: opium, mandrake, onions, mint, burdock

RENAISSANCE: 1450 - 1700

KEY:

ANATOMY & THE BODY	OPERATIONS & TREATMENTS

30   www.rrma.org.uk

A Timeline of Ideas and Treatments of Disease continued...

18th CENTURY

More scientific ideas based on evidence and observation are beginning to be used. This means that theories such as the Four Humours as well as supernatural ideas that God or the position of the stars cause illness become less common.

Edward Jenner (1749 1749-1823) created a vaccine in 1796 when he discovers that Cowpox gives people immunity to the deadly disease Smallpox. Although there is resistance at first to the treatment, its effectiveness is proven and later vaccination is supported by the government. However, Jenner cannot explain why it works.

Miasma Theory is that 'bad air' (caused by pollution, bad smells or sick people) moves around and spreads disease. Although this is incorrect, it does lead doctors and scientists to believe cleanliness is important to being healthy.

INDUSTRIAL: 1800 - 1900

Thanks to microscopes scientists are able to see germs. A theory is developed in which germs appear as a result of disease or decay. Although we know this is scientifically incorrect today, it becomes a widely-accepted theory of disease. This is known as Spontaneous Generation.

French scientist Louis Pasteur (1822-1895) conducts his 'swan-neck flask' experiment in 1862, which proves that germs are the cause of decay and this is known as Germ Theory. His idea faces a lot of opposition, but is over time accepted.

He conducts research into animal diseases and creates vaccines for chicken Cholera, Anthrax and Rabies. Pasteur and his team also successfully trial a Rabies vaccine on humans. Rivalry between Pasteur and Koch spur on many discoveries.

After Pasteur's breakthrough with Germ Theory the German scientist Robert Koch (1843-1910) develops his ideas further. Koch and his team identify the germs responsible for Anthrax, Cholera and Tuberculosis. Koch also develops new methods of researching germs such as growing microbes on agar, staining bacteria and photographing bacteria.

Chemical cures known as 'Magic Bullets' are when chemicals are used to kill specific germs. For example, Paul Ehrlich, who had worked with Robert Koch, uses Salvarsan 606 to cure Syphilis.

MODERN: 1900 +

Alexander Fleming (1881-1955) discovers by chance in 1928 that the antibiotic Penicillin kills Staphylococcus bacteria. However, he does not develop this scientific discovery into a medical breakthrough.

Howard Florey and Ernst Chain test Penicillin on mice and prove its medical potential. A test on a human patient in 1941 is successful but the patient dies when the limited supply of Penicillin runs out. It isn't until WWII that US anda UK mass production is used to create Penicillin on an industrial scale.

Subsequent scientific breakthroughs lead to understanding of DNA and stem cells. These in turn develop new treatments and cures.

A Timeline of Surgery

ANATOMY & THE BODY | OPERATIONS & TREATMENTS | PAIN RELIEF

MEDIEVAL: 500 -1450

Galen (2nd & 3rd century AD) had proved that the brain controls the body through his pig experiment. Galen's understanding of anatomy is based on animals but is used until the 1600s.

In the 14th century there are limited number of dissections at universities. If a body goes against what Galen wrote, then Medieval surgeons say that the body is wrong, not Galen!

Islamic surgeon, Abulcasis (10th century AD) writes a guidebook to surgery called Al Tasrif. He explains cautérisation and even eye surgery.

Hugh of Lucca (13th century) criticise the view that pus was good for a wound. However, this goes against Hippocrates and so this good advice is ignored.

Medieval operations include: amputations, blood-letting and trepanning. Cauterisation with burning oil is used to burn wounds shut.
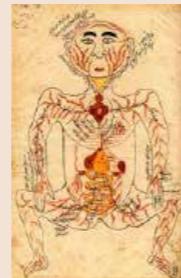
Painkillers such as alcohol, mandrake and opium are used - many of these come from Ibn-Sina's The Canon

RENAISSANCE: 1450 -1700

Andreas Vesalius (1514-64) promotes use of dissections for surgeons. He disproves many ideas of Galen and publishes them in the beautifully illustrated The Fabric of the Human Body (1543)

William Harvey (1578-1657) researches the circulation of the blood. He disproved Galen's ideas about blood and proves the heart is a pump and how much blood is in the body. Published his ideas in The Motion of the Heart (1628)

Ambroise Paré (1510 - 90) develops new operations thanks to his wartime experience. By chance he discovers that a soothing cream works better than painful burning oil. He also uses ligatures to tie-off blood vessels which is much less painful that cauterisation. His ideas are published in Works on Surgery (1575).

18th CENTURY

John Hunter (1728 - 93) not only improves surgical understanding but encourages a more scientific approach to medicine. He learns how to restrict blood to aneurysms instead of amputating limbs, and shows that gunshot wounds should not be 'cut out' of the skin. Published his ideas in Blood Inflammation and Gunshot Wounds (1794) and kept a museum of anatomical specimens.

## A Timeline of Surgery continued...

ANATOMY & THE BODY | OPERATIONS & TREATMENTS | PAIN RELIEF

INDUSTRIAL: 1800 -1900

Joseph Lister (1827-1912) was inspired by the work of Louis Pasteur to use the chemical carbolic acid to prevent infection during and after surgery. Although there were downsides to Carbolic Acid, its use showed that antiseptics could drastically reduce deaths. However, his work was not immediately accepted.
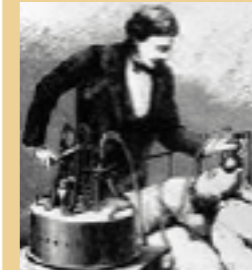
New developments in chemistry meant that there were new, more effective anaesthetics. **Nitrous Oxide** was used by dentists from 1844. Ether was used from 1846 despite it causing vomiting and being highly flammable.

The first safe and effective anaesthetic **Chloroform** was pioneered by Dr James Simpson in 1847 after he discovered its effects by chance.

MODERN: 1900 +

X-Rays are discovered in 1895 but first used on a massmass-scale during WW1

Blood transfusions are possible after Karl Landsteiner discovers that there are 'blood groups'. In 1914

Albert Hustin discovers how to store blood which allows for the use of blood transfusions during WW1.

In 1938 the National Blood Transfusion Service is set up, and huge blood banks are using in WW2.

Skin grafts and plastic surgery is used in WW1to treat soldiers suffering from severe facial wounds. This is pioneered by **Harold Gillies.**

Heart surgery is experimented with by US army surgeon Dwight Harken during WWII leading to huge improvements in surgery

Modern medicine can involve laser surgery, organ and even face transplants, radiation therapy and much more.

A Timeline of Public Health

KEY:

HOSPITALS & TREATMENT	PUBLIC HEALTH	EPIDEMICS

MEDIEVAL: 500 -1450

Christian Hospitals care for sick people but there isn't a serious attempt to cure patients or research illness. Hospitals are mostly funded by the Church or wealthy patrons.

**Islamic Hospitals** called Bimaristans treat patients and not simply caring for them.

Medieval Towns are breeding grounds of disease. Few have sewers, rubbish is thrown onto the street and trade waste pollutes rivers and streams. Some local action is made, but doesn't stop unhygienic conditions.

Monasteries and abbeys are far more hygienic. Monks and nuns understand the importance of cleanliness and good sanitation - they have fresh running water, keep privvies away from water sources, have infirmaries and understand herbal remedies for illness. Lastly, they are isolated away from towns.

The Black Death 1348 was a combination of the bubonic and pneumonic plague spread by rats and fleas, and contact with breath or blood. It spread rapidly in cities and there was no understanding of the cause or a cure - many believed it was a punishment from God or the result of outsiders such as Jews or beggars. Almost 2 million people in Britain died.
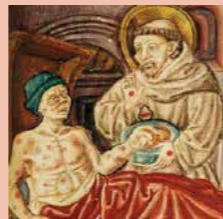
RENAISSANCE: 1450 -1700

The Great Plague 1665 was a return of the plague. Around 100,000 people died in London alone. However there was a greater attempt to control the epidemic: victims were quarantined with watchmen to stop people breaking quarantine. Houses with the plague were marked with an 'X'. Homeowners were made to tidy the street in front of their houses and animals were banned from the streets. Bodies were removed at night and thrown into plague pits.

New hospitals are opened in the 1700s. Between 1720 -50 there are 5 new hospitals in London. Specialist hospitals are also set up for maternity care, venereal disease and mental health care.

A Timeline of Public Health continued...

KEY:

HOSPITALS & TREATMENT	PUBLIC HEALTH	EPIDEMICS

18th CENTURY

Industrial Towns are breeding grounds of disease. Cities like Manchester grow to around 100,000 inhabitants in half a century.

People live in crowded terrace housing without enough toilets, without running water or waste removal. Diseases such as Cholera, Typhoid and Tuberculosis spread rapidly in these conditions.

Cholera regularly kills tens of thousands in London. In 1831 a cholera outbreak kills 50,000.

INDUSTRIAL: 1800 -1900

Edwin Chadwick publishes a report in 1842 about conditions in Britain. Although he wrongly believes disease is caused by Miasma, he identifies the need for cleaner streets and clear water and his report is widely read, however no action is taken.

Public Health Act 1848 gives councils the power to spend money on improving hygiene in towns. Only some towns make improvements and in 1854 the Central Board of Health is closed down because laissez-faire ideas mean that many politicians are against government action.

John Snow in 1854 makes the discovery that Cholera is spread through contaminated water after researching a water pump in Broad Street, London.

The 1858 'Great Stink' heat wave causes the filthy Thames river to smell worse than ever. Even politicians are affected as Parliament is on the rive r. Finally, politicians call for a sewer to be built to improve the condition of the Thames. This is built by Joseph Bazalgette and bring s better sanitation to London.

Public Health Act 1875 forces councils to appoint Medical Officers and to provide sewers, fresh water and to collect rubbish. Hygiene rapidly improves.

MODERN: 1900 +

Reports by Charles Booth (1889) and Seebohm Rowntree (1901) reveal that working class people remain stuck in lives of poverty and ill health. In 1899 during the Boer War, some 40% of volunteers for the army are found to be unfit to serve.

Liberal Reforms 1906 - 1914 introduce School Meals, School Clinics and Doctors, Unemployment Benefits and Old Age Pensions. All of these improve the standard of living and health for the British working classes.

The Welfare State emerges after the **1942 Beveridge Report** identifies 'The Five Giants' which still ruin the lives of the working classes - such as disease, squalor and idleness.

The NHS is set up by the Labour Government and spearheaded by Aneurin Bevan in 1948. It provides free medical care for all -previously in the 1940s over 8 million people had never seen a doctor because they couldn't afford to.

Estimate

Round each value to one significant figure

Standard form

$a \times 10^n$, where $1 \le a < 10$

Reciprocal

Reciprocal of 7 is $\frac{1}{7}$ reciprocal of $\frac{2}{3}$ is $\frac{3}{2}$ etc

Sequences

Fibonacci sequence: 1, 1, 2, 3, 5, 8, 13, 21
Geometric Sequence: each term is multiplied by the same constant to get the next number.
*E.g. 3, 12, 48, 192, …. (x by 4 each time)*

Squares and Cubes

Square numbers: 1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144, 169, 196, 225 etc
Cube numbers: 1, 8, 27, 64, 125, 216, 343, 512, etc

Sharing in a given Ratio

A Add the ratio parts
D Divide the amount by the total parts
A and
M Multiply the ratio by the value of one part
E.g. share £420 in the ratio 2:5
   2 + 5 = 7
   420 ÷ 7 = £60
   2 : 5
   (x60) (x60)
   £120 : £300

Simplifying Ratio

Divide both sides by the highest common factor
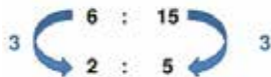
Simplifying Ratio 1:n

Divide both sides by the highest factor of the left hand side

   2m: 180cm
   200cm: 180cm
   2:1.8
   1: 0.9

Fractions

Add and Subtract – ensure the fractions have the same denominator before adding numerators

$$\frac{4}{5} - \frac{1}{3} = \frac{12}{15} - \frac{5}{15} = \frac{7}{15}$$

Multiply – multiply numerators and denominators

$$\frac{4}{5} \times \frac{1}{3} = \frac{4}{15}$$

Divide – take reciprocal of the second fraction and then multiply the new numerators and denominators

$$\frac{4}{5} \div \frac{1}{3} = \frac{4}{5} \times \frac{3}{1} = \frac{12}{5} = 2\frac{2}{5}$$

Percentages

Finding percentages of an amount
1% ÷100
5% ÷20
20% ÷5
25% ÷4
50% ÷2

Multipliers

To find the multiplier for a percentage, divide by 100
Use multipliers on a calculator paper
e.g. 35% of 370 = 0.35 x 370

Increasing and decreasing a given amount

Calculator:
   Original Amount x multiplier = New amount
Non-calculator: find the increase or decrease and add to the original amount
Finding percentage increase or decrease (profit/loss)

$$\frac{\text{Value of increase/decrease}}{\text{Original}} \times 100$$

Writing an amount as a percentage of the original

$$\frac{\text{Amount}}{\text{Original}} \times 100$$

Reverse Percentage – finding the original amount

$$\text{Original Amount} = \frac{\text{New Amount}}{\text{Multiplier}}$$

Growth & Decay / Compound interest

Original amount x multiplier time Where the multiplier is the percentage, increase or decrease from 100%, converted to a decimal.
E.g.
30% decrease is 70% = 0.7
30% increase is 130% = 1.3

Compound Units (rearrange as necessary)

Speed = $\dfrac{\text{Distance}}{\text{Time}}$

Area = $\dfrac{\text{Force}}{\text{Pressure}}$

Density = $\dfrac{\text{Mass}}{\text{Volume}}$

Ordering fractions

Calc: use division to write each fraction as a decimal. Non-calc: write fractions with common denominators

Index Laws

$$a^n \times a^m = a^{n+m}$$
$$a^n \div a^m = a^{n-m}$$
$$(a^n)^m = a^{nm}$$
$$a^0 = 1$$
$$a^{-n} = \frac{1}{a^n}$$
$$a^{\frac{n}{m}} = \sqrt[m]{a^n}$$

Dividing by decimals:

1. Write the calculation as a fraction 2. Form an equivalent fraction to makes integers (multiply by powers of 10) 3. Use short division (bus stop) to calculate

$$E.g \ \ 460 \div 0.4 = \frac{460}{0.4} = \frac{4600}{4} = 1150$$

Error Intervals

least possible value ≤ x < greatest possible value
E.g. A fence is 30 m long to the nearest 10 m.
   $25 \ m \le l < 35 \ m$
Truncation
Truncation is a method of approximating a decimal number by dropping all decimal places past a certain point without rounding.
E.g. Truncate 3.14159265 to 4 decimal places. = 3.1415

Order of operations

Bracket
Indices
Division and **M**ultiplication
Addition and **S**ubtraction

Conversions

10 millimetres = 1 centimetre 15 minutes = 0.25 hours
100 centimetres = 1 metre 30 minutes = 0.5 hours
1000 metres = 1 kilometre 45 minutes = 0.75 hours
1000cm³ = 1 litre 1000g = 1 kilogram
1000ml = 1 litre 1000kg = 1 tonne

Negative numbers

Adding and subtracting: (vertical number lines help)
-3 – 5 = - 8
-3 + 5 = 2
-3 - - 5 = -3 + 5 = 2
-3 - + 5 = -3 – 5 = -8
-3 + - 5 = -3 – 5 = -8
Multiplying and dividing:
Different signs – answer will be negative
+ x – = -, - x + = -
Same signs – answer will be positive
- x - = +

Rounding to significant figures

Start from the first **non-zero** number and round as normal, but ensure the place value is correct
E.g.　　*345,635 to 2SF = 350,000*
　　　　0.0060821 to 3SF = 0.0608

Prime Factorisation

HCF and LCM of 90 and 120 (Factor Tree & Venn Diagram). HCF is the product of common factors. LCM is the product of common factors and remaining factors.
HCF: 2 x 3 x 5
LCM: 2³ x 3² x 5

Estimate

Round each value to _____

Standard form

ax_____^{n}, where $1 \leq a < 10$

Reciprocal

Reciprocal of 7 is _____ reciprocal of $\frac{2}{3}$ is

etc _____ _____

Sequences

Fibonacci sequence: _____
Geometric Sequence: _____
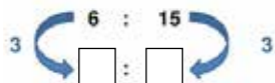*E.g. 3, 12, 48, 192, …. (x by 4 each time)*

Squares and Cubes

Square numbers: _____
_____
Cube numbers: _____
_____

Sharing in a given Ratio

A   Add the ratio parts
D   Divide the amount by the total parts
A   and
M   Multiply the ratio by the value of one part
E.g. share £420 in the ratio 2:5

Simplifying Ratio

Divide both sides by the highest common factor

Simplifying Ratio 1:n

Divide both sides by the highest factor of the left hand side

2m: 180cm

Fractions

Add and Subtract – ensure the fractions have the same _____ before adding the _____

$$\frac{4}{5} - \frac{1}{3} =$$

Multiply – multiply _____ and _____

$$\frac{4}{5} \times \frac{1}{3} =$$

Divide – take _____ of the second fraction and then _____ the new _____ and _____

$$\frac{4}{5} \div \frac{1}{3} =$$

Percentages

Finding percentages of an amount
1% ÷ _____
5% ÷ _____
20% ÷ _____
25% ÷ _____
50% ÷ _____

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Increasing and decreasing a given amount

Calculator:
_____= New amount

Non-calculator: find the increase or decrease and add to the original amount
Finding percentage increase or decrease (profit/loss)

$$\frac{\text{_____}}{\text{Original}} \times 100$$

Writing an amount as a percentage of the original

$$\frac{\text{Amount}}{\text{\_\_\_\_\_}} \times \text{\_\_\_\_\_}$$

Reverse Percentage – finding the original amount
Original Amount = _____

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_____ x _____
Where the multiplier is the percentage,
increase or decrease from 100%, converted to a decimal.
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30% increase is 130% = _____

Compound Units (rearrange as necessary)

Speed =   —————

Area =   —————

Density =   —————

Ordering fractions

Calc: use division to write each fraction as a decimal. Non-calc: write fractions with common denominators

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$$a^n \times a^m =$$
$$a^n \div a^m =$$
$$(a^n)^m =$$
$$a^0 =$$
$$a^{-n} =$$
$$a^{\frac{n}{m}} =$$

Dividing by decimals:

1.
2.
3.

E.g.   460 ÷ 0.4 =

Error Intervals

least possible value ≤ x < greatest possible value
E.g. A fence is 30 m long to the nearest 10 m.
_____ ≤ l < _____
Truncation
Truncation is_____
_____
E.g. Truncate 3.14159265 to 4 decimal places.
= _____

Order of operations

B_____
I_____
D_____ and **M**_____
A_____ and **S**_____

Prime Factorisation

HCF and LCM of 90 and 120
(Factor Tree & Venn Diagram).
HCF is the _____
LCM is the _____

HCF: _____
LCM: _____

_____   _____

Conversions

10 millimetres = __ centimetre
100 centimetres = __ metre
1000 metres = __ kilometre
1000cm^3 = __ litre
1000ml = __ litre

15 minutes = ___ hours
30 minutes = ___ hours
45 minutes = ___ hours
1000g = ___ kilogram
1000kg = ___ tonne

Negative numbers

Adding and subtracting: (vertical number lines help)
-3 – 5 =
-3 + 5 =
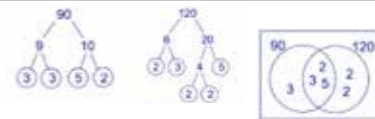-3 - - 5 =
-3 - + 5 =
-3 + - 5 =
Multiplying and dividing:
Different signs – answer will be _____
+ x - = _____ - x + = _____
Same signs – answer will be _____
- x - = _____

Rounding to significant figures

Start from the first **non-zero** number and round as normal, but ensure the place value is correct
E.g.   345,635 to 2SF = 350,000
0.0060821 to 3SF = 0.0608

Notation

$ab = a \times b$
$a^2 = a \times a$
$(2a)^3 = 2a \times 2a \times 2a$
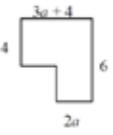$(a+b)^2 = (a+b)(a+b)$

Definitions

Expression – no equal signs e.g. 2x + 3, 2y, (3x -2)2
Equations – equal signs, can be solved, e.g. y + 4 = 10
Identities – identical/equivalent to e.g. 2(y + 4) = 2y + 8
Formulae – equal signs, more than one unknown e.g.
A= ½bh

Simplifying expressions by collecting like terms

Always circle the sign IN FRONT of the term to avoid errors.

$3x - 7b - x + 9b = 2x + 2b$

Typical Exam Q: Create an expression for the perimeter of the shape by adding and collecting like terms. If the perimeter is given as 20cm, for example, you can create an equation:
4 + 3a + 4 + 6 + 2a = 20
5a + 14 = 20
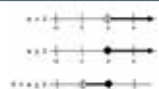
Simplifying expressions multiplication and division

$2ma^2 \times 7ma = 14m^2a^3 \qquad \dfrac{18b^6}{3ab^2} = \dfrac{6b^4}{a}$

Inequalities

Open circle: </ >
Closed circle: ≤/ ≥

Factorising and expanding

Expand
$2(y+3) \qquad 2y+6$
Factor

Expand
$(x+4)(x-1) \qquad x^2 + 3x - 4$
Factor

Distance / Time Graphs

Graphs that need to be recognised

Straight line graphs

$y = mx + c$
$m = gradient$
$c = y\ intercept$

Positive Gradient \quad *Negative Gradient*

$m = \dfrac{Y_2 - Y15}{X_2 - X_1} = \dfrac{Change\ in\ y}{Change\ in\ x}$

Parallel lines – have equal gradients

Inequalities

Turning point and roots of a quadratic equation
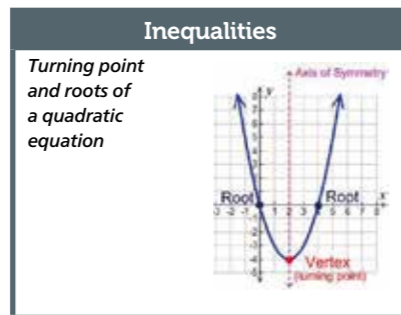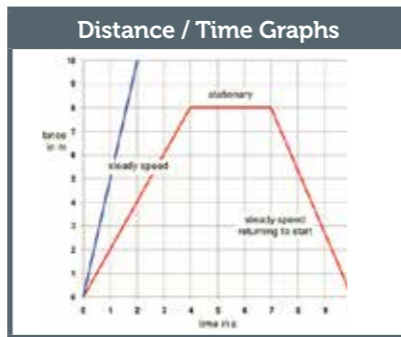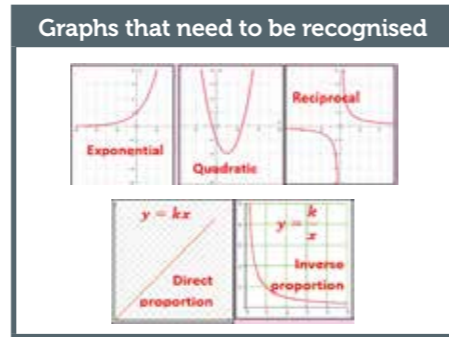
Finding the nth term of a linear sequence

5, 7, 9, 11, 13, ….

1. Find the common difference: 2
2. This is the coefficient of n: 2n
3. Find the difference between the coefficient of n and the first term 5 – 2 = 3
4. Add this to the amount of n   2n + 3

Notation

$ab =$
$a^2 =$
$(2a)^3 =$
$(a+b)^2 =$
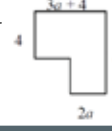
Definitions

Expression –
Equations –
Identities –
Formulae –

Simplifying expressions by collecting like terms

Always circle the sign IN FRONT of the term to avoid errors.

$3x - 7b - x + 9b = 2x + 2b$

Typical Exam Q: Create an expression for the perimeter of the shape by adding and collecting like terms. If the perimeter is given as 20cm, for example, you can create an equation:
Answer =

Simplifying expressions multiplication and division
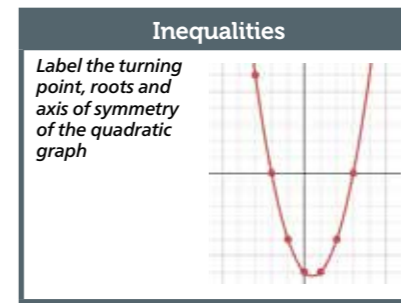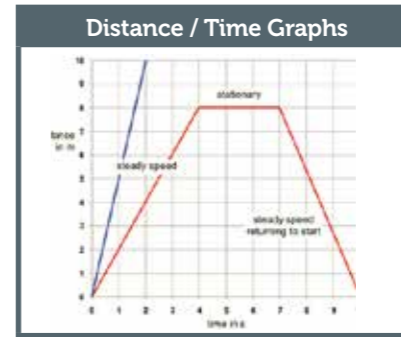
$2ma^2 \times 7ma = \qquad \dfrac{18b^6}{3ab^2} =$

Inequalities

Open circle: _____
Closed circle: _____

Factorising and expanding

Expand
$2(y+3)$
Factor

Expand
$x^2 + 3x - 4$
Factor

Distance / Time Graphs

Inequalities

Label the turning point, roots and axis of symmetry of the quadratic graph

Straight line graphs

$y = mx + c$
$m =$ _____
$c =$ _____

_____ *Gradient* \qquad _____ *Gradient*

$m =$ _____ = _____
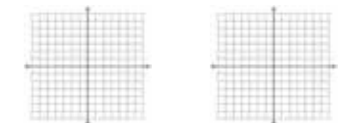
Parallel lines – _____

Graphs that need to be recognised

Graphs that need to be recognised: sketch

Exponential \quad **Quadratic R** \quad **eciprocal**

Direct Proportion \qquad **Inverse Proportion**

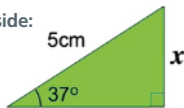## Finding the nth term of a linear sequence

5, 7, 9, 11, 13, ….

Trigonometry

$$S \frac{O}{H} \quad C \frac{A}{H} \quad T \frac{O}{H}$$

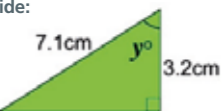**Example – finding a side:**

$sin\ 37 = \frac{x}{5}$
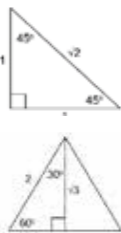
$x = 5 \times sin\ 37^\circ$

Example - finding a side:

$tan\ Y = \frac{3.2}{7.1}$

$y = tan^{-1}\left(\frac{3.2}{7.1}\right)$

Exact Trig values

Angle (θ)	sin(θ)	cos(θ)	tan(θ)
0°	0	1	0
30°	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{3}}$
45°	$\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{2}}$	1
60°	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	$\sqrt{3}$
90°	1	0	undefined

Types of triangles	Types of quadrilaterals
Right angled	Square
Isosceles	Rectangle
Equilateral	Parallelogram
Scalene	Rhombus
	Trapezium
	Kite

Angle Facts
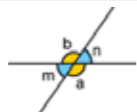
Vertically opposite angles are equal: a=b and m=n

Angles in a triangle sum to 180˚.
Angles on a straight line sum to 180˚.
E.g: b=60˚ so a = 50˚

Simple vector notation

a: movement along the x-axis (left or right)
b: movement along the y-axis (up or down) $\begin{pmatrix} a \\ b \end{pmatrix}$

-a: movement left   -b: movement down

Operations with vectors

$\begin{pmatrix} 2 \\ 6 \end{pmatrix} + \begin{pmatrix} 7 \\ -3 \end{pmatrix} = \begin{pmatrix} 9 \\ 3 \end{pmatrix}$

$If\ b = \begin{pmatrix} 4 \\ -2 \end{pmatrix},\ then\ 3b = \begin{pmatrix} 12 \\ -6 \end{pmatrix}$
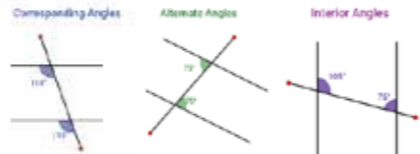
Area of key shapes

Triangle : $A = \frac{b \times h}{2}$ **(h = perpendicular height)**

Parallelogram: $A = b \times h$ **(h = perpendicular height)**

Trapezium: $A = \left(\frac{a \times b}{2}\right) \times h$ **(add together the parallel sides, divide the total by 2, and then multiply by the perpendicular height between the parallel sides)**

Angles in parallel lines

Corresponding angles are equal

Alternate angles are equal

Co-interior angles are equal

Volume & surface area

Volume = area of cross section x length Surface area = area of all the faces of a 3D shape

Learn the cylinder
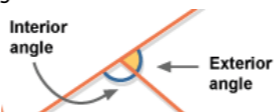
$$V = \pi r^2 h$$
$$SA = 2\pi r^2 + \pi dl$$

Angles in regular polygons

$n = number\ of\ sides$

$Interior\ angle + exterior\ angle = 180\degree$
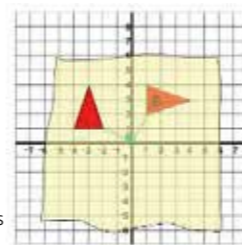
$Exterior\ angle = \frac{360}{n}$
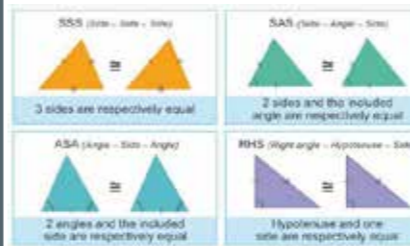
$n = \frac{360}{Exterior\ angle}$

Transformations – rotation

Always use tracing paper. **Describe:**
1. It's a rotation
2. Size of rotation in degrees
3. Orientations: clockwise or anticlockwise
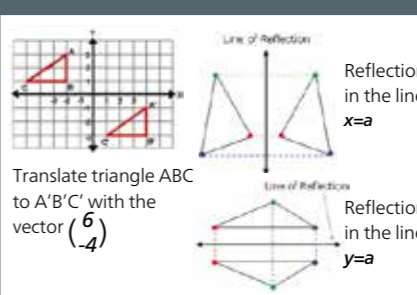4. Centre of rotation given as coordinate (x,y)

Congruent triangles

Similar shapes

Same shape, different sides. The ratio of the lengths of corresponding sides are equal
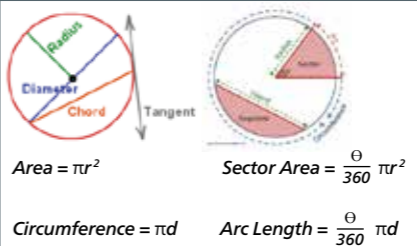
Length scale factor = 15 ÷ 5 = 3 x = 3cm x 3

Transformations – translations and reflections

Translate triangle ABC to A'B'C' with the vector $\begin{pmatrix} 6 \\ -4 \end{pmatrix}$

Reflection in the line x=a

Reflection in the line y=a

Circles

$Area = \pi r^2$ $Sector\ Area = \frac{\Theta}{360}\ \pi r^2$

$Circumference = \pi d$ $Arc\ Length = \frac{\Theta}{360}\ \pi d$

3D notation

Cube:
Faces: 6   **Edges: 12**   **Vertices: 8**

Square based pyramid:
F = 5, E = 8, V = 5
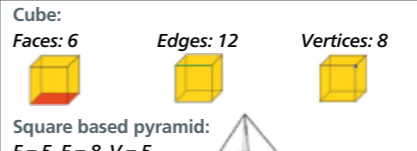
Transformations - enlargement

Describe:
1. It's an enlargement
2. The scale factor (if the image is smaller than the object the scale factor is fractional e.g. ½)
3. The centre of enlargement

Pythagoras' Theorem

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

Only applies to right angled triangles

Can be used to find the height of an isosceles triangle

Can be used to find the length distance between two coordinates

Bearings

Measure from the North
Measured in a clockwise direction
Written using 3 digits

Bearing of B from A (start at A)

Bearing of A from B (start at B)

Year 11 | Knowledge Organiser

Trigonometry

Fill the blanks:

S ____   C ____   T ____

Show how to find x:

Show how to find y:
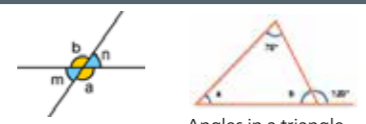
Exact Trig values

	0°	30°	45°	60°	90°
sinΘ					
cosΘ					
tanΘ					

Types of triangles	Types of quadrilaterals
_____	_____
_____	_____
_____	_____
	_____
	_____

Angle Facts

Vertically opposite angles are _____ _____

Angles in a triangle sum to _____.
Angles on a straight line sum to _____.
E.g: b=____ so a = ____

Simple vector notation

a: movement along the _____
b: movement along the_____ $\binom{a}{b}$

-a: movement _____   -b: movement _____

Operations with vectors

$\binom{2}{6} + \binom{7}{-3} = (\quad)$

If b = $\binom{4}{-2}$, then 3b = $(\quad)$
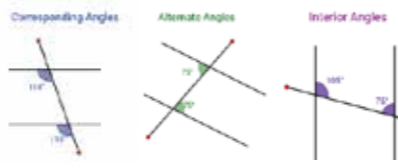
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Parallelogram: A = _____
(h = _____height)

Trapezium: A = _____

Angles in parallel lines

Corresponding angles are _____

Alternate angles are _____

Co-interior angles are _____

Volume & surface area

Volume = _____ x _____
Surface area = area of _____

Learn the cylinder
V = _____
SA = _____

Angles in regular polygons

n = number of sides

Interior angle + exterior angle = 180˚

Exterior angle = _____

n = _____

Transformations – rotation

Always use tracing paper. **Describe:**
1. _____
2. _____
_____
3. _____
_____
_____
4. _____
_____

Transformations – translations and reflections

Translate triangle ABC to A'B'C' with the vector $\binom{6}{-4}$

Reflection in the line _____

Reflection in the line _____

Transformations - enlargement

Describe:
1. _____
2. _____
3. _____
_____
_____

Congruent triangles

Circles

Area =   Sector Area =
Circumference =   Arc Length =

Pythagoras' Theorem

_____

Only applies _____

Can be used to find the height of an _____ triangle

Can be used to find the length distance between two _____

Similar shapes

Same shape, different sides. The ratio of the lengths of corresponding sides are equal
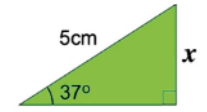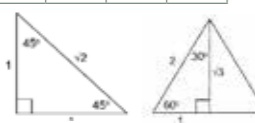
Length scale factor = _____
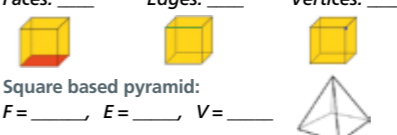
3D notation
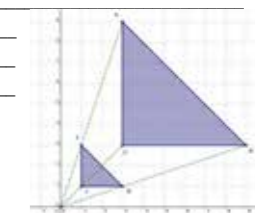
Cube:
Faces: ____   Edges: ____   Vertices: ____

Square based pyramid:
F = _____,   E = _____,   V = _____

Bearings

Measure from _____
Measured in a _____ direction
Written using _____digits

Bearing of B from A (start at _____)

Bearing of A from B (start at_____)

Averages

Mode: most common piece of data

Mean: Sum of the data ÷ total frequency

Median: order the data and find the middle value

Range: Highest value – lowest value

Frequency Polygons

1. Plot frequency at the mid-point

2. Join with straight lines

Weight w (kg)	Frequency
30 ≤ w < 50	3
50 ≤ w < 55	7
55 ≤ w < 75	10
75 ≤ w < 80	8
80 ≤ w < 100	4

Reading and Drawing Pie Charts

Find the fraction of the total

1000 people were surveyed

Beef: $\frac{150}{360} \times 1000$

Vegetarian: $\frac{90}{360} \times 1000$

Find the fraction of the full circle.
Size of Blonde sector:

$\frac{8}{31} \times 360$

Hair colour	People
Blonde	8
Brown	12
Red	3
Grey	2
Black	6

Averages from a frequency table

Mean: $\frac{\sum fw}{\sum f}$; where, w is the midpoint of the group.

Median group: find which group the $\frac{n+1}{2}$ th, value lies. Where, n is the total frequency.

E.g. in this table 51.5th value which lies in group 8< w ≤12 (using the cumulative frequency)

Weight of box (w kg)	Frequency
0 < w ≤ 4	11
4 < w ≤ 8	16
8 < w ≤ 12	29
12 < w ≤ 16	26
16 < w ≤ 20	20
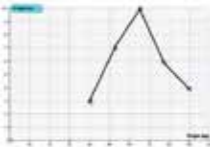
Venn Diagrams

Information given:
90 pupils were surveyed
52 said they owned a laptop.
45 said they owned a tablet.
23 said they owned both.
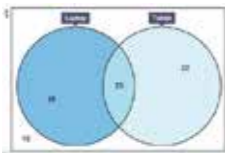
Probability Definitions

Total probability: adds to 1

Relative frequency: Frequency ÷ Total Trials

Independent events: one event doesn't impact the other

Expected outcomes

Expected outcome = probability x number of trials

E.g. A biased spinner is spun 800 times. The probabilities it lands on each colour is below. The probability of it landing on red is the same as the probability of it landing on yellow. How many times would you expect yellow to come up?

Result	Red	Green	Brown	Yellow
Probability		0.48	0.2	

P(Y) = (1 – 0.48 – 0.2) ÷ 2 = 0.32 ÷ 2 = 0.16

Expected yellow = 0.16 x 800 = 128

Tree diagrams

red $\frac{2}{5} \times \frac{2}{5} = \frac{4}{25}$

red
blue
red
blue
blue

Multiply along the branches to find each probability

1. Probability that a red counter is picked both times P(RR) = $\frac{2}{5} \times \frac{2}{5} = \frac{4}{25}$

2. Probability that the counters are different colours = P(RB) + P(BR) = $\frac{2}{5} \times \frac{3}{5} + \frac{3}{5} \times \frac{2}{5} = \frac{12}{25}$

Averages

Mode: _____

Mean: _____

Median: _____

Range: _____

Frequency Polygons

1. _____

2. _____

Weight w (kg)	Frequency
30 ≤ w < 50	3
50 ≤ w < 55	7
55 ≤ w < 75	10
75 ≤ w < 80	6
80 ≤ w < 100	4

Reading and Drawing Pie Charts

Find the fraction of the total

1000 people were surveyed

Beef: —— × _____

Vegetarian: —— × _____

Find the fraction of the full circle.
Size of Blonde sector:

_____

Hair colour	People
Blonde	8
Brown	12
Red	3
Grey	2
Black	6

Averages from a frequency table

Mean: $\frac{\sum fw}{\sum f}$; where, w is the _____ of the group.

Median group: find which group the $\frac{n+1}{2}$ th, value lies. Where, n is the total frequency.

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16 < w ≤ 20	20

Venn Diagrams

Information given:
____ pupils were surveyed
____ said they owned a laptop.
____ said they owned a tablet.
____ said they owned both.
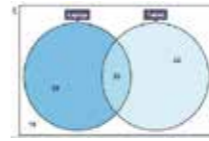
Probability Definitions

Total probability: adds to _____

Relative frequency: _____ ÷ _____

Independent events: one event _____ impact the other

Expected outcomes

Expected outcome = _____ x number of _____

E.g. A biased spinner is spun 800 times. The probabilities it lands on each colour is below. The probability of it landing on red is the same as the probability of it landing on yellow. How many times would you expect yellow to come up?

Result	Red	Green	Brown	Yellow
Probability		0.48	0.2	

P(Y) =

Expected yellow =

Tree diagrams

red
red
blue
red
blue
blue

_____ along the branches to find each probability

1. Probability that a red counter is picked both times P(RR) =

2. Probability that the counters are different colours = P(RB) + P(BR) =

Estimate

Round each value to one significant figure

Standard form

$a \times 10^n$, where $1 \le a < 10$

Reciprocal

Reciprocal of 7 is $\frac{1}{7}$, reciprocal of $\frac{2}{3}$ is $\frac{3}{2}$ etc

Sequences

Fibonacci sequence: 1, 1, 2, 3, 5, 8, 13, 21
Geometric Sequence: each term is multiplied by the same constant to get the next number.
E.g. 3, 12, 48, 192, …. (x by 4 each time)

Simplifying Surds

Find a factor that is a square number
$\sqrt{96} = \sqrt{16 \times 6} = 4\sqrt{6}$
Manipulating surds
$\sqrt{ab} = \sqrt{a} \times \sqrt{b} \qquad \sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}$
Rationalising Surds
Rationalise by removing any surds from the denominator e.g. with surd.
$\frac{2\sqrt{3}}{\sqrt{3}} = \frac{2\sqrt{3} \times \sqrt{5}}{\sqrt{3} \times \sqrt{3}} = \frac{2\sqrt{3 \times 5}}{\sqrt{5 \times 5}} = \frac{2\sqrt{15}}{\sqrt{25}} = \frac{2\sqrt{15}}{5}$
E.G with surd expressions multiply by top and bottom by the denominator with the opposite sign.
$\frac{5}{3 + \sqrt{2}} = \frac{5 \times (3 - \sqrt{2})}{(3 + \sqrt{2}) \times (3 - \sqrt{2})} = \frac{5(3 - \sqrt{2})}{9 - \sqrt{4}}$
$= \frac{5(3 - \sqrt{2})}{7}$

Recurring Decimals

Form two equations where the digits following the decimal point are the same, and therefore can be cancelled

Upper and lower bounds

Look at the value above and below for the same place value. LB and UB will be half way between these points
E.g. 17 rounded to the nearest integer
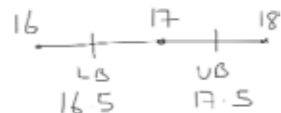
E.g. 24.6 rounded to one decimal place. LB = 24.55, UB = 24.65

Fractions

Add and Subtract – ensure the fractions have the same denominator before adding numerators
$\frac{4}{5} - \frac{1}{3} = \frac{12}{15} - \frac{5}{15} = \frac{7}{15}$
Multiply – multiply numerators and denominators
$\frac{4}{5} \times \frac{1}{3} = \frac{4}{15}$
Divide – take reciprocal of the second fraction and then multiply the new numerators and denominators
$\frac{4}{5} \div \frac{1}{3} = \frac{4}{5} \times \frac{3}{1} = \frac{12}{5} = 2\frac{2}{5}$

Percentages

Finding percentages of an amount
1% ÷100
5% ÷20
20% ÷5
25% ÷4
50% ÷2

Multipliers

To find the multiplier for a percentage, divide by 100
Use multipliers on a calculator paper
E.g. 35% of 370 = 0.35 x 370

Increasing and decreasing a given amount

Calculator:
Original Amount x multiplier = New amount
Non-calculator: find the increase or decrease and add to the original amount
Finding percentage increase or decrease (profit/loss)
$\frac{\text{Value of increase/decrease}}{\text{Original}} \times 100$
Writing an amount as a percentage of the original
$\frac{\text{Amount}}{\text{Original}} \times 100$
Reverse Percentage – finding the original amount
Original amount = $\frac{\text{New Amount}}{\text{Multiplier}}$

Growth & Decay / Compound interest

Original amount x multiplier time
Where the multiplier is the percentage, increase or decrease from 100%, converted to a decimal.
E.g.
30% decrease is 70% = 0.7
30% increase is 130% = 1.3

Compound Units (rearrange as necessary)

Speed = _____
Area = _____
Density = _____

Product rule

If there are m ways to do one thing and n ways to do another, then there are m x n ways to do both

Index Laws

If there are m ways to do one thing and n ways to do another, then there are m x n ways to do both

Index Laws

$$a^n \times a^m = a^{n+m}$$
$$a^n \div a^m = a^{n-m}$$
$$(a^n)^m = a^{nm}$$
$$a^0 = 1$$
$$a^{-n} = \frac{1}{a^n}$$
$$a^{\frac{n}{m}} = \sqrt[m]{a^n}$$

Dividing by decimals:

1. Write the calculation as a fraction **2.** Form an equivalent fraction to makes integers (multiply by powers of 10) 3. Use short division (bus stop) to calculate
E.g. $460 \div 0.4 = \frac{460}{0.4} = \frac{4600}{4} = 1150$

Error Intervals

least possible value ≤ x < greatest possible value
E.g. A fence is 30 m long to the nearest 10 m.
$25 \text{ m} \le l < 35 \text{ m}$
Truncation
Truncation is a method of approximating a decimal number by dropping all decimal places past a certain point without rounding.
E.g. Truncate 3.14159265 to 4 decimal places. = 3.1415

Order of operations

Bracket
Indices
Division and **M**ultiplication
Addition and **S**ubtraction

Conversions

10 millimetres = __ centimetre	15 minutes = ___ hours
100 centimetres = __ metre	30 minutes = ___ hours
1000 metres = __ kilometre	45 minutes = ___ hours
1000cm³ = __ litre	1000g = ___ kilogram
1000ml = __ litre	1000kg = ___ tonne

Negative numbers

Adding and subtracting: (vertical number lines help)
-3 – 5 = - 8
-3 + 5 = 2
-3 - - 5 = -3 + 5 = 2
-3 - + 5 = -3 – 5 = -8
-3 + - 5 = -3 – 5 = -8
Multiplying and dividing:
Different signs – answer will be negative
+ x - = -, - x + = -
Same signs – answer will be positive
- x - = +

Rounding to significant figures

Start from the first **non-zero** number and round as normal, but ensure the place value is correct
E.g. 345,635 to 2SF = 350,000
0.0060821 to 3SF = 0.0608

Prime Factorisation

HCF and LCM of 90 and 120 (Factor Tree & Venn Diagram). HCF is the product of common factors. LCM is the product of common factors and remaining factors.
HCF: 2 x 3 x 5
LCM: 2³ x 3² x 5

01228554119 asda pharmacy

Estimate

Round each value to _____

Standard form

a^x_____n, where 1≤ a <10

Reciprocal

Reciprocal of 7 is _____, reciprocal of $\frac{2}{3}$ is _____ etc
_____ ____

Sequences

Fibonacci sequence: _____
Geometric Sequence: _____
E.g. 3, 12, 48, 192, …. (x by 4 each time)

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Find a factor that is a _____number
$$\sqrt{96} =$$
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Rationalise by removing any
surds from the denominator
e.g. with surd.
$$\frac{2\sqrt{3}}{\sqrt{5}} =$$

E.g with surd expressions
multiply by top and bottom
by the denominator with
the opposite sign.
$$\frac{5}{3 + \sqrt{2}} =$$

Recurring Decimals

To change a recurring decimal into a fraction you
_____
_____

Upper and lower bounds

Look at the value above and below for the same
place value. LB and UB will be half way between
these points
E.g. 17 rounded to the nearest integer

E.g. 24.6 rounded to one decimal place.

LB = _____, UB = _____,

Fractions

Add and Subtract – ensure the fractions have
the same _____ before adding the
_____
$$\frac{4}{5} - \frac{1}{3} =$$

Multiply – multiply numerators and
denominators $\frac{4}{5} \times \frac{1}{3} =$

Divide – take _____of the second fraction
and then _____ the new _____ and
_____
$$\frac{4}{5} \div \frac{1}{3} =$$

Percentages

Finding percentages of an amount
1% ÷_____
5% ÷_____
20% ÷_____
25% ÷_____
50% ÷_____

Multipliers

To find the multiplier for a percentage, divide by
100
Use multipliers on a calculator paper
E.g. 35% of 370 = 0.35 x 370

Increasing and decreasing a given amount

Calculator:
_____ = New amount

Non-calculator: find the increase or decrease and
add to the original amount
**Finding percentage increase or decrease (profit/
loss)**
$$\frac{\underline{\hspace{3cm}}}{Original} \times 100$$

**Writing an amount as a percentage of the
original**
$$\frac{Amount}{\underline{\hspace{2cm}}} \times$$

Reverse Percentage – finding the original
amount

Original amount = _____

Growth & Decay / Compound interest

_____ x _____
Where the multiplier is the percentage, increase
or decrease from 100%, converted to a decimal.
E.g.
30% decrease is 70% = _____
30% increase is 130% = _____

Compound Units (rearrange as necessary)

$$Speed = \frac{Distance}{Time}$$
$$Area = \frac{Force}{Pressure}$$
$$Density = \frac{Mass}{Volume}$$

Ordering fractions

Calc: use division to write each fraction as a
decimal. Non-calc: write fractions with common
denominators

Index Laws

$$a^n \times a^m =$$
$$a^n \div a^m =$$
$$(a^n)^m =$$
$$a^0 =$$
$$a^{-n} =$$
$$a^{\frac{n}{m}} =$$

Dividing by decimals:

1.
2.
3.

eg. 460 ÷ 0.4 =

Error Intervals

least possible value ≤ x < greatest possible
value
E.g. A fence is 30 m long to the nearest 10 m.
_____ ≤ l < _____
Truncation
Truncation is_____
_____
E.g. Truncate 3.14159265 to 4 decimal places.
= _____

Order of operations

B_____
I_____
D_____ and **M**_____
A_____ and **S**_____

Prime Factorisation

HCF and LCM of 90 and 120
(Factor Tree & Venn Diagram).
HCF is the _____
LCM is the _____

HCF: _____
LCM: _____
_____ _____

Conversions

10 millimetres = _____
100 centimetres = _____
30 minutes = _____ hours
1000 metres = _____
45 minutes = _____ hours
1000cm3 = _____ 1000g = _____
1000ml = _____ 1000kg = _____

Negative numbers

Adding and subtracting: (vertical number lines help)
-3 – 5 =
-3 + 5 =
-3 - - 5 =
-3 - + 5 =
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Multiplying and dividing:
Different signs – answer will be _____
+ x - = _____ - x + = _____
Same signs – answer will be _____
- x - = _____

Rounding to significant figures

Start from the first _____ number and round
as normal, but ensure the place value is correct e.g.
345,635 to 2SF = _____
0.0060821 to 3SF = _____
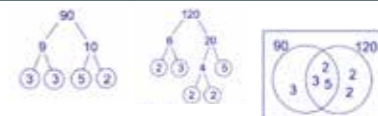
Quadratic Formula

$$x = \frac{-b + \sqrt{b^2 - 4ac}}{2a}$$

Inequalities

Open circle: </ >

Closed circle: ≤/ ≥

Velocity / Time Graphs

Gradient = acceleration

Area = distance travelled
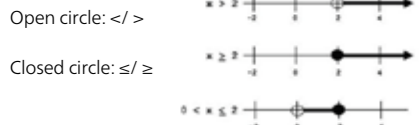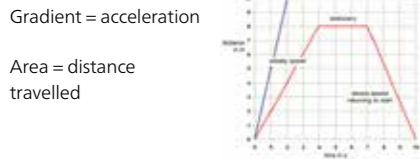
Iteration

Showing a root lies between 2 points: If there is a change in sign for y for two particular values of x then we can say there is a root between these values of x and we can say that the equation f(x) = 0 will have a solution between these two values of x.

Gradients of curves

Gradient of a curve at a point = gradient of the tangent at the point

Algebriac proof

Even numbers: 2n, 2n+2, 2n+4,…
Odd numbers: 2n+1, 2n+3, 2n+5,…
Sum: add
Product: multiply
Difference: subtract
Show it's a multiple: factorise
Show it's even: show it's a multiple of 2
Show it's odd: show it's a multiple of 2, plus 1

Completing the square
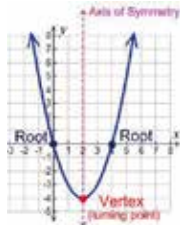
Quadratic expression factorised by completing the square: $(x + a)^2 + b$
Turning point of graph occurs at $(-a, b)$

Solve quadratic inequalities

e.g solve x2 + 5x – 24 ≥ 0
1. Factorise: (x + 8)(x – 3) ≥ 0
2. Solve: x = -8, x = 3
3. Sketch the graph
4. Values that satisfy the inequality x ≤ -8, x ≥ 3

Inequalities

Turning point and roots of a quadratic equation

Straight line graphs

$y = mx + c$
m = gradient
c = y intercept

Positive Gradient   *Negative Gradient*

$$m = \frac{Y_2 - Y15}{X_2 - X_1} = \frac{\text{Change in y}}{\text{Change in x}}$$

Parallel lines – have equal gradients
Perpendicular lines – If L_1 and L_2 are perpendicular then $m_2 = \dfrac{1}{m_1}$

Graphs that need to be recognised
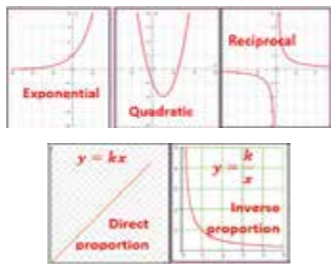
Equation of a circle centre (0, 0)
$$x^2 + y^2 = r^2$$

Functions

f(4): Substitute 4 into the function

F (g (x): Substitute g(x)into f(x) i.e. replace all values of x in f(x) with the entire function g(x)

E.g. f (x) = 2x + 3, g(x) = x – 3, fg(x) = 2(x-3) + 3

Quadratic Formula

$$x = $$

Inequalities

Open circle:
_____or_____

Closed circle:
_____or_____

Velocity / Time Graphs

Gradient = _____

Area = _____
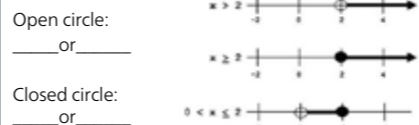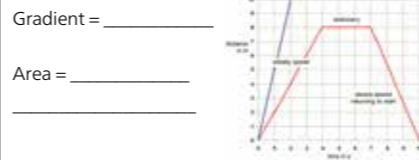
Iteration

Showing a root lies between 2 points: If there is _____ for y for two particular values of x then we can say there is a _____ between these values of x and we can say that the equation f(x) = 0 will have a solution between these two values of x.

Gradients of curves

Gradient of a curve at a point = _____
_____
_____
_____
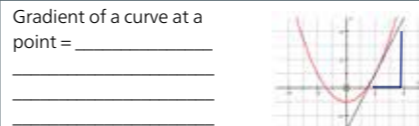
Algebraic proof

Even numbers: _____
Odd numbers: _____
Sum: _____
Product: _____
Difference: _____
Show it's a multiple:_____
Show it's even: show it's _____
Show it's odd: show it's _____

Completing the square

Quadratic expression factorised by completing the square: $(x + a)^2 + b$
Turning point of graph occurs at $(\_\_\_\_, \_\_\_\_)$

Solve quadratic inequalities

e.g solve $x^2 + 5x – 24 ≥ 0$
1.
2.
3.
4.

Inequalities

Label the turning point, roots and axis of symmetry of the quadratic graph
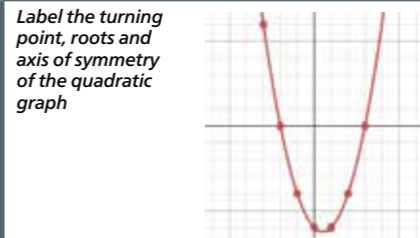
Straight line graphs

$y = mx + c$
m = _____
c = _____

_____ *Gradient*   _____ *Gradient*

$m = _____ = _____$

Parallel lines – have equal gradients
Perpendicular lines – If L_1 and L_2 are perpendicular then $m_2 = $

Graphs that need to be recognised

Graphs that need to be recognised: sketch

Exponential   **Quadratic R**   **eciprocal**

Direct Proportion   **Inverse Proportion**

Equation of a circle centre (0, 0) is _____
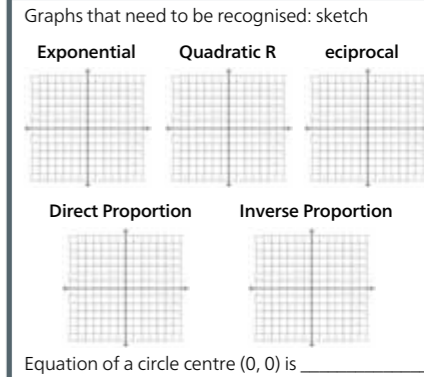
Functions

f(4): _____
F (g (x): _____ i.e. replace all values of _____ in _____ with the entire function _____

*E.g. f (x) = 2x + 3, g(x) = x – 3, fg(x) = *

Trigonometry

$$S \frac{O}{H} \quad C \frac{A}{H} \quad T \frac{O}{H}$$

Example – finding a side:

$$\sin 37 = \frac{X}{5}$$

5cm

$x = 5 \times \sin 37°$

37° x

Example - finding a side:

$$\tan Y = \frac{3.2}{7.1}$$

7.1cm

$$y = \tan^{-1} \left(\frac{3.2}{7.1} \right)$$

y° 3.2cm

Exact Trig values

Angle (θ)	sin(θ)	cos(θ)	tan(θ)
0°	0	1	0
30°	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{3}}$
45°	$\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{2}}$	1
60°	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	$\sqrt{3}$
90°	1	0	undefined

Transformation Of A Graph

Trigonometric Graphs

Sine Curve

Tangent Curve

Cosine Curve

Simple vector notation

a: movement along the x-axis (left or right)
b: movement along the y-axis (up or down) $\begin{pmatrix} a \\ b \end{pmatrix}$

-a: movement left   -b: movement down

Operations with vectors

$$\begin{pmatrix} 2 \\ 6 \end{pmatrix} + \begin{pmatrix} 7 \\ -3 \end{pmatrix} = \begin{pmatrix} 9 \\ 3 \end{pmatrix}$$

If $b = \begin{pmatrix} 4 \\ -2 \end{pmatrix}$, then $3b = \begin{pmatrix} 12 \\ -6 \end{pmatrix}$

Sine rule

Angles: $\dfrac{Sin A}{a} = \dfrac{Sin B}{b} = \dfrac{Sin C}{c}$

Sides: $\dfrac{a}{Sin A} = \dfrac{b}{Sin B} = \dfrac{c}{Sin C}$

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

Area of a triangle $\dfrac{1}{2}$ ab sin C

Angles in parallel lines

Corresponding angles are equal

Alternate angles are equal

Co-interior angles are equal

Volume & surface area

Volume = area of cross section x length Surface area = area of all the faces of a 3D shape

Learn the cylinder

$$V = \pi r^2 h$$
$$SA = 2\pi r^2 + \pi dl$$

Angles in regular polygons

n = number of sides

Interior angle + exterior angle = 180°

Exterior angle = $\dfrac{360}{n}$

$n = \dfrac{360}{Exterior\ angle}$

Interior angle

Exterior angle

Transformations – rotation

Always use tracing paper. **Describe:**

1. It's a rotation

2. Size of rotation in degrees

3. Orientations: clockwise or anticlockwise

4. Centre of rotation given as coordinate (x,y)
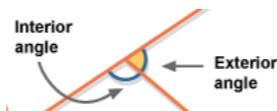
Congruent triangles

Similar Shapes

Same shape, different sides. The ratio of the lengths of corresponding sides are equal

Length scale factor = x

Area scale factor = x^2

Volume scale factor = x^3

Transformations - enlargement

Describe:

1. It's an enlargement

2. The scale factor (if the image is smaller than the object the scale factor is fractional e.g. ½)

3. The centre of enlargement

Circles
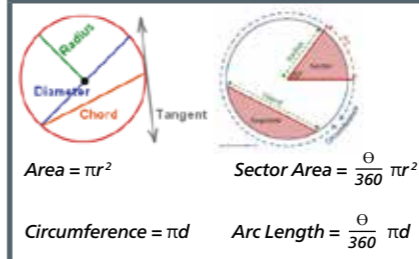
$Area = \pi r^2$ $Sector\ Area = \dfrac{\Theta}{360} \pi r^2$

$Circumference = \pi d$ $Arc\ Length = \dfrac{\Theta}{360} \pi d$

Pythagoras' Theorem

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

Only applies to right angled triangles

Can be used to find the height of an isosceles triangle

Can be used to find the length distance between two coordinates

13 m   13 m
h
5 m   5 m

Circle Theorems

Angle at the centre is twice the angle at the circumference.

Angles in a semicircle are 90°.

Angles in the same segment are equal.

Opposite angles of a cyclic quadrilateral add up to 180).

Alternate segment theorem.

Tangents from an external point are equal in length.

The tangent to a circle is perpendicular (90°) to the radius.

Trigonometry

Fill the blanks:

S —— C —— T ——

Show how to find x:

5cm

x

37°

Show how to find y:

7.1cm   y°   3.2cm

Exact Trig values

	0°	30°	45°	60°	90°
$\sin\Theta$					
$\cos\Theta$					
$\tan\Theta$					

Transformation of a graph: sketch

$y=fx+a$ $y=f(-x)$ $y=f(x-a)$ $y=-fx$

Trigonometric Graphs

Sine Curve   **Tangent Curve**

Cosine Curve

Simple vector notation

a: movement along the _____ $\binom{a}{b}$
b: movement along the_____

-a: movement _____   -b: movement _____

Operations with vectors

$\binom{2}{6} + \binom{7}{-3} = \binom{}{}$

If b = $\binom{4}{-2}$ *, then 3b =*$\binom{}{}$

Sine rule

Write down:
Sine rule
angles:
sides:
Cosine rule
Area of a triangle

Angles in parallel lines

Corresponding angles are _____

Alternate angles are _____

Co-interior angles are _____

Volume & surface area

Learn the cylinder
$V =$ _____
$SA =$ _____

Area Of A Trapezium

$A =$

Angles in regular polygons

n = number of sides
Interior angle + exterior angle = 180°

Exterior angle = _____

n = _____

Transformations – rotation

Always use tracing
paper. **Describe:**
1. _____
2. _____
_____
3. _____
_____
_____
4. _____
_____
**Transformation –
translation**
Vector 6 _____, 4 _____

Congruent triangles

Similar Shapes

Same shape, different sides. The ratio of the lengths of corresponding sides are equal

Length scale factor =

Area scale factor =

Volume scale factor =

Transformations - enlargement

Describe:
1. _____
_____
2. _____
_____
_____
3. _____
_____
_____

Circles

Area =

Sector Area =

Circumference =

Arc Length =

Pythagoras' Theorem

_____
Only applies to_____ triangles
Can be used to find the
height of an _____ triangle   13 m   13 m   h
Can be used to find the
length distance between
two _____   5 m   5 m

Circle Theorems

1. _____
_____
2. _____
_____
_____.

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Frequency Polygons

1. Plot frequency at the mid-point
2. Join with straight lines

Weight w (kg)	Frequency
30 ≤ w < 50	3
50 ≤ w < 55	7
55 ≤ w < 75	10
75 ≤ w < 80	6
80 ≤ w < 100	4

Histograms

FD = Frequency densi...

FD =

Venn Diagrams

Information given:
90 pupils were surveyed
52 said they owned a laptop.
45 said they owned a tablet.
23 said they owned both.

Notation
A – all elements in **A**
A' – all elements **not in A**
B – all elements in **B**
B' – all elements **not in B**
A ∪ B – all the elements **in A or B or both**
A ∩ B – all the elements **in both A and B**

Cumulative Frequency Diagrams and Box Plots
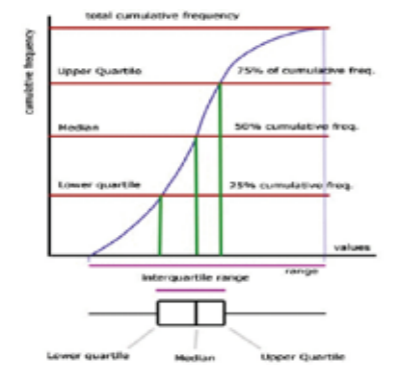
Expected outcomes

Expected outcome = probability x number of trials

E.g. A biased spinner is spun 800 times. The probabilities it lands on each colour is below. The probability of it landing on red is the same as the probability of it landing on yellow. How many times would you expect yellow to come up?

Result	Red	Green	Brown	Yellow
Probability		0.48	0.2	

$P(Y) = (1 - 0.48 - 0.2) \div 2 = 0.32 \div 2 = 0.16$

Expected yellow = 0.16 x 800 = 128

Averages from a frequency table

Mean: $\dfrac{\Sigma fw}{\Sigma f}$; where, w is the midpoint of the group.

Median group: find which group the $\dfrac{n+1}{2}$ th, value lies. Where, n is the total frequency.

E.g. in this table 51.5th value which lies in group 8< w ≤12 (using the cumulative frequency)

Weight of box (w kg)	Frequency
0 < w ≤ 4	11
4 < w ≤ 8	16
8 < w ≤ 12	29
12 < w ≤ 16	26
16 < w ≤ 20	20

Tree diagrams

Multiply along the branches to find each probability

1. Probability that a red counter is picked both times $P(RR) = \dfrac{2}{5} \times \dfrac{2}{5} = \dfrac{4}{25}$

2. Probability that the counters are different colours = $P(RB) + P(BR) = \dfrac{2}{5} \times \dfrac{3}{5} + \dfrac{3}{5} \times \dfrac{2}{5} = \dfrac{12}{25}$

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Frequency Polygons

1.
2.

Weight w (kg)	Frequency
30 ≤ w < 50	3
50 ≤ w < 55	7
55 ≤ w < 75	10
75 ≤ w < 80	6
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FD = Frequency densi...

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Notation
A –
A' –
B –
B' –
A ∪ B –
A ∩ B –

Cumulative Frequency Diagrams and Box Plots

Expected outcomes

Expected outcome = _____ ÷ _____

E.g. A biased spinner is spun 800 times. The probabilities it lands on each colour is below. The probability of it landing on red is the same as the probability of it landing on yellow. How many times would you expect yellow to come up?

Result	Red	Green	Brown	Yellow
Probability		0.48	0.2	

$P(Y) =$

Expected yellow =

Averages from a frequency table

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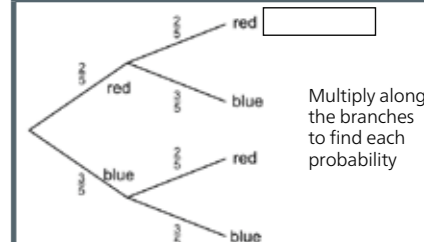
1. Probability that a red counter is picked both times $P(RR) =$

2. Probability that the counters are different colours = $P(RB) + P(BR) =$

Order of the Sharps and Flats

Sharps	Flats
F – Father	B – Battle
C – Charles	E – Ends
G – Goes	A – And
D – Down	D – Down
A – And	G – Goes
E – Ends	C – Charles'
B – Battle	F – Father

Key Signatures – Number of #s and bs.

#s	bs
1 – Good (G)	1 – Flowers (F)
2 – Dogs (D)	2 – Bloom (Bb)
3 – Are (A)	3 – Early (Eb)
4 – Easily (E)	4 – And (Ab)
5 – Bought (B)	5 – Die (Db)
6 – For (F#)	6 – Gradually (Gb)
7 – Cash (C#)	7 – Charlie (Cb)

Theory

$\frac{4}{4}$ → Number beats
→ Type of beats

Degrees of the Scale

Tonic	I
Supertonic	II
Mediant	III
Sub-dominant	IV
Dominant	V
Sub-mediant	VI
Leading Note	VII

Lower pitch — Higher pitch

Theory

Pitch – How high or low a note is. Pitch increases and decreases by steps of a scale.

Scales can be major or minor. Tempo – Tempo describes the speed of the music. We use Italian terms to describe speed.

Rhythm – Notes have different lengths – some long, some short. When we combine long and short notes it creates a rhythm.

Form/Structure – Music is divided into sections. These sections are put together to create a structure.

Texture – Music is made up of layers. We have different names depending on how many layers there are and how they work together.

Timbre/Sonority – We use the word timbre to describe the different sounds made by the instruments.

Tonality – Whether the piece is major or minor. Major sounds 'happy', minor sounds 'sad'.

Dynamics – Dynamics is volume in music. Varying dynamics make music more interesting. We use Italian terms to describe dynamics.

Major Minor

Dynamics

pp	p	mp	mf	f	ff
Pianissimo	Piano	Mezzo piano	Mezzo forte	Forte	Fortissimo
Very quiet	Quiet	Medium quiet	Medium loud	Loud	Very loud

Crescendo — Diminuendo
Gradually getting louder — Gradually getting quieter

Rhythm – Notes and Note Values

Semibreve	Minim	Crotchet	Quaver	Semiquaver
4 beats	2 beats	1 beat	½ beat	¼ beat

Theory

Stave	Treble Clef	Bass Clef	Sharp	Flat
5 lines where notes are placed to determine pitch.	Symbol placed on the stave. Used for high pitch – right hand piano.	Symbol placed on the stave. Used for low pitch – left hand piano.	Black key to the right on the piano.	Black key to the left on the piano.

Rhythm – Rhythms into Syllables

Tea	Coffee	Lemonade
Coco-cola	Pineapple	

Articulation

Articulation refers to how you play a note.

Staccato - Short	Tenuto - Long	Slur - Smooth	Accent - Strong

Performance

Requirements
It must be 4-6 minutes. One piece must link to one area of study. One piece must be an ensemble piece.

Top Tips!
The standard required is Grade 3. Choose a piece you can polish off and deliver accurately, even if it is a slightly lower standard.

How to Practise
- Don't rush your practice.
- Make sure you have a quiet space. Slow and steady is best!
- Always have a warm-up.
- Plan your practice.
- Practise the hard parts first.
- Use your practice diary to show progress.
- Record yourself and listen back to it.
- Keep a pencil handy to mark up your score.

Composition

Requirements
2 compositions – one set to a brief, one free. Must last between 3 and 6 minutes.

Composition Log
You are required to keep a log for both compositions explaining what you composed and when.

Responding to a Brief
You are required to respond to a brief, which are set by the exam board and based on the four areas of study.

Free Composition
You must set your own brief for your free composition. This can be anything you wish.

AOS 1 – Musical Forms and Devices

Devices

Repetition – exact repeat of a musical idea.

Contrast – a change in the music.

Anacrusis – a note before the first beat.

Imitation – when another part copies a musical idea.

Sequence – a repeated idea but at a different pitch.

Ostinato – a repeated pattern or phrase.

Syncopation – off-beat.

Dotted rhythms – lengthening a note by half of its value by placing a dot after it.

Drone – a long held note.

Pedal – a held or repeating note against which harmonies change.

Canon – melody is repeated in another part whilst the original melody continues to play.

Conjunct movement – (mainly) stepwise melody.

Disjunct movement – leaping melody.

Broken Chord/Arpeggio – notes of a chord are played separately one after the other.

Alberti bass – broken-chord accompaniment (I, V, III, V).

Regular phrasing – balanced melody.

Motif – short melodic or rhythmic idea.

Chord progressions – a series of related chords.

Modulation – changing key.

Important Musical Periods & Composers

The Baroque Era (1600-1750) – Bach, Handel, Vivaldi, Corelli, Lully, Purcell.

The Classical Era (1750-1810)– Haydn, Mozart, Beethoven.

The Romantic Era (1810-1910)– Schubert, Mendelssohn, Chopin, Schumann, Liszt, Wagner, Verdi, Brahms, Tchaikovsky, Dvorak.

Musical Forms

Binary – A, B

Ternary – A, B, A

Rondo – A, B, A, C, A

Variation – T, V1, V2, V3

Strophic – A, A, A

Minuet and Trio – M, T, M

Reading A Score – Clefs

Treble Clef – Violin   Alto Clef – Viola   Bass Clef – Cello

AOS 2 – Music for Ensemble

Texture

Monophonic – single melodic line for an instrument or voice or when instruments/voices are unison.

Homophonic – one main melody plus harmonic accompaniment of chords (inc. broken chords).

Polyphonic Texture – number of melodic lines heard independently of each other.

Texture Devices

Unison – Two or more musical parts sound at the same pitches at the same time - can be in octaves (monophonic).

Chordal – Parts move together producing a series or progression of chords (homophonic).

Melody and Accompaniment – The tune is the main focus of interest and importance, and it is 'accompanied' by another part/parts which support the tune (homophonic).

Canon or Imitation – The melody is repeated exactly in another part while the initial melody is still being played (polyphonic).

Countermelody – A new melody played at the same time as a previous melody.

Layered – When more parts are added on top of each other.

A musical ensemble is a group of people who perform instrumental or vocal music together.

A duet   A piece for 2 performers

A trio   A piece for 3 performers

A quartet   A piece for 4 performers

A quintet   A piece for 5 performers

A sextet   A piece for 6 performers

A septet   A piece for 7 performers

An octet   A piece for 8 performers

Ensembles

Chamber Music – Baroque (Sonata, Trio Sonatas), Classical (String Quartet) and Romantic.

Musical Theatre – duets, trios, quartets, chorus.

Jazz and Blues

Sonority and Timbre

Sonority or timbre means 'tone colour' associated with different instrument and musical sounds. The tone colour of different instrument combinations can result in different effects.

AOS 3 – Film Music

Leitmotif – A frequently recurring short melodic or harmonic idea which is associated with a character, event, concept, idea, object or situation.

Mickey-Mousing – Used in cartoons and animated films where the music attempts to represent every little physical movement on screen.

Sequencing – Where a melodic idea (often a leitmotif) is repeated growing louder and louder and consistently rising either a tone or a semitone higher during each repetition.

Diegetic Music – Music that is included in the film, and that the characters would be able to hear.

Non-diegetic Music – Music which has been composed to accompany events on screen but that the characters can't hear, but the audience can. Also referred to as Underscore or Incidental Music.

Synchronisation – The process of marrying up music and film.

Soundtrack – The music and sound recorded on a motion-picture film.

Motif – A short thematic strand of only a few notes.

Visual Narrative – The process of describing a story or storyline using visual images. Musical narrative is therefore the process of describing a story or storyline using music and sound.

Film Music

Film Music is a type of Descriptive Music that represents a mood, story, scene or character through music; it is designed to support the action and emotions of the film on screen.

Film Music

Film music today often blends popular, electronic and classical music in a flexible way that suits the needs of the particular film. Nevertheless, Hollywood still creates superstar composers whose film music often takes on a life of its own away from its original context, on CDs, downloads and in the concert hall.

AOS 4 – Popular Music

Pop Music

Is generally regarded as a commercial genre which has mass audience appeal.

Rock Music

Is generally accepted as a genre which sounds more aggressive, but also of significance are the more gentle and reflective rock balladtype tracks.

Musical Features of Pop and Rock Music

Instruments – Lead guitar, bass guitar, drum kit, vocals keyboard and synthesiser.

Melody – The melody is the part that is usually, though not always, sung. It is often regarded as the most important part of any pop or rock song.

Rhythm – Rhythm is such an important element in rock and pop music – it is consistent and strong with the use of the drum kit and the rhythm section driving the music forward.

Harmony – Harmony does not work in rock and pop music the same way as it does in classical. Most chords are root position or 7th chords.

Riffs – A repeated chordal pattern, series of notes or musical phrase.

Power Chords – The name given to a chord that uses the root and the 5th (i.e. no 3rd). It is used by rock guitarists.

MIDI – A digital and technical system that allows electronic instruments and computers to communicate with each other.

Chest Voice – The lower, more powerful part of the voice.

Head Voice – One of the higher registers of the voice when singing.

Falsetto – Male vocal technique used to extend the vocal range into a higher range than usual.

Range – The distance between the highest and lowest note that can be played or sung.

Remixing – Change a musical piece stylistically through electronic manipulation.

Panning – Adjusting the sound levels between the left and right hand speakers.

Looping – Part of the music is repeated indefinitely.

Abduction – Movement where a part of the body is taken away from the midline of the body, for example, moving the legs apart.

Adduction – Movement where a part of the body is brought towards the midline of the body, for example, bringing the arms into the sides.

Aerobic Energy System – Uses/is dependent on oxygen; used for long-duration, low intensity activities.

Aerobic Training Zone – Working at 60% – 80% of maximal heart rate.

Agility – The ability to move and change direction quickly (at speed) while maintaining control.

Agonist – The contracting muscle; the muscle that causes movement.

Alveoli – Minute air sacs in the lungs.

Anaerobic Energy System – Not dependent on oxygen and used for short duration; used for high intensity activities.

Anaerobic Training Zone – Anything over 80% of maximal heart rate.

Antagonist – Muscle that relaxes to allow the agonist to contract.

Aorta – Blood vessel carrying oxygenated blood from the left ventricle to the body.

Appendicular Skeleton – The outer part of the skeleton.

Artery – Blood vessel carrying blood away from the heart.

Articulating Cartilage – Protective covering on ends of bones.

Atria – Upper chambers of the heart that collect blood from the veins.

Axial Skeleton – The central part of the skeleton.

Balance – The maintenance of the centre of mass over the base of support.

Biceps – Located on the front of the upper arm; cause flexion at the elbow.

Body Composition – A comparison of the percentage of bone, fat, water and muscle within the body.

Bradycardia – Lower resting heart-rate as a result of training.

Bronchi – Two tubes that carry air from the trachea into each lung.

Bronchioles – Tiny tubes that carry air to the alveoli.

Capillary – Very thin blood vessels that allow gaseous exchange to happen.

Cardiac Output – Amount of blood leaving the heart each minute.

Cardiovascular Endurance – The ability of the heart and lungs to supply oxygen to the working muscles.

Cartilage – A firm connective tissue.

Cervical – Neck vertebrae, supports the head.

Circuit Training – A series of exercises performed one after the other to complete a 'circuit', with a rest in between each circuit.

Coccyx – Lowest part of the spine; allows attachment of ligaments and muscles.

Concentric – Isotonic contraction where the muscle shortens.

Coordination – The ability to use different (two or more) parts of the body together smoothly and efficiently.

Deltoid – Located on the shoulder; causes abduction of the arm.

Deoxygenated Blood – Blood returning to the heart/lungs lacking oxygen.

Diastolic Pressure – The blood pressure in the arteries when the heart rests between beats.

Diffusion – Movement of substances from a high concentration to a lower concentration.

DOMS – Delayed onset of muscle soreness.

Eccentric – Isotonic contraction where the muscle lengthens – used to control downward movement.

Ectomorph – Body shape characterised by lean, skinny, low muscle mass. Ectomorphs are often tall.

Endomorph – Body shape characterised by large fat content.

Energy Systems – Aerobic (with oxygen) and Anaerobic (without oxygen).

Exhalation – Breathing air out.

Extension – Straightening a joint. This occurs when the angle of a joint increases, for example, at the elbow when putting a shot.

Factors that affect blood pressure – Activity levels, Diet, Age and Stress.

Fitness – The ability to cope with the daily demands without suffering undue fatigue. In other words, your body is fit enough to do what it needs to do.

Flexibility – The range of movement possible at a joint.

Flexion – Bending a joint. This occurs when the angle of a joint decreases. For example, the elbow flexes when performing a biceps curl.

Frequency – Increase how often you train.

Functions of the Skeleton – Support, Movement, Protection of vital organs, Storage of minerals, Blood cell production and Shape.

Gastrocnemius – Located on the back of the lower legs; causes straightening of the ankle.

Gluteus Maximus – Located on the buttocks; causes extension of the hips.

Gravity – The natural pull towards the earth's core.

Hamstring – Located on the back of the upper leg; cause flexion at the knee.

Health – A state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity.

Heart Rate – The number of times the heart beats in a minute.

High Blood Pressure – Blood pressure above 140/90mmHg.

Hip Flexors – Located on the front of the upper legs; cause flexion of the legs at the hip.

Hypertrophy – Increase in size due to training (e.g. hypertrophy of the left ventricle in the heart).

Ideal Blood Pressure – Blood pressure between 90/60mmhg and 120/80mmhg.

Inspiration – Breathing air in.

Intensity – Increase how hard the training is.

Involuntary Muscle – Muscle that we have no control over.

Isometric – Muscle action where the muscle stays the same length – used in balances.

Isotonic – Muscle action where the muscle changes length – causes movement.

Joint – Where two or more bones meet.

Joint Capsule – Holds bones in place.

Kyphosis – Excessive outward curve of thoracic region of the spine.

Lactic Acid – Fatiguing waste product of the anaerobic energy system.

Larynx – Voice box.

Latissimus Dorsi – Located on the back; causes adduction at the arm.

Left Atrium – Heart chamber receiving oxygenated blood from the pulmonary vein.

Left Ventricle – Heart chamber pumping oxygenated blood into the aorta.

Ligaments – Joins bone to bone; supports and reinforces joint capsule.

Lordosis – Excessive inward curve of lumbar region of the spine.

Low Blood Pressure – Blood pressure less than 90/60.

Lumbar – Lower back vertebrae; weight bearing.

Maximal – Working with 100% effort.

Maximal Heart Rate (MHR) – Calculated as 220 – Age.

Mesomorph – Body shape characterised by large muscular shoulders.

Mouth and Nose – Air enters the body through these.

Muscular Endurance – The ability of a muscle or muscle group to undergo repeated contractions avoiding fatigue.

Muscular Strength – The ability to apply force against a resistance.
- Static Strength – Maximal strength that can be applied to an immovable object.
- Dynamic Strength – Repeated contractions applied to a moving object.
- Explosive Strength – Sometimes called Power. A combination of strength x speed.

Overload – Working harder than normal.

Oxygenated Blood – Blood leaving the heart/lungs rich in oxygen.

Pectoralis Major – Located on the chest; causes adduction of the arm.

Pharynx – Chamber at the back of the throat.

Power – Explosive strength or anaerobic power is the product of strength and speed i.e. strength x speed.

Principles of Training – Specificity, Progression, Overload, Reversibility and Tedium.

Principles of FITT – Frequency, Intensity, Time and Type.

Progression – Gradually increasing the intensity of training.

Pulmonary Artery – Blood vessels carrying deoxygenated blood from the right ventricle to the lungs.

Pulmonary Vein – Blood vessels carrying oxygenated blood from the lungs to the left atrium.

Quadriceps – Located on the front of the upper leg; causes extension at the knee.

Reaction Time – The time taken to initiate a response to a stimulus.

Recovery – What a performer does to allow repair of the body.

Rectus Abdominus – Located on the stomach wall; causes flexion of the trunk and hips.

Red Blood Cell – Carries oxygen in the blood.

Residual Volume – Amount of air left in the lungs after a maximal exhalation.

Rest – A time when a performer undertakes little or no exertion.

Reversibility – You lose fitness if you stop or reduce training.

Right Atrium – Heart chamber receiving deoxygenated blood from the vena cava.

Right Ventricle – Heart chamber pumping deoxygenated blood into the pulmonary artery.

Rotation – Movement where a whole limb or part of the body turns or revolves around its length.

Sacrum – Attached to pelvis.

Scoliosis – A sideways curve of the spine.

Set – A collection of repetitions (reps) that occur before a rest period.

Soleus – Located on the back of the lower legs; causes straightening of the ankle.

Specificity – Training must be relevant to your chosen activity.

Speed – The maximum rate at which an individual is able to perform a movement or cover a distance in a period of time. Putting body parts into action as quickly as possible.

Strength – The ability to overcome a resistance.

Striated – Striped muscle.

Stroke Volume – Amount of blood leaving the heart each beat.

Synovial Joints – Pivot, Condyloid, Saddle, Gliding, Ball & Socket and Hinge.

Synovial Membrane – Produces synovial fluid.

Synovial Fluid – Lubricates joint.

Systolic Pressure – The blood pressure in the arteries during the contraction of your heart.

Tedium – Training needs to be varied to avoid boredom.

Tendons – Attach muscle to bone.

Thoracic – Chest vertebrae; attached to ribs.

Tidal Volume – Amount of air that enters the lungs during normal inspiration at rest.

Time – Increase the duration of your training.

Trachea – Often called the windpipe, lined with rings of cartilage and carries air from the pharynx to the bronchi.

Trapezius – Located on the neck; causes extension of the head.

Triceps – Located on the back of the upper arm; causes extension at the elbow.

Type – Vary the type of training.

Types of Bones – Long, Flat, Irregular, Short and Sesamoid.

Types of Joints – Fixed, Slightly moveable and Synovial.

Types of Muscle – Cardiac, Smooth and Skeletal.

Type 1 Slow Twitch Fibres – Muscle fibre that is red, contracts slowly and resists fatigue.

Type 2 Fast Twitch Fibres – Muscle fibre that is white, contracts rapidly and fatigues easily.

Unstriated – Unstriped muscle.

Vascular Shunt – Mechanism that directs blood to where there is greater demand and away from where there is less demand.

Vasoconstriction – Reducing the diameter of small arteries to reduce blood flow to tissues.

Vasodilation – Increasing the diameter of small arteries to increase the blood flow to tissues.

Vein – Blood vessel carrying blood towards the heart.

Vena Cava – Blood vessels carrying deoxygenated blood from the body to the right atrium.

Ventricles – Lower chambers of the heart that pump blood out of the heart to the arteries.

Vital Capacity – Maximum amount of air you can exhale after taking the deepest possible inspiration.

Voluntary Muscle – Muscle that we can control (Skeletal).

Exploring the Performing Arts

Techniques for your practical performance

Physical skills, for example actions and gestures.

Vocal and musical skills, for example clarity and remembering lines.

Other performance and interpretation skills such as interacting with others, focus energy and commitment.

Design skills needed by designers such as costume, set, props, sound and make-up.

BTEC Tech award in Performing Arts Component 2:

Learners will develop their Performing Arts skills and techniques through the reproduction of acting, dance and musical theatre. In this component you have the opportunity to develop to specialise as a performer in acting or musical theatre. Throughout your development you will review your own progress and consider how to make improvements.

You will develop your performance skills.

Application of skills and techniques during rehearsal	Explanation
Physical	Body language and gestures
Vocal	Voice projection and accent
Musicality	Songs, lyrics and purpose
Interpretative	What is the inside meaning of performance?
Stylistic	Types of dances and practitioner influences
Interaction with group	Teamwork and your ideas/organisation skills
Interaction in performance	Your role and the character that you played
Refining ideas	Feedback from your peers and your teacher - what did you change in order to develop your performance?
Communicating design ideas	Staging, costumes and sound - what did you choose to do for your performance and why?

Above is an image of the film Swallows and Amazons for which Lakeside Casting Agency provided the actors and actresses.

Key Words

Physical
Play
Musical
Interaction
Ideas
Communicating
Casting Agent
Develop
Stylistic
Interpretation
Component
Rehearsal Process
Voice
Accent
Gesture
Body Language

Responding to a Brief

This component is about responding to a brief given by BTEC. You will be given a stimulus and you will then devise your own performance, being creative, and looking at different theatre practitioner styles and ideas that you can use.

Key tips to devising a performance:

Be passionate

Do your research

Get your materials out there as soon as possible

Keep an open mind

The importance of the story is relative

Remember everyone works differently

Don't be precious

Stay optimistic and enjoy yourself

Teamwork is key

Key Words

Brief	Building
Ideas	Developing
Plot	Ambitious
Setting	Understanding
Characters	Assessment
Stimulus	Performers
Staging	Creativity
Lighting	Knowledge
Sound	Drama techniques
Set	
Teamwork	Theatre practitioner

You will be given the opportunity to work as part of a group to contribute to a workshop performance as either a performer or designer in response to a given brief and stimulus.

This external component builds on knowledge, understanding and skills acquired and developed in Components 1 and 2 and includes synoptic assessment. Learners will apply their skills and techniques creatively to a workshop performance for a selected audience. Learners will capture their ideas on planning, development and effectiveness of the production process in a written log and an evaluation report. The practical task worth 60 marks will be completed under supervised conditions. For assessment, learners will be given a brief and stimulus to create performance material as either a performer or designer. In groups consisting of a minimum of three and a maximum of seven performers, plus up to a maximum of four designers, learners will respond to the stimulus and create a workshop performance that communicates ideas and creative intentions to a target audience of their choice.

B5 – Homeostasis and Response

Homeostasis

Homeostasis = regulation of internal conditions of a cell or organism to maintain optimum conditions.

- Maintains optimal conditions for **enzyme action** and **cell functions.**

In humans this includes:

- Blood glucose concentration
- Body temperature
- Water levels
- Happens **automatically** and involves **nervous responses** (nervous system) or **chemical responses** (endocrine system).

All control systems include:

Receptors – cells which detect stimuli (changes in environment)

Co-ordination centres – e.g. brain/spinal cord **Effectors** – muscle or gland which causes response.

Nervous System

- Allows humans to react to surroundings.

Central Nervous System (CNS) = brain and spinal cord.

CNS co-ordinates response of effectors (muscles/glands):

stimulus → receptor → coordinator → effector → response

Neurones

- Carries electrical impulses

Axon = long, stretched out to carry impulse long distances

Myelin sheath = insulates electrical impulse

Dendrites = branched to connect to other neurones

Synapse

Synapse = gap between two neurones.

- Electrical impulse cannot travel across gap (synapse).
- Turns into **chemical neurotransmitters**.
- Chemicals travel across synapse by **diffusion**.
- Chemicals bind to receptors on next neurone.
- Impulse returns to electrical.

- Impulse slows down at synapse as it takes time for chemicals to diffuse across the gap.

Reflex Arc

synapse   synapse

Stimulus → receptor → sensory neurone → relay neurone → motor neurone → effector → response

in spinal cord

Stimulus = change in environment e.g. hot plate
Receptor = cell which detects stimulus e.g. skin cell
Effector = muscle/gland which causes response e.g. arm muscle
Response = e.g. muscle contracting and moving arm away
- Reflex responses are **rapid** and do not involve the conscious part of the brain – quick so body can **protect** itself from **harm**.

B5 – Homeostasis and Response

Endocrine System

- Made up of glands which secrete chemicals called hormones.
- Hormones are carried in the blood to target organs.
- Pituitary gland = the master gland - it controls the release of other hormones.

Gland	Hormone released	Effect on body
Pituitary	FSH and LH	Involved in menstrual cycle
Thyroid	Thyroxine	Controls metabolism – growth and development
Adrenal	Adrenaline	Prepares for emergency – increased heart rate and breathing rate
Pancreas	Insulin and glucagon	Control of blood glucose
Ovaries	Oestrogen and progesterone	Reproductive hormones in females
Testes	Testosterone	Reproductive hormone in males

Neurones vs Hormones

	Neurones (nervous)	Hormones (endocrine)
Speed	Fast	Slow
Duration	Short-term effect	Longer-term effect
Target area	Specific	General

Diabetes

Two types: **Type 1** and **Type 2**

	Type 1	Type 2
Cause	Pancreas does not produce insulin	Too much sugar in diet over long time (usually over 50s and obese)
Effect	Sugar levels become too high	Cells no longer respond to insulin
Treatment	Injection of insulin	Carbohydrate controlled diet and regular exercise

Negative Feedback (HT only)

- Negative feedback regulates levels of hormones in the body (e.g. thyroxine):

Controlling blood glucose

- Monitored and controlled by the pancreas.

B5 – Homeostasis and Response

Menstrual Cycle
- Occurs in females every **28 days.** - Controlled by four main **hormones: FSH, oestrogen, LH and progesterone.**

Hormone	Where it is produced	Response caused	Interaction with other hormones (HT only)
FSH	Pituitary gland	Causes egg to develop in ovaries	Stimulates the production of oestrogen
Oestrogen	Ovaries	Lining of uterus builds up and thickens	Stimulates the production of LH Inhibits the production of FSH
LH	Pituitary gland	Causes ovulation (egg to be released) at Day 14	Indirectly stimulates the production of progesterone
Progesterone	Ovaries	Causes uterus lining to maintain (if egg is fertilised for protection)	Inhibits the production of LH

Day 1   Day 4   Day 14   Day 28
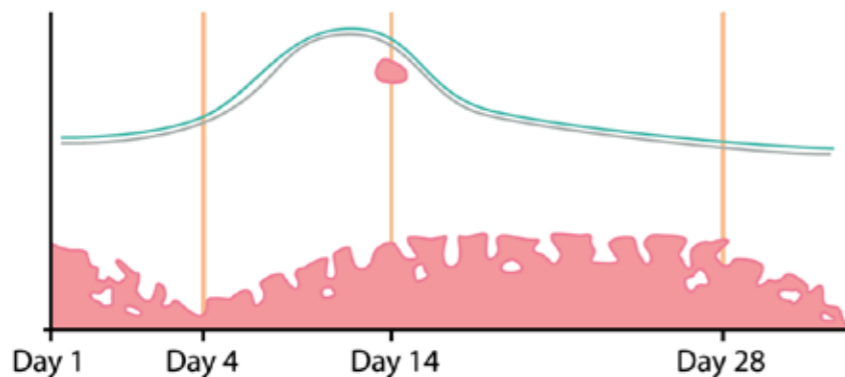
B5 – Homeostasis and Response

Contraception
Two types of contraception: **hormonal** and **non-hormonal (barrier).** **Hormonal** = alters hormones to prevent egg being released. **Non-hormonal (barrier)** = methods which prevent the egg and sperm being released.

Method	Hormonal Non-hormonal	How it works	Pros and Cons
Oral contraceptive (the pill)	Hormonal	Pill taken containing hormones to **inhibit FSH** so egg does not mature	**Pros** – Easy, short-term effects, can easily be reversed **Cons** – mild side-effects, easy to forget to take, does not protect from STIs
Condoms or diaphragm (female condom)	Non-hormonal	Creates a **physical barrier** to prevent sperm from reaching the egg	**Pros** – Easy to use, cheap, easily reversed, protects from most STIs **Cons** – Can rip – not 100% effective
Injection, implant or skin patch	Hormonal	Contains **progesterone** which is slowly released to stop ovulation for months or years	**Pros** – Very reliable, easily administered by GP, do not need to take every day **Cons** – Does not protect from STIs, can take a while to be reversed
Intrauterine devices **IUD** (the coil)	Hormonal	Attached to lining of uterus and **releases hormones** to prevent **implantation** of embryo	**Pros** – Very reliable, do not need to take every day – easily maintained **Cons** – Does not protect from STIs, takes time to be reversed
Spermicidal agents	Non-hormonal	Chemicals to kill or immobilise sperm cells	**Pros** – Easy to use and short term effects **Cons** – Does not protect from STIs, less effective when used on own
Abstaining from intercourse	Non-hormonal	Avoiding intercourse when there is a likelihood of an egg being released	**Pros** – Cheap and short term effect **Cons** – Not always reliable
Surgery	Non-hormonal	Men – tubes sealed to prevent sperm passing from testes Women – fallopian tubes sealed to prevent egg being released	**Pros** – Very reliable **Cons** – Risk of infection with surgery and difficult to reverse (if at all possible), sometimes can take several months to be reliable

B5 – Homeostasis and Response

Infertility (HT only)

Infertility = unable to conceive naturally.

Lots of treatments to help this:

- Fertility drugs – **FSH** and **LH** injected to stimulate menstrual cycle.

- **In vitro fertilisation (IVF)** which involves several stages:

1) Woman is given fertility drugs to stimulate ovaries to release eggs.

2) Eggs collected from woman and fertilised using sperm in the lab.

3) Fertilised eggs develop into **embryos**.

4) Two embryos implanted into woman's uterus.

5) If successful – pregnancy progresses as usual.

- Processes offer couples chance to have own baby however:

- Stressful and emotional processes

- Success rates are low

- Higher chance of multiple births (twins/triplets) which carries risk to mother and babies

- Can be expensive

Required Practical – Reaction times

- Aim: Investigate the effect of _____ on reaction time.

- Method (example for caffeine):

1) One of pair sits upright on chair with forearm on table – hand hanging over edge of table.

2) Other partner places a ruler vertically between partner's thumb and first finger (thumb and finger should be as far apart as possible).

3) Ensure 0cm on the ruler is level with top of the thumb.

4) Drop ruler without telling partner and partner catches ruler with thumb and finger.

5) Take reading from top of thumb – recording how many cm it took to catch.

6) Repeat 9 more times.

7) Drink 100ml of caffeinated drink then wait 15 minutes.

8) Repeat Steps 1-6.

9) Use a conversion table to convert results from centimetres to reaction time (s).

10) Take a mean for with and without caffeine.

Variables

- **Independent** – What you are changing (in method above it would be caffeine)

- **Dependent** – Reaction time in seconds

- **Control** – Using same hand to catch, same type of ruler, finger and thumb as far apart as possible, arm remaining on desk

Common Questions

- **Q1)** Why do you wait 10 minutes after drinking caffeine?

- **A1)** Takes time for caffeine to enter bloodstream.

- **Q2** Why could the reaction times decrease with more repeats?

- **A2)** Practice could cause an increase in reaction time – get used to reaction.

- **Q3)** Why should you ensure the same hand is used?

- **A3)** Using a different hand would affect reaction time.

B6 – Inheritance, Variation and Evolution

Key Words

Allele – An alternative form of a gene.

Asexual reproduction – The production of offspring from a single parent by mitosis. Offspring are clones of the parent.

Chromosome – Structures that contain the DNA of an organism. Found in the nucleus.

Cystic fibrosis – A disorder of cell membranes that is caused by a recessive allele.

DNA – A polymer that is made up of two strands that form a double helix.

Dominant – An allele that is always expressed, even if only one copy is present.

Fertilisation – The fusion of male and female gametes.

Gamete – Sperm and egg cell in animals; pollen and egg cell in plants.

Gene – A small section of DNA which codes for a specific protein.

Genome – The entire genetic material of an organism.

Genotype – The combination of alleles.

Heterozygous – A genotype that has two different alleles, one dominant and one recessive.

Homozygous – A genotype that has two of the same alleles. Either two dominant or two recessive.

Meiosis – Type of cell division – makes gametes for sexual reproduction – have half the number of chromosomes and are genetically different.

Mutation – A change in DNA.

Phenotype – The characteristic expressed because of the combination of alleles.

Polydactyly – Having extra fingers or toes. It is caused by a dominant allele.

Recessive – An allele that is only expressed if two copies are present.

Sexual reproduction – Production of offspring by combining genetic information from the gametes of two parents. Leads to variation in the offspring.

Cell Division
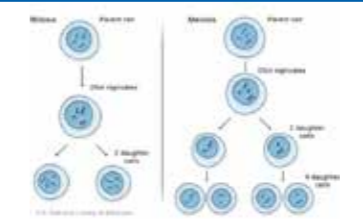
Mitosis	Meiosis
2 daughter cells	4 daughter cells
Daughter cells = genetically identical	Daughter cells = not genetically identical
Cell divides once	Cell divides twice
Daughter cells = 46 chromosomes	Daughter cells = 23 chromosomes
Used for growth and repair – asexual reproduction	Produces gametes for sexual reproduction

How to complete a punnet square
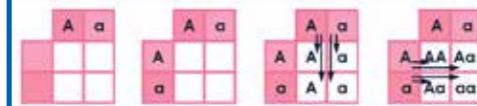
Step 1: Put the two alleles from one parent into the boxes at the top. This parent is a heterozygote. This means they have one dominant and one recessive allele.

Step 2: Put the two alleles from the second parent into the boxes on the left. This parent is also a heterozygote.

Step 3: Put the alleles from the first parent into the two boxes underneath them.

Step 4: Put the alleles from the second parent into the boxes to the right of them.
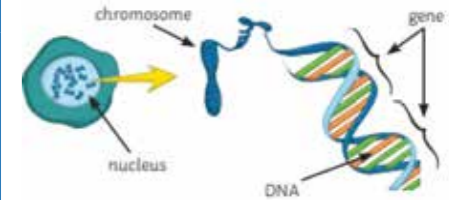
Sex Determination

Mum

Dad
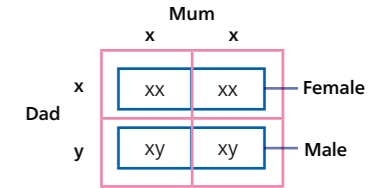
Females carry two X chromosomes. Males carry one X and one Y chromosome. 50% chance of male and female.

Probability

There are four possible combinations of gametes that offspring can inherit.

male genotype

female genotype
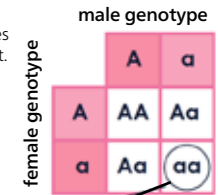
One of these four has the type aa – that's ¼, 25% or 0.25.

B6 – Inheritance, Variation and Evolution

Key Words

Embryo screening – Genetic tests carried out on an embryo to see whether it carries a faulty allele.

Evolution – A change in the inherited characteristics of a population of time through natural selection.

Evolutionary tree – A method used to show how scientists believe organisms are related.

Extinction – Permanent loss of all members of a species.

Fossils – The remains of organisms from millions of years ago which are found in rocks.

Genetic engineering – The process by which scientists manipulate and change the genotype of an organism.

Natural selection – Organisms that are better adapted are more likely to survive and reproduce.

Selective breeding – Humans selecting animals or plants that have a required characteristic for breeding.

Speciation – The process by which two species evolve from a single original species by natural selection. The two populations have become so different that they can no longer interbreed to produce fertile offspring.

Variation – Different characteristics of individuals in a population.

Variation

May be due to differences in:
- Genes that have been inherited (genetic causes)
- Conditions which they have lived in (environmental causes)
- Combination of genes and the environment.

Mutations = a change in the DNA (randomly) can lead to a new phenotype.

Evolution

Evolution = a change in inherited characteristics of a population over time through natural selection – could lead to a new species.
- Theory of evolution (Charles Darwin) states that all species have evolved from a simple life from more than 3 billion years ago.

Natural Selection

1. **Variation** within a species – different genes (could be due to a **mutation**).
2. One variation may be better **adapted** for survival in the environment.
3. Those with **advantageous genes** will survive and reproduce – passing genes to **offspring**.
4. Happens over hundreds of years – may lead to a new **species**.

Selective Breeding

- Process by which humans breed plants and animals for particular **genetic characteristics.**
- Humans have done this for thousands of years for crops and domesticated pets (dogs for hunting etc.)

Steps of selective breeding:
1. Choose two individuals with **desired characteristics**.
2. Breed together.
3. Pick the offspring which have the desired characteristic and breed together.
4. Continue over many generations until all offspring show desired characteristic.

Characteristic can be chosen for usefulness or appearance:
- Diseases resistance in food crops
- Animals which produce more meat/milk
- Domestic dogs with a gentle nature
- Large or unusual flowers Selective breeding can lead to **'inbreeding'** which can cause some breeds to be prone to **disease** or inherited **defects**.
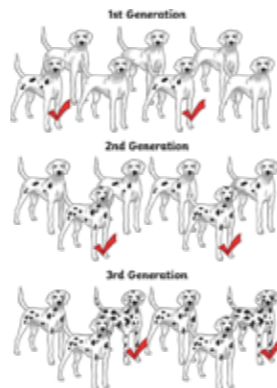
B6 – Inheritance, Variation and Evolution

Genetic Engineering

- Process which involves modifying the genome of an organism by introducing a gene from another organism to give a desired characteristic.
- Uses of genetic engineering:
- Plant crops to be resistant to diseases or produce bigger, better fruits.
- Bacteria cells to produce useful substances, such as human insulin to treat diabetes.

Genetically Modified (GM) Crops

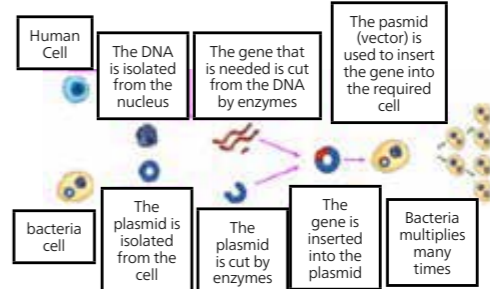| Advantages	Disadvantages
Resistant to insect attack	Not sure on long term effects when eating GM crops
Produce increased yields	Could affect populations of wild flowers and insects

Fossils

Fossils could be:
- Remains of an organism that has not decayed.
- Mineralised forms of the harder parts of an organism (such as bones).
- Traces of organisms such as footprints or burrows.

Many early life forms were **soft bodied** so have left few traces behind – cannot be sure how life started on Earth.

Fossils help us understand how much or little organisms have changed as life developed on Earth.

Process of Genetic Engineering (HT only)

| Human Cell | The DNA is isolated from the nucleus | The gene that is needed is cut from the DNA by enzymes | The pasmid (vector) is used to insert the gene into the required cell |

| bacteria cell | The plasmid is isolated from the cell | The plasmid is cut by enzymes | The gene is inserted into the plasmid | Bacteria multiplies many times |

Classification

Linnaeus classified things into: kingdom, phylum, class, order, family genus and species.
Organisms are names by the binomial system of genus and species.
Due to evidence from chemical analysis, there is now a 'three-domain system' by Carl Woese.

Domain	bacteria	archaea	eukaryota			
Kingdom	eubacteria	archaebacteria	protista	fungi	plantae	animalia

Extinction

Extinction = no remaining individuals of a species still alive.
Factors which could cause extinction:
- Disease
- Natural disasters (e.g. meteor/volcano eruption)
- New predators
- Increased competition

Resistant Bacteria

- Bacteria evolve rapidly as they reproduce at a fast rate.
- Mutations of bacterial pathogens can produce new strains.
- Some strains are resistant to antibiotics (so are not killed).
- They survive and reproduce – population of resistant strain rises.
- Resistant strain will spread because people are not immune and there is no effective treatment.
- MRSA is resistant to antibiotics.

| There is variation in the bacterial population. One bacterium develops a mutation by chance that means it is resistant to an antibiotic. | The antibiotic kills some of the bacteria, the resistant bacterium survives and reproduces. | The antibiotic kills the rest of the nonresistant bacteria so the person may start to feel a little better. The resistant bacterium has survived and continues to multiply. |

How to reduce antibiotic resistant strains:
- Doctors should not prescribe antibiotics for non-serious or viral infections
- Complete course of antibiotics
- Agricultural use of antibiotics should be restricted.

C7 – Organic Chemistry

Hydrocarbons

Hydrocarbons = molecules containing **hydrogen** and **carbon only**.
Two types of hydrocarbons are **alkanes** and **alkenes**.

Alkanes
- Alkanes = **saturated** hydrocarbons.
- Held together by **single bonds**.
- General formula = C_nH_{2n+2}
- All have similar properties.
- Have different boiling points – longer the chain, higher the boiling point (more intermolecular forces need breaking).
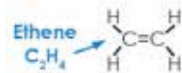
You need to remember the names, and formulas of the first 4 alkanes.

Name of Alkane	Structural Formula	Molecular Formula
methane		CH_4
ethane		C_2H_6
propane		C_3H_8
butane		C_4H_{10}

Alkenes
Alkenes = **unsaturated** hydrocarbons.
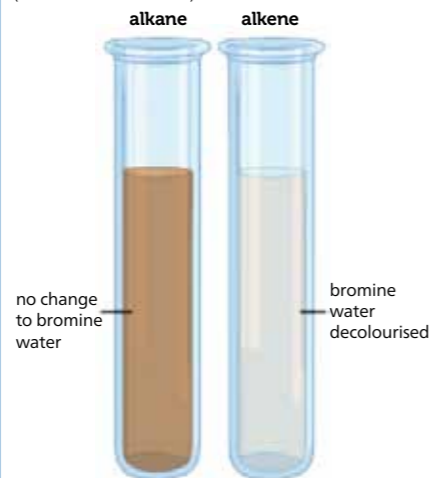Contain carbon-carbon **double bonds.**
General formula = C_nH_{2n}

Ethene
C_2H_4

Test for Alkenes

Use bromine water to test for alkanes.
- Bromine water + alkane = stay brown
- Bromine water + alkene = turn colourless (double bonds breaks)

alkane   alkene

no change to bromine water

bromine water decolourised

Making Polymers

- Alkenes are used to produce polymers and as burns. starting materials for many other chemicals.
- Polymers can be used to make plastics such as:

Poly(ethene) – plastic bags/drinks bottles

Poly(propene) – strong tough plastics

Properties of Hydrocarbons

Short-Chain Molecules	Increasing Chain Length	Long-Chain Molecule
	As chain length increases, the boiling point of the hydrocarbon chains also increases.	
	Viscosity describes how easily a substance can flow e.g. treacle is very viscous; it is thick.	
	Flammability is a measure of how easily a substance burns.	

C7 – Organic Chemistry

Crude Oil

Crude oil = a mixture of hydrocarbons.

- It is a **non-renewable resource (fossil fuel).**
- Made from remains of dead plants and animals **compressed** underground over millions of years.

Fractional Distillation

Used to **separate** the mixtures of hydrocarbons in **crude oil.**

Steps in Fractional Distillation (COMMON 6 MARKS)

1. Crude oil enters **fractioning column** and is heated.

2. Crude oil begins to evaporate and hydrocarbons vaporise.

3. Vapours rise up the column where it is **cooler** at the **top** and **hotter** at the **bottom**.

4. Hydrocarbons have **different boiling points** based on their **chain length.**

5. The **shorter** (more useful) hydrocarbons **condense** at the **top** as they have a **lower boiling point.**

6. The **longer** hydrocarbons condense at the **bottom** as they have a **higher boiling point.**

7. Some of the hydrocarbons have too high of a boiling point to evaporate, so are collected as residue at the bottom of the column.

Combustion of Hydrocarbons

Complete combustion = when there is enough oxygen for a fuel to burn.
Hydrocarbon + oxygen → carbon dioxide + water

Incomplete combustion = **not enough oxygen**
Products would be **carbon monoxide** and water.

Carbon monoxide = poisonous gas
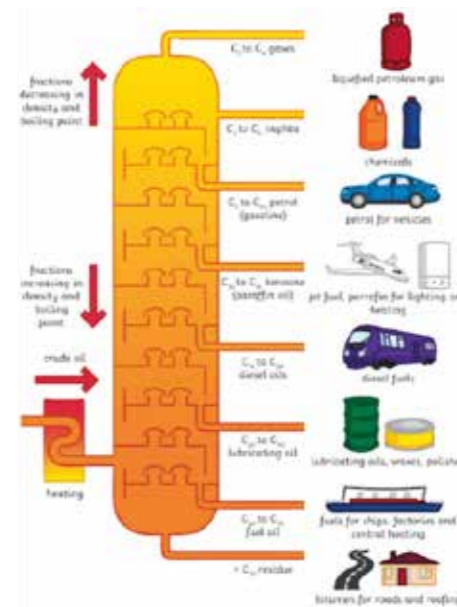
Cracking

- Example of **thermal decomposition.**

- Long hydrocarbons are **broken down** into smaller, more useful hydrocarbons.

- Shorter hydrocarbons are **more useful** as they have a **lower boiling point**, so they can be used as fuels more easily.

Two types of cracking: catalytic and steam cracking.

Catalytic cracking – needs a **high temperature** and a **hot catalyst**.

- Cracking produces a **short-chain alkane** and an **alkene**.
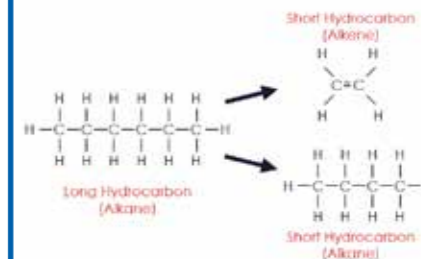
C8 – Chemical Analysis

Pure substances

Pure = single element or compound – not mixed with any other substance.

Testing a substance is pure:
- Pure substances have specific melting and boiling points.
- Compare your data to a library of known values.

E.g. Water has a boiling point of 100oC, if it is above or below this, it is not pure.

Formulations

Formulation = a mixture that is designed as a useful product.

- Components mixed carefully to get the required **properties**.

Examples of formulations:
- Fuels
- Cleaning agents
- Paints
- Medicines
- Alloys
- Fertilisers
- Food

Chromatography

Paper chromatography = technique used to separate mixtures of **soluble substances**.
- How soluble a substance is determines how far it travels across paper.

More soluble = travels furthest (highest up paper)

Least soluble = travels least (lowest on paper)

Two phases:

Mobile phase
- **Solvent** is the mobile phase.
- Moves through the stationary phase.
- Carries different substances with it.

Stationary phase
- Chromatography paper is the stationary phase.

R$_f$ Values

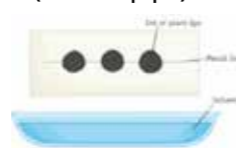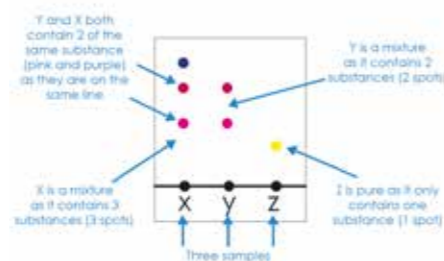$$R_f = \frac{distance\ travelled\ by\ substance}{distance\ travelled\ by\ solvent}$$

- Should always be between 0 and 1.
- Each substance has a unique R$_f$ value.
- Can compare R$_f$ values to a library of
- known substances.
- Can identify unknown substances.
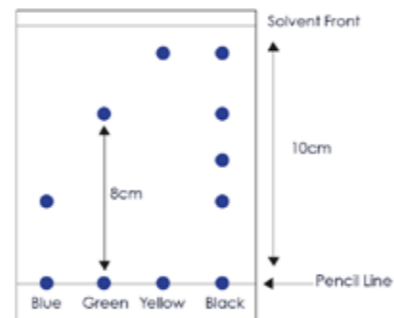
R$_f$ value of green:

$$\frac{8cm}{10cm} = 0.8$$

C8 – Chemical Analysis

Required Practical – Paper Chromatography

Aim: Investigate how paper chromatography can be used to separate and distinguish between coloured substances.

Method

1) Using a ruler, measure 1cm from bottom of chromatography paper and draw a line across the paper with a **pencil**.

2) Using a pipette, drop small spots of each ink onto pencil line (leave a gap so do not merge).

3) Pour solvent into a beaker, do not fill solvent above the pencil line on the paper.

4) Place chromatograph paper into beaker and allow solvent to move up the paper.

5) Remove paper just before solvent reaches top of the paper and leave to dry.

6) Calculate Rf values of all the spots using the equation below:

$$R_f = \frac{distance\ travelled\ by\ substance}{distance\ travelled\ by\ solvent}$$

Common questions

Q1) Why is a pencil used instead of a pen?

A1) Ink in the pen would move up the paper with the substances.

Q2) Why do you not fill the solvent above the line?

A2) Substances would wash off into the solvent instead of rising up the paper.

Q3) Why might water not work as a solvent?

A3) Some substances are insoluble in water.

Identification of the Common Gases

Test for hydrogen – Place a **burning** splint at the opening of a test tube. If hydrogen gas is present, it will burn with a **squeaky-pop sound.**

Test for Oxygen – Place a **glowing** splint inside a test tube. The splint will **re-light** in the presence of oxygen.

Test for Carbon Dioxide – Calcium hydroxide **(lime water)** is used. Carbon dioxide is bubbled through the lime water, the lime water turns **cloudy**.
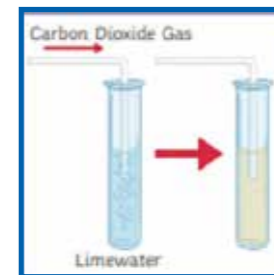
Test for Chlorine – **Damp litmus paper** is used to test for chlorine gas. The litmus paper becomes **bleached** and **turns white.**

C9 – Chemistry of the Atmosphere

Human activities to greenhouse gases

- Human activities increase amounts of greenhouse gases in atmosphere including:
- Carbon dioxide
- Methane

Gas	Human activities which will increase it
Carbon Dioxide	Burning fossil fuels and deforestation
Methane	Raising livestock (for food), using landfills and rice fields.

Peer-reviewed evidence shows:
- Human activities will cause temperature of Earth's atmosphere to increase.
- This will result in global climate change.

Global Climate Change

- Increase in average global temperature is a major cause of climate change.
- Potential effects of global climate change:

Effect	Impact
Rising sea levels	Flooding of low-lying areas
Ice caps melting	Causes increase in sea temperature – reduction in sea-life.
Droughts/Floods	Hard to grow crops + loss of habitats
Forrest fires	Loss of habitats

Global Climate Change

- Combustion of fuels = major source of atmospheric pollutants.
- Most fuels, including coal, contain: carbon and hydrogen and may also contain sulfur.

Gases which may be released when burned are:

Pollutant	Source	Problem caused by pollutant
Carbon dioxide	Complete combustion of fuels	Greenhouse gas – contribute to greenhouse effect
Carbon monoxide	Incomplete combustion of fuels	Colourless and odourless **toxic** gas – stops haemoglobin carrying oxygen – can kill
Carbon particulates (soot)	Incomplete combustion of fuels	Can cause **global dimming**
Sulfur dioxide	Combustion of a fossil fuel which contains sulfur impurities	**Acid Rain** – harms and kills plants and animals – especially in oceans. Can also damage statues and buildings
Nitrogen oxides	Oxidation of atmospheric nitrogen inside engines or cars, lorries etc. (high temps)	Photochemical **smog** – cause health effects e.g. asthma attacks

Carbon Footprint

- Total amount of carbon dioxide and other greenhouse gases emitted over the life cycle of a product, service or event.
- Can be reduced by reducing emissions of CO_2 and methane.

E.g. – Using local products – reduces CO_2 from transport - Using renewable forms of energy to prevent combustion of fossil fuels – CO_2 production

However actions to reduce may be limited as:
- Expensive to fund alternatives
- Some products are not available in the UK.

Complete combustion

- When there is a **good supply** of **oxygen**.
- More energy released

Fuel + oxygen → carbon dioxide + water

e.g.

Methane + oxygen → carbon dioxide + water

$CH_4 + 2O_2 → CO_2 + H_2O$

- Carbon dioxide = greenhouse gas - can contribute to **greenhouse effect.**

P5 – Forces

Scalar and Vector Quantities

Scalar – has **magnitude** only e.g. temperature, mass and speed.

Vector – has both **magnitude** and **direction** e.g. velocity.

Vectors can be shown using **arrows**:

Size of arrow = magnitude of the quantity

Direction of arrow = direction of quantity

Contact and Non-Contact Forces

Force = a push or pull that acts on an object due to interaction with another object.

All forces are either:
- **Contact forces** – objects are physically touching e.g. friction, air resistance, tension and normal contact force.
- **Non-Contact forces** – objects are physically separated e.g. gravitational force, electrostatic force and magnetic force.
- Forces are **vectors** – shown by arrows.

Gravity

Weight = the **force** acting on an object due to gravity.

- Gravity close to Earth is due to the gravitational field.
- Weight of an object depends on the gravitational field strength at the point where the object is.

Weight can be calculated using:

weight = mass x gravitational field strength

$$W = m \times g$$

Newtons (N)   Kilograms (kg)   Newtons per kilogram (N/kg)

- Weight of an object can act at a single point = object's 'centre of mass'.
- Weight can be measured using a newton meter.

Newtons meter

Resultant Forces

- Resultant force = a single force that represents a number of forces acting on an object.
- Forces acting on an object are shown in a free body diagram (car below).

30N   50N

- Car is being pushed to the left by a force of 30N. It is also pushed to the right by 50N.

Resultant force is: 50N – 30N = 20N

20N is pushing to the right, **so car will move right.**

- When a resultant force is not zero, an object will **change speed (accelerate or decelerate)** or **change direction** (or both).
- When forces are **balanced** the resultant force will be **zero**.
- When zero – object will either **remain stationary** or continue to move at a **constant speed.**

30N – 30N = 0N

Forces are balanced – it will remain stationary
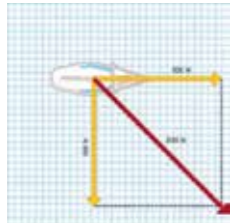
P5 – Forces

Vector Diagrams (HT only)

- Used to calculate resultant forces that are not acting directly opposite each other, on a straight line.

Worked Example 1

Boat is being pulled toward the harbour by two winch motors. Each is pulled with a force of 100N.

To find the resultant force – draw construction lines from the end of each arrow parallel to the other force.

Remember that the size of the arrow shows the size of the force being exerted.

Where the construction lines intercept indicates the direction of the resultant force.

The resultant force is the sum of the forces acting. So in this example it would be 100N + 100N = 200N.

Work done and Energy Transfer

- When a force acts on an object and makes it move – **work is done.**
- So a force does work on an object when the force causes a displacement of the object.

Work done is calculated by:

work done = force x distance

$$W = F \times s$$

Joules (J)   **Newtons (N)**   **Metres (m)**
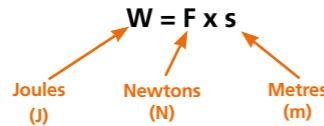
- One joule of work is done when a force of one newton causes a displacement of one metre.
- 1 joule = 1 newton-metre
- Work done against the frictional forces acting on an object causes a rise in the temperature.

Forces and Elasticity

- When work is done on an elastic object (e.g. spring), energy is stored as elastic potential energy.
- When force is applied, object changes shape and stretches.
- When the force is no longer applied, object returns to original shape.

Elastic deformation = temporary shape change – can be reversed.

Inelastic deformation = stretched beyond limit – will not return to original shape.

Force = spring constant x extension

$$F = k \times e$$

Newtons (N)   **Newtons per metre (N/m)**   **Metres (m)**
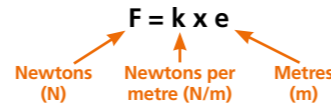
Work done in stretching (or compressing) a spring:

elastic potential = 0.5 x spring constant x (extension)^2 energy

$$Ee = \frac{1}{2} \times k \times e^2$$

P5 – Forces

Hooke's Law

Hooke's law = Force is directly proportional to extension **F ∝ e**

- However, there is a maximum force that if exceeded, spring will not return to original shape – **permanently deformed.**
- This is called **limit of proportionality.**
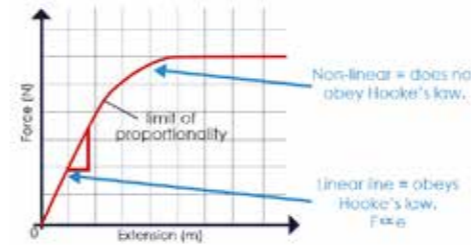
Momentum (HT only)

- Defined by the equation: momentum = mass x velocity

$$p = m \times v$$

Units:
momentum = kilograms metre per second (kg m/s)
mass = kg
velocity = m/s

- In a closed system, total momentum before an event is equal to the total momentum after the event – this is called **conservation of momentum**.

Hooke's Law – Required Practical

$$F = k \times e$$

Aim: Investigate the relationship between force and extension for a spring.

Method

1) Set up equipment as shown.

2) Measure original length of elastic object, e.g. a spring and record this.

3) Attach a mass – record the new length of the spring.

4) Continue adding masses recording the length each time.

5) Work out the extension for each mass using **final length – original length.**

6) Plot a line graph with extension (m) on the x-axis and force (N) on the y-axis.

7) Use the gradient of the graph to calculate the spring constant

P5 – Forces

Distance and Displacement

Distance
- How far an object moves
- Does not involve direction
- Distance = scalar

Displacement
- Includes both the distance an object moves, measured in a straight line from start to finish point, and the direction of that straight line
- Displacement = vector

Speed

- Does not involve direction
- Speed = scalar

You should be able to recall the following typical speeds:

Activity	Typical Speed
Walking	1.5 m/s
Running	3 m/s
Cycling	6 m/s
Speed of sound	330 m/s

Calculating speed: speed = distance x time	**Units** Speed = m/s Distance = m Time = s

Velocity

- Velocity of object = speed in a given direction
- Velocity = vector quantity

Distance-Time and Velocity-Time Graphs

- When object travels in a **straight line**, we can show the distance which has been covered in a **distance-time graph.**

Graph Feature	Distance-Time Graph	Velocity-Time Graph
x-axis	time	time
y-axis	distance	velocity
gradient	speed	acceleration (or deceleration)
plateau	stationary (stopped)	constant speed
uphill straight line	steady speed moving away from start point	acceleration
downhill straight line	steady speed returning to the start point	deceleration
uphill curve	acceleration	increasing acceleration
downhill curve	deceleration	increasing deceleration
area below graph		distance travelled

Changing Speed on a D-T Graph

Acceleration

Deceleration

Straight line = **constant speed**
Curved line = **changing speed**
(HT only) Speed can be calculated by:
- Drawing a **tangent** from the curve and finding the **gradient** of the tangent

---

P5 – Forces

Acceleration

Average acceleration of an object can be calculated using:

$$acceleration = \frac{change\ in\ velociry}{time\ taken}$$

$$(a = \frac{\Delta v}{t})$$

Units:
Acceleration = m/s^2
Change in velocity = m/s
Time = s

Stopping Distance

Stopping distance = thinking distance + braking distance.
- Greater the speed of vehicle – greater the stopping distance.

Thinking Distance (reaction time)

Thinking distance = distance travelled before driver reacts and presses brakes.

Reaction times are typically 0.2s to 0.9s.

Factors that affect a driver's reaction time:
- Tiredness
- Drugs
- Alcohol
- Distractions (e.g. phone/music)

Braking Distance

Braking distance = distance travelled by a vehicle **once brakes are applied** until it reaches a full stop.
It is affected by:
- Adverse weather conditions (wet/icy)
- Poor vehicle conditions (brakes/tyres)

When a force is applied to brakes, **work is done** by the friction between the car wheels and the brakes.
Work done – reduces the **kinetic energy** and it is transferred to **heat energy**, increasing temperature of the brakes.

Increased speed = increased force required to stop the vehicle
Increased braking force = increased deceleration
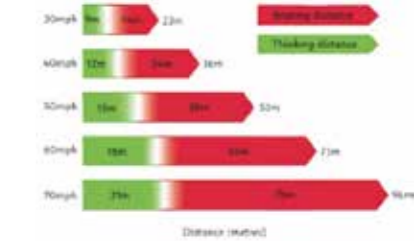
Newton's First Law

If resultant force acting on object is zero:
- Stationary object will remain stationary
- Moving object will continue at a steady speed and in the same direction.

100N resistance
(friction and air)   **100N thrust**

(HT only) Inertia = tendency of an object to continue in a state of rest of uniform motion (same speed and direction)

Newton's Second Law

Acceleration of an object is proportional to resultant force acting on it and inversely proportional to the mass of the object.
Resultant force = mass x acceleration
(HT only) Inertial mass = how difficult it is to change an object's velocity. Defined as ratio of force over acceleration.
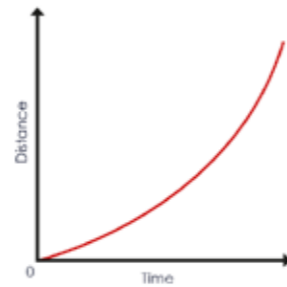
Newton's Third Law

When two objects interact, forces acting on each other are always equal and opposite.
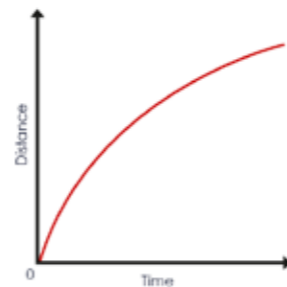e.g. book laid on table. It experiences reaction force from table, table pushed up on book. Book also pushes down on table – forces are equal and opposite.

P5 – Forces – Required Practical - Acceleration

Aim: To investigate the effect of varying force on the acceleration of an object of constant mass.

You may be given any of the following apparatus set-ups to conduct these investigations:

Method (using toy car)

1) On desk, draw chalk lines at equal space (e.g. every 10cm).

2) Place a 1N weight on the pulley attached to the toy car.

3) Hold the toy car at starting point and let go of car.

4) Record the time the car passes each distance marker (can record this on phone and play it back to make it easier to record a more **accurate** time).

5) Repeat the experiment several times, decreasing the weight each time e.g. 0.8N, 0.6N, 0.4N etc.

6) Acceleration is **proportional** to force applied (Newton's second law).

7) Should find that as you increase the force, the acceleration of the object increases.

Independent variable = force applied

Dependent variable = acceleration

Control variables = mass of toy car and surface car is on
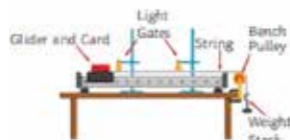
Aim: Investigate the effect of varying mass of an object on the acceleration produced by a constant force.

You may be given any of the following apparatus set-ups to conduct these investigations:

Method (using toy car)

1) On desk, draw chalk lines at equal space (e.g. every 10cm).

2) Place a 1N weight on the pulley attached to the toy car.

3) Add a 100g mass onto the toy car.

4) Hold the toy car at starting point and let go of car.

5) Record the time the car passes each distance marker (can record this on phone and play it back to make it easier to record a more accurate time).

6) Repeat the experiment several times, increasing the mass on the car each time (e.g. 200g, 300g, 400g etc.) whilst keeping the weight (1N) on the pulley constant.

**7)** Acceleration is inversely proportional to mass of object (Newton's second law).

8) Should find as you increase the mass of the object, the acceleration decreases.

Independent variable = mass of car

Dependent variable = acceleration of car

Control variables = force applied and surface car is on
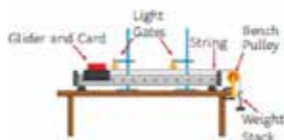
P7 – Magnetism and Electromagnetism

Magnets

- Have two poles called **north** and south.
- Magnetic forces are **strongest** at the **poles**.

- **Like poles** will **repel** each other (e.g. N-N or S-S).
- **Opposite poles** will **attract** (e.g. N-S).
- Magnetism is a **non-contact** force – magnets do not need to be touching for effect to be observed.

Magnetic materials: only **iron, cobalt** and **nickel** are magnetic.

Types of magnets

Permanent magnet
- Has its own magnetic field.
- Magnetism cannot be turned on or off.

Induced magnet
- Induced magnet = a material which becomes magnetic when placed in a magnetic field.
- Induced magnets only attract other materials and lose most (if not all) their magnetism when removed from the magnetic field.

Magnetic Fields

Magnetic field = the area surrounding a magnet where the force will act on another magnet or magnetic material.

You need to draw this!
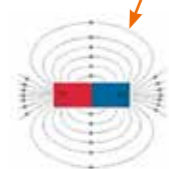
- Magnet field is strongest at the **poles** where the field lines are **closest together.**
- Field lines always go away from **magnetic north** and towards **magnetic south.**

Earth's Magnetic Field

- Earth produces a magnetic field.
- Magnetic compasses use this to help navigation.
- The core of the Earth is made of **iron** (magnetic).
- The north end of a magnet is attracted to the **south magnetic pole** of the Earth.

Plotting Magnetic Field Lines

A magnetic compass can be used to plot and draw the magnetic field lines around a magnet.

You need to be able to describe this method!
1) Place the bar magnet in centre of paper.
2) Using magnetic compass, position it around the bar magnet.
3) Observe direction of needle. Draw a dot at circumference of magnet in line with needle. Draw an arrow to indicate direction of north.
4) Repeat for several positions around magnet.
5) Join the arrows to complete magnetic field lines.

Electromagnetism

- A circular **magnetic field** is produced when a **current** is passed through a conducting wire.
- This produces an **induced magnet.**
- Switching off the magnet causes magnetism to be lost.
- Strength of magnet can be increased by increasing the current.

Coiling the wire will form a solenoid.
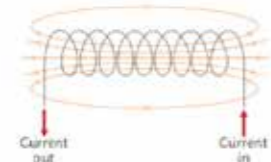
To increase strength of magnetic field around a solenoid you can:
- Add an iron core
- Increase number of turns in coil
- Increase the current passing through wire

Electromagnets

- Electromagnet is a solenoid with an iron core.
- Are **induced magnets** (can be turned on and off).

Uses = electric motors, loudspeakers, electric bells, scrapyards.

P7 – Magnetism and Electromagnetism

The Motor Effect (HT only)

- When a wire carrying a **current** is exposed to another magnetic field, a force is produced on the wire at a **right angle** to the direction of magnetic field produced.
- This is called **motor effect.**
- The force produced by the motor effect can be calculated using:

Force (N) = magnetic flux density (T) x current (A) x length (m)

F = B x I x L

For example:

A current of 8A is flowing through a wire that is 75cm long. The magnetic field acting at a right angle on the wire is 0.5T. Calculate the force.

Force = magnetic flux density x current x length.

Remember: the equation uses length in m. The question has given you the length in cm so you need to convert it before you answer.

F = 0.5 x 8 x 0.75

F = 3N

- If current flowing through wire is **parallel** to magnetic field, **no force** is produced.
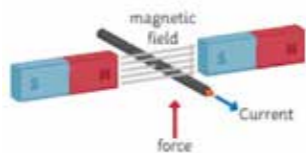
Fleming's left-hand rule

- You may be shown a diagram and asked to indicate direction of force.
- You can use Fleming's left-hand rule to do this (picture).

Remember:
- Use your **left hand!**
- The angle between index and middle should be **right angle.**
- Thumb = direction of **force**.
- Index finger = direction of **magnetic field.**
- Middle finger = direction of **current** through wire.
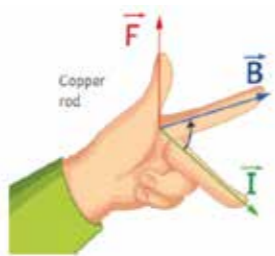
Electric Motors (HT only)

- When wire carrying current is **coiled**, the motor effect causes wire to **rotate**.
- This is how an **electric motor** works.
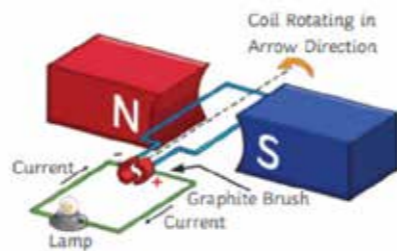
- Current flows (from negative to positive), force produced acts in **opposite directions** causing coil to **rotate** overall.
- When coil reaches a **vertical position,** force is parallel so would be zero – stops rotating.
- To maintain rotation – **split ring commutator** is used to supply current to wire.
- This is a DC supply and ensures current **changes direction** each half-turn to maintain a **constant rotation** in one direction overall.

Grammar & Key Vocabulary

The present tense – regular verbs

Take the ending off the infinitive and replace it with the correct ending for the person you want to talk about:

	-ar	-er	-ir
I (yo)	-o	-o	-o
You (tú)	-as	-es	-es
He/She/It (él/ella)	-a	-e	-e
We (nosotros)	-amos	-emos	-imos
You pl (vosotros)	-áis	-éis	-ís
They (ellos/ellas)	-an	-en	-en

Ejemplo: hab**lar** = **to** speak so hab**lo** = **I** speak (as it is an -ar verb).

Irregular verbs

Some verbs don't follow the pattern above and you just have to learn these ones. These are some of the most common irregular verbs:

|	tener (to have)	ser (to be)	ir (to go)	hacer (to do/make)
I (yo)	tengo	soy	voy	hago
You (tú)	tienes	eres	vas	haces
He/She/It (él/ella)	tiene	es	va	hace
We (nosotros)	temenos	somos	vamos	hacemos
You pl (vosotros)	tenéis	sois	vais	hacéis
They (ellos/ellas)	tienen	son	van	hacen

Some verbs in present tense are only irregular in the 'I' Form

hacer (to do)   hago (I do)
salir (to go out)   salgo (I go out)
ver (to see/watch)   veo (I watch/see)

Stem Changing Verbs

Some Spanish verbs change a bit at the start of the verb as well as the end **except for the we and you pl forms:**

	jugar (to play)	quere (to want)	poder (to be able to)
I (yo)	**jue**go	qu**ie**ro	**pue**do
You (tú)	**jue**gas	qu**ie**res	**pue**des
He/She/It (él/ella)	**jue**ga	qu**ie**ro	**pue**de
We (nosotros)	jugamos	queremos	podemos
You pl (vosotros)	jugáis	queries	podéis
They (ellos/ellas)	**jue**gan	qu**ie**ren	**pue**den

The Preterite Tense -regular verbs

This is used to describe a single, completed action in the past (i.e. not a repeated action) Take the ending off the infinitive and replace it with the correct ending for the person you want to talk about:

	-ar	-er	-ir
I (yo)	-é	-í	-í
You (tú)	-aste	-iste	-iste
He/She/It (él/ella)	-ó	-ió	-ió
We (nosotros)	-amos	-imos	-imos
You pl (vosotros)	-astais	-isteis	-isteis
They (ellos/ellas)	-aron	-ieron	-ieron

Ejemplo: hab**lar** = **to** speak so hab**lo** = **I** speak (as it is an -ar verb).

Preterite tense - Irregular verbs

Some verbs don't follow the regular pattern and you just have to learn these ones. These are some of the most common irregular verbs:

	tener (to have)	ser (to be)	ir (to go)	hacer (to do/make)
I (yo)	tuve	fui	fui	hice
You (tú)	tuviste	fuiste	fuiste	hiciste
He/She/It (él/ella)	tuvo	fue	fue	hizo
We (nosotros)	tuvimos	fuimos	fuimos	hicimos
You pl (vosotros)	tuvisteis	fuiteis	fuiteis	hicisteis
They (ellos/ellas)	tuvieron	fueron	fueron	hacieron

The **imperfect tense** is another past tense. One of the ways it is used is for descriptions in the past. These are the key verbs you need to know to describe someone or something in the past:

era – it/he/she was
estaba – it/he/she was (for location or mood)
tenía – it/he/she had

The near future tense – going to do something. Use the right form of 'ir' (to go), put 'a' in the middle and add an infinitive.

I'm going - Voy a   **You (pl) are going** - Vais a
You're going - Vas a   **They're going** - Van a
He'she/its is going - Va a
We're going - Vamos a

+ infinitive (jugar, salir, ir, ser, montar, hacer, comer, vivir etc)
E.g. voy a jugar = I'm going to play, vamos a salir = we're going to go out

Other ways of talking about future hopes and plans:

I hope	Espero (+ infinitive)	I want	Quiero (+ infinitive)
I would like	Me gustaría (+ infinitive)	I want	Tengo ganas de (+ infinitive)
I intend	Tengo la intención de (+ infinitive)	I am thinking of	Pienso (+ infinitive)

Comparatives – these are phrases that are used to compare things or people. This is how you form them:

mas (adjective) que...	more **(adjective)** than...	e.g. más **interesante** que – more interesting than…
menos (adjective) que...	less **(adjective)** than...	e.g. menos **interesante** que – less interesting than…
tan (adjective) como...	as **(adjective)** as...	e.g. menos **interesante** que – less interesting than…
mejor que	better than...	
peor que	worse than...	

Superlatives – This is how you say something is **the most, the least, the best or the worst.** To form these you need the word 'the' in front of the words used for comparatives. Remember you will need to use the right word for 'the' depending on whether the noun you are talking about is masculine **(el)**, feminine **(la)**, masculine plural **(los)** or feminine plural **(las)**.

el/la/los/las má¡s (+ adjective)	the most (+ adjective)	(e.g. el más importante – the most important)
el/la/los/las menos (+ adjective)	the least (+adjective)	
el/la mejor	the best	
los/las mejores	the best (plural)	
el/la peor	the worst	
los/las peores	the worst (plural)	

The Future Tense

This is used to say **'will** do something' (I **will** go, we **will** play etc.) To form the future tense you do not take the ending off the infinitive about you need to add the following endings which are the same for -ar, -er and -ir verbs:

I (yo)	-é
You (tú)	-ás
He/She/It (él/ella)	-á
We (nosotros)	-emos
You pl (vosotros)	-éis
They (ellos/ellas)	-án

Some verbs have irregular stems in the future tense (the start of the verb) but the endings are the same as in the table above.

	Infinitive	Stem change
to say	decir	dir- (diré – I will say)
to do/make	hacer	har-
to be able to	poder	podr-
to put	poner	pondr-
to leave/go out	salir	saldr-
to have	tener	tendr-
to come	venir	vendr-

The Conditional tense

This is used to say 'would' do something. It works the same as the future tense but the endings are different. The irregular verbs are the same as the future tense irregulars.

I (yo)	-ía
You (tú)	-ías
He/She/It (él/ella)	-ía
We (nosotros)	-íamos
You pl (vosotros)	-íais
They (ellos/ellas)	ían

hay	there is/are
había	there was
habrá	there will be

Reflexive verbs-

These verbs have an extra bit. The infinitives have a '-**se**' on the end and lots of daily routine verbs are reflexive verbs. (e.g. lavar**se** = to get washed etc.). They describe actions that you do to yourself.

First you have to **take off the '-se'** and then treat the verb the same as any other – **change the ending for the right person.**

Then, for this type of verb, you need to add **an extra bit in front of the verb** depending on the person you are referring to.

ducharse (to have a shower)	
I (yo)	**me** duch**o**
You (tú)	**te** duch**as**
He/She/It (él/ella)	**se** duch**a**
We (nosotros)	**nos** duch**amos**
You pl (vosotros)	**os** duch**áis**
They (ellos/ellas)	**se** duch**an**

Some reflexive verbs are also stem-changing:
acostarse (to go to bed) - me ac**ue**sto
despertarse (to wake up) - me desp**ie**rto
vestirse (to get dressed) - me v**i**sto

Talking about what could, should or must be done:

Se puede **+ infinitive**	you can (ejemplo: se puede **ahorrar** energiá – you can **save** energy)
Se debe + infinitive	you must/should (e.g. se debe **reciclar** más – you should **recycle** more)
deberíamos/debemos + infinitive	we should/must
tenemos que + infinitive	we have to
podemos + infinitive	we can

Ser and Estar

Both of these verbs mean **'to be'**. You need to choose the right one depending on what you want to use it for.

Ser is used for:
Description
Origin:(where someone is from)
Character
Time
Occupation

Estar is used for:
Position
Location
Action
Condition
Emotion

	Ser	Estar
I (yo)	soy	estoy
You (tú)	eres	estás
He/She/It (él/ ella)	es	está
We (nosotros)	somos	estamos
You pl (vosotros)	sois	estáis
They (ellos/ellas)	Son	están

Ciudades – Home, town, neighbourhood and region.

En la oficina de turismo	At the tourist office
¿Tiene… ?	Do you have… ?
más información sobre la excursion a…	more information about the trip to…
un plano de la ciudad	a map of the town / city
¿Cuándo abre… ?	When does… open?
¿Cuándo cuesta una entrada?	How much is a ticket?
para adultos / niños	for adults / children
¿Dónde se pueden comprar las entradas?	Where can you buy tickets?
¿A qué hora sale el autobús?	What time does the bus leave?
cada media hora	every half an hour

Las tiendas	Shops
el banco	bank
el estanco	tobacconist's
la carnicería	butcher's
la estación de trenes	train station
la frutería	greengrocer's
la joyería	jeweller's
la librería	book shop
la panadería	bakery
la pastelería	cake shop
la peluquería	hairdresser's
la pescadería	fish shop
la zapatería	shoe shop
sellos	stamps
horario comercial	hours of business
de lunes a viernes	from Monday to Friday
abre a la(s)…	it opens at…
cierra a la(s)…	it closes at…
no cierra a mediodía	it doesn't close at midday
cerrado domingo y festivos	closed on Sundays and public holidays
abierto todos los días	open every day

En mi ciudad	In my town
Hay…	There is/are…
un ayuntamiento	a town hall
un bar / muchos bares	a bar / lots of bars
un castillo	a castle
un cine	a cinema
un centro comercial	a shopping centre
un mercado	a market
un museo /	a museum /
unos museos	a few museums
un parque	a park
un polideportivo	a sports centre
un puerto	a port
muchos restaurantes	lots of restaurants
un teatro	a theatre
una biblioteca	a library
una bolera	a bowling alley
una iglesia	a church
una piscina	a swimming pool
una playa / unas playas	a beach / a few beaches
una plaza Mayor	a town square
una pista de hielo	an ice rink
(una oficina de) Correos	a post office
una tienda / muchas tiendas	a shop / lots of shops
(No) hay mucho que hacer.	There is (not) a lot to do.
Vivo en un pueblo…	I live in a… village
Vivo en una ciudad…	I live in a… town
histórico/a / moderno/a	historic / modern
tranquilo/a / ruidoso /a	quiet / noisy
tranquilo/a / industrial	touristy / industrial
bonito/a / feo/a	pretty / ugly
Está en…	It is in…
el norte / el sur	the north / the south
el este / el oeste	the east / the west
del país	of the country

Los pros y los contras de mi ciudad	The pros and cons of my town/city
Lo mejor de mi ciudad es que…	The best thing about my city is that…
hay tantas diversiones	there are so many things to do
el transporte público	the public transport
es muy bueno	is very good
las tiendas están tan cerca	the shops are so close
hay muchas posibilidades de trabajo	there are a lot of job opportunities
Lo peor es que…	The worst thing is that…
es tan ruidoso/ a	it's so noisy
hay tanto tráfico	there is so much traffic
hay tantas fábricas	there are so many factories
hay pocos es espacios verdes	there are a few green spaces
En el campo…	In the countryside…
la vida es más relajada	life is more relaxed
no hay tanta industria	there's not as much industry
hay bastante desemplo	there is quite a lot of unemployment
la red de transporte público no es fiable	the public transport network is not reliable
no hay tantos atascos	there are not as many traffic jams
Necesitamos más…	We need more…
zonas verdes	green spaces
zonas peatonales	pedestrian zones
rutas para bicis	cycleways

Ciudades – Home, town, neighbourhood and region.

¿Cómo es tu zona?	What is your area like?
Está situado/a…	It is situated…
es un valle	in a valley
al lado del río / mar	by the river / sea
Está rodeado/a de…	It is surrounded by…
sierra / volcanes	mountains / volcanoes…
entre	between
el desierto	the desert
los bosques	the woods
las selvas subtropicales	subtropical forests
los lagos	lakes
Tiene…	It has
un paisaje impresionate	an impressive landscape
lo mejor de una ciudad	the best things of a city
El clima es…	The climate is…
soleado / seco/ frío /	sunny / dry / cold /
variable	variable
Llueve a menudo.	It rains often.
Hay mucha marcha.	There is a lot going on.
Es…	It is…
mi ciudad natal	my home town
mi lugar favorito	my favourite place
famosa/a por…	famous for…
un paraíso	a paradise
Se puede…	You/One can…
pasar mucho tiempo al aire libre	spend lots of time in the open air
apreciar la naturaleza	appreciate nature
subir a la torre	go up the tower
disfrutar de las vistas	enjoy the views
alquilar bolas de agua	hire water balls
Se pueden…	You/One can…
practicar ciclismo y senderismo	do cycling and hiking
probar platos típicos	try local dishes
practicar deportes acuáticos	do water sports

¿Te gusta ir de compras?	Do you like going shopping?
(No) me gusta ir de compras.	I (don't) like going shopping.
Normalmente voy…	Usually I go…
Suelo ir…	I tend to go…
al centro commercial	to the shopping centre
Prefiero / Odio comprar…	I prefer / I hate buying…
en grandes almacenes	in department stores
en tiendas de moda	in fashion shops
en tiendas de segunda mano	in second-hand shops
en tiendas de diseño	in designer shops
en línea	online
por Internet	on the internet
porque…	because…
es muy divertido	it's a lot of fun
es mucho más cómodo	it's much more convenient
hay más variedad	there's more variety
pudes encontrar gangas	you can find bargains
se puede comprar de todo	you can buy everything
la ropa alternativa	alternative clothing
artículos de marca	branded items
hacer cola	to queue
esperar	to wait

¿Por dónde se va al / a la…?	How do you get to the…?
¿Dónde está el / la…?	Where is the…?
¿Para ir al / a la…?	How do I get to the…?
Sigue todo recto	Go straight on
Gira…	Turn
a la derecha / izquierda	right / left
Toma la…	Take the…
primera / segunda / terecera	first / second / third
calle a la derecha	road on the right
calle a la izquierda	road on the left
Pasa…	Go over…
el puente / los semáforos	the bridge / the traffic lights
Está…	It is…
cerca / lejos	near / far
enfrente de	opposite
(la piscina)	(the swimming pool)

¿Qué harás mañana?	What will you do tomorrow?
Visitaré la catedral.	I will visit the cathedral.
Sacaré muchas fotos.	I will take lots of photos.
Subiré al teleférico.	I will go up the cable car.
Nadaré en el mar.	I will swim in the sea.
Descansaré en la playa.	I will relax on the beach.
Iré al polideportivo.	I will go to the sports centre.
Jugaré al bádminton.	I will play badminton.
Haré una excursión…	I will go on a… trip.
en barco / en autobús	by boat / by bus
Veré delfines.	I will see dolphins.
Iré de compras.	I will go shopping.
Compraré regalos.	I will buy presents.
El primer día	On the first day
El segundo día	On the second day
Otro día	Another day
El último día	On the last day
Si…	If…
hace sol	it's sunny
hace calor	it's hot
hace mal tiempo	it's bad weather
hace viento	it's windy
llueve	it rains
hay chubascos	there are showers
¡Qué bien!	How great!
¡Qué guay!	How cool!
¡Buena idea!	Good idea!
De acuerdo.	OK.

Hacia un mundo mejor – environment, local and global issues.

¿Cómo es tu casa?	What is your house like?
Vivo en…	I live in…
un bloque de pisos	a block of flats
una casa individual	a detached house
una casa adosada	a semi-detached / terraced house
una residencia de ancianos	an old people's home
una finca / granja	a farmhouse
Alquilamos una casa amueblada.	We rent a furnished house.
Está en…	It is in / on…
un barrio de la ciudad	a district / suburb of the city / town
las afueras	the outskirts
el campo	the country
la costa	the coast
la montaña / sierra	the mountains
el cuarto piso de un edificio antiguo	the fourth floor of an old building
Mi apartamento / piso tiene…	My apartment / flat has…
tres dormitorios	three bedrooms
dos cuartos de baño	two bathrooms
una cocina amplia y bien equipada	a spacious, well-equipped kitchen
un comedor recién renovado room	a recently refurbished dining
un estudio	a study
un aseo	a toilet
un sótano	a basement / cellar
un salón	a living room
una mesa	a table
unas sillas	some chairs
Mi casa ideal sería…	My ideal house would be…
Tendría…	It would have…
una piscina climatizada	a heated swimming pool
mi propio cine en casa	my own home cinema
una sala de fiestas	a party room
Cambiaría los muebles.	I would change the furniture.
Pintaría … de otro color.	I would paint … another colour.

¿Cuáles son los problemas globales más serios hoy en día?	What are the most serious global issues today?
Me preocupa(n)…	I am worried about…
el paro / desempleo	unemployment
el hambre / la pobreza	hunger / poverty
la deforestación	deforestation
la diferencia entre ricos y pobres	the difference between rich and poor
la drogadicción / la salud /	drug addiction / health /
la obesidad	obesity
la crisis económica	the economic crisis
los problemas del medio ambiente	environmental problems
los sin hogar / techo	the homeless
los animales en peligro de extinción	animals in danger of extinction
Es necesario / esencial que…	It's necessary / essential that (we)…
cuidemos el planeta	look after the planet
hagamos proyectos de conservación	do conservation projects
compremos / usemos productos verdes / de comercio justo	buy / use green / fairtrade products
apoyemos proyectos de ayuda	support aid projects
creemos oportunidades de trabajo	create job opportunities
ayudemos a evitar el consumo de sustancias perjudiciales	help to avoid the consumption of harmful substances
ahorremos agua	save water
construyamos más casas	build more houses
cambiemos la ley	change the law
consumamos menos	consume less
hagamos campañas publicitarias	carry out publicity campaign[5]
recaudemos dinero	raise money
para organizaciones de caridad	for charities in the third world
en el tercer mundo	
No es justo / Es terrible que	It's not fair / terrible that there is….
haya…	is…
tanta desigualdad social / contaminación	so much social inequality / pollution
tanta gente sin trabajo y sin techo	so many people out of work and homeless
tanta gente obesa y tantos drogadictos	so many obese people and so many drug addicts

¡Actúa localmente!	Act locally!
Hay demasiada…	There is / are too much / many…
basura en las calles	rubbish on the streets
gente sin espacio para vivir	people with nowhere to live
destrucción de los bosques	destruction of woodland / forest
polución de los mares y ríos	pollution of seas and rivers
El aire está contaminado.	The air is polluted.
Los combustibles fósiles se acaban.	Fossil fuels are running out.
No corte tantos árboles.	Don't cut down so many trees.
No vaya en coche si es posible ir a pie.	Don't go by car if it's possible to walk.
No tire basura al suelo.	Don't throw rubbish onto the ground.
No malgaste energía.	Don't waste energy.
No construya tantas casas grandes.	Don't build so many large houses.
No eche tantos desechos químicos.	Don't release so much chemical waste.
Plante más bosques y selvas.	Plant more woods and forests.
Reduzca las emisiones de los vehículos.	Reduce vehicle emissions.
Recicle el papel, el vidrio y el plástico.	Recycle paper, glass and plastic.
Use energías renovables.	Use renewable energy.
Diseñe casas más pequeñas.	Design smaller houses.
Introduzca leyes más estrictas.	Introduce stricter laws.
Ilevar una vida más verde	(to) live a greener life
salvar el planeta	(to) save the planet
reducir la huella de (	to) reduce your
carbono	carbon footprint
ecológico/a	environmentally friendly
el techo	roof
el agua de lluvia	rain water
el domicilio	home
los recursos naturales	natural resources
los paneles solares	solar panels
la arena	sand
los (eco-)ladrillos	(eco-)bricks
una fábrica	a factory
mudarse (de casa)	(to) move house

Hacia un mundo mejor – environment, local and global issues.

¿Cómo se debería cuidar el medio ambiente en casa?	How should you look after the environment at home?
Para cuidar el medio ambiente	To care for the environment
se debería…	you / one should…
apagar la luz	turn off the light
ducharse en vez de bañarse	have a shower instead of taking a bath
separar la basura	separate the rubbish
reciclar el plástico y el vidrio	recycle plastic and glass
desenchufar los aparatos eléctricos	unplug electric appliances
ahorrar energía	save energy
cerrar el grifo	turn off the tap
hacer todo lo posible	do everything possible
no se debería…	you / one should not…
malgastar el agua	waste water
usar bolsas de plástico	use plastic bags

Una dieta sana	A healthy diet
los alimentos	foods
lácteos	milk products
fideos	noodles
grasas	fats
dulces	sugars / sweet things
legumbres	pulses
frutos secos	nuts and dried fruit
grasa	fat
sal	salt
azúcar	sugar
el sabor	taste
tiempo para cocinar	time to cook
protege contra el cáncer	protects against cancer
combate la obesidad	combats obesity
reduce el riesgo de enfermedades	reduces the risk of diseases
evitar comer / beber…	avoid eating / drinking…
cambiar mi dieta	change my diet
llevar una dieta equilibrada	have a balanced diet
preparar con ingredientes frescos	prepare with fresh ingredients
engordar	to put on weight
saltarse el desayuno	to skip breakfast

¡El deporte nos une! ¿Para qué sirven…?	Sport unites us! What are…for?
los eventos deportivos internacionales	international sporting events
los grandes acontecimientos deportivos	big sporting events
los Juegos Paralímpicos / Olímpicos	the Paralympics / Olympics
la Copa Mundial del Fútbol	the Football World Cup
Sirven para…	They serve to…
promover…	promote / foster / encourage…
la participación en el deporte	participation in sport
el espíritu de solidaridad	team spirit
regenerar los centros urbanos	regenerate city centres
elevar el orgullo nacional	increase national pride
transmitir los valores de respeto y convey / instil the disciplina	values of respect and discipline
unir a la gente	unite people
dar un impulso económico	give a boost to the economy
inspirar a la gente	inspire people
Una / Otra	A / Another
desventaja es…	disadvantage is…
el riesgo de ataques terroristas	the risk of terrorist attacks
el tráfico	the traffic
el dopaje	doping
la deuda	the debt
el coste de organización de la	the cost of organising
seguridad	the security
la ciudad anfitriona	the host city
el voluntariado	volunteering
Solicité un trabajo	I applied for a
voluntario	volunteering job
porque…	because…
(Nunca) Había sido…	I had (never) been…
Antes ya había trabajado como…	Previously I had already worked as…

¡Vivir a tope!	Live life to the full
Beber alcohol…	To drink / Drinking alcohol…
Fumar cigarrillos / porros…	To smoke / Smoking cigarettes / joints…
Tomar drogas blandas / duras…	To take / Taking soft / hard drugs…
Es / No es…	It is / isn't…
ilegal / peligroso	illegal / dangerous
un malgasto de dinero	a waste of money
una tontería / un problema serio	stupid / a serious problem
un vicio muy caro	an expensive habit
muy perjudicial para la salud	very damaging to your health
tan malo	as bad
provoca mal aliento	causes bad breath
daña los pulmones	damages the lungs
mancha los dientes de amarillo	stains your teeth yellow
causa el fracaso escolar	causes failure at school
depresión	depression
produce una fuerte dependencia física	produces a strong, physical dependence
tiene muchos riesgos	has many risks
afecta a tu capacidad para tomar	affects your capacity
decisiones	to make decisions
te relaja / te quita el estrés	relaxes you / relieves stress
te quita el sueño /	control robs you of sleep / self-control
te hace sentir bien / más adulto	makes you feel good / more adult
Es fácil engancharse.	It is easy to get hooked.
¡Qué asco!	How disgusting!
Cedí ante la presión de grupo.	I gave in to peer pressure.
Caí en el hábito de…	I fell into the habit of…
Empecé a…	I started to…
Perdí peso.	I lost weight.
No puedo parar.	I can't stop.
Ya he empezado a…	I've already started to…
Todavía no he dejado de…	I still haven't given up…
A partir de ahora intentaré…	From now on I will try to…

Hacia un mundo mejor – environment, local and global issues.

¡Apúntate!	Sign up!
¿Qué estabas haciendo?	What were you doing?
Estaba / Estábamos / Estaban…	I / He/She/It was / We were/They were…
ensayando	rehearsing
nevando	snowing
entrando en casa	coming into the house
durmiendo	sleeping
conduciendo por la ciudad	driving through the city
leyendo	reading
volando por el aire	flying through the air
Se estaba convirtiendo en un río.	It was turning into a river.
Se estaba moviendo.	It was moving.
a mi alrededor	around me
Se estaban cayendo.	They were falling.
¿Cómo te enteraste del/de la/	How did you find out about
de las…?	the..?
temblor	tremor
incendio forestal	forest fire
huracán	hurricane
tornado	tornado
terremoto	earthquake
tormenta de nieve	snow storm
acción humanitaria	humanitarian campaign
inundaciones	floods

Estaba…	I / He/She was…
mirando/viendo las noticias / la tele	watching the news / the TV
buscando informaciones en línea	looking for information online
charlando con un amigo / una amiga	chatting with a friend
leyendo un post en	Facebook reading a Facebook post
cuando…	when…
encontré un reportaje / un artículo	I found a report / an article
recibí un SMS	I received a text message
(lo) vi en las noticias	I saw (it) on the news
mi novio me llamó / me contó	my boyfriend called/told me
la historia	the story
una organización de servicio voluntario	a voluntary organisation
una campaña para las víctimas	a campaign for the victims
una caja de supervivencia	a survival box
Decidí apuntarme.	I decided to sign up.
recaudar fondos /	to raise funds /
solicitar donativos	ask for donations
organizamos algunos eventos	we organised some events
un concierto / un espectáculo de baile	a concert / a dance show
una carrera de bici apadrinada	a sponsored bike race
una venta de pasteles	a cake sale
ser solidario	showing solidarity / supporting…
Te hace sentir más conectado con	Makes you feed more connected
los demás.	to others.

Notes

Notes

Y11 KNOWLEDGE ORGANISER

SEPTEMBER 2024 TO FEBRUARY 2025