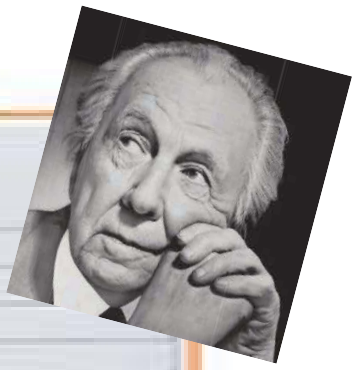
Knowledge Organisers

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

John 10: 10

Year 10 - GCSE

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



Name: _____

Form: _____

Knowledge Organisers at St John Fisher Catholic School

Why do we have Knowledge Organisers?

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

How do I use it?

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

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

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

How will my teachers use it?

Your teachers may set homework to learn parts of the Knowledge Organiser or set tasks from what is on there. You will be expected to complete between 45-60 minutes of homework for each subject according to the homework timetable.

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

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

What do I do if I lose it?

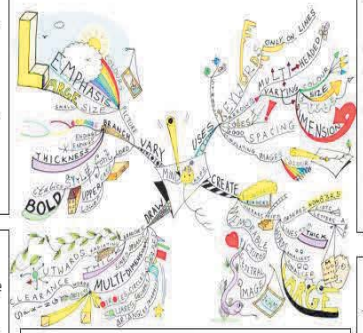
All Knowledge Organisers are on the school website. However, you can purchase a copy at student services if you lose this.

GCSE Art

Mind Mapping – Ideas presented around the theme of the work

Central idea.
This is the starting point of your Mind Map and represents the topic you are going to explore.
Your central idea should be in the centre of your page and should include an image that represents the Mind Map's topic.

Branches.
The main branches which flow from the central image are the key themes. You can explore each theme or main branch in greater depth by adding smaller branches.



Key words.
When you add a branch to your Mind Map, you will need to include a key idea. An important principle of Mind Mapping is using **one word per branch.** Keeping to one word sparks off a greater number of associations compared to using multiple words or phrases.

Colour coding.
This links the visual with the logical and helps your brain to create mental shortcuts. The code allows you to categorise, highlight and analyse information. Colours also make images more appealing and engaging.

Include images.
Images have the power to convey much more information than a word or sentence. They are processed instantly by the brain and act as visual stimuli to recall information.

Moodboard – A collage of ideas using collected images

Consider your theme.
Do you want it quite narrow or are you happy to collect a wider range of ideas.

Use a range of sources.
Internet images, photographs, wallpaper/fabric samples, lettering.

Don't limit yourself.
Even if it doesn't directly link to your starting point it may relate to the theme. Consider colours and words to help you.

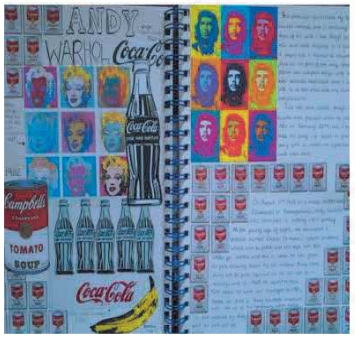
Apply your ideas.
Your moodboard will directly link to the development of your project. If there is empty space fill it with sketches or annotations.

Pick a style.
Pulling it all together with a colour theme or visual style will make your page work together as a whole.

Artist Research – showing your understanding of an artists work or style

Biographical information.
Birth, death, style, education, important works

Social, historical and economic influences.
What was happening at the time? Were they responding to anything that was happening around them?



Technical information.
How was their produced? What methods and materials did they use?

Artistic influences.
Who influenced their work? Did their work influence anyone else?

Collected images.
Select images that are relevant and that appeal to you, make comments about why you like them

Copied images.
Show your understanding by reproducing examples of their work

Presentation.
Must be A3 or 2 A4 sheet, include a clear title and relevant background

Analysing Art Work

Content – Looking at the subject of the work.
What is it? What exactly can you see? What is happening? What does the work represent?
What does the artist call the work?
Does the title change the way we see the work?
What is the theme of the work?
Landscape, portrait, journey, moment, memory, event, surreal, fantasy, abstract, message.

Form – Looking at the formal elements.
What colours does the artist use? Why? How is the colour organised?
What kind of shapes can you see?
What kinds of lines and marks does the artist use?
What is the surface like? What textures can you see?
What patterns can you see?
How big is the work?
Light, delicate, layered, strong, rough, dark, peaceful, dripped, textured, scale, vivid, bright.

Process – How the work has been developed and made.
What materials and tools have been used?
What is the evidence for how it has been made?
Painted, drawn, woven, printed, cast, stitched, constructed, collaged.

Mood – Looking at the communication of moods and feelings.
How does the work make you feel?
Why do you feel like this?
Does the colour, texture, form or theme of the work affect your mood?
Quiet, contemplative, thoughtful, hopeful, peaceful, elated, joyful, reflective.

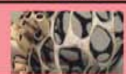
Assessment Objective 1: Contextual Understanding – Develop ideas through investigations, demonstrating critical understanding of sources

GCSE Art

Assessment Objective 2: Creative Making –refine work by exploring ideas and experimenting with appropriate media, materials, techniques and processes

Media	The substance that an artist use to make art.
Materials	The same as media but can also refer to the basis of the art work eg, canvas, paper, clay.
Techniques	The method used to complete the art work, can be generic such as painting or more focus such as blending.
Processes	The method used to create artwork that usually follows a range of steps rather than just one skill.

Colour Theory	
Primary= RED, YELLOW, BLUE	Complimentary; Colours opposite on the colour wheel
Secondary= Primary+Primary	Harmonious; Colours next to each other on the wheel
Tertiary= Secondary+Primary	Monochromatic; shades, tones & tints of one colour
Shades –add black	Hue –the pigment
Tint –add white	Warm; RED, ORANGE YELLOW. Cold; BLUE, GREEN, PURPLE

Pencil		The basic tool for drawing, can be used for linear work or for shading
Biro		Drawings can be completed in biro and shaded using hatching or cross hatching
Pastel (chalk/oil)		Oil and chalk pastels can be used to blend colours smoothly, chalk pastels give a lighter effect
Coloured pencil		Coloured pencil can be layered to blend colours, some are water soluble
Acrylic paint		A thick heavy paint that can be used smoothly or to create texture
Watercolour		A solid or liquid paint that is to be used watered down and layered
Gouache		A pure pigment paint that can be used like watercolours or more thickly for an opaque effect
Pressprint		A polystyrene sheet that can be drawn into to print white lines – can be used as more than 1 layer
Monoprint		Where ink is transferred onto paper by drawing over a prepared surface
Collograph		A printing plate constructed of collaged materials
Card construction		Sculptures created by building up layers of card or fitting together
Wire		Thick or thin wire manipulated to create 2d or 3d forms
Clay		A soft substance used for sculpting, when fired can be glazed to create shiny colourful surfaces
Batik		A fabric technique using hot wax to resist coloured inks
Silk painting		Fabric inks painted onto silk, Gutta can be used as an outliner to prevent colours mixing

GCSE Art

Methods of Recording

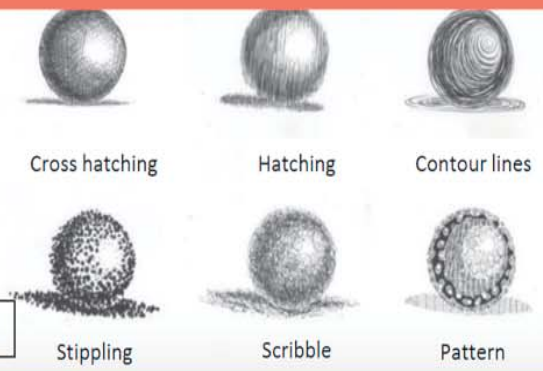
Observational drawing	Drawing from looking at images or objects
First hand observation	Drawing directly from looking at objects in front of you
Second hand observation	Drawing from looking at images of objects
Photographs	Using a camera or smartphone to record images will class as first hand observation
Sketches	Basic sketches and doodles can act as a starting point for development

Stages of Drawing

Basic Shapes → Accurate Shapes → Detail → Shade

Tonal shade
Produce a range of tones by varying the pressure and layering – consider using softer pencils for darker shades

Alternative shade techniques



Annotation

Describes writing notes, using images and explaining your thoughts to show the development of your work.

Step 1: Describe
What is this an image of?
What have you done here?
What was this stage od the project for?

Step 2: Explain
How was this work made?
How did you produce particular effects?
How did you decide on the composition?

Step 3: Reflect
Why did you use these specific methods?
Why do particular parts work better than others?
Why might you do things differently next time?

Assessment Objective 3: Reflective Recording –Record ideas, observations and insights relevant to intentions as work progresses

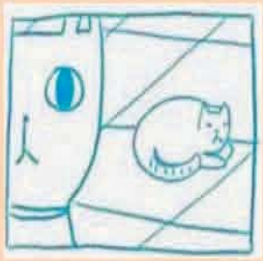
GCSE Art

The Formal Elements

LINE	the path left by a moving point, e.g. a pencil or a brush dipped in paint. It can take many forms, e.g. horizontal, diagonal or curved.
TONE	means the lightness or darkness of something. This could be a shade or how dark or light a colour appears
TEXTURE	the surface quality of something, the way something feels or looks like it feels. There are two types : Actual and Visual
SHAPE	an area enclosed by a line. It could be just an outline or it could be shaded in.
PATTERN	a design that is created by repeating lines, shapes, tones or colours. can be manmade, like a design on fabric, or natural, such as the markings on animal fur.
COLOUR	There are 2 types including Primary and Secondary . By mixing any two Primary together we get a Secondary

A Rough	A Visual/ Maquette	Final Piece
A basic sketch of a final idea	A small image or model created in selected materials	An image or sculpture pulling all preparatory work together

Rule of thirds – Place focal objects at 1/3 or 2/3 of the image horizontally or vertically. Not in the middle



Balance elements. If there is an emphasis on one side balance it out with smaller objects on the other

Simplify and fill. Enlarge or crop the image to fill the space

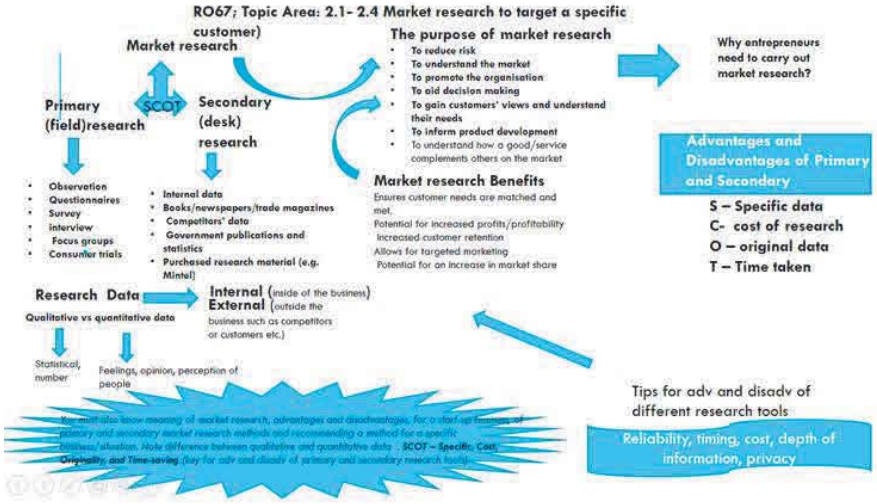
Use lines. Lines will draw the viewer in, they don't have to be straight, consider S or C

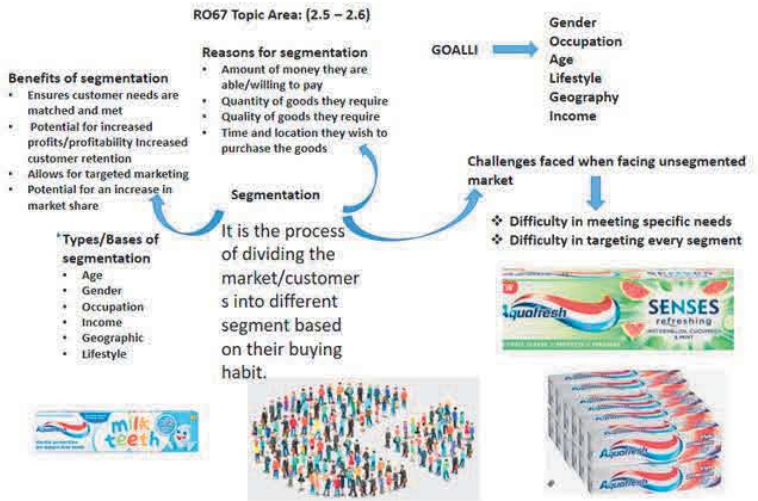
Assessment Objective 4: Personal Presentation: Present a personal and meaningful response that realises intentions and demonstrates understanding of visual language.

Year 10 Enterprise and Marketing Knowledge Organiser (R067 and R068) Autumn term

AIM: This term we will learn market research and sampling tools, then conduct a research on a given case study.

Assessment: Coursework and homework which is set weekly





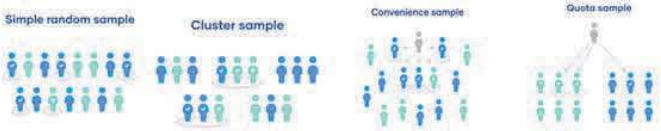
Sampling techniques

Random - every member of the population has an equal chance of being selected. Your sampling frame should include the whole population

Clusters - also involves dividing the population into subgroups, but each subgroup should have similar characteristics to the whole sample. Instead of sampling individuals from each subgroup, you randomly select entire subgroups

Convenience - A convenience sample simply includes the individuals who happen to be most accessible to the researcher or have relevant information needed.

Quota - a type of non-probability sampling where researchers will form a sample of individuals who are representative of a larger population



Design Mix: The design mix refers to three aspects of design that companies need to consider when developing a product. All three are functions, manufacturing costs, and aesthetics.

KEY SKILLS: Research, I.T, Analytical and Evaluative skills

Algorithms

An **algorithm** is a sequence of ordered instructions that are followed step-by-step to solve a problem. This does *not* need to be on a computer.

Decomposition is the breaking down of a complex problem into smaller more manageable problems that are easier to solve.

Abstraction allows us to remove unnecessary detail from a problem leaving us with only the relevant parts of a problem thereby making it easier to solve.

Algorithm Efficiency More than one algorithm can be used to solve the same problem. Normally we use the algorithm that solves the problem in the quickest time with the fewest operations or makes use of the least amount of memory.

Dry run testing is carried out using **trace tables**. The purpose of the trace tables is for the programmer to track the value of the variables and outputs at each step of the program and to track how they change throughout the running of the program.

Flowchart Symbols

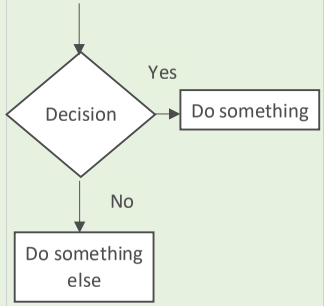
Start and Stop

Process – An operation that the algorithm performs

Connector – Links all the other symbols together

Input and Output of data that is read in and written out

Decision is the same as a selection (if then … else)




```
IF answer is "yes" THEN
      do something
ELSE IF answer is "no"
      do something else
ENDIF
```

Pseudocode

	Example	Python equivalent
Variable assignment	a ← 10	a = 10
Constant assignment	constant PI ← 3.142	PI = 3.142
Input	a ← USERINPUT	a = input()
Output	OUTPUT "Bye"	print("Bye")
Arithmetic Operators		
Integer division	a ← 7 DIV 2	a= 7 // 2
Modulus (remainder)	a ← 7 MOD 2	a = 7 % 2
Relational Operators		
Less than	<	<
Greater than	>	>
Equal to	=	==
Not equal to	≠ or <>	!=
Less than or equal to	≤	<=
Greater than or equal to	≥	>=
Boolean Operators		
AND	AND	AND
OR	OR	OR
NOT	NOT	NOT
Selection		

if ..	IF i > 2 THEN
	  j ← 10
	ENDIF
		if i > 2:
		  j=10

if .. else …	IF i > 2
	THEN
	  j ← 10
	ELSE
	  j ← 3
	ENDIF
		if i > 2:
		  j=10
		else:
		  j=3

if … else if … else	IF i ==2 THEN
	  j ← 10
	ELSE IF i==3
	THEN
	  j ← 3
	ELSE
	  j ← 1
	ENDIF
		if i ==2:
		  j=10
		elif i==3:
		  j=3
		else:
		  j=1

Iteration		

While loops	a ← 1
	WHILE a < 4
	  OUTPUT a
	  a ← a + 1
	ENDWHILE
		while a<4:
		  print(a)
		  a=a+1

For loops	FOR a ← 0 TO 3
	  OUTPUT a
	ENDFOR
		for a in range(3):
		  print(a)

Repeat loops	a ← 1
	REPEAT
	  OUTPUT a
	  a ← a + 1
	UNTIL a←4	

Subroutines		

procedure	SUB hello()
	  OUTPUT "hello"
	ENDSUB
		def hello():
		  print("hello")

Function (with paramerters and return)	SUB add(n)
	  a ← 0
	  FOR a ← 0 TO n
	  a ← a + n
	  ENDFOR
	  RETURN a
	ENDSUB
		def add(n):
		  a=0
		  for a in range(n+1):
		  a=a+n
		  return a

Built-in functions		
Length of array	LEN(a)	len(a)
Random integer	RANDOM_INT(0, 9)	import random random.randint(0,9)

Searching Algorithms

Linear Search Algorithm

- The purpose of the linear search algorithm is to find a target item within a list.
- Compares each list item one-by-one against the target until the match has been found and returns the position of the item in the list.
- If all items have been checked and the search item is not in the list then the program will run through to the end of the list and return a suitable message indicating that the item is not in the list.
- The algorithm runs in linear time. If *n* is the length of the list, then at worst the algorithm will make *n* comparisons. At best it will make 1 comparison and on average it will make (*n+1*)/2 comparisons.
- The performance of the algorithm will be improved if the target item is near the start of the list.

Binary Search Algorithm

- The binary search algorithm works on a sorted list by identifying the middle value in the list and comparing it with the search item.
- If the search item is smaller the mid element becomes the new high value for the search area.
- If the search item is larger the mid element becomes the low value for the search area.
- The keeps repeating until the search item is found.
- When the search item is found the index position of the item is returned.
- At each iteration the search are halved in size consequently this is an efficient algorithm.

Linear search versus binary search

	Advantages	Disadvantages
Linear Search	• Very simple algorithm and easy to implement • No sorting required • Good for short lists	• slow because it searchers through the whole list • very inefficient for long lists
Binary Search	• much quicker than linear search, because it halves the search zone each step	• The list need to be ordered

Sorting Algorithms

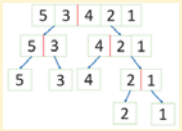
Bubble Sort

- The purpose of sorting algorithms is to order an unordered list. Item can be ordered alphabetically or by number.
- Bubble sort steps through a list and compares pairs of adjacent numbers. The numbers are swapped if they are in the wrong order. For an ascending list if the left number is bigger than the right number the items are swapped otherwise the numbers are not swapped.
- The algorithm repeatedly passes through the list until no more swaps are needed.

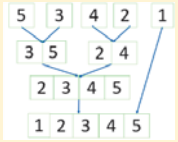
Merge Sort

- Merge sort is a type of divide and conquer algorithm.
- There are two steps: divide and combine
- Merge sort works by dividing the unsorted list sublists. It keeps on doing this until there is 1 item in each list.
- Pairs of sublists are combined into an ordered list containing all items in the two sublists. The algorithm keeps going until there is only 1 ordered list remaining.
- Merge sort is a recursive function, that calls itself.

Step 1: Divide



Step2: Combine



Merge sort Versus Bubble sort

	Advantages	Disadvantages
Bubble sort	Very simple and robust algorithm	Can be slow particularly for long lists. As the number of items increases the time taken for the algorithm to run increases dramatically.
Merge sort	Much faster than bubble sort especially when the number of elements is large	More complex to understand Step 1: Divide Step 2: Combine

Define the term algorithm.

[2 marks]

The following are computer science terms (labelled **A – E**).

A abstraction
B data type
C decomposition
D efficiency
E input

For each of the definitions in the table, write the label of the most suitable computer science term. Use a label only once.

[3 marks]

	Label
Breaking a problem down into a number of sub-problems.	
The process of removing unnecessary detail from a problem.	
Defines the range of values a variable may take.	

Fill in the values in the boxes to show how the merge part of the merge sort algorithm operates. The first and last rows have been completed for you.

[3 marks]

7	3	4	1	2	8	5	6
1	2	3	4	5	6	7	8

Programming - Python

Comment – Text within the code that is ignored by the computer. A Python comment is preceeded by a #.

```
# This is an example of a comment
```

Output – Processed information that is sent out from a computer

Python	Pseudocode

`print("Hello World!")`
Hello World!
`print("Hello"+"World!")`
HelloWorld!
`print("Hello\nWorld!")`
Hello
World!
	`OUTPUT "Hello World"`

Input – Data sent to a computer to be processed

`print("Enter name")`
`name=input()`
`print("Hello", name)`
`print("Enter age")`
`age=int(input())`
	`OUTPUT "Enter name"`
	`name ← USERINPUT`
	`OUTPUT "Hello", name`
	`OUTPUT "Enter age"`
	`age ← USERINPUT`

Assignment - The allocation of data values to variables, constants, arrays and other data structures so that the values can be stored.

- *Variable* – Value that can change during the running of a program. By convention we use lower case to identify variables (eg `a=12`)
- *Constant* – Value that remains unchanged for the duration of the program. By convention we use upper case letters to identify constants. (e.g. `PI=3.141`)

Data Types

Integer – Whole number	`age = 12`	`age ← 12`
Float (real) number – A number with a decimal point	`height = 1.52`	`height ← 12`
Character – A single letter, symbol or number	`a = 'a'`	`a ← 'a'`
String – multiple characters	`name = "Bart"`	`name ← "Bart"`
Boolean – Has two values: true of false.	`a = True` `b = False`	`a ← True` `b ← False`

Sequencing represents a set of steps. Each line of code will have some operation and these operations will be carried out in order line-by-line

Using + operator for adding
`a = 1`
`b = 2`
`c = a + b`
`print(c) -> 3`
	`a ← 1`
	`b ← 2`
	`c ← a + b`
	`OUTPUT c`

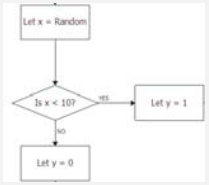
Using + operator for concatenation
`a = 'Hello '`
`b = 'World'`
`c = a + b`
`print(c) -> Hello World`
	`a ← 'Hello '`
	`b ← 'World'`
	`c ← a + b`
	`OUTPUT c`

Random number

Random integer	`import random` `random.randint(0,9)`	`RANDOM_INT(0,9)`
Choice	`random.choice('a','b','c')`	
Random value from 0 to 1	`random.random()`	

Selection represents a decision in the code according to some condition. The condition is met then the block of code is executed otherwise it is not. Often alternative blocks of code are executed according to some condition.

```
x=RANDOM_INT()
IF  x < 10 THEN
 y=1
ELSE
 y=0
ENDIF
```



IF ...	`IF i > 2 THEN`
	`j ← 10`
	`ENDIF`
		`if i > 2:`
		`j=10`

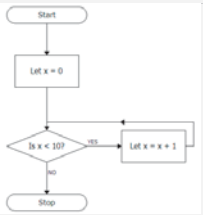
IF ... ELSE ...	`IF i > 2 THEN`
	`j ← 10`
	`ELSE`
	`j ← 3`
	`ENDIF`
		`if i > 2:`
		`j=10`
		`else:`
		`j=3`

IF ... ELSE IF ... ELSE	`IF i ==2 THEN`
	`j ← 10`
	`ELSE IF i==3`
	`j ← 3`
	`ELSE`
	`j ← 1`
	`ENDIF`
		`if i ==2:`
		`j=10`
		`elif i==3:`
		`j=3`
		`else:`
		`j=1`

Iteration Sometimes we wish the code to repeat a set of instructions

`WHILE` loops are used when the we do not know beforehand the number of iterations needed and this varies according to some condition.

```
x = 0
while (x < 10):
      x = x + 1
```



`while True:`
`print("Hello World")`
	`WHILE TRUE`
	`OUTPUT "Hello World"`
	`ENDWHILE`

`a=0`
`while a<4:`
`print(a)`
`a=a+3`
	`a ← 0`
	`WHILE a < 4`
	`OUTPUT a`
	`a ← a + 3`
	`ENDWHILE`

`FOR` loops are used when we know before hand the number of iterations we wish to make.

`for a in range(3):`
`print(a)`
	`FOR a ← 0 TO 3`
	`OUTPUT a`
	`ENDFOR`

Nested structures - Use constructs (e.g. `WHILE`, `FOR`, `IF`) inside another.

use a nested FOR loop to print out a grid	`for i in range (10):`
	`for i in range (10):`
	`print ("x ",end="")`
	`print()`

Use a nested while and if to print out only even numbers	`i=0`
	`while i<51:`
	`if (i%2==0):`
	`print(i)`
	`i=i+1`

Strings

Get length of a string	`len("Hello")`	`LEN("Hello")`
Character to character code	`ord("a") -> 97`	`ORD("a")`
Character code to character	`chr(101) -> 'e'`	`CHR(101)`

String to integer	a=int("12")	a=INT("12")
String to float	a=float("12.3")	a=FLOAT("12.3")
integer to string	a=str(12)	a=STR(12)
real to string	a=str(12.3)	a=STR(12.3)

Concatenation -merge multiple strings together	a="hello " b="world" c=a+b print(c) -> hello world
Return the position of a character If there is more than 1 of the same character the position of the first character is returned.	student = "Hermione" student.index('i')
Find the character at a specified position	student = "Hermione" print(student[2]) -> r

sub strings - select parts of a string

Example	student="Harry Potter"	
Output the first two characters	print(student[0:2])	Ha
Output the first three characters	print(student[:3])	Har
Output characters 2-4	print(student[2:5])	Rry
Output the last 3 characters	print(student[-3:])	Ter
Output a middle set of characters	print(student[4:-3])	y Pot

Subroutines are a way of managing and organising programs in a structured way. This allows us to break up programs into smaller chunks.

- Can make the code more modular and more easy to read as each function performs a specific task.
- Functions can be reused within the code without having to write the code multiple times.

- **Procedures** are subroutines that do not return values
- **Functions** are subroutines that have both input and output

Procedure: *No input parameters or return*	SUB greeting() OUTPUT "hello" ENDSUB	def greeting(): print("hello") call: greeting()
Procedure: One input parameter, no return	SUB greeting(name) OUTPUT "Hello",name ENDSUB	def greeting(name): print("Hello",name) greeting("grey")

Function:
1 input parameter, and 1 return value
	SUB add(n)
	a ← 0
	FOR a ← 0 TO n
	a ← a + n
	ENDFOR
	RETURN a
	ENDSUB
		def add(n):
		a=0
		for a in range(n+1):
		a=a+n
		return a

Function: *Two input parameters, and 1 return value*	SUB (num1,num2) sum=num1+num2 return sum	def add(num1,num2): sum=num1+num2 return sum greeting(1,2)

The **scope** of a variable determines which parts of a program can access and use that variable.
A **global variable** is a variable that can be used anywhere in a program. The issue with global variables is that one part of the code may inadvertently modify the value because global variables are hard to track.
A **local variable** is a variable that can only be accessed within a certain block of code typically within a function. Local variables are not recognized outside a function unless they are returned. There is no way of modifying or changing the behavior of a local variable outside its scope.

Data Validation Routines

Check if an entered string has a minimum length	OUTPUT "Enter String"
	s ← USERINPUT
	IF LEN(S) > 5 THEN
	OUTPUT "STRING OK"
	ELSE
	OUTPUT "TOO SHORT"
	ENDIF

Check is a string is empty	OUTPUT "Enter String"
	s ← USERINPUT
	IF LEN(S) == 0 THEN
	OUTPUT "EMPTY STRING"
	ENDIF

Check if data entered lies within a given range	OUTPUT "Enter number" s num ← USERINPUT IF num > 1 AND num < 10 OUTPUT "Within range" ENDIF

Authentication Routine

```
OUTPUT "Enter Username"
username ← USERINPUT
OUTPUT "Enter Password"
password ← USERINPUT

WHILE username != "bart" OR password !="abc"
 OUTPUT "Login failed"
 OUTPUT "Enter Username"
 username ← USERINPUT
 OUTPUT "Enter Password"
 password ← USERINPUT

ENDWHILE

OUTPUT "Login Successful"
```

Debugging

Syntax errors – Errors in the code that mean the program will not even run at all. Normally this is things like missing brackets, spelling mistakes and other typos.

Runtime errors – Errors during the running of the program. This might be because the program is writing to a memory location that does not exist for instance. eg. An array index value that does not exist.

Logical errors - The program runs to termination, but the output is not what is expected. Often these are arithmetic errors.

Test data

Code needs to be tested with a range of different input data to ensure that it works as expected under all situations. Data entered need to be checked to ensure that the input values are:

- within a certain range
- in correct format
- the correct length
- The correct data type (eg float, integer, string)

The program is tested using normal, erroneous or boundary data.
Normal data - Data that we would normally expect to be entered. For example for the age of secondary school pupils we would expect integer values ranging from 11 to 19.

Erroneous data - Data that are input that are clearly wrong. For instance, if some entered 40 for the age of a school pupil. The program should identify this as invalid data but at the same time should be able to handle this sensibly which returns a sensible message and the program does not crash.

Boundary data - Data that are on the edge of what we might expect. For instance if someone entered their age as 10, 11, 19 or 20.

Creative i-Media R093 part 1 & R094

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Colour	Feelings
Red	Excitement, Energy, Passion, Courage
Orange	Cheerful, Friendly, Optimistic, Playful
Yellow	Youthful, Energetic, Happiness
Green	Growth, Nature, Balance, Harmony
Blue	Trust, Serious, Security, Confidence
Purple	Creativity, Fantasy, Royalty, Luxury
Pink	Hope, Inspiration, Dreams, Childhood
Brown	Rugged, Reliability, Honest, Natural
Black	Efficiency, Power, Elegance, Luxury
Grey	Classic, Mature, Modest, Neutral
White	Youthful, Purity, Peace, Simplicity

What we are Learning This Term

R093 Creative iMedia in the media industry

In this unit you will learn how digital media products are planned and used to convey meaning, create impact and engage audiences.

- Factors influencing product design
- Pre-production planning

R094 Visual identity and digital graphics

In this unit you will learn to how to develop visual identities for clients and use the concepts of graphic design to create original digital graphics to engage target audiences.

- Develop visual identity
- Plan digital graphics for products
- Create visual identity and digital graphics.

Keywords

Assets	Mood boards
Audience	Planning
Brief	Properties
Client	Resources
Client Requirements	Software
Hardware	Target Audience
House Style	Visualisation Diagrams
Mind Maps	

Logo Design –

- Negative Space (the space surrounding a subject. Also called white space, it is typically empty and lacks details so as to simplify an image. Negative space surrounds positive space in a piece of work.)
- Typography (the art of arranging letters and text in a way that makes the copy legible, clear, and visually appealing to the reader.)
- Imagery (Adding Images)
- Colour (See Table)
- Font (Serif/San-Serif)

Serif

A small decorative line added as embellishment to the basic form of a character. Typefaces are often described as being serif or sans serif (without Serifs). The most common serif typeface is Times Roman.

Sans Serif

A Category of Typefaces that do not use serifs, small lines at the ends of characters. Popular sans serif fonts include Helvetica, Arial, Verdana and Tahoma.

	Raster Image	Vector Image
File size	Large	Small
Resolution	Nonscalable	Scalable
File extensions	GIF PNG BMP TIFF JPEG PCX	PDF CGM SVG EPS CDR
Examples of use	Print materials Photography Web imagery	2D or 3D animation Digital printing Laser engravings Logos Fonts
Software	Adobe Photoshop Canva Procreate Corel Painter Scanned images Digital cameras	Adobe Illustrator CorelDRAW Figma Sketch

What will I learn?

In this topic you will learn about:

- the impact of new and emerging technologies on the design and organisation of the workplace, buildings and the place of work, tools and equipment
- enterprise based on the development of an effective business innovation
- the impact of resource consumption on the planet
- how technology push/market pull affects choice
- changing job roles due to the emergence of new ways of working driven by technological change
- changes in fashion and trends in relation to new and emergent technologies
- respecting people of different faiths and beliefs
- how products are designed and made to avoid having a negative impact on others
- the positive and negative impacts new products can have on the environment
- the contemporary and potential future use of production techniques and systems
- how the critical evaluation of new and emerging technologies informs design decisions.

The Six Rs of Sustainability

Designers can often improve products by using the Six Rs. **REDUCE, REUSE, RECYCLE, REPAIR, RETHINK REFUSE** can often provoke innovation in products.

Better build quality can improve a product's performance during its expected life – designers can ensure that products are easy to service, maintain and repair.

New or emerging materials, manufacturing methods or energy sources can often provide opportunities for greener products. This could be a more eco-friendly material or a self-repairing material. For example, the inner tube in the tyre below, which contains a sticky liquid that hardens when it contacts air – a perfect cure for punctures.

KEY WORDS

Fossil fuels a natural fuel such as coal, oil or gas, formed from the remains of living organisms.

Global warming an increase in the temperature of the Earth's atmosphere caused by the greenhouse effect and increased levels of greenhouse gases.

Fission the process in which uranium atoms are split and produce heat.

Renewable energy energy from a source that is not depleted when used, such as wind or solar power.

Hydroelectricity the process which uses a dam to block a river in a valley and channels water through turbines that are used to turn generators for producing electricity

Biomass growing plants so that they can be burnt, or using decaying plant or animal materials to produce heat.

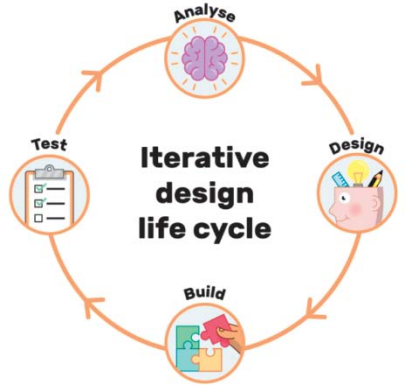
THE JAMES DYSON FOUNDATION

WHAT'S IN THE BOX?

DESIGN ENGINEERING, UNCOVERED

CASE STUDY
THE DYSON AIR MULTIPLIER™ FAN

First, identify the problem.



Length of Unit:

1st Term

Year 10 TERM 1

You will learn about

Introduction to the course and outline of the course
risk assessment and hygiene and safety instructions
Introduction to Protein
Planning and costings
Carbohydrates
To identify nutritional profile and science behind the recipe.
Micronutrients - Fat Soluble Vitamins
vitamins planning
Calcium, iron, sodium, iodine and fluoride.
Calcium and Vitamin D Plan

Foods high fat, salt and sugar

- Includes products such as chocolate, cakes, biscuits, full-sugar soft drinks, butter and ice cream.
- Are high in fat, sugar and energy and are not needed in the diet.
- If included, should be had infrequently and in small amounts.

The Claw

Curl your hand into a claw with the fingertips pressing down to stop ingredients slipping.

The hand then moves backwards in even steps as you slice.

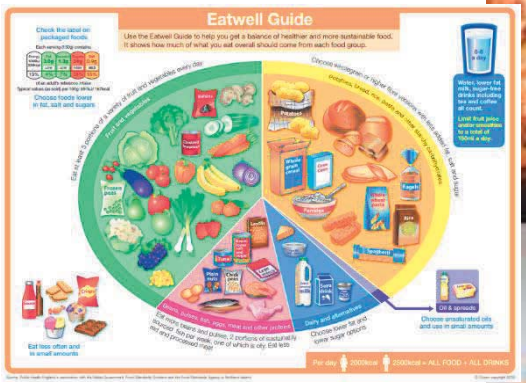
To be used when the ingredient is stable, with a flat edge.

The Bridge

Grip both sides of the food, between your thumb and fingers so that it can't roll or slip.

Think of the knife as a train going into the bridge, then cutting down through the food.

This is used for cutting round and wobbly foods.



Composite/combination food
Much of the food people eat is in the form of dishes or meals with more than one kind of food component in them. For example, pizzas, casseroles, spaghetti bolognese and sandwiches are all made with ingredients from more than one food group. These are often called 'combination' or 'composite' foods.

Key terms
The Eatwell Guide: A healthy eating model showing the types and proportions of foods needed in the diet.
Hydration: The process of replacing water in the body.
Dietary fibre: A type of carbohydrate found in plant foods.
Composite/combination food: Food made with ingredients from more than one food group.

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

A Christmas Carol

Key events (AO1)	Associated quotes
A miserly old man called Ebenezer Scrooge is mean, selfish and cruel to all around him. One night when returning home he is visited by the ghost of his old friend and business partner Jacob Marley. Marley tells Scrooge he must change his ways and live a life of generosity or he will be punished and forced to walk the earth forever more. Scrooge is visited by three spirits (The Ghosts of Christmas Past, Present and Yet-to-Come) who all show him visions of his life and how his life will be if he doesn't change. Filled with regret, sorrow but a determination to change, Scrooge is returned to his home on Christmas Day where he sets out to change his life and use his wealth to help others. He goes on to embody the Christmas spirit better than anyone else.	
Stave 1: Marley's Ghost	
We discover Jacob Marley, who was Ebenezer Scrooge's business partner, died seven years ago. Scrooge is working in his counter-house, along with his clerk - Bob Cratchit. Scrooge's nephew Fred arrives and wishes him a Merry Christmas, but Scrooge dislikes his enthusiasm for the festive and answers: "Bah! Humbug!" Scrooge argues that Christmas is like any other day when there is money to be paid through bills. Fred has a different attitude, proclaiming Christmas to be a "as a good time: a kind, forgiving, charitable, pleasant time: the only time I know of, in the long calendar of the year, when men and women seem by one consent to open their shut-up hearts freely." Fred invites his uncle to visit him and his friends for Christmas, but Scrooge refuses. Two portly gentlemen then come into Scrooge's counter house and ask Scrooge if he would donate money for the poor. Scrooge asks them if the prisons and workhouses are still open and dismisses them - saying he wishes to donate nothing and to be left alone. The weather is getting colder and colder. Outside, a Christmas caroler tries to sing a song through the keyhole of Scrooge's office door but Scrooge scares him off. After closing up the counting office and before he goes home, Scrooge tells his clerk Bob Cratchit that he wants him to work on Christmas Day, but eventually he is persuaded to allow him to have the day off - but Cratchit must turn up all the earlier the next day. Scrooge continues his usual routine of having dinner in a tavern and then returns home through awful, foggy London streets. As he arrives at his front door he thinks he sees Marley's face on the door knocker until it turns back into an ordinary knocker. He is surprised but refuses to accept what he has seen. Scrooge thinks he sees a hearse going up the stairs in front of him. He rushes into his room and locks the door behind him, putting on his dressing grown as well. He eats gruel by the fire, but suddenly the carvings on the mantelpiece change into pictures of Jacob Marley's face. Again, Scrooge is reluctant to accept what he has seen. All of the bells and in the room start ringing and Scrooge hears footsteps coming up the stairs. A ghost floats through the door - it is Jacob Marley - see-through and covered up in chains, cash-boxes, keys, padlocks, ledgers, deeds and heavy purses wrought in steel. Scrooge tries to deny Marley's Ghost exists, claiming he is just a symptom of food poisoning. The ghost explains to Scrooge that he has spent seven years wandering the world in his chains as a form of punishment for the way he lived his life. Marley's Ghost tells Scrooge he has come back to save Scrooge from the same fate he has suffered. He informs Scrooge that he will be visited by three different spirits over the next three nights. The first one will come at one o'clock, the next the same time and the final one will be there on the last stroke of midnight. The ghost moves towards Scrooge's window which opens by itself. Scrooge is terrified and full of fear. The ghost tells Scrooge to look out of the window and he sees many spirits, all covered in chains. They are all shouting about how they did not lead caring and honourable lives and did not help others. Marley disappears and Scrooge goes back to bed and falls asleep.	"Scrooge was his sole executor, his sole administrator, his sole assign, his sole residuary legatee, his sole friend and sole mourner." "But what did Scrooge care? It was the very thing he liked. " "Bah! Humbug!" "Are there no prisons?" asked Scrooge. "Plenty of prisons," said the gentleman, laying down the pen again. "As a good time: a kind, forgiving, charitable, pleasant time" Fred on Christmas
Stave 2: The First of the Three Spirits	
Scrooge wakes up at midnight and is confused. When he went to sleep it was 2am! To begin with he believes he must have slept through an entire day or it's noon and the sun isn't out. He remembers that Marley's Ghost told him the first spirit will arrive at 1am. Terrified and anxious, Scrooge waits. At one o'clock Scrooge's curtains on his bed are blown away by an unusual, child-like character who exudes wisdom and experience. The spirit has a cap to cover the light that comes from its head. Scrooge is taken to the rural countryside where he was born and raised. He visits his old school, sees his young friends and remembers many parts of his childhood. The effect of seeing these memories makes Scrooge cry. The ghost moves Scrooge into the school where a lonely little boy - Scrooge as a youngster - is all alone at Christmas time. Scrooge and the ghost continue to visit different Christmases of the past and eventually we see a little girl - Scrooge's sister Fan - who runs into the room and tells Scrooge she has come to take him home. She says their father has allowed Ebenezer Scrooge to come home. Young Scrooge hugs his sister. Scrooge reveals to the ghost that Fan died years ago and she is the mother of his nephew Fred. The Ghost of Christmas Past and Scrooge visit other Christmases and see a party being held by Fezziwig, a merchant who had Scrooge as an apprentice when Ebenezer was younger. Scrooge sees an older version of himself in conversation with Belle - his fiancée. She tells Scrooge she is ending their engagement as his love of capital gain and greed has ruined their love that used to be everything to Scrooge. Scrooge is taken to see a more recent Christmas where an older Belle talks to her new husband about her former fiancé Scrooge. Her husband says that Scrooge is alone in the world. Scrooge is struggling to deal with these scenes and begs the ghost to allow him to go back home. Full of anger, sadness and loss, Scrooge grabs the ghost's cap and pulls it over the child's head, and the light begins to diminish. By the time he gets to the ground, Scrooge finds himself back in his bedroom, where he goes to bed again and falls asleep straight away.	"A solitary child, neglected by his friends, is left there still." Scrooge said he knew it. And he sobbed. "Scrooge sat down upon a form, and wept to see his poor forgotten self as he used to be." "Why, it's old Fezziwig! Bless his heart; it's Fezziwig alive again!" "Spirit!" said Scrooge in a broken voice, "remove me from this place."
Stave 3: The Second of the Three Spirits	
In the distance the church clock strikes one and Scrooge wakes up in shock. He is glad to be awake and is waiting for the second spirit to arrive, but none seems to come. Scrooge waits 15 minutes and then suddenly a bright light beams down onto him. Scrooge moves into his other room where he finds the second spirit waiting for him. The Ghost of Christmas Present is very different to the first spirit. He is a giant, covered in green robes and sits on top of a throne made of a huge Christmas feast. He has a booming, loud voice and tells Scrooge he has more than 1800 brothers (one for each Christmas). He lives for only a single day. The spirit tells Scrooge to touch his robe, and when he does so the feast and room disappear. Scrooge finds himself in the middle of London on Christmas morning. It is very busy and full of life. He sees all sights of a joyful Christmas day as people shovel snow, take presents to each other and say to each other: "Merry Christmas!" The ghost and Scrooge then move on to visiting Bob Cratchit's family - remember that Cratchit is Scrooge's clerk. Mrs Cratchit prepares a Christmas meal of goose and all the trimmings. They are poor and this meal is one of the few treats they set money aside for. The eldest daughter Martha comes back from her job at the milliner's. Peter, the eldest son, wears a stiff-collared shirt which he received from his father. Bob arrives carrying his young son Tiny Tim on his shoulders. Tiny Tim has a debilitating condition that makes him very weak. The family is happy even though they have little food to celebrate Christmas with. Scrooge begs the Ghost to know whether Tiny Tim will survive. The spirit replies that given the current conditions in the Cratchit house, there will be an empty chair at next year's Christmas dinner. They move on to other people celebrating Christmas, including an isolated community of miners, lighthouse workers celebrating, and a crew on board a ship. Next they move on to Fred's Christmas party, where Scrooge enjoys watching the many party games, although none of the party guests can actually see him. As the night carries on, the Ghost of Christmas Present grows older. Lastly they come to a huge expanse of emptiness. Scrooge sees a pair of starving children who travel with the Ghost beneath his robes; their names are Ignorance and Want. Scrooge inquires if nothing can be done to help them. Mockingly, the ghost echoes Scrooge's own words from Stave 1: "Are there no prisons? Are there no workhouses?" The spirit vanishes as the clock strikes midnight and Scrooge sees a strange hooded ghost moving towards him.	"Oh, a wonderful pudding! Bob Cratchit said, and calmly too, that he regarded it as the greatest success achieved by Mrs Cratchit since their marriage." But even here, two men who watched the light had made a fire, that through the loophole in the thick stone wall shed out a ray of brightness on the awful sea. Fred on Scrooge: "I mean to give him the same chance every year, whether he likes it or not, for I pity him." "Are there no prisons?" said the Spirit, turning on him for the last time with his own words. "Are there no workhouses?"

	Character summary	Key Quotes	Associated themes or ideas:
Jacob Marley 	Scrooge's former business associate and friend. Marley passed away seven years ago on Christmas Eve. Marley inspired Scrooge to be selfish, greedy and utterly ruthless when dealing with other people. However, it is Marley that comes back to Scrooge as a ghost to tell him to change his ways or end up with the same fate as him, cursed to forever travel the world filled with regret and sorrow.	"It is required of every man," the Ghost returned, "that the spirit within him should walk abroad among his fellowmen, and travel far and wide; and if that spirit goes not forth in life, it is condemned to do so after death. It is doomed to wander through the world -- oh, woe is me! -- and witness what it cannot share, but might have shared on earth, and turned to happiness!"	Christmas Spirit Regret Sorrow Greed Supernatural Choice Time Guilt and Blame Emotional Coldness Memory and the Past Compassion and Forgiveness
Ebenezer Scrooge 	The central protagonist (main character) of the novella, Scrooge is a selfish, greedy but ultimately isolated elderly man that has spent much of his life hoarding his wealth away from others despite being surrounded by poverty and suffering. He is initial cruel and callous to everyone else before the visits of Marley's Ghost and the Three Spirits bring about his epiphany and the change in his character. Through the help of the narrator we follow Scrooge on his journey through his own past, present and potential future and celebrate his embracing of the Christmas spirit at the end.	"Bah! Humbug!" "Since you ask me what I wish, gentlemen, that is my answer. I don't make merry myself at Christmas and I can't afford to make idle people merry." "I will honor Christmas in my heart, and try to keep it all the year. I will live in the Past, the Present, and the Future."	Isolation Christmas Spirit Regret Sorrow Greed Choice Guilt and Blame Emotional Coldness Emotional Warmth Catharsis Transformation Memory and the Past Compassion and Forgiveness
The Ghost of Christmas Past 	The first of the three spirits to visit Scrooge, The Ghost of Christmas Past takes Scrooge on a journey through his memories – ones he enjoys remembering and others that bring up emotions that he has long since buried. We see his absolute joy at seeing Fan and Fezziwig again, but his immense sorrow and regret for what happened between him and Belle. The Ghost is presented as very unusual looking and re-reading and re-analysing the use of description of the character would be very useful to you as part of your revision. 	"It wore a tunic of the purest white, and round its waist was bound a lustrous belt, the sheen of which was beautiful." "Why did his cold eye glisten, and his heart leap up as they went past? Why was he filled with gladness when he heard them give each other Merry Christmas, as they parted at cross-roads and-bye ways, for their several homes? What was merry Christmas to Scrooge? Out upon merry Christmas! What good had it ever done to him?"	Supernatural Memory and the Past Compassion and Forgiveness Regret Sorrow Guilt and Blame Choice Isolation Christmas Spirit Family Emotional Warmth Time
The Ghost of Christmas Present 	The second of the three spirits that is presented a giant representing all that is great and good about Christmas Day. He is more dominating than the previous spirit and mocks Scrooge's own words from Stave 1 when Scrooge previously asked about prisons and workhouses being in operation. This spirit shows to Scrooge how everyone across society takes joy from Christmas and celebrate together, they do not isolate themselves like Scrooge has done. In particular, the visit to the Cratchits and Scrooge seeing the love for Tiny Tim hits him hard.	"I am the Ghost of Christmas Present," said the Spirit. "Look upon me." "[Tiny Tim] told me, coming home, that he hoped the people saw him in the church, because he was a cripple, and it might be pleasant to them to remember upon Christmas Day, who made lame beggars walk, and blind men see."	Christmas Spirit Family Compassion and Forgiveness Isolation Emotional Warmth Supernatural Choice Guilt and Blame Time Self-awareness
The Ghost of Christmas Yet-to-Come	The final spirit is a dark, silent phantom that terrifies Scrooge and in some ways resembles the Grim Reaper, a classical symbol of death. This spirit shows Scrooge how the death of an isolated and friendless man sees vagabonds still his personal items, people celebrating his death and others suffering at his lack of compassion in life. Finally, the Ghost shows Scrooge his own gravestone and it is as this point that Scrooge has his epiphany. 	"He lay, in the dark empty house, with not a man, a woman, or a child, to say that he was kind to me in this or that, and for the memory of one kind word I will be kind to him." "We may sleep to-night with light hearts, Caroline."	Supernatural Regret Sorrow Choice Time Guilt and Blame Transformation Emotional Coldness Isolation Death Family
Fred 	Scrooge's nephew and the son of Ebenezer's sister Fan. Fred embodies everything good about Christmas and is filled with joy and happiness everywhere he goes. He is the antithesis of Ebenezer Scrooge. When Scrooge sees Fred spending Christmas with his friends Fred refuses to criticise Scrooge, only saying he pities him. Fred is delighted to see his uncle in Stave 5.	"He had so heated himself with rapid walking in the fog and frost, this nephew of Scrooge's, that he was all in a glow"	Family Christmas Spirit Memory and the Past
Other characters 	Bob Cratchit – An honourable man and a wonderful father. Scrooge comes to respect him very much. He is part of the Cratchit family including his wife, Martha, Belinda and Peter. Tiny Tim - Bob's crippled son who everyone loves and everyone pities. Dickens was arguably trying to evoke immense sympathy from his readers for this weak but wonderful young boy. Tiny Tim survives his illness thanks to Scrooge's financial help. Fan and Belle – Scrooge's sister and former fiancée. They represent Scrooge's past and his regrets. Fezziwig – Scrooge's old boss who represents the Christmas Spirit. The portly gentlemen – Scrooge is rude to them but apologizes to one of them in Stave 5. They raise money for charity.	"Hilli-ho!" cried old Fezziwig, skipping down from the high desk, with wonderful agility. (Stave 2) "I have come to bring you home, dear brother!" said the child, clapping her tiny hands, and bending down to laugh. "To bring you home, home, home!" Fan (Stave 3) "God bless us every one!" said Tiny Tim, the last of all. (Stave 3)	Christmas Spirit Family Memory and the Past Guilt and Blame Emotional Warmth Isolation Regret Sorrow Transformation Charity

Stave 4: The Last of the Three Spirits

This new phantom is very different to the others spirits. He wears a black hooded robe and moves towards Scrooge. Scrooge cannot help but kneel before him and asks if he is The Ghost of Christmas Yet to Come. The phantom says nothing and Scrooge feels terrified. Scrooge is still hugely affected by the visits of the last two spirits and asks the phantom to share his lesson so he can avoid the fate of Jacob Marley. The ghost takes Scrooge to the London Stock Exchange, where he overhears a group of businessmen discussing the death of a wealthy man. Next they see a pawn shop in a poor part of London, where a group of low-lives sell personal items taken from a dead man.

Scrooge sees the body of the dead man all alone and demands to be shown someone who feels sorry for this man who has passed. The ghost shows the dinner table of a poor family, where a husband and wife express relief at the death of a man to whom they owe money. They move on to the Cratchit household again, where the family struggles to cope with the death of Tiny Tim. Scrooge is desperate to know the identity of the dead man, struggling to understand what point or lesson the ghost is trying to make. Suddenly, he finds himself in a rundown churchyard where the spirit points him toward a freshly dug grave. Scrooge approaches the grave and reads the inscription on the headstone: EBENEZER SCROOGE. Stunned, Scrooge grabs at the spirit and begs him to stop the events of his nightmarish vision. He promises to honor Christmas within his heart and to live by the lessons of Past, Present, and Future. The spirit's hand begins to tremble, and, as Scrooge continues to ask for mercy, the phantom's robe shrinks and collapses. Scrooge finds himself returned to the his bed once more.

"He felt that it was tall and stately when it came beside him, and that its mysterious presence filled him with a solemn dread."

"I will honour Christmas in my heart, and try to keep it all the year."

I promised him that I would walk there on a Sunday. My little, little child!" cried Bob. "My little child!"

Stave 5: The End of It

Scrooge realizes he has a chance to live the rest of life in a way that will make him truly happy. He praises of the three spirits and the ghost of Jacob Marley. When he realises he hs been returned back to Christmas morning, he begins shouting "Merry Christmas!" as loud as he can. Full of energy and excitement, Scrooge struggles to dress properly and dances while he shaves. As quickly as he can, Scrooge runs into the street and offers to pay the first boy he meets a colossal sum to deliver a great Christmas turkey to Bob Cratchit's family. He meets one of the portly gentlemen who in Stave 1 asked for donations to the poor. Scrooge apologises for his rudeness, and whispers into the man's ear the massive sums of money he promises to give to charity. Scrooge moves on to Fred's Christmas party and shows such joy and enthusiasm that the other guests cannot understand Scrooge's sea change in behavior.

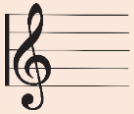
The next morning, Scrooge arrives at the office early and decides to put on his usual stern and serious expression when Bob Cratchit enters eighteen and a half minutes late. Scrooge, pretending to be disgusted, begins to criticize Bob, before suddenly telling Bob he will give him a large raise and will assist his family as much as he can. Bob cannot believe it, but Scrooge promises to keep his word. We are told by the narrator that Scrooge is as good as his word: He helps the Cratchits and becomes a second father to Tiny Tim who does not die as predicted in the ghost's dreadful vision. Many people in London are puzzled by Scrooge's new behavior, but Scrooge merely laughs at them. Scrooge brings the Christmas spirit into every day, respecting the lessons of Christmas more than any man alive. The narrator finishes the story by saying that Scrooge's words and thoughts should be shared by of all of us ... "and so, as Tiny Tim observed, God bless us, Every one!"

"I don't know how long I've been among the Spirits. I don't know anything. I'm quite a baby. Never mind. I don't care. I'd rather be a baby. Hallo! Whoop! Hallo here!"

"I'll send it to Bon Cratchit's!" whispered Scrooge, rubbing his hands, and splitting with a laugh. "He shan't know who sends it. It's twice the size of Tiny Tim. Joe Miller never made such a joke as sending it to Bob's will be!"

Context key idea	Why is this significant?
Philanthropy and Dickens' Sense of Social Justice 	Although now in Britain we have what is known as the welfare state (which includes support for the neediest including the NHS, social housing, unemployment benefits and more), there is was little government support for the poorest in society during the Victorian era. Many wealthy Victorians who were socially conscious (meaning they felt a responsibility to help those who could not help themselves) became heavily involved in philanthropy. They used their own money to give to charities and to set up their own charities to help those that needed help. Charles Dickens was one such person and he used his own money to help others, as well as working with wealthy benefactors to make changes in society, too. Dickens was philanthropic advisor to Angela Burdett-Coutts (1814-1906), known as 'the richest heiress in all England'. Dickens used her wealth to give to social causes as well. In 1847 her money was used to create Urania Cottage for homeless women. Under his guidance she also supported the Ragged School Union, which was founded in 1844 to provide free education to poor children by Lord Shaftesbury. Moreover, Dickens used his writing to act as a social commentator – bringing to the attentions of his middle and upper class readers the need for social upheaval. Some of his characters play a positive philanthropic role, such as Mr Brownlow in Oliver Twist, the Cheeryble brothers in Nicholas Nickleby, and Mr and Mrs Garland in The Old Curiosity Shop.
Victorian Deprivation  	Workhouses existed well before the Victorian era, but the 1834 Poor Law Amendment Act meant it a legal requirement for all able-bodied people to work in workhouses to get their 'poor relief' (financial support). Before this time the poorest in society had to rely on charity and hand outs to survive. However, Victorians saw poverty as a kind of illness or disease in society that needed to be eradicated. Governments were keen to move the poorest indoors, away from everyone. However, those in charge of the country made workhouses places to be feared in order to prevent 'lazy' citizens thinking it was an easy option instead of going out to find work. Workhouses meant the poorest would work for food and a place to sleep, but many people saw it as a form of slavery. workhouses also took in orphans, abandoned children, the mentally ill, the disabled, unmarried mothers and the elderly. Despite their age or abilities, all were required to work long and demanding hours. Whenever someone entered a workhouse they were stripped, bathed whilst being supervised and then provided with a uniform. This uniform separated them from the rest of society. If those from workhouses were out in the streets everyone else would instantly know they were in a workhouse. Often children were 'hired out' to wealthy business men and made to work in awful places such as mines. You were not allowed to try to contact your family and doing so could result in being punished. The standard of education provided was awful and would not help those within the workhouses get out of them. The food given to those in the workhouses was of a poor quality, simple and the same every day. Food was seen as a tool to keep you working, not as something to be enjoyed.

Linguistic devices (AO2)	Why is this significant?
Pathetic fallacy 	This is where a writer gives human feelings to non-human objects or places to get across a tone or emotion to readers. For instance, the weather is very foggy and dingy as Scrooge walks through London in Stave 1, indicating mystery and a lack of harmony in Scrooge's world. In Stave 1 he is surrounded by the "Piercing, searching, biting cold'", echoing Scrooge's cold heart and lack of human warmth. By Stave 5 after Scrooge has transformed into a joyful human being the weather has also changed: "'No fog, no mist; clear, bright, jovial, stirring, cold; cold, piping for the blood to dance to'".
Epiphany 	An epiphany is a sudden realisation of something. Scrooge has an epiphany as he reveals after seeing his own gravestone that he must love with Christmas in his heart (Stave 5). Because of this epiphany he is then able to go out at the end of the text and share his wealth with others and actually feel happy.
Symbols 	Each of the ghosts acts as a symbol for something much greater. The Ghost of Christmas Past embodies Scrooge's regrets that he changed so much from his past, that he did not make the most of his family and that he has lost his fiancée Belle. The Ghost of Christmas Present is a symbol of the happiness and joy all people feel at Christmas despite their often harsh and deprived conditions. The Ghost of Christmas Yet-to-Come symbolises what will happen to Scrooge and his friends and family if he does not change.
Metaphors and Similes, Personification, Parallelism, and Descriptive Language 	Dickens needs to use a lot of descriptive language to get across not only the Christmas London settings but also the unusual spirits that visit Scrooge. Marley's Ghost needs to be terrifying, the Ghosts of Christmas Past and Present are not human but supernatural. He uses numerous metaphors and similes to get across both characters and setting to his readers. Dickens was a master of description and this shines through in A Christmas Carol. Metaphor example: "But he [Scrooge] was a tight-fisted hand at the grindstone" Simile example: "It was a strange figure -- like a child: yet not so like a child as like an old man..."

Form (AO2)	Why is this significant?
Allegory 	An allegory is a type of story that has a hidden meaning, where characters represent bigger themes and ideas. For instance, Star Wars is an allegory of good and evil. The Jedi represent good and the Dark Side represents evil. In the same way A Christmas Carol represents turning away from greed, selfishness and an obsession with money and turning towards helping others and using your wealth to good for friends, family and society.
Frame Story 	Because A Christmas Carol begins with a narrator introducing the story and finishes with the narrator summing it up and ending it, this is known as a 'frame story'. At the beginning Scrooge's character is established by the narrator and at the end his dramatic shift in personality is explained by the narrator as well. In between these two parts of the plot we find out other stories from Scrooge's past, present and future in order for him to have his epiphany and change.
Cyclical Structure 	A cyclical structure to a text is where it begins and ends in the same way. In Stave 1 Scrooge is rude and unkind to Bob Cratchit, two portly gentleman raising money for charity, and his nephew Fred. In the final stave he sees all these people again and is able to apologise and show them his transformation. It's a structure that works very well for emphasising Scrooge's change in personality.
'Staves' instead of 'Chapters' 	A stave could refer to a wooden plank used to help in construction (a bit like scaffolding). It can also refer to a musical staff or symbol - used with sheet music. Whilst Dickens most likely used 'staves' instead of chapters in A Christmas Carol because he wanted to associate the plot with a literal 'Christmas Carol' or song, it could be said that each chapter helps in the construction of Scrooge as a transformed man. Similarly, in two other novellas by Dickens he also used musical symbols instead of 'chapters' ("quarters" in *The Chimes* and "chirps" in *The Cricket on the Hearth*).

Geography - Year 10 Term 1 – Changing Landscapes

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The role of geology and tectonics in the formation of upland and lowland landscapes.
Different types of rocks have varying resistance to physical processes. Igneous and metamorphic rocks tend to be more resistant and therefore form upland areas. The UK igneous and metamorphic rocks were formed when we had tectonic activity; eg, Haytor, Dartmoor. Sedimentary rocks tend to be more easily weathered and eroded and form lowlands. They can form hills such as the Cotswolds when there are slight differences in resistance. If rocks have faults or joints (weakness) then erosion is easier.

How upland and lowland landscapes are affected by physical processes such as glaciation, weathering, rivers, coastal and slope processes.
Glaciation: The uplands were covered in ice. Erosion by glaciers created features such as aretes, pyramidal peaks, corries, U shaped valleys and truncated spurs. The lowlands were covered with glacial sands and gravels which were deposited on floodplains as they were washed out of the uplands when the glaciers melted.
Weathering: In the upland, freeze thaw creates exposed and angular rock faces with scree slopes below. In the lowlands biological and chemical weathering processes break down material into smaller pieces which can then be transported.
Rivers: Erode in the uplands giving waterfalls, gorges, interlocking spurs and V shaped valleys. In the lowlands deposition produces flat floodplains, levees and deltas.
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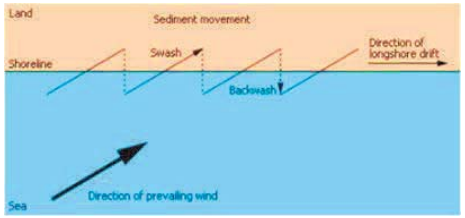
Geography - Year 10 Term 1 – Coastal Landscapes



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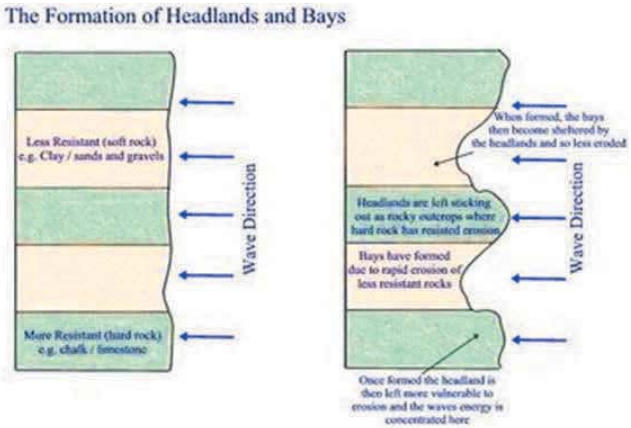

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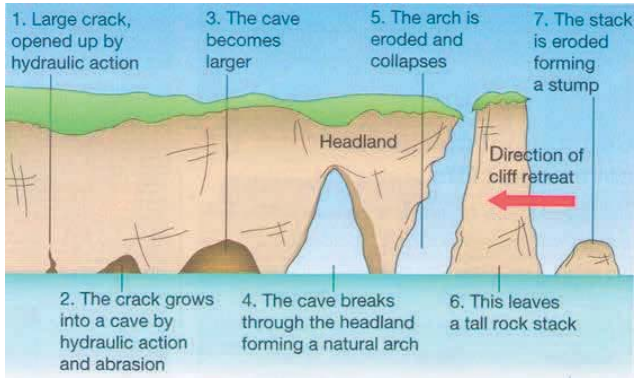

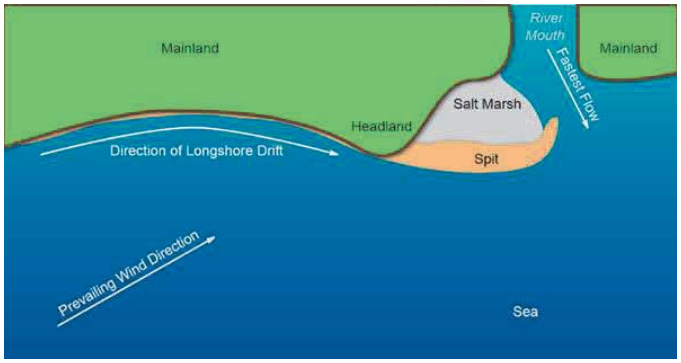

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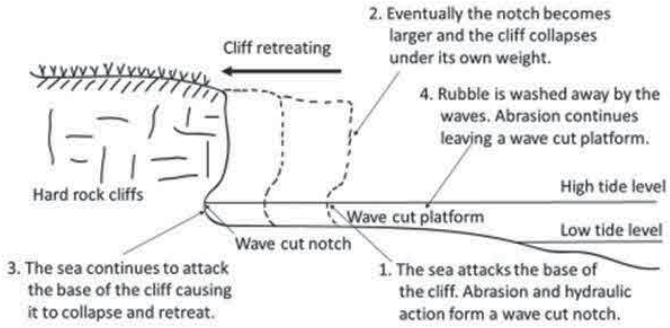

Discordant coastlines	Concordant coastlines
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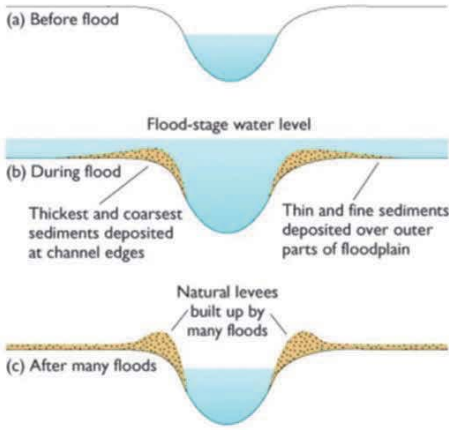
Geography - Year 10 Term 1 – River Landscapes



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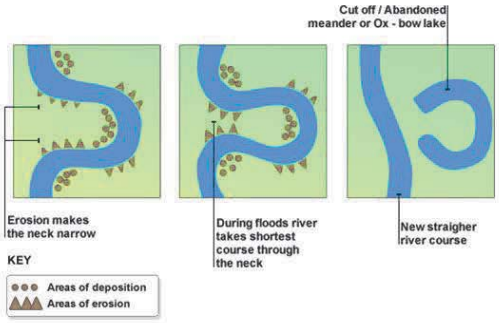

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Physical Factor - River Processes	Physical Factor - Weathering
The river erodes and deposits material forming features such as meanders, levees, floodplains, oxbow lakes, river cliffs and river beaches.	Mechanical, chemical and biological processes produce scree. Material is then available for the river to use in both erosional and depositional processes.
Human Factor - Industry	Human Factor – Settlement
Smelting of iron ore has left old iron mines, piles of slag and woodlands that were coppiced for fuel. Quarrying of limestone for building materials and for lime kilns has increased the gradient of the valley sides.	Settlement in the valley goes back 12000 years. The town of Hereford and Tintern Abbey were founded in the 12th century and continue to grow today. A road was built along the valley in the early 19th century and a railway in 1876.
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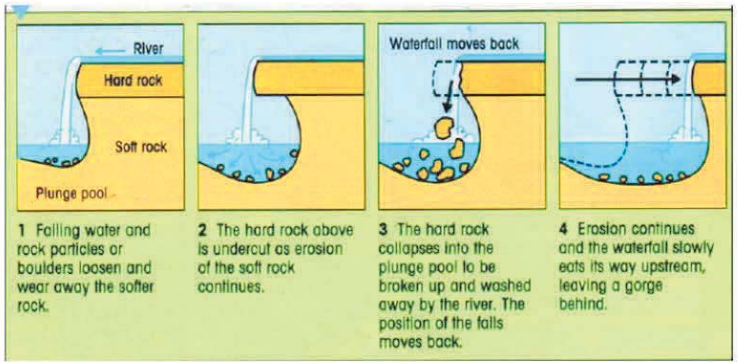
Many trees were felled in the 18th and 19th centuries for ship building. Some coniferous plantations have been harvested whereas places like Coppet Hill have seen woodland planted on former pasture land. Since the 1980's broad leaved species are now planted.	The Wye Valley was one of the earliest tourist honeypots with visitors flocking since the 17th century. The cliff ascent and walks at Piercefield Park were landscape attractions by 1700 and the tourists are attracted to the many castles and other historical sites that are found in the valley.



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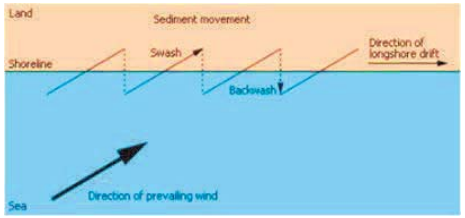
Geography - Year 10 Term 1 – Coastal Landscapes



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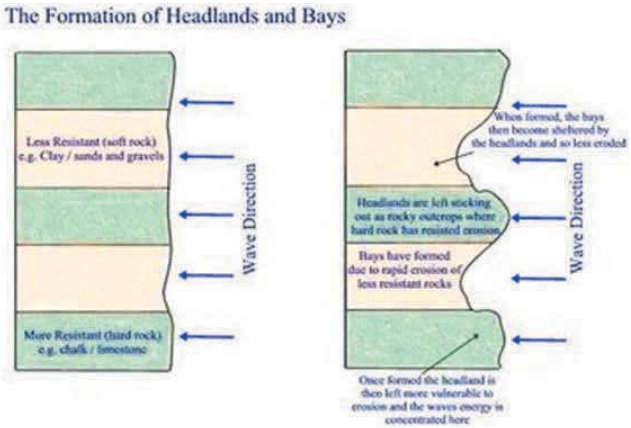

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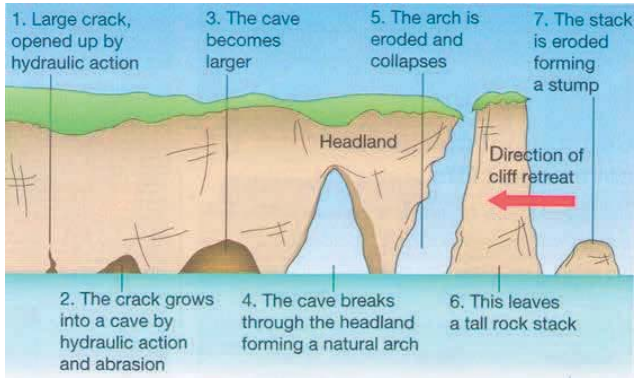

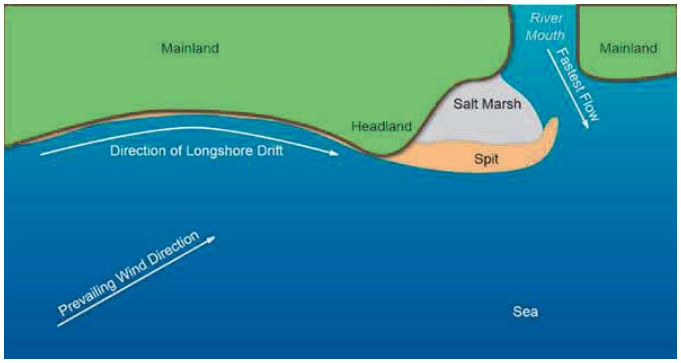

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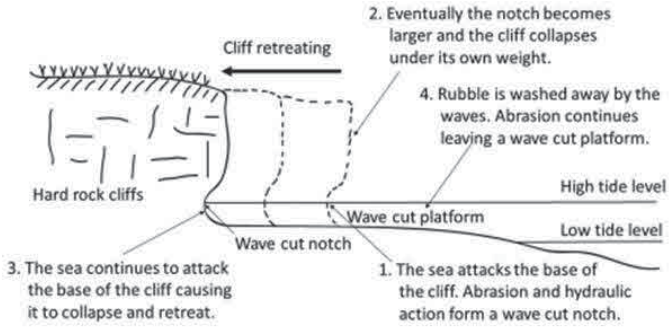

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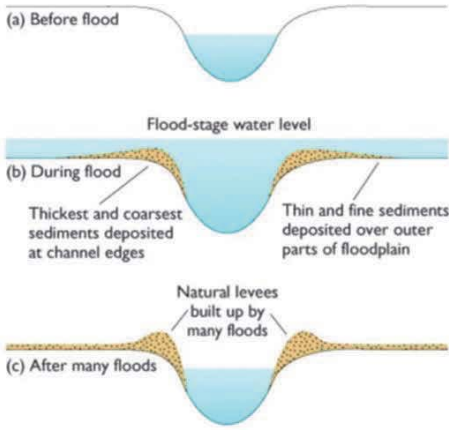

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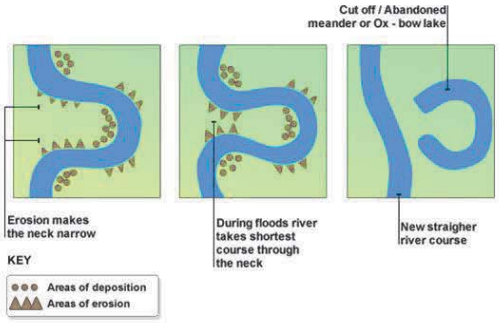

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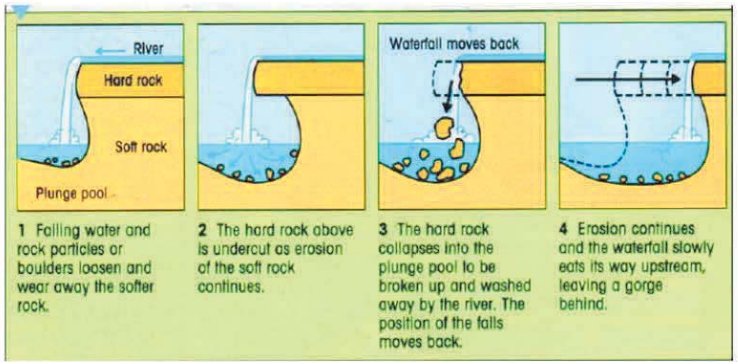

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PSHE- Knowledge organiser- Y10- Term 1

Themes	Topics	Key learning points
Transition	Learning skills 	• Motivation: you need to be motivated to succeed. Short-term rewards for studying can be helpful. • Self-testing is a key part of the learning process. • Confidence: you need to identify what 'success' means for you. Some attributes of a confident person are: self-belief, asking for support when needed, knowing your strengths and areas for development, setting clear goals to work towards, believing that you will succeed, recognising your self-worth, acknowledging and celebrating your own achievements.
Living in the wider world	Finance 	• Interest rate: When someone saves with a high street bank, the bank pays him or her a little extra money. When someone borrows, the bank charges a little extra money. This extra is called 'interest'. • The Bank of England: The UK's central bank – it is responsible for keeping the economy healthy and the financial system safe. It makes decisions that influence the economy across the whole of the UK. In turn, this influences what consumers do with their money. • Bank rate: The interest rate at which the Bank of England lends money to high street banks. It influences the interest that high street banks • charge, or pay, their customers. • The Bank of England can raise or lower bank rate. It looks at the prices of over 700 items from food & clothes to furniture & train fares. This information is combined with other data like unemployment figures and how much people are spending to help the Bank make a decision about interest rates. • Inflation: when most prices go up. If there's too much money in the economy and too much demand for goods, prices tend to rise.
Healthy living	staying safe 	• Drug: a medicine or other substance which has a physiological effect when ingested or otherwise introduced into the body. • Illegal drugs: Possessing, using and selling illegal drugs is a crime and may result in a custodial sentence.

PSHE- Knowledge organiser- Y10- Term 2

Living in the wider world	Citizenship: extremism 	• The benefits of living in a diverse society are: it promotes tolerance and understanding between different cultures; it enriches our community through shared experiences with different people; it attracts more money to our economy through the growth of different businesses; it relieves skills shortages. • Extremism: holding extreme political, social or religious views. • Violent extremism: acts of violence that are justified by, or associated with, an extreme religious, social or political ideology. • Radicalisation: a process causing someone to support radical political, social or religious beliefs, often leading to association with terrorist organisations.
RSE	Life to the full 	• Sex bonds two people together and it can lead to pregnancy. • Dignity: the state or quality of being worthy of honour or respect. • Modesty: the quality or state of being unassuming in the estimation of one's abilities. • Belief: something that you believe or accept as true. • Values: the things that you believe are important in the way you live and work. They (should) determine your priorities, and, deep down, they're probably the measures you use to tell if your life is turning out the way you want it to. • Attitude: a mental position with regard to a fact or state. • Declaration of the rights of a child: legally-binding international agreement setting out the civil, political, economic, social and cultural rights of every child, regardless of their race, religion or abilities. • Parental responsibility: the legal rights and duties relating to your children's upbringing. • Abortion: a procedure to end a pregnancy. The pregnancy is ended either by taking medicines or having a surgical procedure. • Healthy relationship: involve honesty, trust, respect and open communication between partners and they take effort and compromise from both people. There is no imbalance of power. Partners respect each other's independence, can make their own decisions without fear of retribution or retaliation, and share decisions. • Unhealthy relationship: Some of the common characteristics often seen in unhealthy relationships include controlling behaviours, mistrust, disrespect, and poor communication. • Abuse: when someone causes us harm or distress; the four main categories are physical abuse, emotional abuse, sexual abuse and neglect.

PSHE- Knowledge organiser- Y10- Term 3

Living in the wider world	IAG 	• Employability skills: communication, team working, adaptability and flexibility, problem solving, planning and organisation, negotiation, leadership, creativity, commercial awareness, IT, numeracy, literacy, willingness to learn, self-awareness, initiative, determination and commitment, decision-making. • Health and safety regulations: The aim of this legislation is to require employers and employees to not put others or themselves in danger. • Employer reference: a document employers write to provide information about their former employee's mode of conduct, abilities, qualities and achievements. It's a recommendation letter from previous employers endorsing a candidate's skills. • CV: a short, written summary of your skills, achievements and experience which relate to a role you want. You use it in the first stage of applying for jobs. Employers often ask for a CV instead of an application form but sometimes you'll need both. It's your first chance to promote yourself to an employer. • Options after GCSEs: A levels, T levels, vocational courses, apprenticeships, foundation courses, employment with training. • Options after 18: Further education, higher education, degree level apprenticeships, employment with training. • Vocational qualifications: BTEC, OCR, City and Guilds

Living in the wider world	Values, rights and responsibilities 	• Diversity: all the ways in which people differ • Equality: may require us to treat people differently to 'level the playing field' so everyone has the same potential to shine/thrive. • Inclusion: where we are able to meet everyone's needs and ensure they all feel welcome and valued. • Protected characteristics: age, disability, gender reassignment, marriage and civil partnership, pregnancy and maternity, race, religion or belief, sex, and sexual orientation. • Race:- no biological basis for hierarchy of races – usually means colour of skin/ texture of hair • Ethnicity: social construct, tradition, nationality, language, geographical origin • Prejudice: negative opinion formed without knowledge • Unconscious bias: Everyone holds unconscious beliefs which stem from our human tendency to organise social worlds by categorising. Unconscious bias is far more prevalent than conscious prejudice and often incompatible with our conscious values. • Global majority: a term to draw attention to the fact that globally most people aren't white • Microagression: everyday, verbal, non-verbal and environmental slight, snubs or insults, intentional or unintentional, which communicate hostile, derogatory or negative messages to target people based up their marginalised group membership. • LGBT+: Initialism of Lesbian, Gay, Bisexual, Transgender/Transsexual plus. The "plus" is inclusive of other groups, such as asexual, intersex, queer, questioning, etc. • A hate crime: Any criminal offence which is perceived by the victim or any other person, to be motivated by hostility or prejudice based on a person's race or perceived race; religion or perceived religion; sexual orientation or perceived sexual orientation; disability or perceived disability and any crime motivated by hostility or prejudice against a person who is transgender or perceived to be transgender. • Misogyny: the dislike of, contempt for, or ingrained prejudice against women and girls. • Harassment: Behaviour carried out more than once in any way to another, that causes alarm or distress where the perpetrator knows or should know that alarm or distress was/is/could be/will be, caused.

Remember!

- We will be open and honest, but not discuss directly our own and others personal/ private life.
- Your teacher will not repeat what is said in the room except if she/he is concerned we are at risk.
- It is ok to disagree but we will not judge.
- Taking part is important but we have the right to pass.
- We will not make assumptions and we will listen to others' point of view.
- We know that there are no stupid questions but we will use appropriate language.
- If we need further help or advice, you know you can talk to your teachers, form tutor and SSOs.

YEAR 10 – PROPORTION...

@whisto_maths

Ratios and fractions

What do I need to be able to do?

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

- Compare quantities using ratio
- Link ratios and fractions and make comparisons
- Share in a given ratio
- Link Ratio and scales and graphs
- Solve problems with currency conversions
- Solve 'best buy' problems
- Combine ratios

Keywords

Ratio: a statement of how two numbers compare
Equivalent: of equal value
Proportion: a statement that links two ratios
Integer: whole number, can be positive, negative or zero
Fraction: represents how many parts of a whole
Denominator: the number below the line on a fraction. The number represent the total number of parts.
Numerator: the number above the line on a fraction. The top number. Represents how many parts are taken
Origin: (0,0) on a graph. The point the two axes cross
Gradient: The steepness of a line

Compare with ratio (R)

"For every dog there are 2 cats"


Dogs: Cats

1:2

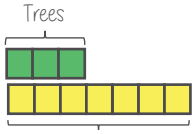
The ratio has to be written in the same order as the information is given.
e.g. 2:1 would represent 2 dogs for every 1 cat.

Units have the be of the same value to compare ratios

Ratios and fraction (R)

Trees: Flowers

3 : 7



Ratio

Fraction of trees

Number of parts of in group / Total number of parts

3 / 10

Fraction

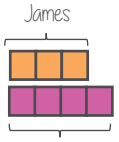
Sharing a whole into a given ratio (R)

James and Lucy share £350 in the ratio 3:4
Work out how much each person earns

Model the Question

James: Lucy

3 : 4



£350

Find the value of one part

Whole: £350
7 parts to share between (3 James, 4 Lucy)

£350 ÷ 7 = £50

□ = one part
= £50

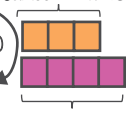
Put back into the question

James: Lucy

x 50 3 : 4 x 50

£150:£200

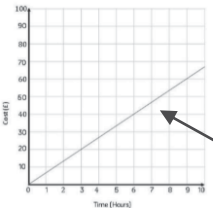
James = 3 x £50 = £150



£350

Lucy = 4 x £50 = £200

Ratio and graphs (R)



Graphs with a constant ratio are directly proportional
- Form a straight line
- Pass through (0,0)

The gradient is the constant ratio

Ratio and scale (R)

A picture of a car is drawn with a scale of 1:30

The car image is 10cm

Image : Real life

1cm : 30cm (x10)

10cm : 300cm (x10)

Conversion between currencies (R)



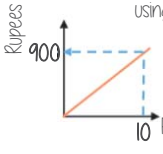
For every £1 I have 90 Rupees

£1 = 90 Rupees ← Currency is directly proportional

£1 = 90 Rupees (x10 / x10)

£10 = 900 Rupees

Currency can be converted using a conversion graph



Convert 630 Rupees into Pounds

£1 = 90 Rupees (x7 / x7)

630 ÷ 90 = 7

£7 = 630 Rupees

Ratios in 1:n and n:1

This is asking you to cancel down until the part indicated represents 1

Show the ratio 4:20 in the ratio of 1:n

The question states that **this part has to be 1** unit. Therefore **Divide by 4**

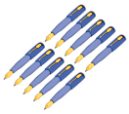
4 : 20

1 : 5

This side has to be divided by 4 too – to keep in **proportion**

the n part does not have to be an integer for this type of question

Best buys

	4 pens costs £2.60	10 pens costs £6.00
"1 pen costs..."	£2.60 ÷ 4 = £0.65	£6.00 ÷ 10 = £0.60
"1 pound buys..."	4 ÷ 2.60 = 1.54 pens	10 ÷ 6 = 1.67 pens

You could work out how much 40 pens are and then compare

Compare the solution in the context of the question

The best value has the lowest cost "per pen"

The best value means £1 buys you more pens

Combining ratios

The ratio of Blue counters to Red counters is 5:3

The ratio of Red counters to Green counters is 2:1

Ratio of Blue to Red to Green

10 : 6 : 3

Lowest common multiple of the ratio both statements share

Use equivalent ratios to allow comparison of the group that is common to both statements

YEAR 10 – USING NUMBER...

@whisto_maths

Indices & Roots

What do I need to be able to do?

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

- Identify square and cube numbers
- Calculate higher powers and roots
- Understand powers of 10 and standard form
- Know the addition and subtraction rule for indices
- Understand power zero and negative indices
- Calculate with numbers in standard form

Keywords

Standard (index) Form: A system of writing very big or very small numbers
Commutative: an operation is commutative if changing the order does not change the result
Base: The number that gets multiplied by a power
Power: The exponent – or the number that tells you how many times to use the number in multiplication
Exponent: The power – or the number that tells you how many times to use the number in multiplication
Indices: The power or the exponent
Negative: A value below zero.
Coefficient: The number used to multiply a variable

Square and cube numbers

R

Square numbers

1, 4, 9, 16...

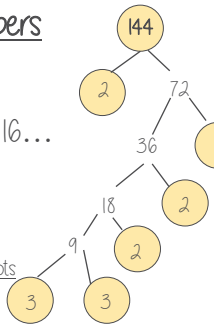
144 = 2 x 2 x 2 x 2 x 3 x 3

(2 x 2 x 3) x (2 x 2 x 3)

12 x 12

Prime factors can find square roots

$\sqrt{144} = 12$



Cube numbers

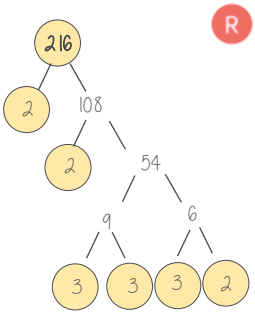
1, 8, 27, 64, 125...

216 = 2 x 2 x 2 x 3 x 3 x 3

(2 x 3) x (2 x 3) x (2 x 3)

6 x 6 x 6

$\sqrt[3]{216} = 6$



Higher powers and roots

x^n

n – power (number of times multiplied by itself)

x – the base number

$\sqrt[n]{x}$

Finding the nth root of any value

Other mental strategies for square roots

$\sqrt{810000} = \sqrt{81} \times \sqrt{10000}$

$= 9 \times 100$

$= 900$

Standard form

R

Any integer

Any number between 1 and less than 10

$A \times 10^n$

Example

3.2 x 10^4

= 3.2 x 10 x 10 x 10 x 10

= 32000

Non-example

0.8 x 10^4

5.3 x $10^{0.7}$

0.001

1 x $\frac{1}{1000}$

1 x 10^{-3}

10	1	$\frac{1}{10}$	$\frac{1}{100}$	$\frac{1}{1000}$
10^1	10^0	10^{-1}	10^{-2}	10^{-3}
10	1	0.1	0.01	0.001

Any value to the power 0 always = 1

Negative powers do not indicate negative solutions

Numbers in standard form with negative powers will be less than 1

3.2 x 10^{-4} = 3.2 x $\frac{1}{10}$ x $\frac{1}{10}$ x $\frac{1}{10}$ x $\frac{1}{10}$ = 0.00032

Addition/ Subtraction Laws

$a^m \times a^n = a^{m+n}$

$a^m \div a^n = a^{m-n}$

Zero and negative indices

$x^0 = 1$

Any number divided by itself = 1

$\frac{a^6}{a^6} = a^6 \div a^6$

$= a^{6-6} = a^0 = 1$

Negative indices do not indicate negative solutions

$2^2 = 4$
$2^1 = 2$
$2^0 = 1$
$2^{-1} = \frac{1}{2}$
$2^{-2} = \frac{1}{4}$

Looking at the sequence can help to understand negative powers

Powers of powers

$(x^a)^b = x^{ab}$

$(2^3)^4 = 2^3 \times 2^3 \times 2^3 \times 2^3$

The same base and power is repeated. Use the addition law for indices

$(2^3)^4 = 2^{12}$ ← $a \times b = 3 \times 4 = 12$

NOTICE the difference

$(2x^3)^4 = 2x^3 \times 2x^3 \times 2x^3 \times 2x^3$

The addition law applies ONLY to the powers. The integers still need to be multiplied

$(2x^3)^4 = 16x^{12}$

Standard form calculations

R

Addition and Subtraction

Tip: Convert into ordinary numbers first and back to standard from at the end

6 x 10^5 + 8 x 10^5

Method 1

= 600000 + 800000

= 1400000

= 1.4 x 10^5

Method 2

= (6 + 8) x 10^5

= 14 x 10^5

= 1.4 x 10^1 x 10^5

= 1.4 x 10^5

This is not the final answer

Multiplication and division

$\frac{1.5 \times 10^5}{0.3 \times 10^3}$

Division questions can look like this

(1.5 x 10^5) ÷ (0.3 x 10^3)

1.5 ÷ 0.3 x $10^5 \div 10^3$

= 5 x 10^2

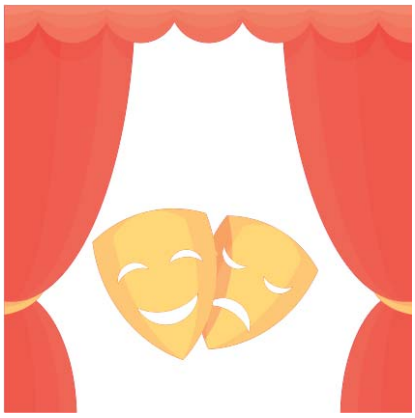
For multiplication and division you can look at the values for A and the powers of 10 as two separate calculations

TERM 1

Year 10 Drama

Autumn Term

An introduction to GCSE Drama and Holocaust Memorial Day



Introductory workshops
We will be exploring a variety of different dramatic techniques in a series of workshops. These techniques may well prove useful to you when you start to work on your devising and scripted components.

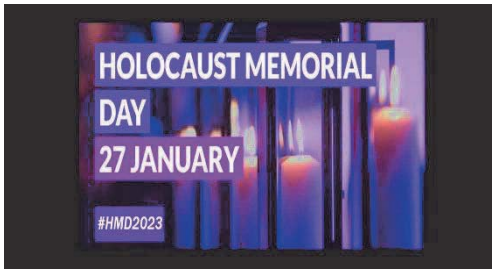
Holocaust Memorial Day
Every year, students from St John Fisher School produce a devised piece of theatre that is to be performed in January in the Cathedral Square. You will be working on devising this performance as a class in the second half of the Autumn Term.

Three different components
Devising Drama: Students research and explore a stimulus, work collaboratively and create their own devised drama. They complete a portfolio of evidence during the devising process, give a final performance of their drama, and write an evaluation of their own work. (30% of total GCSE)

Presenting and performing texts:
Students develop and apply theatrical skills in acting or design by presenting a showcase of two extracts from a performance text.
(30% of total GCSE)

Drama: Performance and response:
Students explore practically a whole performance text and demonstrate their knowledge and understanding of how drama is developed, performed and responded to. They also analyse and evaluate a live theatre performance.
(40% of total GCSE)

Useful Dramatic Terminology:
Improvisation-making a scene up on the spot with little to no prior preparation.
Mime-scenes that have no dialogue in.
Analysis-The process of examining how the elements of practical drama relate to each other in performance
Flashback-when a story transitions to a scene that has occurred in the past.
Tableaux-a series of images that are frozen onstage.
Split-stage-This is where you utilise the stage for two different locations. These two scenes take place at the same time on different sides of the stage.
Blocking-A traditional term used to describe the path traced by an actor's movement on stage, including entrances and exits.
Ensemble Skills-communicating a scene as a whole group, usually using movement.
Unison-performing movements at the same time as one another.
Canon-performing a movement one after another.



Live Theatre review
You will begin to watch some live theatre/recordings and will learn how to analyse and evaluate theatre. You will explore analysis of actor's, directorial choices and design choices.

R185 | PERFORMANCE AND LEADERSHIP IN SPORTS ACTIVITIES

TOPIC AREA 1

Key components of performance

Skills and Techniques

Technique

The way in which a skill is performed.

Skills

Ability to use a combination of movements to produce a co-ordinated action.

Badminton techniques and skills:

The grip
Serving (backhand & forehand)
Footwork/Stance
Drop shot
Clearing (backhand & forehand)
Smash (backhand & forehand)

Stance

- Watch the shuttle
- Arm point to shuttle
- Knees slightly bent
- Racket up

Backhand serve

- Pinch shuttle
- Stand sideways
- Drop shuttle
- Flick racket

Creativity

Creativity

This is the ability to generate or react to a certain situation in a particular way. A performers creativity will depend on what physical activity or sport in being performed. For example:

Creativity in badminton

Within badminton a player could be creative in games by changing the speed or direction of specific moves including disguise shots such as an overhead clear disguised as a drop shot. This can also mean a performer doing something different or unexpected. For example, a badminton player changing a way a shot is played by playing it across the court by a slight flick of the wrist rather than hitting it down the line.

Disguise overhead clear to a drop shot

Tactics/Strategies

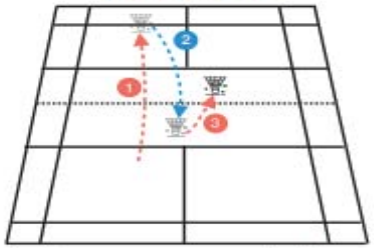
Tactic/Strategy

A tactic/strategy is an overall plan of how you'll win the game.

Movement pressure

This is a strategy that moves the player around the court to apply pressure in order for you to win the point.

For example:



1. Force your opponent to the back
2. They play a drop shot
3. You play a net shot to force them to the front

Other tactics in badminton

- Hitting the corners
- Deception
- Hitting an opponents weakness

Decision making

Decision making

This requires the performer to choose the correct skill for a chosen situation. For example, a badminton player may choose a to play a drop shot as they have seen the opponent at the back of the court.

Manage/Maintain

Ability to manage/maintain own performance

Performers will need to manage their emotions and anxiety levels during a performance as this will lead to poor performance. E.g. a badminton player losing a key point or a golfer missing an important putt. The player can get over anxious and angry during a performance.

Key Terms

- **Technique** - The way in which a skill is performed
- **Skills** - Ability to use a combination of movements to produce a co-ordinated action
- **Creativity** - This is the ability to generate or react to a certain situation in a particular way
- **Tactics/Strategy** - A tactic/strategy is an overall plan of how you'll win the game
- **Disguise** - Pretending to play one shot but then playing another
- **Decision Making** - The performer choosing the correct skill for a chosen situation
- **Maintaining/Managing performance** - The ability to control emotions throughout the game so that performance isn't affected

Year 10 Science – Term 1

Physics P1 – Energy

Required Practical

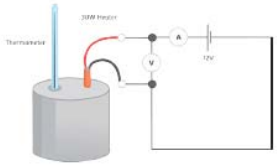
Investigating Specific Heat Capacity

independent variable – material

dependent variable – specific heat capacity

control variables – insulating layer, initial temperature, time taken

$\Delta E = m \times c \times \Delta\Theta$



Method:

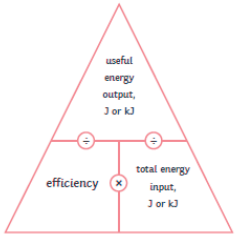
1. Using the balance, measure and record the mass of the copper block in kg.
2. Wrap the insulation around the block.
3. Put the heater into the large hole in the block and the block onto the heatproof mat.
4. Connect the power pack and ammeter in series and the voltmeter across the power pack.
5. Using the pipette, put a drop of water into the small hole.
6. Put the thermometer into the small hole and measure the temperature.
7. Switch the power pack to 12V and turn it on.
8. Read and record the voltmeter and ammeter readings – during the experiment, they shouldn't change.
9. Turn on the stop clock and record the temperature every minute for 10 minutes.
10. Record the results in the table.
11. Calculate work done and plot a line graph of work done against temperature.

Efficiency

When energy is transferred, some energy is wasted. The less energy that is wasted during the transfer, the more efficient the transfer.

There are two equations to calculate efficiency:

$$\text{efficiency} = \frac{\text{useful output energy transfer}}{\text{total input energy transfer}}$$



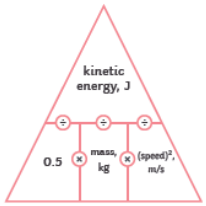
Kinetic and Potential Energy Stores

Movement Energy

kinetic energy = ½ x mass x speed²

$$E_k = \frac{1}{2}mv^2$$

(J) (kg)(m/s)

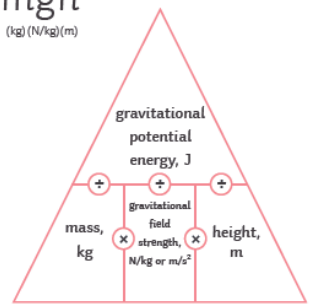


When something is off the ground, it has gravitational potential energy

gravitational potential energy = mass x gravitational field strength x height

$$E_p = mgh$$

(J) (kg) (N/kg)(m)



When an object falls, it loses gravitational potential energy and gains kinetic energy.

Stretching an object will give it elastic potential energy.

elastic potential energy = ½ × spring constant × extension²

$$E_e = \frac{1}{2}ke^2$$

(J) (N/m)(m)

Transferring Energy by Heating

Heating a material transfers the energy to its thermal energy store - the temperature increases.

E.g. a kettle: energy is transferred to the thermal energy store of the kettle. Energy is then transferred by heating to the waters thermal energy store. The temperature of the water will then increase.

Some materials need more energy to increase their temperature than others.

change in thermal energy = mass × specific heat capacity × temperature change

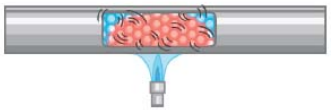
$$\Delta E = m \times c \times \Delta\Theta$$

(J) (kg) (J/kg°C) (°C)

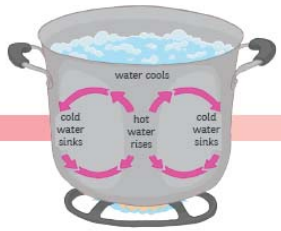
Specific heat capacity is the amount of energy needed to raise the temperature of 1kg of a material by 1°C.

Lubrication reduces the amount of friction. When an object moves, there are frictional forces acting. Some energy is lost into the environment. Lubricants, such as oil, can be used to reduce the friction between the surfaces.

Conduction – when a solid is heated, the particles vibrate and collide more, and the energy is transferred.



Convection – when a liquid or a gas is heated, the particles move faster. This means the liquid or gas becomes less dense. The denser region will rise above the cooler region. This is a convection current.



Energy Stores and Systems

Energy Stores	
kinetic	Moving objects have kinetic energy.
thermal	All objects have thermal energy.
chemical	Anything that can release energy during a chemical reaction.
elastic potential	Things that are stretched.
gravitational potential	Anything that is raised.
electrostatic	Charges that attract or repel.
magnetic	Magnets that attract or repel.
nuclear	The nucleus of an atom releases energy.

Energy can be transferred in the following ways:

mechanically – when work is done;

electrically – when moving charge does work;

heating – when energy is transferred from a hotter object to a colder object.

Conservation of Energy

Energy can never be created or destroyed, just transferred from one form to another. Some energy is transferred usefully and some energy gets transferred into the environment. This is mostly wasted energy.

Power

Power is the rate of transfer of energy – the amount of work done in a given time.

power = energy transferred ÷ time

P (W) = E (J) ÷ t (s)

power = work done ÷ time

P (W) = W (J) ÷ t (s)

Insulation – reduces the amount of heat lost. In your home, you can prevent heat loss in a number of ways:

- thick walls;
- thermal insulation, such as:
- loft insulation (reducing convection);
- cavity walls (reduces conduction and convection);
- double glazing (reduces conduction).

Equations

$E = \frac{1}{2}mv^2$

$E_p = mgh$

$E_e = \frac{1}{2}ke^2$

$\Delta E = m \times c \times \Delta\Theta$

$P = \frac{E}{t}$

$P = \frac{W}{t}$

Energy Resource	Advantages	Disadvantages
solar – using sunlight	Renewable, no pollution, in sunny countries it is very reliable.	Lots of energy needed to build, only works during the day, cannot increase power if needed.
geothermal – using the energy of hot rocks	Renewable and reliable as the rocks are always hot. Power stations have a small impact on environment.	May release some greenhouse gases and only found in specific places.
wind – using turbines	Renewable, no pollution, no lasting damage to the environment, minimal running cost.	Not as reliable, do not work when there is no wind, cannot increase supply if needed.
hydroelectric – uses a dam	Renewable, no pollution, can increase supply if needed.	A big impact on the environment. Animals and plants may lose their habitats.
wave power – wave powered turbines	Renewable, no pollution.	Disturbs the seabed and habitats of animals. Unreliable.
tidal barrages – big dams across rivers	Renewable, very reliable, no pollution.	Changes the habitats of wildlife, fish can be killed in the turbines.
biofuels	Renewable, reliable, carbon neutral.	High costs, growing biofuels may cause a problem with regards to space, clearance of natural forests.
non-renewable – fossil fuels	Reliable, enough to meet current demand, can produce more energy when there is more demand.	Running out, release CO_2, leading to global warming, and also release SO_2 which causes acid rain.

Year 10 Science – Term 1

Physics P2 - Electricity

Equations and Maths

Equations		Maths
Charge:	Q = It	1kW = 1000W
Potential difference:	V = IR	0.5kW = 500W
Energy transferred:	E = Pt	50 000W = 50kW
Energy transferred:	E = QV	
Power:	P = VI	
Power:	$P = I^2R$	

Required Practical

Investigating Resistance in a Wire

Independent variable: length of the wire.

Dependent variable: resistance.

Control variables: type of metal, diameter of the wire.

Conclusion: As the length of the wire increases, the resistance of the wire also increases.

Investigating Series and Parallel Circuits with Resistors

Independent variable: circuit type (series, parallel).

Dependent variable: resistance.

Control variables: number of resistors, type of power source.

Conclusion: Adding resistors in series increases the total resistance of the circuit. In a parallel circuit, the more resistors you add, the smaller the resistance.

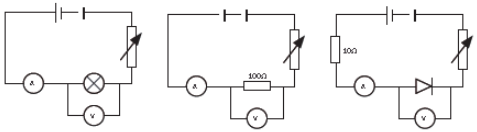
Investigating I-V Relationships in Circuits (Using a filament bulb, ohmic conductor, diode.)

Independent variable: potential difference/volts (V).

Dependent variable: current (A).

Control variable: number of components (e.g. 1 filament bulb, 1 resistor), type of power source.

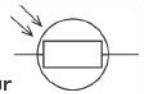
Set up the circuits as shown below and measure the current and the potential difference.



Draw graphs of the results once collected.

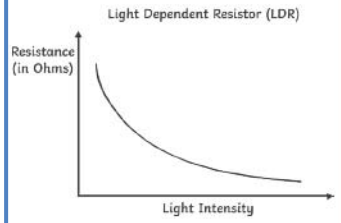
Circuit Devices

LDR – Light Dependent Resistor



An LDR is dependent on light intensity. In bright light the resistance falls and at night the resistance is higher.

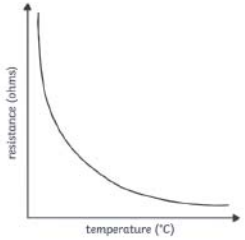
Uses of LDRs: outdoor night lights, burglar detectors.



Thermistor

A thermistor is a temperature dependent resistor. If it is hot, then the resistance is less. If it becomes cold, then the resistance increases.

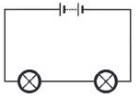
Uses of thermistors: temperature detectors.



Series and Parallel Circuits

Series Circuits

Once one of the components is broken then all the components will stop working.



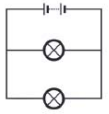
Potential difference – the total p.d. of the supply is shared between all the components. $V_{total} = V_1 + V_2$

Current – wherever the ammeter is placed in a series circuit the reading is the same. $I_1 = I_2 = I_3$

Resistance – In a series circuit, the resistance will add up to make the total resistance. $R_{total} = R_1 + R_2$

Parallel Circuits

They are much more common - if one component stops working, it will not affect the others. This means they are more useful.



Potential Difference – this is the same for all components. $V_1 = V_2$

Current – the total current is the total of all the currents through all the components. $I_{total} = I_1 + I_2 + I_3$

Resistance – adding resistance reduces the total resistance.

Charge

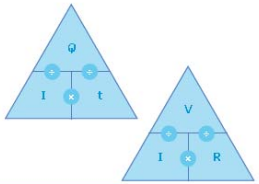
Electric current is the flow of electric charge. It only flows when the circuit is complete.

The **charge** is the current flowing past a point in a given time. Charge is measured in **coulombs (C)**.

Calculating Charge

charge flow (C) = current (A) × time (s)

Q = It



potential difference = current x resistance

V (V) = I (A) × R (Ω)

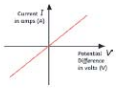
Resistance

voltage (V) = current (A) × resistance (Ω)

V = IR

Graphs of I-V Characteristics for Components in a Circuit

1. **Ohmic conductor**: the current is directly proportional to the potential difference - it is a straight line (at a constant temperature).



2. ***Filament lamp***: as the current increases, so does the temperature. This makes it harder for the current to flow. The graph becomes less steep.

3. **Diode**: current only flows in one direction. The resistance is very high in the other direction which means no current can flow.

Current and Circuit Symbols

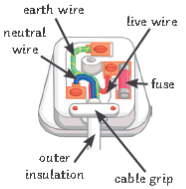
Current: the flow of electrical charge.

Potential difference (voltage): the push of electrical charge.

Resistance: slows down the flow of electricity.

cell		closed switch		fuse	
resistor		ammeter	A	LDR	
battery		voltmeter	V	LED	
variable resistor		bulb		thermistor	
open switch		diode			

Electricity in the Home



AC – alternating current. Constantly changing direction - UK mains supply is 230V and has a frequency of 50 hertz (Hz).

DC – direct current. Supplied by batteries and only flows in one direction.

Cables – most have three wires: live, neutral and earth. They are covered in plastic insulation for safety.

Live wire – provides the potential difference from the mains.

Neutral wire – completes the circuit.

Earth wire – protection. Stops the appliance from becoming live. Carries a current if there is a fault.

Touching the live wire can cause the current to flow through your body. This causes an electric shock.

Energy Transferred – this depends on how long the appliance is on for and its power.

energy transferred (J) = power (W) × time (s) $E = Pt$

Energy is transferred around a circuit when the charge moves.

energy transferred (J) = charge flow (C) × potential difference (V) $E = QV$

power (W) = potential difference (V) × current (A) $P = VI$

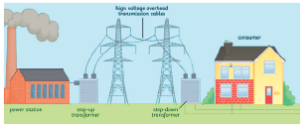
power (W) = current^2 (A) × resistance (Ω) $P = I^2R$

The National Grid

The National Grid is a system of **cables** and **transformers**. They transfer electrical power from the power station to where it is needed. Power stations are able to change the amount of electricity that is produced to meet the demands. For example, more energy may be needed in the evenings when people come home from work or school. Electricity is transferred at a low current, but a high voltage so less energy is being lost as it travels through the cables.

Step-up transformers – increase the voltage as the electricity flows through the cables.

Step-down transformers – decrease the potential difference to make it safe.



Year 10 Science – Term 1

Chemistry C3 – Quantitative Chemistry

Relative Formula Mass (M_r)

The **relative atomic mass** (A_r) of an element is an elements relative mass compared to the mass of an atom of carbon-12. A_r values are given in the periodic table.

The **relative formula mass** (M_r) of a compound is the **sum** of all the relative atomic masses (A_r) of the atoms in the formula.

Example 1: hydrochloric acid (HCl) consists of one hydrogen atom (A_r 1) and one chlorine atom (A_r 35.5).

The M_r of HCl = 1 + 35.5 = 36.5

Uncertainty

Whenever a measurement is made, there is always some degree of **uncertainty** about the result. Uncertainty is a **measure** of the **variability** in scientific data.

Uncertainty can be measured by considering the **resolution** of the scientific equipment being used or from the **range** of a set of scientific data.

There are two types of errors: **random error** and **systematic error**.

Random errors may be caused by **human error** such as a poor technique when taking measurements or by **equipment** that is **faulty**. For example, three mass balances all showing different mass values for the same object. Random errors are **random** and not something that can be predicted.

Law of Conservation of Mass

The law of conservation of mass states that during a chemical reaction, no atoms are lost or made.

For example: $2Mg + O_2 \longrightarrow 2MgO$

In a chemical reaction, mass is never lost or gained. What goes in must come out. The total mass of the reactants at the beginning of the chemical reaction equals the total mass of the products made at the end of the reaction.

Systematic errors are errors that are produced **consistently**: if the experiment is repeated, the **same error** will occur. For example, not taring a mass balance properly or problems with the experimental method.

$$\text{uncertainty} = \frac{\text{range of results}}{2}$$

The **range** is the difference between the **largest** and **smallest** value.

Reactions in Closed and Non-Enclosed Systems

If a reaction occurs in a **closed system**, the **mass** in a chemical reaction will remain **constant**.

In an **non-enclosed system, changes in mass can occur,** such as when a gas is released. It is important to remember that **no atoms are created or destroyed,** they are just **rearranged**. If a gas escapes a non-enclosed system, the total mass will look as if it has decreased. Similarly, if a gas is gained, the total mass will look as if it has increased. However, the **total mass** will **remain the same** if the mass of the gas is included in the reaction calculation.

Converting between Units

To convert between g/dm³ and mol/dm³, the relative formula mass of the solute is used.

Multiply by the M_r to convert from mol/dm³ to g/dm³.

Divide by the M_r to convert from g/dm³ to mol/dm³.

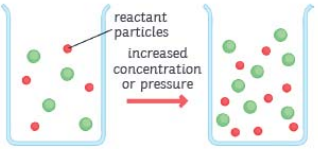
Example:

Determine the concentration of 0.8mol/dm³ sodium hydroxide (M_r 40) solution in g/dm³.

concentration = 0.8 × 40 = 32g/dm³

Concentration of Solutions

Concentration is a **measure** of the amount of a **substance** in a **volume** of liquid. The higher the concentration, the more particles of a substance are present in the solution.



In chemistry, there are two ways to measure the concentration of a solution. This can be done by calculating the **mass** of the substance in grams or by calculating the number of **moles**.

In order to calculate concentration, you must be working in dm³.

If it is not, it may mean that you need to do a conversion.

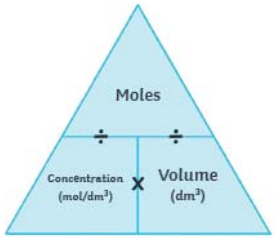
cm³ ⟶ dm³ = ÷ 1000

m³ ⟶ dm³ = × 1000

Calculating Concentrations

The concentration of a solution can have the units g/dm³ or mol/dm³.

Concentration can be calculated using the mass of dissolved solute or the volume of the solvent or solution in dm³.



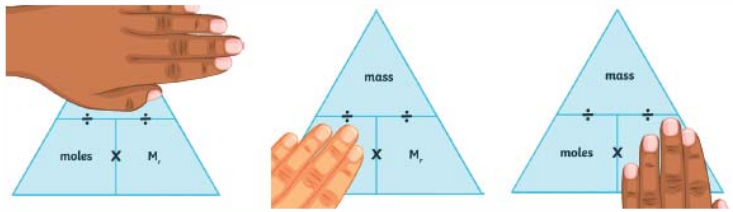
Example:

Student A dissolved 1 mol of sodium hydroxide in 4dm³ of water. Determine the concentration of the sodium hydroxide solution he made.

concentration = 1 mol ÷ 4dm³

concentration = 0.25mol/dm³

Calculating Moles, Mass and M_r



Calculating Moles, Mass and M_r

Calculate the number of **moles** in 330g of K_2S.

K_2S consists of two potassium atoms (A_r 39) and one sulfur atom (A_r 32).

Calculate the M_r of the compound = (39 × 2) + 32 = **110**

moles = mass ÷ M_r

moles = 330 ÷ 110 = 3 moles

Calculate the **mass** of 0.9 moles of $Fe(NO_3)_3(H_2O)_9$.

Calculate the Mr of the compound.

(16 × 3) + 14 = 62

62 × 3 = **186**

(1 × 2) + 16 = 18

18 × 9 = **162**

56 + 186 + 162 = **404**

mass = moles × M_r

mass = 0.9 × 404 = 363.6g

Relative Atomic Mass (A_r)

iron (Fe) = 56

oxygen (O) = 16

nitrogen (N) = 14

hydrogen (H) = 1

Limiting Reactants

A chemical reaction ends once one of the **reactants** is used up. The other reactants have nothing to react with and so some are left over.

The **limiting reactant** is the reactant that is **completely used up** in a chemical reaction. This reactant is the one that determines the amount of product that is made.

The reactant in **excess** is the one that is left over and could further react if there was another reactant to react with.

The **amount of product** that is produced during a chemical reaction is **dependent** upon the **amount of the limiting reactant**.

Calculating the maximum mass of a product formed during a chemical reaction can be done by the following:

a. Writing a balanced equation.

b. Calculating the mass (g) of the limiting reactant.

c. The A_r and M_r of the product and limiting reactant.

Avogadro's Constant

1 mole = 6.02×10^{23}

The number is known as **Avogadro's constant or Avogadro's number** and is named after the Italian scientist Amedeo Avogadro. The mole is abbreviated to **mol**.

This number is very important and one that you should remember. The mass of one mole of a substance in grams is equal to its relative formula mass. For example, one mole of carbon-12 has a mass of 12g

A mole is the amount of a substance that contains **6.02×10^{23}** particles of that substance. The particles could be atoms, molecules, ions or electrons.

For example, 1 mole of carbon will contain the same number of atoms **(6.02×10^{23})** as you would have molecules in 1 mole of water.

Masses in Equations

$$Fe + 2HCl \longrightarrow FeCl_2 + H_2$$

$$56 + 2\,(1 + 35.5) \longrightarrow (56 + 2(35.5) + (1 \times 2))$$

$$56g + 73g \longrightarrow 127g + 2g$$

One mole of iron reacts with two moles of hydrochloric acid to **produce** one mole of iron chloride and one mole of hydrogen.

Year 10 Science – Term 1

Chemistry C3 – Quantitative Chemistry

Balancing Equations

By using the masses of the products and reactants, it is possible to work out the balancing numbers in an equation.

For example, 12g of magnesium (Mg A_r 24) reacts with 8g of oxygen (O_2 M_r 32) to produce magnesium oxide (MgO M_r 40). Determine the balanced symbol equation for the reaction.

Calculate the amount of each of the reactants.

Mg = 12 ÷ 24 = 0.5 mol

O_2 = 8 ÷ 32 = 0.25 mol

Divide both values by the smaller amount.

Mg = 0.5 ÷ 0.25 = 2

O_2 = 0.25 ÷ 0.25 = 1

The equation shows that on the left-hand side of the equation, 2 mol of the reactant (Mg) reacts with 1 mol of oxygen. Using this information, it is then possible to balance the rest of the equation in the normal way.

$2Mg + O_2 \longrightarrow 2MgO$

Volumes of Solutions

By rearranging the concentration equation, it is possible to calculate the amount of a solute in a given volume of solution if the concentration is known.

amount of solute (mol) = concentration (mol/dm^3) × volume (dm^3)

Example:

Determine the amount of 0.2mol/dm^3 sodium hydroxide in 75cm^3 of solution.

Step 1: Convert the volume to dm^3.

75cm^3 = 75.0 ÷ 1000 = 0.075dm^3

Step 2: amount of solute (mol) = concentration (mol/dm^3) × volume (dm^3)

= 0.2mol/dm^3 × 0.075dm^3

= 0.015 mol

Calculating the Mass

Using the example above, calculate the mass of sodium hydroxide (M_r 40) in 75cm^3 of solution.

mass = amount × M_r

mass = 0.015 mol × 40

mass = 0.6g

Molar Gas Volume

The volume of one mole of any gas at room temperature and pressure (20°C and 1 atmosphere pressure) is 24dm^3 (**24 000 cm^3**).

To calculate a known volume of a gas:

volume = amount in mol × molar volume

For example, determine the volume of 0.55 mol of carbon monoxide at room temperature and pressure.

volume = amount in mol × molar volume

volume = 0.55 × 24

= 13.2dm^3

Calculating the Amount of Gas

By **rearranging the equation**, it is possible to calculate the amount of a gas in moles.

For example, determine the amount of hydrogen gas that occupies 198cm^3 at room temperature and pressure.

$$\text{amount in mol} = \frac{\text{volume}}{\text{molar volume}}$$

$$\text{amount in mol} = \frac{198}{24\,000}$$

amount in mol = 0.0083 mol

Chemistry C3 – Quantitative Chemistry Higher Tier Only

Amount of Substances in Equations – Higher Tier Only

How do we know the masses involved in the equation?

To work out the masses involved, write in the relative atomic mass (A_r) for an element and the relative formula mass (M_r) for a compound.

Example

Step 1: Write down the **balanced** symbol equation. $2Mg + O_2 \longrightarrow 2MgO$

Step 2: Write in the relative atomic and relative formula masses for the **reactants** and **products** involved in the chemical reaction. $(2 \times 24) + (2 \times 16) \longrightarrow 2 \times (24 + 16)$

$48g + 32g \longrightarrow 80g$

Reaction Pathways – Higher Tier Only

There is often more than one way to make a substance. Reaction pathways **describe** the **reactions** that have taken place to form the **desired product**. Choosing a particular pathway is dependent upon a number of factors:

1. percentage yield
2. atom economy
3. rate of reaction
4. position of the equilibrium
5. usefulness of any byproducts

The raw materials needed for a particular reaction may affect its chosen pathway. For example, crude oil is a **non-renewable resource**; the resource will run out if we continue to use it. However, plant sugars are **renewable** and can be replenished as long as other plants are replanted.

Avogadro's Law – Higher Tier Only

When the temperature and pressure stay the same, Avogadro's law states that different gases that have the same volume contain equal numbers of molecules.

For example, 1 mol of methane gas occupies the same volume as 1 mol of argon gas.

$H_2 + Cl_2 \longrightarrow 2HCl$

When hyrdogen and chlorine react, hydrogen chloride is produced. In terms of the molar ratio, 10cm^3 of hydrogen reacts completely with 10cm^3 of chlorine. Therefore, the ratio between hydrogen and chlorine is 1:1.

The molar ratio between hydrogen and hydrogen chloride is 1:2. For example, 10cm^3 of hydrogen reacts to produce 20cm^3 of hydrogen.

The Mole – Higher Tier Only

When we talk about moles, we are not talking about the moles that live underground.

A **mole** (mol) is a **measurement** that is used in chemistry.

Example 1

Look at this reaction:

$2Mg + O_2 \longrightarrow 2MgO$

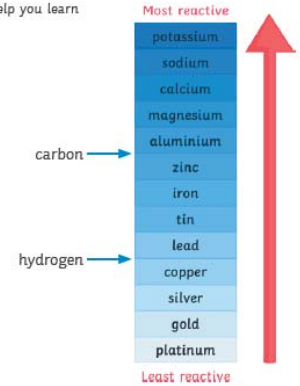
The reaction shows that **two moles** of magnesium react with oxygen to produce **two moles** of magnesium oxide. Using moles in a **balanced symbol equation** shows the **ratio** of **reactants** to **products**.

Year 10 Science – Term 1

The Reactivity Series

Here's a **mnemonic** to help you learn the order.

purple (potassium)
slime (sodium)
can (calcium)
make (magnesium)
a (aluminium)
careless (carbon)
zebra (zinc)
insane (iron)
try (tin)
learning (lead)
how (hydrogen)
camels (copper)
surprise (silver)
gorillas (gold)



The reactivity series is a league table for metals. The **more reactive** metals are near the **top** of the table with the **least reactive** near the **bottom**. In chemical reactions, a more reactive metal will displace a less reactive metal.

Reactions of Metals with Water

Metals, when reacted with water, produce a metal hydroxide and hydrogen.

lithium + water → lithium hydroxide + hydrogen

$2Li + 2H_2O \rightarrow 2LiOH + H_2$

The more reactive a metal is the faster the reaction.

Reactions of Metals with Dilute Acid

Metals, when reacted with acids, produce a **salt** and **hydrogen**.

Sodium + hydrochloric acid → sodium chloride + hydrogen

$2Na + 2HCl \rightarrow 2NaCl + H_2$

Metals that are below hydrogen in the reactivity series **do not** react with dilute acids.

Reactions of Acids

The general formula for the reaction between an acid and a metal is:
acid + metal → salt + hydrogen

For example: hydrochloric acid + sodium → sodium chloride + hydrogen
$2HCl + 2Na \rightarrow 2NaCl + H_2$

When an acid reacts with an alkali, a neutralisation reaction takes place and a salt and water are produced.

The general formula for this kind of reaction is acid + alkali → salt + water

hydrochloric acid + sodium hydroxide → sodium chloride + water

$HCl + NaOH \rightarrow NaCl + H_2O$

Naming Salts

The first part comes from the metal in the metal carbonate, oxide or hydroxide. The second part of the name comes from the acid that was used to make it.

Acid Used	Salt Produced
hydrochloric	chloride
nitric	nitrate
sulfuric	sulfate

Chemistry C4 – Chemical Changes

Making Soluble Salts

1. Make a saturated solution by stirring copper oxide into the sulfuric acid until no more will dissolve.

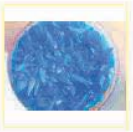
2. Filter the solution to remove the excess copper oxide solid.

3. Half fill a beaker with water and set this over a Bunsen burner to heat the water. Place an evaporating dish on top of the beaker.

4. Add some of the solution to the evaporating basin and heat until crystals begin to form.

5. Once cooled, pour the remaining liquid into a crystallising dish and leave to cool for 24 hours.

6. Remove the crystals with a spatula and pat dry between paper towels.



Electrolysis of Aqueous Solutions

Gases may be given off or metals deposited at the electrodes. This is dependent on the reactivity of the elements involved.

If the metal is **more reactive** than **hydrogen** in the reactivity series, then **hydrogen** will be **produced** at the **negative cathode**. At the **positive anode**, negatively charged ions **lose** electrons. This is called **oxidation** and you say that the ions have been oxidised.

Using Electrolysis to Extract Metals

Metals are extracted by electrolysis if the metal in question reacts with carbon or if it is too reactive to be extracted by reduction with carbon. During the extraction process, large quantities of energy are used to melt the compounds.

Aluminium is manufactured by the process of electrolysis. Aluminium oxide has a high melting point and melting it would use large amounts of energy and increase the cost of the process. Therefore, molten **cryolite** is added to aluminium oxide to lower the melting point and thus reduce the cost.

Reactions with Bases

The general formula for the reaction between an acid and a metal oxide is:
acid + metal oxide → salt + water

sulfuric acid + copper oxide → copper sulfate + water
$H_2SO_4 + CuO \rightarrow CuSO_4 + H_2O$

Reactions with Carbonates

The general formula for the reaction between an acid and a carbonate is:

acid + carbonate → salt + water + carbon dioxide

hydrochloric acid + calcium carbonate → calcium chloride + water + carbon dioxide

pH Scale

In aqueous solutions, acids produce H^+ ions and alkalis produce OH^- ions.

Neutral solutions are pH7 and are neither acids nor alkalis.

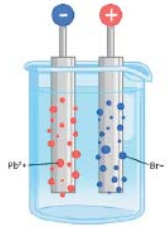
For example, in neutralisation reactions, hydrogen ions from an acid react with hydroxide ions from an alkali to produce water:

$H^+ + OH^- \rightarrow H_2O$

Electrolysis of Molten Ionic Compounds – Lead Bromide

Lead bromide is an **ionic** substance. Ionic substances, when solid, are **not** able to conduct electricity. When molten or in solution, the ions are free to move and are able to carry a charge.

The **positive lead** ions are attracted toward the **negative cathode** at the same time as the **negative bromide** ions are attracted toward the **positive anode**.



Oxidation is the loss of electrons and reduction is the gaining of electrons. **OIL RIG (Higher Tier Only).**

We represent what is happening at the electrodes by using **half equations (Higher Tier Only).**

The lead ions are attracted towards the negative electrode. When the **lead ions** (Pb^{2+}) reach the cathode, each ion **gains two electrons** and becomes a neutral atom. We say that the lead ions have been **reduced**.

$Pb^{2+} + 2e^- \rightarrow Pb$

The bromide ions are attracted towards the positive electrode. When the **bromide ions** (Br-) reach the anode, each ion **loses one electron** to become a neutral atom. Two bromine atoms are then able to bond together to form the **covalent** molecule Br_2.

$2Br^- \rightarrow Br_2 + 2e^-$

Strong and Weak Acids (Higher Tier Only)

A **strong** acid **completely dissociates** in a solution.
For example: $HCl \rightarrow H^+ + Cl^-$

Hydrochloric acid is able to completely dissociate in solution to form hydrogen and chloride ions.

Examples of strong acids include nitric acid (HNO_3) and sulfuric acid (H_2SO_4).

Weak acids in comparison only **partially dissociate.**

For example, acetic acid partially dissociates to form a hydrogen and acetate ion.

$CH_3COOH \rightleftharpoons CH_3COO^- + H^+$

The **double arrow** symbol indicates that the reaction is **reversible.**

Chemistry C4 – Chemical Changes Higher Tier Only

Redox Reactions (Higher Tier Only)

When metals react with acids, they undergo a redox reaction. A **redox reaction** occurs when both **oxidation** and **reduction** take place at the **same time.**

For example:

$2H^+ + Ca \rightarrow Ca^{2+} + H_2$

The ionic equation can be further split into two half equations.

$Ca \rightarrow Ca^{2+} + 2e^-$

Oxidation is loss of electrons.

$2H^+ + 2e^- \rightarrow H_2$

Reduction is gaining of electrons.

Year 10 Science – Term 1

Chemistry C5 – Energy Changes

Activation Energy – the minimum amount of energy required for a chemical reaction to take place.

Catalysts – increase the rate of a reaction. Catalysts provide an alternative pathway for a chemical reaction to take place by **lowering** the activation energy.

Bond Making and Bond Breaking

In an **endothermic** reaction, energy is needed to break chemical bonds. The **energy change (ΔH)** in an endothermic reaction is **positive**.

You may also find, in some textbooks, **ΔH** referred to as the **enthalpy change.**

In an **exothermic** reaction, energy is needed to form chemical bonds. The **energy change (ΔH)** in an exothermic reaction is **negative**.

Bond energies are measured in **kJ/mol**.

Required Practical

Aim

To investigate the variables that affect temperature changes in reacting solutions, e.g. acid plus metals, acid plus carbonates, neutralisations and displacement of metals.

Equipment

- polystyrene cup
- measuring cylinder
- thermometer
- 250cm^3 glass beaker
- measuring cylinder
- top pan balance

Method

Reaction between a metal and an acid.

1. Gather the equipment.
2. Place the polystyrene cup inside the beaker. This will prevent the cup from falling over.
3. Using a measuring cylinder, measure out 30cm^3 of the acid. Different acids such as hydrochloric or sulfuric acid may be used. Pour this into the polystyrene cup.
4. Record the temperature of the acid using a thermometer.
5. Using a top pan balance, measure out an appropriate amount of the solid (for example, 10g) or use one strip of a metal such as magnesium.
6. Add the solid to the acid and record the temperature. You may choose to record the temperature of the acid and metal every minute for 10 minutes.

Exothermic and Endothermic Reactions

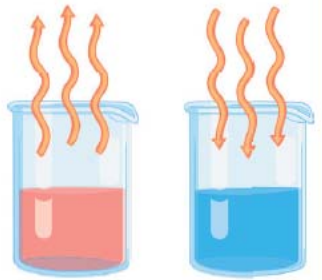
When a chemical reaction takes place, **energy** is involved. Energy is transferred when chemical **bonds are broken** and when new **bonds are made.**

Exothermic reactions are those which involve the transfer of energy **from the reacting chemicals to** the surroundings. During a practical investigation, an exothermic reaction would show an **increase in temperature** as the reaction takes place.

Examples of exothermic reactions include **combustion, respiration and neutralisation** reactions. Hand-warmers and self-heating cans are examples of everyday exothermic reactions.

Endothermic reactions are those which involve the transfer of energy **from the surroundings to** the reacting chemicals. During a practical investigation, an endothermic reaction would show a **decrease in temperature** as the reaction takes place.

Examples of endothermic reactions include the **thermal decomposition** of calcium carbonate. Eating **sherbet** is an everyday example of an endothermic reaction. When the sherbet dissolves in the saliva in your mouth, it produces a cooling effect. Another example is **instant ice packs** that are used to treat sporting injuries.

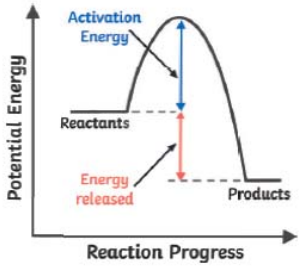


Reaction Profiles – Exothermic

Energy level diagrams show us what is happening in a particular chemical reaction. The diagram shows us the **difference in energy** between the reactants and the products.

In an exothermic reaction, the **reactants** are at a **higher** energy level than the products.

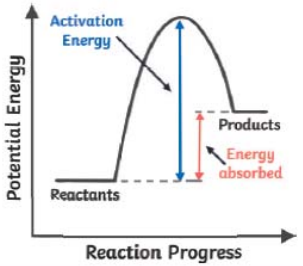
In an **exothermic** reaction, the difference in energy is **released** to the surroundings and so the **temperature** of the surroundings **increases**.



Reaction Profiles – Endothermic

In an **endothermic** reaction, the **reactants** are at a **lower** energy level than the products.

In an **endothermic** reaction, the difference in energy is **absorbed** from the surroundings and so the **temperature** of the surroundings **decreases**.



Chemistry C5 – Energy Changes Higher Tier Only

Calculations Using Bond Energies (Higher Tier Only)

Bond energies are used to calculate the change in energy of a chemical reaction.

Calculate the change in energy for the reaction: $2H_2O_2 \longrightarrow 2H_2O + O_2$

The first step is to write the symbol equation for the reaction. Once you have done this, work out the bonds that are breaking and the ones that are being made.

H-O-O-H ⟶ 2H-O-H + O=O

Bond	Bond Energy kJ/mol
H-O	464
O-O	146
O=O	498

On the **left-hand side** of the equation, the **bonds are breaking.**

There are two **O-H** bonds and one **O-O** bond.

So 464 + 146 + 464 = 1074

There are two moles of H_2O_2 therefore the answer needs to be multiplied by two.

So 1074 × 2 = 2148

On the **right-hand** side of the equation, the **bonds are made.**

There are two **H-O** bonds

So 464 + 464 = 928

Two moles of H_2O are made therefore the answer needs to be multiplied by two.

So 928 × 2 = 1856

There is also one **O=O** bond with a bond energy of 498

So 1856 + 498 = 2354

ΔH = sum (bonds broken) – sum (bonds made)

ΔH = 2148 – 2354 = -206 kJ/mol

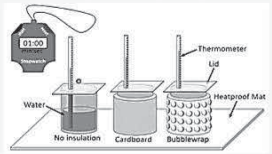
The reaction is exothermic as ΔH is negative.

Year 10 TRIPLE SCIENCE ONLY – Term 1

Physics P1 – Energy

Investigating Different Insulators-Practical-Method

1. Wrap three beakers with a layer of insulation.
2. Put a thermometer in each beaker.
3. Record the temperature of the water.
4. Take the temperature of each beaker-every two minutes.

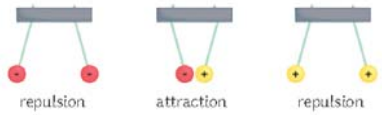


Physics P2 - Electricity

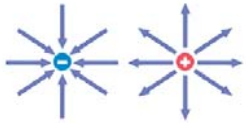
Static

A build-up of static is caused by friction. When materials are rubbed together, the electrons move from one to the other. One material becomes positively charged and the other is negatively charged. The positive charges do not move.

Too much static can cause a spark. If the potential difference is large enough, the electrons can jump across the gap - this is the spark.



Electric charges create an **electric field**. The closer you get to the object, the **stronger** the field. The electric field can be shown by drawing field lines, they go from **positive to negative**.



If a charged object is placed near the field, it will experience a force. The force becomes stronger as the charged object gets closer.

Chemistry C4 – Chemical Changes

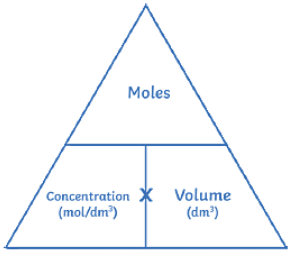
Titration Method (Chemistry Only)

1. Using the pipette and pipette filler, measure 25cm³ sodium hydroxide solution and pour into a conical flask.
2. Add several drops of phenolphthalein to the sodium hydroxide solution.
3. Swirl the flask and the mixture should be pink.
4. Place the conical flask on a white tile.
5. Place the burette into its stand, ensuring the tap is closed. Using the funnel, fill the burette with sulfuric acid to the 0cm³ line. Should you go above this line, open the tap and allow the excess to run off into a beaker.
6. Once the burette is correctly filled, place over the conical flask.
7. Carefully open the tap so the acid flows slowly into the conical flask. Swirl the flask and look for the indicator changing from pink to colourless.
8. Continue adding the acid to the flask until the indicator is permanently colourless.
9. Record the total volume of acid added to the sodium hydroxide in the results table.
10. Repeat the experiment twice more.

Titration Method (Chemistry Only)

Using the results from a titration experiment, it is possible to calculate the concentration of a solution or the volume of solution required to neutralise an acid or alkali.

Worked Example



In a titration, 20cm³ of 1.0mol/dm³ sulfuric acid reacted with 25cm³ of sodium hydroxide. What was the concentration of sodium hydroxide?

Write out the symbol equation for the reaction.

$NaOH + H_2SO_4 \rightarrow Na_2SO_4 + H_2O$

Check that the equation is balanced.

$2NaOH + H_2SO_4 \rightarrow Na_2SO_4 + 2H_2O$

To convert cm³ to dm³, just divide by 1000.

Draw a table like the one below and fill it in with the information that you know from the question.

	Acid (H_2SO_4)	Alkali (NaOH)
number of moles		
concentration mol/dm³	1.0	
volume (dm³)	0.02	0.025

As the values for the **concentration** and **volume** of the acid are known, it is possible to now work out the **number of moles** of H_2SO_4.

number of moles = concentration × volume

number of moles = 1.0 × 0.02 = **0.02 moles**

From the balanced symbol equation, we know that there is double the amount of NaOH compared to H_2SO_4, therefore to calculate the number of moles of the alkali, we double the number of moles of the acid. 0.02 × 2 = **0.04 moles.**

	Acid (H_2SO_4)	Alkali (NaOH)
number of moles	0.02	0.04
concentration mol/dm³	1.0	
volume (dm³)	0.02	0.025

Chemistry C3 – Quantitative Chemistry

Percentage Yield – Chemistry Only

The percentage yield can be calculated from the following equation.

$$\text{percentage yield} = \frac{\text{actual mass of product made}}{\text{maxium theoretical mass of product}} \times 100$$

The **theoretical yield** is **the maximum mass** that can be made during a chemical reaction. The law of conservation states that during a chemical reaction, no atoms are lost or made. It's not always possible to obtain the maximum calculated amount of product.

The loss of product may be due to some of the product being lost when filtered. Some of the reactants may not react as expected and so may not produce enough product. The reaction may be a reversible one and as a consequence, the reaction may not go to completion.

Example:

1.8g of copper sulfate crystals are made during a chemical reaction. The theoretical yield for this reaction is **2.0g**. Calculate the percentage yield of copper sulfate.

$$\text{percentage yield} = \frac{1.8\text{g}}{2.0} \times 100$$

percentage yield = 90%

Atom Economy – Chemistry Only

The percentage atom economy can be calculated from the following equation.

$$\text{atom economy} = \frac{\text{relative formula mass of desired product from equation}}{\text{sum of relative formula masses of all reactants from equation}}$$

The **atom economy** is a measure of the amount of starting materials (reactants) that end up as **useful products**. It is important for sustainable development and for economic reasons to use reactions with **high atom economy**. However, not all atoms end up as the desired product and may form other products. We call these **byproducts**.

Example:

When glucose (M_r 180) is fermented, ethanol (M_r 46) is produced.

$C_6H_{12}O_6 \longrightarrow 2CH_3CH_2OH + 2CO_2$

Calculate the atom economy for this reaction.

$$\text{atom economy} = \frac{2 \times 46}{180} \times 100$$

atom economy = 51.1%

Year 10 TRIPLE SCIENCE ONLY – Term 1

Chemistry C5 – Energy Changes

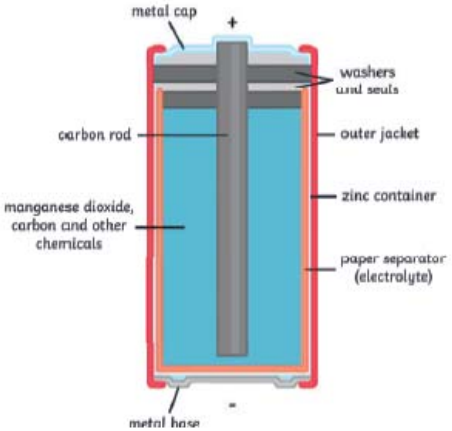
Chemical Cells

A chemical cell converts **chemical energy** into **electrical energy**. More than one cell connected in series is called a battery.

There are two types of chemical cell, **rechargeable** and **non-rechargeable.**

Non-rechargeable cells will produce a **voltage** until the chemicals inside are used up. Once this occurs, the cell is no longer useful and can then be recycled.

Rechargeable cells and batteries can be recharged multiple times. An electrical current is passed backwards through the cell. This works by **reversing** the chemical reactions and the cell or battery can then be used again to produce more electricity. Mobile phones contain rechargeable batteries.

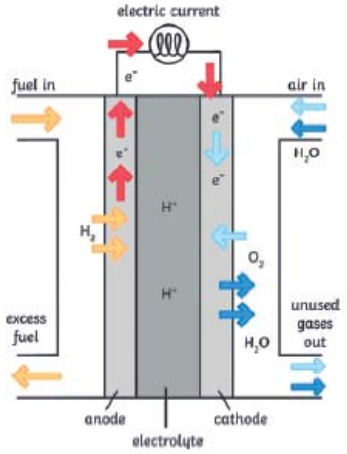


Fuel Cells

Fuels cells work differently to chemical cells in that they need to be supplied with a fuel and oxygen. The constant supply of these two ingredients will allow a fuel cell to produce a voltage continuously.

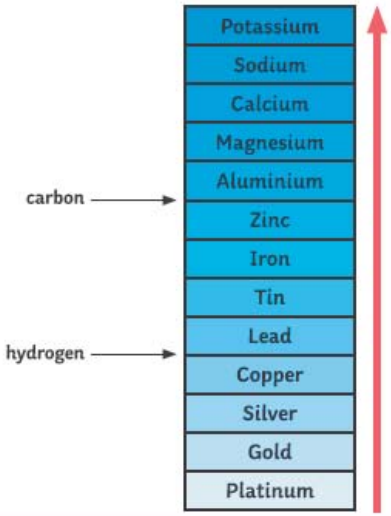
Inside the fuel cell, hydrogen is **oxidised** electrochemically; the fuel is **not combusted.** This allows the reaction to take place at a lower temperature.

Hydrogen-oxygen fuel cells are an alternative to rechargeable batteries and cells as the only product that is produced is water.



Voltage

The voltage of a cell is affected by the combination of metals used inside it. The bigger the difference in the **reactivity** of the two metals, the bigger the **voltage** produced. For example, if the metals used inside the cell are magnesium and zinc, then the voltage produced will be **small** as the two metals are **close together** in the **reactivity series.** By comparison, if magnesium and copper are used, then the voltage produced will be **larger** as the metals are **further apart** in the **reactivity series.**



Ionic Equations

hydrogen + oxygen ⟶ water

$2H_2 + O_2 \longrightarrow 2H_2O$

At the **cathode:** $2H_2 + 4OH^- \longrightarrow 4H_2O + 4e^-$

At the **anode:** $O_2 + 2H_2O + 4e^- \longrightarrow 4OH^-$

In the fuel cell, **oxygen** is being **reduced** (reduction is the gaining of electrons) whilst **hydrogen** is being **oxidised** (oxidation is the loss of electrons). Oxidation and reduction happen simultaneously – this is called a **redox reaction.**

Marriage

Catholics believe: marriage was created by God to build and preserve **society**; it is a **sacrament**; it is the right setting for **sexual relationships** and starting a **family**.

The purpose of marriage is: to live in a **life-long** and **faithful** relationship where a couple can support each other; to enjoy a **sexual relationship** as God intended; **to have children** (procreation) and bring them up as members of the Church

Catholics believe marriage: can only be between one man and one woman (**monogamy**); **joins a couple together for life**; is not for everyone - some choose a **celibate** life.

Many non-religious people believe that couples can choose to live together (**cohabit**) or get married but should be faithful to their partner. A legal marriage can provide stability and legal protection for children. Many people to choose to have a sexual relationship and cohabit before they get married. Today marriage can be between same-sex couples.

The Catholic Church teaches that couples should wait until they are married before having sex or living together. Research suggests many Catholics today would allow pre-marital sex and accept cohabitation.

Sexual relationships

The Catholic Church believes that sex in marriage is unitive (a source of joy and pleasure, bringing the couple closer together) and procreative (open to the possibility of having children).

The Catholic Church teaches that sex-outside marriage is wrong because: the **Bible** says it is sinful; the **Catechism** says it is wrong; adultery breaks the **wedding vows**; adultery is prohibited in the **10 Commandments** and condemned by **Jesus**.

The Catholic Church says that **being homosexual is not a sin** but homosexual sex is a sin. The Church does not accept same-sex marriage or civil partnerships. This is because: the **Bible** condemns homosexual activity; sex should be open to the possibility of **new life**; the **Catechism** teaches marriage is for a man and a woman.

The Church teaches that **it is sinful to harass or attack homosexuals** because: people cannot help their sexual orientation; the Bible teaches that all people should be respected because we are all made in God's image and likeness.

Most non-religious people **accept consensual sexual relationships** and see **no problem with same-sex relationships** if it does not affect other people's human rights.

Families

The Catholic Church teaches that parents have a duty to: provide for their **children's needs**; teach them **moral values**; bring them up in the **Catholic faith**.

Family life is important because: it is one of the purposes of marriage; the family was **created by God** as the basic unit of society; it is where children learn right from wrong; it is **where faith is introduced and nurtured**.

The main family types today are: **nuclear** families; **single-parent** families; **same-sex** families; **extended** families; **blended** families.

The Catholic Church: gives its blessing to nuclear and extended families as living within the law of the Church; recognises that single-parent families need support and are not sinful; disapproves of same-sex and blended families as they involve same-sex marriage and re-marriage following divorce; believes parents should be married and the Church should make it easier for cohabiting couples to marry.

Most **non-religious people** believe that the family is an important part of society for bringing up children in a stable setting, providing for their needs, keeping them safe, passing on moral values and teaching them to be responsible citizens.

Support for the family in the local parish

The Catholic parish supports family life by: providing Catholic education (**schools**) where faith, worship and moral teaching is part of daily life; **being family-friendly**, welcoming children and helping children share in worship through Children's liturgies; help parents prepare their children to receive the sacraments by **running First Communion and Confirmation classes**; the priest **teaching about the importance of family life and marriage**, offering **marriage guidance and support** when it is needed; providing contact with charities and groups who can support family life e.g. Catholic Marriage Care; run events which **bring families together** to help them feel part of the parish family and to offer support to one another.

Parishes help families because: they have a duty to **support baptised children**; to **support parents** in bringing their children up in the Catholic faith; by doing so they are helping **build a better society for all**; in this way **it helps the Church to grow** from generation to generation.

Parish support is important to families because: bringing up children in the Catholic faith involves taking them to Church regularly; teaching them about the faith requires knowledge and expertise parents may not have; taking part in the sacraments is essential; praying and supporting one another gives families strength.

GCSE Religious Studies Unit 3 Philosophy and Ethics 3.2 Relationships and Families in the 21st Century (Key sources of wisdom & authority are included on the back of the sheet)

Contraception

The **Catholic Church** teaches that: sex should be **unitive** and **procreative**; Catholics may use **natural family planning (NFP)** as a way to regulate the size of their family.

Catholics believe this because: the encyclical '**Humanae Vitae'** (Pope Paul VI) **condemned artificial contraception** and declaring NFP acceptable; NFP does not separate the unitive and procreative purpose of sex; artificial methods do, which is not God's intention; some contraceptives cause an early abortion; artificial contraception can lead to promiscuity.

NFP uses the natural pattern of a woman's fertility cycle to help a couple decide when to have sex.

Other Christians accept artificial contraception within marriage because: it can improve **women's health**; it allows **couples to grow closer through sex**; the **Bible** does not forbid it; **Church leaders** have declared it acceptable.

Non-religious people accept artificial contraception because: it **reduces abortions**, it reduces the spread of **STIs/HIV**; it improves the **health** of women and children.

Divorce and remarriage

The **Catholic Church does not allow divorce** because: **Jesus** taught it was wrong and that marriage is for life; the couple have made a **covenant** with God through their marriage which cannot be broken; the **Catechism** teaches that marriage cannot be dissolved **.**

The **Catholic Church** can grant an **annulment** which recognises that a couple were never truly married. These couples are then free to marry. This could be granted if: the marriage was **never consummated**; it was **never a truly Christian marriage**; a partner **hid important information** e.g. they already had children.

Catholics can get a civil divorce but cannot get remarried.

Most **non-Catholic Churches allow divorce** because: Jesus allowed it for **adultery**; people should be allowed **forgiveness and given a fresh start**; it is **better to divorce than live in hatred**. These Churches **allow remarriage**.

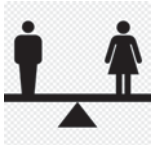
Atheists and Humanists allow divorce and believe: people should be **treated justly**; **partners/children should be cared for**; partners should be **allowed to remarry**; they believe people should **act in the best interests of all people involved**.

Equality of men and women in the family

The **Catholic Church** teaches that: **men and women have equal status in God's eyes**; men and women have **different qualities** e.g. women have the ability to bring new life into the world and have a caring capacity giving them a crucial role in family life; women should have equal roles in work and politics; women must discern the balance of work, community and family.

Many **Evangelical Protestants** believe that **women: have a duty to look after children and the home**; should **not speak in Church**; should **submit to their husband's authority**. These beliefs are based on: St Paul's teaching that 'women should not speak in Church'; the creation of Eve after Adam as his 'helpmate' (Genesis 2.); Jesus choosing only men to be Apostles.

Liberal Protestants believe: **men and women are equal**; they should have **equal roles**. These beliefs are based on: St Paul's teaching that 'in Christ there is neither male or female'; the creation of both Adam and Eve in God's 'image and likeness' (Genesis 1); Jesus treated women as equals.



Atheists believe in equality. **Humanists believe in equal rights for men and women** (many suffragettes and feminists were humanists).

Gender prejudice and discrimination

The **Catholic Church** opposes gender prejudice and discrimination because: **God made men and women in his image and likeness**; St Paul taught we are **all equal in Christ**; the **Catechism** teaches we should have equal rights in life and society.

Following pressure from women, **Vatican II** allowed: women to teach in theological colleges, to be extraordinary ministers of communion; to read at Mass; to take some funerals

Evangelical Protestants teach that: **men and women have separate roles**; women should **not speak in Church**; must **submit to their husbands** because this is the **Bible's teaching**.

Liberal Protestants oppose gender discrimination and **allow women to be ministers, priests and bishops**.

Most **atheists and Humanists believe gender discrimination is wrong** and that Churches that refuse to ordain women or have women leaders should be made illegal.

The **Catholic Church** is accused of discrimination for not ordaining women. The Church teaches: the **priest represents Jesus** who was a man; **men and women are equal but have their own unique gender; Jesus chose 12 men to be his apostles**.

		SOURCES OF WISDOM AND AUTHORITY	
	Topic	**Quote/Reference**	**Source**
1	**Marriage**	Sex should happen within marriage.	Catechism
2	**Sexual Relationships**	Sex should be both unitive and procreative.	Catechism
3	**Families**	Catholics should not live in same-sex parent families, blended families or families headed by cohabiting parents.	Pope John Paul II
4	**Support for families in the parish**	Jesus said, 'let the children come to me."	Mark's Gospel
5	**Contraception**	Only natural method's of contraception are acceptable.	Humanae Vitae (Pope Paul VI)
6	**Divorce and remarriage**	A marriage between baptised persons can never be dissolved.	Catechism
7	**Equality of men and women**	God made mankind his own image and likeness, male and female he created them.	Genesis 1
8	**Gender prejudice and discrimination**	Inequalities between men and women are sinful; Christians should promote equality.	Catechism

		SOURCES OF WISDOM AND AUTHORITY	
	Topic	**Quote/Reference**	**Source**
1	**Revelation**	It pleased God to reveal himself through Christ, the Word made flesh	Catechism
2	**Visions**	At the Transfiguration Jesus' face shone like the sun and his clothes appeared as white as light - Matthew 17	Bible
3	**Miracles**	By the power of his words Jesus calmed the storm - Mark 4	Bible
4	**Religious experience**	Religious experiences happen because people are created by God and God is always trying to contact humans	Catechism
5	**The design argument**	The existence of God can be known with certainty through his creation	Catechism
6	**The cosmological argument**	God is infinitely greater than his creation	Catechism
7	**The problem of evil and suffering**	God's very being is love	Catechism
8	**Catholic responses to the problem of evil and suffering**	Being afflicted by suffering leads to greater understanding of God - Psalm 119	Bible

REVELATION

God exists because he reveals himself through creation: **NATURAL revelation** or directly through people: **SPECIAL revelation**

The bible proves God's existence because (1) it was **inspired by the Holy Spirit** (2) the Church teaches that God **reveals his character and commandments** in the bible (3) **God's laws have his living authority** (4) the bible **brings people into a closer relationship with God**

God's **revelation reached its culmination in the INCARNATION of Jesus**. All the small revelations about God are summed up and made clear in Jesus. In Jesus, God reveals himself by becoming one of us. **Jesus is God**.

God's revelation in Jesus shows that God (1) is **LOVING** - he loves creation so much he becomes a part of it (2) is **FORGIVING** - he is prepared to die on the cross so that we can receive forgiveness for our sins (3) is **CARING** - he meets people wherever they are in life (4) **wants to HEAL people** - through his miracles he heals people in body, mind and spirit

VISIONS

Visions are something seen in a dream, trance or religious ecstasy, which give a religious message.

In the bible **ABRAHAM** had a vision and was told God would give him descendants as numerous as the **stars**. At the **TRANSFIGURATION** the apostles had a vision of **Jesus in glory** and were told, "This is my beloved Son, listen to him".

Visions have continued since Bible times—**ST JOAN OF ARC** saw the Archangel Michael and **ST BERNADETTE** had visions of Our Lady.

Visions are declared to be true only after careful investigation by the Church

Visions prove God exists because (1) if the vision **came from God** then God must exist (2) a change in a **person's behaviour** shows that their vision came from God (3) the **message given** in the vision comes from God (4) if **the person is honest** then they are telling the truth.

Atheists and Humanists say visions **do not** prove God exists because (1) the personal may be **stressed, mentally ill, hallucinating** (2) the **descriptions in the vision do not describe the person as they were** e.g. Mary did not have fair skin and hair (3) there is **no independent evidence** for visions

Catholics disagree because (1) visions are **investigated** by the Church (2) the visionary must be a **good person** (3) the message given must have a **positive effect**

MIRACLES

Miracles prove God exist - they **break the laws of science** and **can only be explained by God's existence**. Miracles **help people to believe in God**

The **bible is full of miracles** (Jesus' miracles include: Calming the Storm, Feeding the 5000, Healing the Centurion's servant, Driving our demons, Raising Lazarus)

Catholics believe that **God still performs miracles** (in **Lourdes** where St Bernadette had visions of Our Lady many **healing miracles** have occured)

Catholics believe miracles prove God exists because (1) miracles **can only be explained by God's existence** (2) **only God can perform miracles** which go beyond the laws of science (3) if **you cannot find a natural explanation** for an event it will lead people to believe God must exist

Atheists and Humanists **do not** believe miracles prove God exists because (1) miracles would break the **laws of nature which explain our whole experience of life** (2) people who claim to have seen or experienced a miracle may be **mistaken or lying** (3) miracles from the past **can now be explained** (4) God **could use miracles to end poverty and sickness but he doesn't**

Catholics disagree because (1) they can **rely on the Bible** which is inspired by God (2) miracles have been **authenticated by the Church** (3) **God does not choose to change the nature of life** for mankind as a whole

Religious Experience

A religious experience is an event that people feel gives them direct contact with God.

3 types of religious experience are **conversion**, a **numinous experience**, **prayer**

Religious people believe these experiences prove God exists because: (1) there must be a cause for a numinous experience—God (2) if a miracle occurs then God which science can't explain, the cause must be God (3) an event which totally changes a person's life must have a cause - God (4) if a prayer is answered God must be listening and therefore exists.

Non-religious people (**Atheists and Humanists**) do not believe religious experiences prove God's existence because (1) why doesn't everyone have a numinous experience? (2) miracles can be explained (3) why aren't all prayers answered if God exists? (4) religious experiences are matters of personal belief and cannot be proven

Catholics would disagree because everybody has a spiritual sense but they don't all have to have the same experiences. Religious experiences may not be provable but that doesn't mean that they are not real or that God does not exist.

GCSE Religious Studies Unit 3 Philosophy and Ethics 3.1 Arguments for the Existence of God (Key sources of wisdom & authority are included on the back of this sheet)

The Design Argument

If something shows evidence of design it must have a designer. The universe appears to be designed (DNA, gravity, magnetism)—it must have a designer: God.

(1) If you found a **watch** you would not say it came to exist by chance (2) the **complexity** of the watch makes you think it was designed (3) the **universe** is more complex than a watch (4) it must have a **designer** (5) only **God** could design the universe (6) this proves God **exists**.

This is important to Catholics because: you can see evidence of God's existence in creation; God gives us the power to think and understand the world; the universe works on fixed principles (e.g. gravity) that help us think scientifically; God is the creator and keeps it in existence

Atheists and Humanists do not believe Design proves God's existence because: there is no design in volcanoes, earthquakes etc.; science can explain creation; what happened to the design of dinosaurs?; if the universe was designed why does the designer have to be God?

The **Catholic Church** argues the universe is more likely to be designed than be a matter of chance; there is no absolute proof God exists it is a matter of faith

The Cosmological Argument

St Thomas Aquinas argued: (1) Nothing moves without being moved - **God is the prime mover** (2) Everything has a cause - **God is the first cause** (3) All material things are contingent - **God is the non-contingent being**

Modern form of the argument: (1) cause and effect is a feature of the world (2) Science shows every effect has a cause (3) the universe/humans must have a cause (4) God is the only logical cause of the universe (5) therefore God exists

This is important for Catholics because it shows God is the origin of all things; God is not a part of the universe. God is infinite and eternal; God is a mystery we cannot fully understand

Atheists and Humanists do not believe this proves God's existence because: if everything needs a cause who 'caused' God?; matter could be eternal; the universe could be eternal; if God existed why should it be the Christian God?

The **Catholic Church** responds, it is no more believable to say the universe 'just happened' than to say God created it. The universe is too complex to have just come into existence by chance. Our immortal souls show that humans have a spiritual dimension, why shouldn't the universe be the same?

The Problem of Evil and Suffering

Moral suffering is caused by humans misusing the gift of free will (e.g. war, murder, theft) causing people to suffer. Christians call such acts sins because they go against God's will.

Natural suffering is not caused by humans but arises from nature e.g. earthquakes, floods, cancers etc.

The problem this causes for Catholic beliefs about God are that (1) if God is **omnipotent** (all-powerful) why doesn't he stop suffering (2) if God is **omni-benevolent** (all-loving) he must want to stop unhappiness so why doesn't he? (3) if God is **omniscient** (all-knowing) he must have known that suffering would happen so why didn't he create the universe so that evil and suffering were avoided?

So, either God is not omnipotent, omni-benevolent and omniscient or God does not exist.

Catholics who witness or experience evil and suffering may question whether God really exists.

Atheists and Humanists argue that the God Christians believe in cannot exist if there is evil and suffering in the world. It is easier to say that suffering is a matter of accident or human choice.

Solutions to the Problem of Evil and Suffering

Biblical responses: (1) the **book of Job**, where God allows Satan to test Job's faith through pain and suffering shows that God has reasons for allowing suffering we may not understand. (2) The **book of Psalms** says that suffering and joy go side by side in life but suffering can help us to understand God better (for instance to understand that Jesus was willing to suffer for us on the cross)

Theoretical responses: (1) God has given us **free-will** so he must give us the freedom to use it even though it can lead to evil and suffering (2) This life is a **preparation for eternal life**. By facing evil and suffering and being good, kind, loving and forgiving we improve our souls and will be rewarded with eternal life in heaven (3) **Good can arise out of evil** when people respond to suffering by trying to help people and create a better world

Practical responses: Christians respond to evil and suffering by following Jesus' example of helping people in practical ways (1) by **praying** for those who are suffering (2) giving **practical help** e.g. working as a doctor, nurse, social worker, aid worker or by supporting charities that help to relieve suffering

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