Year 10
Half Term 1

Knowledge Organisers

The Farnborough Academy

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AN INSPECTOR CALLS KNOWLEDGE ORGANISER

Context – *An Inspector Calls* was written by J.B. Priestley, and was first performed in the UK in 1946. However, it is set in 1912.

J.B. Priestley– John Boynton Priestley was born in Yorkshire in 1894. He fought in the first world war and came very close to death on a couple of occasions. In the 1930s, Priestley became concerned with the effects of social inequality in Britain, and in 1942 set up a new political party, the Common Wealth Party. It merged with the Labour Party, and was integral in developing the welfare state.

Socialism – Socialism is an approach to economic and social systems that is characterised by social ownership, democratic control, and high levels of equity. Socialist regimes are generally concerned with ensuring that disparities between wealth and social status are erased across society. After the two World Wars, British society was far more open to socialist ideas. In *An Inspector Calls*, the Inspector harbours socialist attitudes.

Pre and Post-War –Before the First World War, there was deemed to be a general air of complacency regarding the prospect of any war taking place. There were strong distinctions between upper and lower classes, and women were subservient to men in society. After the Second World War ended in 1945, class distinctions had been greatly reduced by the two wars, and women had earned a more valued place in society (they had filled in for men whilst they were away at war). After 1945, there was a greater desire for social change.

Social and Moral Responsibility –Attitudes towards social and moral responsibility changed rapidly in the time between when the play was set (1912) and the time when the play was written (1946). In 1912, the general attitude of those with social and economic sway was towards looking after oneself and one's family. By the mid-1940s, however, Clement Atlee's Labour party won a landslide election, reflecting a wave of enthusiasm towards communal responsibility for everyone in society.

Realism and Postmodernism – Many see *An Inspector Calls* as a play that combines contrasting styles. Certainly, it contains elements of both realism (popular early in the 20th Century) and postmodernism (which became popular later). The play features very real characters, speaking in common prose in a similar manner to dialogue in a novel. However, with the presence of the Inspector, Priestley introduces elements that are beyond rational reasoning and explanations.

The Titanic– RMS Titanic was a British passenger liner that sank in the North Atlantic Ocean in the morning hours of 15th April 1912. As around 1,500 people died, it was one of the deadliest commercial maritime disasters in modern history. The Titanic was designed to be the pinnacle of both safety and comfort, and due to its enormous size and quality was frequently labelled 'unsinkable.' In *An Inspector Calls*, Birling claims this, thus immediately losing respect from the audience.

Main Characters – Consider what Priestley intended through his characterisation of each of the below...

Arthur Birling – Arthur is the patriarch of the Birling family. He is described as a 'portentous man in his early fifties.' His success as a businessman in the manufacturing industry allows the Birlings to live in upper-middle class comfort. He believes in capitalist principles and rejects socialist ideas of responsibility for one another in society. He considers his daughters engagement as good for business.

Quote: "You'll have a good laugh over it yet."

Sheila Birling – Sheila is the daughter of Arthur and Sybil. She is described as being 'in her early twenties' and is engaged to Gerald Croft. Sheila is a sensitive character, who shows a caring side, and thus she is devastated upon hearing about her family's role in the death of Eva Smith. She wonders how others in her family can simply go on as though nothing has happened.

Quote: "You're pretending everything's just as it was before."

Sybil Birling – Sybil is the matriarch of the Birling family. She is often described as being a 'cold' character. It is suggested that Sybil comes from a family of higher social standing than Arthur, and at times she reminds him of proper social etiquette. She serves on a local committee to aid those in need, and seems primarily consumed with protecting the family's public image.

Quote: "They're over-tired. In the morning they'll be as amused as we are."

Eric Birling – Eric is the son of Arthur and Sybil Birling, and the older brother of Sheila. Eric works part-time for the family business, and has a drinking problem that he attempts to hide from his family. When it is revealed that Eric has made a woman pregnant, outside of marriage, and has stolen from the family business, the family are finally forced to confront issues surrounding Eric.

Quote: "don't forget I'm ashamed of you as well – yes both of you."

The Inspector – The Inspector is (apparently) a representative of the local police force, sent to investigate the events leading up to the suicide of a young woman, who went by the name of both Eva Smith and Daisy Renton. When speaking to the family, the Inspector seems to know the answers to each of the questions that he asks, and appears to offer them a socialist message. After he leaves, the family gather evidence that he does not actually serve on the force.

Quote: "We are members of one body. We are responsible for each other."

Gerald Croft – Gerald is the fiancé of Sheila and the son of another prominent manufacturing family. Gerald's family have an elevated social status, and as a result Arthur worries that Gerald's family may feel that he is marrying beneath himself. Although the Inspector criticises Gerald's affair (and subsequent breakup) with Daisy, he seems to suggest that Gerald is the least morally culpable of the family for her death.

Quote: "I didn't feel about her as she felt about me."

Themes – A theme is an idea or message that runs throughout a text.

Responsibility and Guilt – All of the family are forced to reflect upon their behaviour towards Eva Smith/ Daisy Renton, and consider how responsible they are for her death. Some characters admit responsibility and feel guilt more readily, such as Sheila and Eric. On the other hand, characters such as Arthur and Sybil are more unwilling to accept responsibility for the girl's demise.

Age– Priestley uses age to show the different prevailing attitudes in society at the time. The older characters represent an outdated way of thinking; characters such as Arthur and Sybil believe in only looking after themselves in their family. The younger characters (Sheila and Eric) represent new towards caring about others in society.

Class and Gender – Class and gender are also predominant themes in the novel. Eva Smith's position in society is severely weakened because she is from a lower class background and she is also a woman. Because of biases related to class and gender, Birling is dismissive of the hundreds of working class girls looking for a pay-rise, whilst Mrs Birling refers to her as 'a girl of that sort' in a derogatory manner.

The Supernatural – The presence of the Inspector weaves a supernatural element into the play. His surname (Goole) is certainly a play on the word 'ghoul' (a ghost). He is unheard of by other members of the police force, leading the characters to at first dismiss him as simply a hoaxer, yet he seems to have prior knowledge of the characters' actions, and foresees the suicide before it happens.

Scene-by-Scene Summary – Alongside key quotations from each scene.

Beginning of Act I	The play begins in 1912, with a dinner at the Birling residence. Arthur leads a toast on the future marriage of his daughter, Sheila, to Gerald. Arthur is pleased that the marriage will bring his company closer together with Gerald's family's established company. Sheila lightly teases Gerald about his distant behaviour the summer before. Arthur explains that the world is in a good time, that talk of German aggression should be discounted, and that a new 'unsinkable' ship is being built. Privately after dinner, Arthur tells Gerald that he is up for a knighthood, which will nullify Gerald's mother's fears of him marrying down. Arthur then tells Eric and Gerald of his belief in looking after one's self and one's family – rejecting ideas of socialism. Edna enters and says that an Inspector wants to speak with them.	*"I've learnt in the good hard school of experience – that a man has to mind his own business and look after himself and his own"* 
End of Act I	The inspector introduces himself as Goole. Arthur declares that he has never heard of him before. The Inspector states that a girl named Eva Smith has committed suicide by drinking disinfectant. He shows Arthur alone a photograph of her. Arthur admits that he employed her two years before, but dismissed her for striking over wages. He then shows Sheila the photograph, who is shocked. She admits to getting the girl fired from her next job, at a clothes shop, out of jealousy. There she worked under the name Daisy Renton. Sheila is horrified. Gerald becomes aware that this is a girl that he had an affair with.	*"Two hours ago a young woman died on the infirmary. She'd been taken there this afternoon because she'd swallowed a lot of strong disinfectant."* 
Beginning of Act II	As the Inspector speaks to Gerald and Sheila, Sybil enters and calls his questions 'impertinent.' Sheila warns Sybil not to fall into the trap of complacency with the Inspector, but Sybil warns her to be quiet. Sybil expresses that Eric has had too much to drink at dinner – to Sybil's embarrassment, Sheila and Gerald admit that this is a steady problem with Eric. The Inspector then questions Gerald, who reluctantly admits that he knows a Daisy Renton. He had protected her in a bar from a lecherous old man, and then put her up in a friend's lodgings. She became his mistress. Eventually it ended, and they lost contact. Sheila explains that she actually respects Gerald now, for telling the truth. However, she says they must start again in their relationship. Gerald is allowed to leave.	*"I don't dislike you as I did half an hour ago, Gerald. In fact, in some odd way, I rather respect you more than I've ever done before."* 
End of Act II	The Inspector shows Sybil the photograph of the deceased woman – she lies and says that she does not know her. Sheila pleads with her to tell the truth. It emerges that Sybil refused to give the girl money in her role as a member of the Brumley Women's Charity Organisation, out of 'impudence.' She had pretended that she was called 'Mrs Birling.' The Inspector reveals that she was looking for money as she was pregnant (not Gerald's baby). The girl eventually admitted that she was not married, and couldn't take money off the father, as she knew it was stolen. Under pressure from the Inspector, Sybil contends that the man should bear the responsibility of the girl's subsequent death. It is at this point that the other characters realise that Eric must in fact be the father. Sybil pauses in shock, seemingly wishing to retract her past statements. Eric enters the room, with all staring at him.	*"If, as she said, he didn't belong to her class, and was some drunken young idler, then that's all the more reason why he shouldn't escape. He should be made an example of. If the girl's death is due to anybody, then it's due to him."* 
Beginning of Act III	Eric confesses that he was very drunk the night that he met the girl, and that he followed her home and convinced her to let him stay over. He began a relationship with her, and she fell pregnant. As she needed financial support, Eric swindled Arthur's company out of money. Arthur is extremely angry when he hears this. With the family now in a state of complete anguish, the Inspector goes through each of them, explaining that they all had a significant part to play in the girl's death. Before leaving, the Inspector states that all people should look out for one another if society is to survive. He notes that the Birlings and Gerald must now live with the repercussions of their actions for the rest of their lives, as recompense for Eva Smith/ Daisy Renton, who lost hers.	*"We don't live alone. We are members of one body. We are responsible for each other. And I tell you that the time will soon come when, if men will not learn that lesson, then they well be taught it in fire and bloody and anguish."* 
End of Act III	Arthur says that Eric is predominantly at fault for the death of the girl, and he worries about the public scandal that will be generated. Eric and Sheila criticise Arthur for worrying about his knighthood when someone has died. In light of what Arthur was discussing before the Inspector came, they begin to suspect that he was a hoax. To Sheila and Eric, this is not important (their actions were still terrible) but to Arthur, it means everything (no public scandal). These suspicions are confirmed, when Gerald returns, having bumped into a police officer on the street – there is no Inspector Goole. Arthur then phones the hospital, who confirm that there has been no suicide. Arthur and Sybil delight in this, whilst their children are horrified that they have forgotten their behaviour (despite no one having actually died) so quickly. Just as Arthur is reveling in the fact that the others were all 'bluffed', the phone rings. A girl has just been transported to hospital, dead. She has committed suicide. An inspector is on the way to the house.	*"Birling: (pointing to Eric and Sheila) Now look at the pair of them – the famous younger generation who know it all. And they can't even take a joke"*  *The telephone rings sharply. There is a moment's complete silence. Birling goes to answer it.//*

Priestley's Dramatic Devices

Dramatic Irony	Arthur Birling suggests that the *Titanic* is unsinkable, and yet the audience knows that it sank on its maiden voyage.
Cliffhangers	At the end of Act One, the Inspector appears and says 'Well?' to Gerald, leaving the audience to wonder how Gerald is implicated.
Stage Directions	The precise directions detailing Gerald 'gravely' stating his involvement with Daisy Renton adds more detail to aid the actor's delivery.
Dramatic Tension	The audience feels an increase in tension as they await information regarding how each character is implicated in Eva Smith's death.

Form – The play fits into three possible forms.

Well-Made Play
-A popular type of drama from the 19th Century
-The events build to a climax
-Primarily concerned with events that happened before the play
-Plot is intricate and complex.

Morality Play
-These were most popular during the 15th and 16th centuries
-They taught the audience lessons that focused on the seven deadly sins.
-Characters who committed these sins were punished.

Crime Thriller
-As the name suggests, this involves a gripping tale based around a crime
-The audience receives clues and must guess what has happened before the end.
-All is revealed by the climax.

GCSE ENGLISH LANGUAGE PAPER 1 SECTION A
EXPLORATIONS IN CREATIVE READING AND WRITING

PAPER 1 SECTION A Q1 2-5 mins 4 marks

- Find and read the right section
- Select only details relevant to the key words in the question.
- Write a full sentence for each answer.
- One detail only per answer.
- Start your answer by using the key words in the question.

e.g. List four things about the weather:

1. **The weather is** stormy.
2. **The weather is…**
3. **The weather is…**
4 **The weather is…**

PAPER 1 SECTION A Q2 LANGUAGE – 12 mins 8 marks

1. Identify **the focus of the question and the correct source/section of the text and highlight the relevant language.**
2. Start with an overview of the effect of the language. (2/3 words or phrases)

The language used to describe the _____ in the extract, gives the impression that …

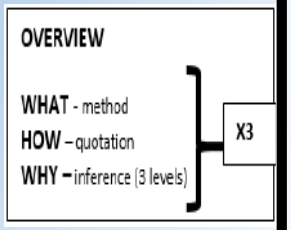
3. Use **Firstly**, then identify a specific technique e.g. metaphor, simile etc.

The writer uses _____ to present _____

Use an embedded quotation, ***if the technique is word class, identify the relevant key words in that class clearly and include at least 2/3 examples.***

4. Explain the **meaning** of the key words/ideas, **in your own words** – use a synonym or phrase.
   This means…
5. What do you learn about what is being described from the language used and its connotations?

The key (word/image) here is… because
This is associated with…
This makes the _____ seem…
In addition, this suggests… and gives the impression that… because
This contrasts with…
This symbolises…
The connotations are… because
There is a semantic field of… **(look for patterns)**



6. Link back to the focus of the question throughout.
7. Use a discourse marker e.g. also, in addition, furthermore to move on to another technique.

Do this 3 times, 3 different methods, word class may only be used once.

WHAT, HOW, WHY?

PAPER 1 SECTION A Q3 STRUCTURE– 12 mins 8 marks

How has the writer structured the text to interest you as the reader?

CHOOSE SOME TERMINOLOGY

Introducing
Developing
Change of focus
Repetition
Contrast
Close focus
Zoom in/zoom out
Flashback/analepsis
Flash forward/ prolepsis
Beginning, middle, end
Equilibrium /Disequilibrium
Foreshadowing
Pace
Juxtaposition
Unifying Feature
Pivotal Moment/Patterns
WHAT, WHERE, WHY

PAPER 1 SECTION A Q4 EVALUATION– 25 mins 20 marks

Evaluate - Consider several ideas and reach a conclusion about how much you agree.

- Focus on the **correct area of the source**
- Judge how far you agree with the quotation in the question – read the extract and start with **clear statement** of how far you agree/disagree.

Wholly, completely, entirely, fully,
largely, fundamentally, somewhat, partially, to some extent, mostly*
In no way, I disagree, not at all, I differ

- If there are two parts to the statement, comment on both – look out for the word **'and'** or a full stop.
- Pick out **4-6 reasons** and **at least 4-6 quotations** to support your view
- Look at the **methods / techniques** as well as the content of the quotation, and explain how the methods influence your view – follow quotations with ***'The writer uses…'***
- Infer / analyse how the quotation supports your opinion – what did you learn from this part of the text – convince the reader of your opinion.
- Explain and justify your views – use the conjunction 'because'
- Include the **counter-argument and the opposite view** as part of your evaluation
- Use discourse markers as you add new points e.g. **also, in addition, furthermore, however.**
- **Point (reason you agree or disagree), quotation, method (the writer uses…), what do you learn/infer that develops your opinion? X3, discourse marker, move to next point…**

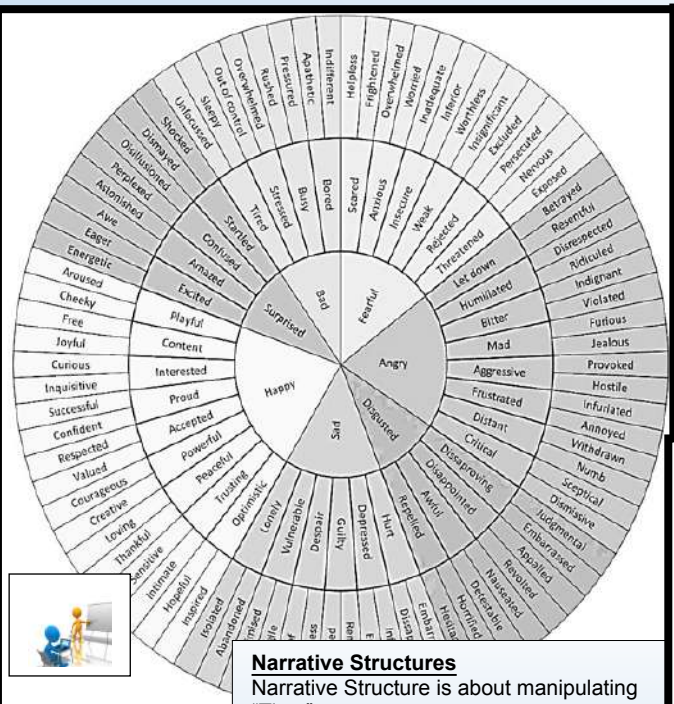
REASON (agree/ disagree), QUOTATION/ METHOD (the writer uses…), WHY (infer/ explain)

GCSE ENGLISH LANGUAGE PAPER 1 SECTION B - Q5 45MINS 24+16= 40 marks

NARRATIVE and/or DESCRIPTIVE Choose **one from two questions, the first is based on a picture.**

METHODS/CONSCIOUS CRAFTING

A strong and interesting opening
Variety of sentence structures e.g. more, more, more, anadiplosis etc.
Range of punctuation – (colon, semi colon, question mark, exclamation mark, apostrophe, ellipsis, dash, brackets)
Speak to your reader – (direct address)
Structure and time (cyclic, discourse markers)
Sensual language
Create an atmosphere
Powerful language
Emotive language – describing feelings in detail
Simile
Metaphor
Personification
Onomatopoeia
Alliteration
Echoism
Close description of small details
Range of vocabulary – sophisticated and impressive
Rhetorical questions
Hyperbole
Oxymorons
Tricolons
Adverbs and adjectives
Range of paragraph structures – including a one word or one line paragraph
Correct spelling
A satisfying conclusion – return to the opening
Originality



Narrative 'Dos and Don'ts'

Dos:

- You are only writing a short story – so you need **do** to focus on a small event – make a lot of a little.
- Do not include lots of dialogue (or action), **do** make your story heavily descriptive – **'action in character, not character in action'**
- Use your initiative – be original and unique, reject common ideas, look at metaphorical/different ways of interpreting the title.
- **Do** think about the way you organise time and narrative structure.

Don'ts:

- **Don't** have lots of action over lots of time – no plane crashes; explosions; snipers; years passing…
- **Don't** start with an alarm going off and getting up to eat your cornflakes – your opening needs to intrigue the reader.
- **Don't** write a love story!
- **Don't** end (or start) by waking up and finding out it was all a dream!

Narrative Structures

Narrative Structure is about manipulating "Time"

In particular, it involves…

Looking Ahead – prolepsis
Freezing Time
Looking Back - analepsis
Mixing Up the Chronology
Speeding Up and Slowing Down

DIACOPE – repetition of a word or phrase with c
e.g. 'Terror. Blood-curdling terror.'
CHIASMUS –Inverting ideas e.g. 'He chased that
escaped that which chased him.'
ANAPHORA –repetition of a word or phrase at the beginning of successive clauses e.g. 'No hiding place, no shelter, no sanctuary from the burning sun.'
EPIPHORA – repetition of a word or phrase at the end of successive clauses e.g. 'Surrounded by silence; cocooned in silence; isolated in silence.'
ANADIPLOSIS – words used at the end of a sentence are repeated again at the beginning e.g. 'He was gripped by terror. Terror created nightmares. Nightmares haunted him.'

Sentence Structures

LEVEL 4

'Uses a full range of appropriate sentence forms for effect.'
'Varied and inventive use of structural features.'
'Conscious crafting.'
Wide range of punctuation is used with a high level of accuracy
High level of accuracy in spelling, including ambitious vocabulary
Extensive and ambitious use of vocabulary

Sentence Structures

The not only, but also sentence
The so, so, so sentence
The more, more, more sentence
The it isn't, it is sentence
The less, less, less sentence
The fortunately, unfortunately sentence
The double verb start sentence
The double adjective start sentence
The whoever, whenever sentence
The triple noun, colon sentence
The adverb start sentence
The repeated relative clause sentence

Write a narrative about a shared experience with friends.

Unfortunately, all good things come to an end, even shared experiences with friends; the shrill crescendo of the bell marked the end of what had turned out to be an amusing, entertaining and diverting lesson. Fortunately, it hadn't been as bad as I was expecting and it was now break - a chance to escape the shackles of learning for twenty minutes! Noisily and chaotically, the class tumbled out, leaving creased worksheets, sweet wrappers and other lesson debris in the room. The teacher watched blinkingly as they departed, muttering permission to leave since so many had already started on the route to the door anyway. A sea of jostling heads and bags were all pushing through the door at once. I was neither the first, nor the last, to make a bid for freedom…

It didn't start out this way, that's for sure…
Maths Monday period 2.
Boredom. Mind-numbing boredom…

Dull and dismal, the classroom was our inescapable prison. Ensnared and enclosed, we had to make our own entertainment or face the inevitable: a protracted hour of quadratic equations. The more I thought about it; the more my heart sank; the more I felt tense and miserable. Cupping my chin in my hand, leaning my arm lazily on the desk, I slowly and slyly surveyed the jail cell of the classroom and secretively observed the behaviour of my friends. My eyes focused on each in turn, like a surveillance camera homing in on each crime whether in progress, or yet to be committed.

Ellis Dunson. My mate. Sat in front of me as usual. Quiet, hiding: pen in hand, though not moving over paper. He stared with glazed vacant eyes at the teacher as she twittered on in an annoying falsetto at the front. His mouth moved from side to side in an elastic repetitive motion as he masticated a piece of gum like a cow chewing the cud. His cheeks dimpled with the effort… for a moment I thought he may be following the lesson intently, but a zoom in on those vacant, expressionless eyes gave it away. In his mind, he was epochs away; making plans for the evening's activities, deciding what delicious feast to buy at tuck; maybe even contemplating the after-life. Fortunately for him, he had found an escape from the lesson; unfortunately for him, the teacher would probably notice that incessant chewing at some point. No focus, no sense, no idea; I thought to myself: he doesn't know how to fly under the radar.

On the back row are the 'brainy' girls. All friends. Never any trouble to the teacher, always receiving lots of praise. Uniforms gleaming, faces shining, pens happily racing, they lap up what most find tedious and gloat about the fact they always get everything right. Never a day's absence, never a deadline stretched, never a teacher displeased. Their gifted minds are brimming with ingenious ideas. It's a wonder their biceps aren't permanently strained with the number of times they raise their hands in a school day! Punctual always; homework completed always; giving the right answer always. I certainly don't belong in one of the golden seats in the back row; they work far too hard for me. I'm Miss Average: Miss Mediocre: Miss Unexceptional.

Then: a change in my focus… an unexpected delight for us all to share among the mundanity of Maths…

I realise that the quiet industriousness of the back row is not what it may initially seem. Alice, clever, well-behaved Alice, A* Alice, appears to have left her phone in her shirt pocket by mistake where it can clearly be seen by any eagle-eyed member of staff. This is a clear breach of the school rules by someone for whom rebellion is as alien as not giving a full answer to a question in a test. And… guess who has just entered the room? Mr Turf, (Vice-Principal, proud disciplinarian), the man who has confiscated a 1000 phones and counting…

A perfect storm. An absolute catastrophe. A total disaster. As his small beady eyes surveyed the classroom for any deviation from the rules, Alice's phone emitted a high-pitched shriek, multiple beeps and a sound like a dog barking! Mr Turf's face went a deep crimson and his shark-like piercing eyes focused keenly on his victim. Alice matched his intense crimson with a radiant scarlet response which then drained to a pale insipid grey as her fear reflected in her face. She reached a quivering hand upwards and touched the offending screeching phone with a look of horror and disbelief on her face. Ellis, unable to hide his glee and unable to keep his mouth shut in any situation announced: "Alice! Is that a text? Surely your phone should be off in lessons!" The Maths teacher paused and appeared to hold her breath, unable to do anything to prevent the inevitable. The hot whips of embarrassment clearly displayed in a fetching glow of deepest burgundy on her cheeks, a silent explosion of shame, (after all, she hadn't spotted the phone had she?)

Mr Turf pounced on his prey like a lion on a gazelle, ready to chew Alice up and spit her out (metaphorically of course!) I sat back, enjoying the entertainment – and I thought Maths was boring! This pantomime was well worth the ticket price of solving a few equations! Quaking and shaking, almost on the verge of a swoon, Alice was led out to certain death – or at the very least the mind-numbing boredom of isolation. I almost, but not quite, felt sorry for her.

Not long after… the shrill crescendo of the piercing bell, the push to the door. Turning around for a brief glance back, I see the teacher gathering the scattered worksheets; straightening the shambolic jumble of chairs and desks; plucking sweet wrappers from the floor, in an effort to restore order.

It didn't end the way it started that's for sure…
Entertainment. Engaging, entertainment.
Maths Monday period 2 - over for another week!

Subject: Maths **Topic: Basic Percentages**

Topic/Skill	Definition/Tips	Example
1. Percentage	**Number of parts per 100.**	means
2. Finding 10%	To find **10%**, **divide by 10**	10% of £36 = 36÷10=£3.60
3. Finding 1%	To find **1%**, **divide by 100**	1% of £8 = 8÷100 = £0.08
4. Percentage Change		A games console is bought for £200 and sold for £250. % change =
5. Fractions to Decimals	**Divide the numerator by the denominator** using the bus stop method.	
6. Decimals to Fractions	**Write as a fraction** over 10, 100 or 1000 and simplify.	
7. Percentages to Decimals	**Divide by 100**	
8. Decimals to Percentages	**Multiply by 100**	
9. Fractions to Percentages	Percentage is just a fraction out of 100. **Make the denominator 100 using equivalent fractions**. When the denominator doesn't go in to 100, use a calculator and **multiply the fraction by 100**.	
10. Percentages to Fractions	Percentage is just a fraction out of 100. **Write the percentage over 100** and simplify.	

Subject: Maths **Topic: Calculating with Percentages**

Topic/Skill	Definition/Tips	Example
1. Increase or Decrease by a Percentage	Non-calculator: **Find the percentage** and **add** or **subtract** it from the **original** amount. Calculator: Find the **percentage multiplier** and multiply.	<u>Increase 500 by 20% (Non Calc):</u> 10% of 500 = 50 so 20% of 500 = 100 500 + 100 = 600 <u>Decrease 800 by 17% (Calc):</u> 100%-17%=83% 83% ÷ 100 = 0.83 0.83 x 800 = 664
2. Percentage Multiplier	The **number** you **multiply** a quantity by to **increase or decrease** it by a **percentage**.	The multiplier for increasing by 12% is 1.12 The multiplier for decreasing by 12% is 0.88 The multiplier for increasing by 100% is 2.
3. Reverse Percentage	Find the **correct percentage given in the question**, then work backwards to **find 100%** Look out for words like '**before'** or '**original'**	A jumper was priced at £48.60 after a 10% reduction. Find its original price. 100% - 10% = 90% 90% = £48.60 1% = £0.54 100% = £54
4. Simple Interest	Interest calculated as a **percentage of the original** amount.	£1000 invested for 3 years at 10% simple interest. 10% of £1000 = £100 Interest =

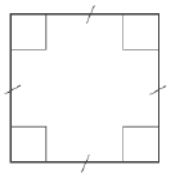
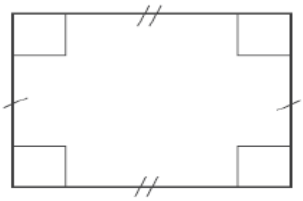
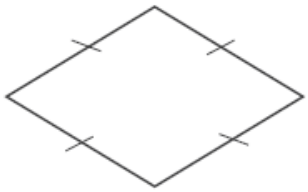
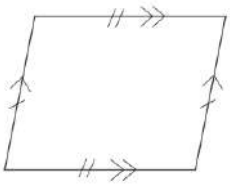
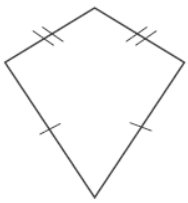
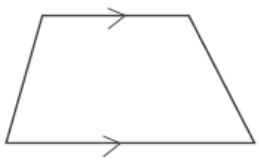
Subject: Maths **Topic:**

Topic/Skill	Definition/Tips	Example
1. Expression	A mathematical statement written using **symbols**, **numbers** or **letters**,	$3x + 2$ or $5y^2$
2. Equation	A statement showing that **two expressions are equal**	$2y - 17 = 15$
3. Identity	An equation that is **true for all values** of the variables An identity uses the symbol:	$2x \equiv x+x$
4. Formula	Shows the **relationship** between **two or more variables**	Area of a rectangle = length x width or A= LxW
5. Simplifying Expressions	**Collect 'like terms'.** Be careful with negatives. and are not like terms.	
6. times	The answer is not .	Squaring is multiplying by itself, not by 2.
7.	The answer is not	If p=2, then =2x2x2=8, not 2x3=6
8.	The answer is 3p not	If p=2, then 2+2+2=6, not
9. Expand	To expand a bracket, **multiply** each term **in the bracket** by the expression **outside** the bracket.	
10. Factorise	The **reverse** of **expanding**. Factorising is writing an expression as a product of terms by '**taking out' a common factor**.	, where 3 is the common factor.

Subject: Maths **Topic: Solving Quadratics by Factorising**

Topic/Skill	Definition/Tips	Example
1. Quadratic	A quadratic expression is of the form where and are numbers,	Examples of quadratic expressions: Examples of non-quadratic expressions:
2. Factorising Quadratics	When a quadratic expression is in the form find the two numbers that **add to give b** and **multiply to give c**.	(because 5 and 2 add to give 7 and multiply to give 10) (because +4 and -2 add to give +2 and multiply to give -8)
3. Difference of Two Squares	An expression of the form can be factorised to give	
4. Solving Quadratics	Isolate the term and square root both sides. Remember there will be a **positive and a negative solution**.	
5. Solving Quadratics	**Factorise** and then **solve = 0**.	
6. Solving Quadratics by Factorising	**Factorise** the quadratic in the usual way. **Solve = 0** Make sure the equation = 0 before factorising.	Solve Factorise:
7. Factorising Quadratics when	When a quadratic is in the form 1. Multiply a by c = ac 2. Find two numbers that add to give b and multiply to give ac. 3. Re-write the quadratic, replacing with the two numbers you found. 4. Factorise in pairs – you should get the same bracket twice 5. Write your two brackets – one will be the repeated bracket, the other will be made of the factors outside each of the two brackets.	Factorise 1. 2. Two numbers that add to give +5 and multiply to give -24 are +8 and -3 3. 4. Factorise in pairs: 5. Answer =
8. Solving Quadratics by Factorising	**Factorise** the quadratic in the usual way. **Solve = 0** Make sure the equation = 0 before factorising.	Solve Factorise:

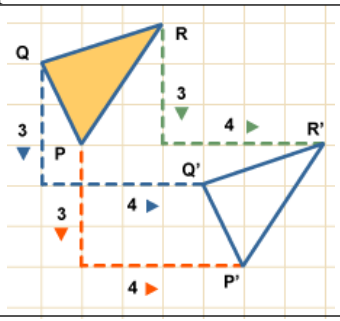
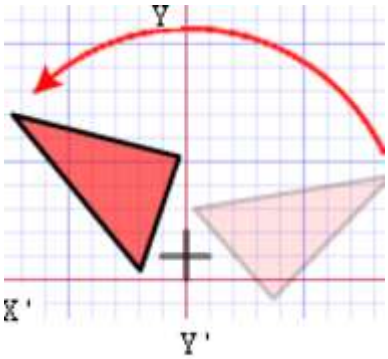
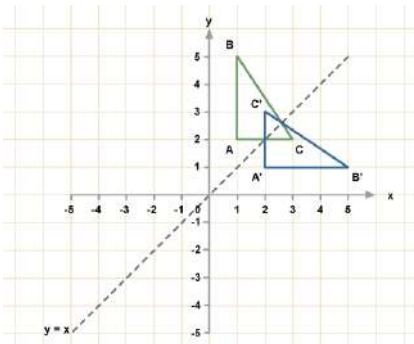
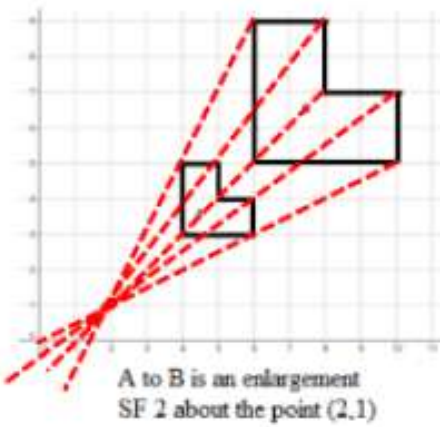
Subject: Maths **Topic: Properties of Polygons**

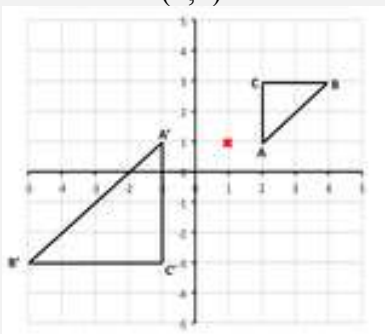
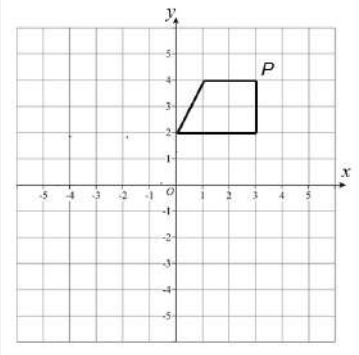
Topic/Skill	Definition/Tips	Example
1. Square	• **Four equal sides** • **Four right angles** • **Opposite sides parallel** • **Diagonals bisect** each other at **right angles** • **Four lines** of **symmetry** • **Rotational symmetry** of **order four**	
2. Rectangle	• **Two pairs** of **equal sides** • **Four right angles** • **Opposite sides parallel** • **Diagonals bisect** each other**, not at right angles** • **Two lines** of **symmetry** • **Rotational symmetry** of **order two**	
3. Rhombus	• **Four equal sides** • **Diagonally opposite angles are equal** • **Opposite sides parallel** • **Diagonals bisect** each other at **right angles** • **Two lines** of **symmetry** • **Rotational symmetry** of **order two**	
4. Parallelogram	• **Two pairs** of **equal sides** • **Diagonally opposite angles are equal** • **Opposite sides parallel** • **Diagonals bisect** each other**, not at right angles** • **No lines** of **symmetry** • **Rotational symmetry** of **order two**	
5. Kite	• **Two pairs** of **adjacent sides** of **equal** length • **One pair** of **diagonally opposite angles are equal** (where different length sides meet) • **Diagonals intersect** at **right angles, but do not bisect** • **One line** of **symmetry** • **No rotational symmetry**	
6. Trapezium	• **One pair** of **parallel sides** • **No lines of symmetry** • **No rotational symmetry** Special Case: Isosceles Trapeziums have one line of symmetry.	

Subject: Maths **Topic: Indices**

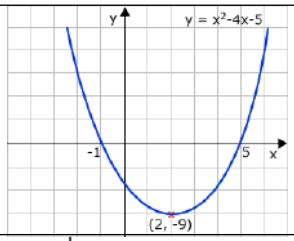
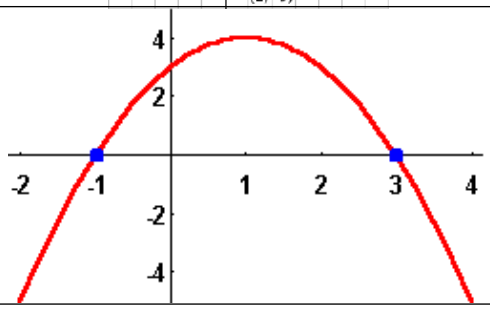
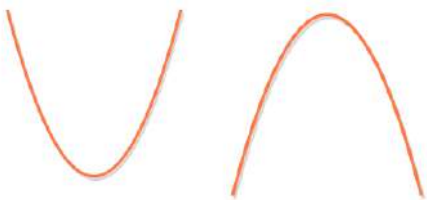
Topic/Skill	Definition/Tips	Example
1. Square Number	The number you get when you **multiply a number by itself**.	**1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144, 169, 196, 225…**
2. Square Root	The **number you multiply by itself** to get another number.	because
3. Solutions to	**Equations** involving **squares** have **two solutions**, one **positive** and one **negative**.	Solve This can also be written as
4. Cube Number	The number you get when you **multiply a number by itself and itself again**.	1, 8, 27, 64, 125…
5. Cube Root	The **number you multiply by itself and itself again** to get another number. The reverse process of cubing a number.	because
6. Powers of…	The powers of a number are that **number raised to various powers**.	The powers of 3 are: etc.
7. Multiplication Index Law	When **multiplying** with the same base (number or letter), **add the powers**.	
8. Division Index Law	When **dividing** with the same base (number or letter), **subtract the powers**.	
9. Brackets Index Laws	When raising a power to another power, multiply the powers together.	
10. Notable Powers		
11. Negative Powers	A negative power performs the reciprocal.	
12. Fractional Powers	The denominator of a fractional power acts as a ‘root’. The numerator of a fractional power acts as a normal power.	

Subject: Maths **Topic: Shape Transformations**

Topic/Skill	Definition/Tips	Example
1. Translation	**Translate** means to **move a shape**. The shape does not change **size** or **orientation**.	
2. Column Vector	In a column vector, the **top** number moves **left (-) or right (+)** and the **bottom** number moves **up (+) or down (-)**	means '2 right, 3 up' means '1 left, 5 down'
3. Rotation	The size does not change, but the **shape is turned around a point**. Use tracing paper.	Rotate Shape A 90° anti-clockwise about (0,1) 
4. Reflection	The size does not change, but the shape is '**flipped**' like in a **mirror**. Line is a **vertical line**. Line is a **horizontal line**. Line is a **diagonal line**.	Reflect shape C in the line 
5. Enlargement	The shape will get **bigger or smaller**. Multiply each side by the **scale factor**.	Scale Factor = 3 means '3 times larger = multiply by 3' Scale Factor = ½ means 'half the size = divide by 2'
6. Finding the Centre of Enlargement	Draw **straight lines** through **corresponding corners** of the two shapes. The centre of enlargement is the point **where all the lines cross over**. Be careful with negative enlargements as the corresponding corners will be the other way around.	
7. Describing	Give the following information when	**- Translation, Vector**

Transformations	describing each transformation: Look at the number of marks in the question for a hint of how many pieces of information are needed. If you are asked to describe a 'transformation', you need to say the **name of the type of transformation** as well as the other details.	**- Rotation, Direction, Angle, Centre** **- Reflection, Equation of mirror line** **- Enlargement, Scale factor, Centre of enlargement**
8. Negative Scale Factor Enlargements	Negative enlargements will **look like they have been rotated**. will be rotated, and also twice as big.	Enlarge ABC by scale factor -2, centre (1,1) 
9. Invariance	A point, line or shape is invariant if it **does not change/move** when a transformation is performed. An invariant point 'does not vary'.	If shape P is reflected in the , then exactly one vertex is invariant. 

Subject: Maths **Topic: Further Quadratics**

Topic/Skill	Definition/Tips	Example
1. Quadratic	A quadratic expression is of the form where and are numbers,	Examples of quadratic expressions: Examples of non-quadratic expressions:
2. Factorising Quadratics	When a quadratic expression is in the form find the two numbers that **add to give b** and **multiply to give c**.	(because 5 and 2 add to give 7 and multiply to give 10) (because +4 and -2 add to give +2 and multiply to give -8)
3. Difference of Two Squares	An expression of the form can be factorised to give	
4. Solving Quadratics	Isolate the term and square root both sides. Remember there will be a **positive and a negative solution**.	
5. Solving Quadratics	**Factorise** and then **solve = 0**.	
6. Solving Quadratics by Factorising	**Factorise** the quadratic in the usual way. **Solve = 0** Make sure the equation = 0 before factorising.	Solve Factorise:
7. Quadratic Graph	A '**U-shaped**' curve called a **parabola**. The equation is of the form , where , and are numbers, . If **,** the parabola is **upside down**.	
8. Roots of a Quadratic	A root is a **solution**. The roots of a quadratic are the **-intercepts of the quadratic graph**.	
9. Turning Point of a Quadratic	A turning point is the **point where a quadratic turns**. On a **positive parabola**, the turning point is called a **minimum**. On a **negative parabola**, the turning point is called a **maximum**.	
10. Factorising Quadratics when	When a quadratic is in the form 1. Multiply a by c = ac 2. Find two numbers that add to give b and	Factorise 1. 2. Two numbers that add to give +5 and

	multiply to give ac. 3. Re-write the quadratic, replacing with the two numbers you found. 4. Factorise in pairs – you should get the same bracket twice 5. Write your two brackets – one will be the repeated bracket, the other will be made of the factors outside each of the two brackets.	multiply to give -24 are +8 and -3 3. 4. Factorise in pairs: 5. Answer =
11. Solving Quadratics by Factorising	**Factorise** the quadratic in the usual way. **Solve = 0** Make sure the equation = 0 before factorising.	Solve Factorise:
12. Completing the Square (when	A quadratic in the form can be written in the form 1. Write a set of brackets with in and **half** the value of 2. Square the bracket. 3. Subtract and add 4. Simplify the expression. You can **use the completing the square form** to help **find the maximum or minimum** of quadratic graph.	Complete the square of Answer: The minimum value of this expression occurs when , which occurs when When , Minimum point =
13. Completing the Square (when	A quadratic in the form can be written in the form **p** Use the same method as above, but factorise out at the start.	Complete the square of Answer:
14. Solving Quadratics by Completing the Square	**Complete the square** in the usual way and **use inverse operations to solve**.	Solve Answer:
15. Solving Quadratics using the Quadratic Formula	A quadratic in the form can be solved using the formula: Use the formula if the quadratic does not factorise easily.	Solve Answer:

AQA GCSE Physics – Equations & Formulae (specification 8463 & 8464)

Unit 1: Energy

Equations to Learn	
kinetic energy = $\frac{1}{2}$ × mass × speed^2	$E_K = \frac{1}{2}mv^2$
GPE = mass × gravitational field strength × height	$E_P = mgh$
power = $\frac{\text{work done}}{\text{time taken}} = \frac{\text{energy transferred}}{\text{time taken}}$	$P = \frac{W}{t} = \frac{E}{t}$
efficiency = $\frac{\text{useful energy output}}{\text{total energy input}}$ efficiency = $\frac{\text{useful power output}}{\text{total power input}}$	
Equations given in the exam	
elastic potential energy = 0.5 × spring constant × (extension)^2	$E_e = \frac{1}{2}ke^2$
change in thermal energy = mass × specific heat capacity × temperature change	$\Delta E = mc\Delta\theta$

Unit 2: Electricity

Equations to Learn	
charge flow = current × time	$Q = I\,t$
potential difference = current × resistance	$V = I\,R$
total resistance = resistance of component 1 + resistance of component 2	$R_T = R_1 + R_2$
power = current × potential difference	$P = I\,V$
power = (current)^2 × resistance	$P = I^2R$
energy transferred = power × time	$E = Pt$
energy transferred = charge flow × potential difference	$E = QV$

* Higher tier only

^ Separate Physics only

Unit 3: Particle Model of Matter

Equations to Learn	
density = $\frac{\text{mass}}{\text{volume}}$	$\rho = \frac{m}{V}$
Equations given in the exam	
change in thermal energy = mass × specific heat capacity × temperature change	$\Delta E = mc\Delta\theta$
thermal energy for a change in state = mass × specific latent heat	$E = mL$
^ for a gas: pressure × volume = constant	$pV = constant$

Unit 6: Waves

Equations to Learn	
wave speed = frequency × wavelength	$v = f\,\lambda$
Equations given in the exam	
time period = $\frac{1}{\text{frequency}}$	$T = \frac{1}{f}$
^ magnification = $\frac{\text{image height}}{\text{object height}}$	$M = \frac{h_{image}}{h_{object}}$

Unit 7: Magnetism and Electromagnetism

Equations given in the exam	
* Force = magnetic flux density × current × length of conductor in magnetic field	$F = BIl$
* $\frac{\text{potential difference across primary coil}}{\text{potential difference across secondary coil}} = \frac{\text{number of turns in primary coil}}{\text{number of turns in secondary coil}}$	$\frac{V_P}{V_S} = \frac{N_P}{N_S}$
* ^ p.d across primary × current in primary = p.d. across secondary x current in secondary	$V_P I_P = V_S I_S$

Unit 5: Forces

Equations to Learn	
weight = mass × gravitational field strength	$W = m\,g$
work done = force × distance (moved along the line of action of the force)	$W = Fs$
force = spring constant × extension	$F = ke$
moment of a force = force × distance (perpendicular to the direction of the force)	$M = Fd$
pressure = $\frac{\text{force normal to a surface}}{\text{area of that surface}}$	$p = \frac{F}{A}$
distance travelled = speed × time	$s = vt$
acceleration = $\frac{\text{change in velocity}}{\text{time taken}} = \frac{\text{final velocity-initial velocity}}{\text{time taken}}$	$a = \frac{\Delta v}{t} = \frac{v-u}{t}$
resultant force = mass × acceleration	$F = ma$
* momentum = mass × velocity	$p = mv$
Equations given in the exam	
* ^ Pressure = height of column × density of liquid × gravitational field strength	$p = h\,\rho\,g$
^ (final velocity)^2 – (initial velocity)^2 = 2 × acceleration × distance	$v^2 - u^2 = 2as$
* ^ Force = $\frac{\text{change in momentum}}{\text{time taken}}$	$F = \frac{m\,\Delta v}{t}$

Unit 4: Atomic Structure & Unit 8: Space

There are no equations in these sections of the course

Scalar & Vector Quantities

The quantity is either a vector or a scalar. These two categories can be distinguished from one another by their distinct definitions: Scalars are quantities that are fully described by a magnitude (or numerical value) alone. Vectors are quantities that are fully described by both a magnitude and a direction.

Contact & Non-contact Forces

A **non-contact force** is a **force** which acts on an object without coming physically in **contact** with it. The most familiar example of a **non-contact force** is a gravity, which confers weight. In contrast a **contact force** is a **force** applied to a body by another body that is in **contact** with it.

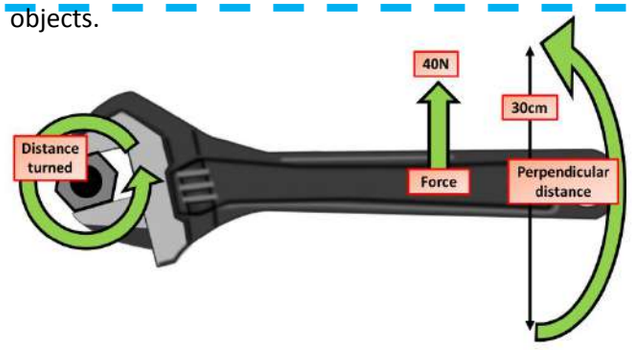
Elasticity Required Practical

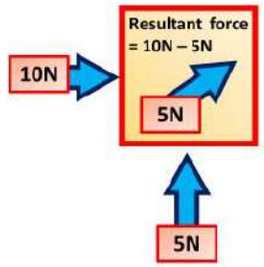
1. Secure a clamp stand to the bench using a G-clamp or a large mass on the base.
2. Use bosses to attach two clamps to the clamp stand.
3. Attach the spring to the top clamp, and a ruler to the bottom clamp.
4. Adjust the ruler so that it is vertical, and with its zero level with the top of the spring.
5. Measure and record the unloaded length of the spring.
6. Hang a 100 g slotted mass carrier - weight 0.98 newtons (N) - from the spring. Measure and record the new length of the spring.
7. Add a 100 g slotted mass to the carrier. Measure and record the new length of the spring.
8. Repeat step 7 until you have added a total of 1,000 g.

Force applied to a spring = Spring constant X extension

Leavers

A simple lever could be a solid beam laid across a pivot. As effort is applied to rotate one end about the pivot. The opposite end is also rotated about the pivot in the same direction. This has the effect of rotating or lifting the load. Levers, such as this one, make use of moments to act as a **force multiplier**. They allow a larger force to act upon the load than is supplied by the effort, so it is easier to move large or heavy objects.



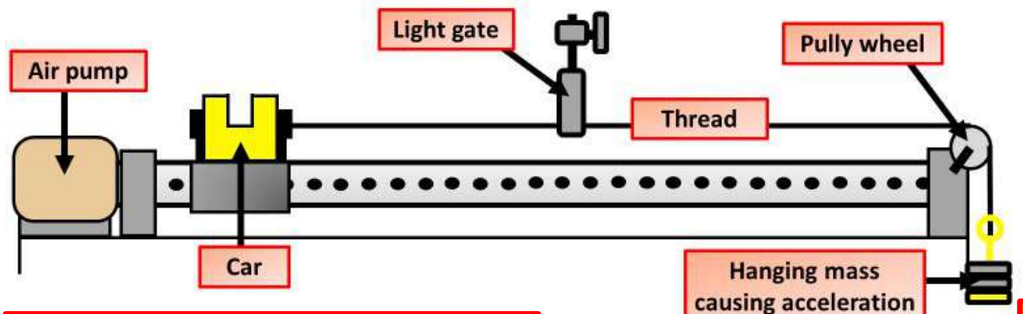


Resultant Force

A resultant force is the single force and associated torque obtained by combining a system of forces and torques acting on a rigid body. The defining feature of a resultant force, or resultant force-torque, is that it has the same effect on the rigid body as the original system of forces.

Resultant Force Required Practical

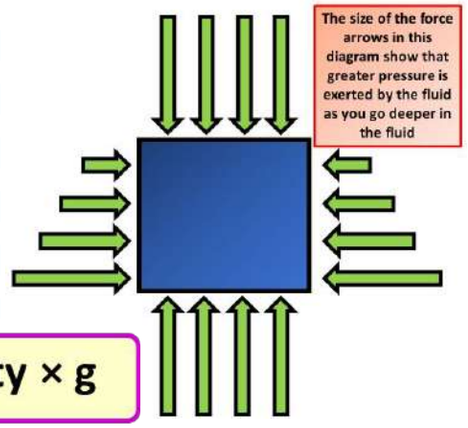
1. Position an air track on a bench with a bench pulley at one end and two light gates above the track. Cut an interrupt card to a known length (such as 10 cm) and attach it to an air track glider.
2. Connect the glider to a hanging mass by a string the length of the air track passing over the bench pulley. Set the data logging software to calculate acceleration.
3. Add 5 × 20 g slotted masses (0.98 N of force) to the end of the string.
4. Release the glider, then record the weight and acceleration.
5. Repeat steps 4 and 5 two more times, and calculate a mean value for the acceleration.
6. Repeat steps 4 to 6, removing one of the slotted masses each time.

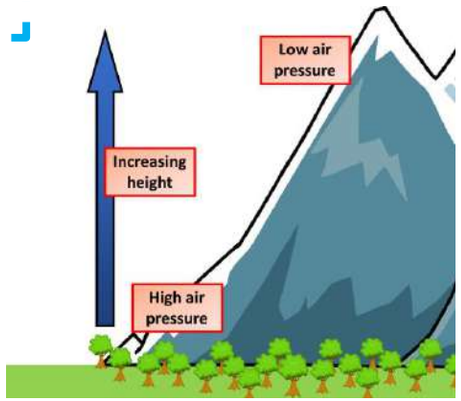


Pressure in a Fluid

Liquid pressure is the increase in pressure at increasing depths in a liquid. This pressure increases because the liquid at lower depths has to support all of the water above it. We calculate liquid pressure using the equation liquid pressure = mass x acceleration due to g density x depth in fluid.

pressure = height × density × g





Atmospheric Pressure

The atmosphere is a thin layer of air round the Earth. The atmosphere gets less dense with increasing altitude.

Air molecules colliding with a surface create atmospheric pressure. The number of air molecules above a surface decreases as the height of the surface above ground level increases. So atmospheric pressure decreases with an increase in height.

Calculating Momentum

momentum = mass x velocity

Calculating Force

force = mass x acceleration

Calculating Acceleration

Acceleration = Change in speed / Time taken

Calculating GPE

GPE = mass x gravitational field strength x height

Calculating Work

work done = force x distance moved

Calculating Moments

Moment = Force X Distance from a pivot

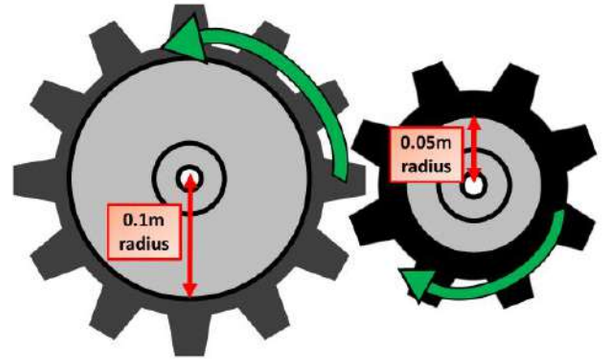
Gears

As one gear turns, the other gear must also turn. Where the gears meet, the teeth must both move in the same direction. In the diagram, the teeth of both gears move upwards. This means that the gears rotate in opposite directions.

The forces acting on the teeth are identical for both gears, but their moments are different:

If a larger gear is driven by a smaller gear, the large gear will rotate slowly but will have a greater moment. For example, a low gear on a bike or car.

If a smaller gear is driven by a larger gear, the larger gear will rotate quickly but will have a smaller moment. For example, a high gear on a bike or car.

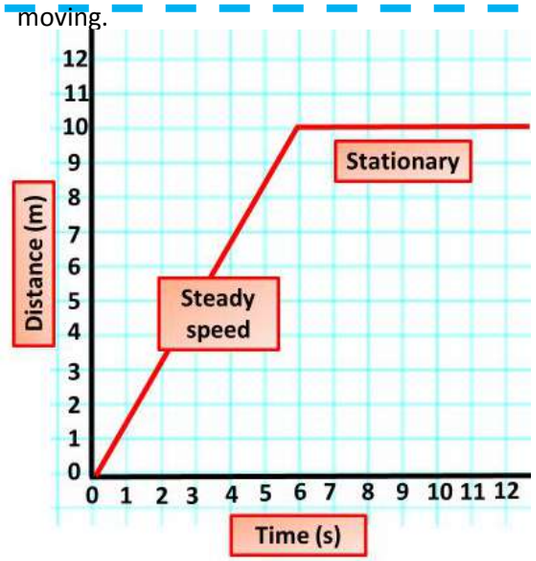


Distance & Displacement

Distance is a scalar quantity that refers to "how much ground an object has covered" during its motion. Displacement is a vector quantity that refers to "how far out of place an object is"; it is the object's overall change in position.

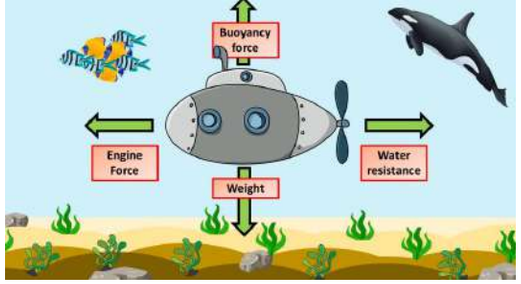
Speed / Time Graphs

In a distance-time graph, the gradient of the line is equal to the speed of the object. The greater the gradient (and the steeper the line) the faster the object is moving.



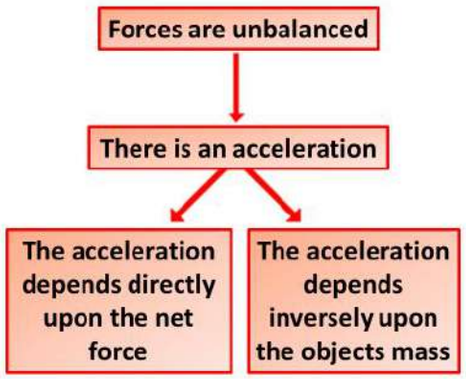
Stopping Distance

This is when: thinking distance is the distance a vehicle travels in the time it takes for the driver to apply the brakes after realising they need to stop. braking distance is the distance a vehicle travels in the time after the driver has applied the brake.



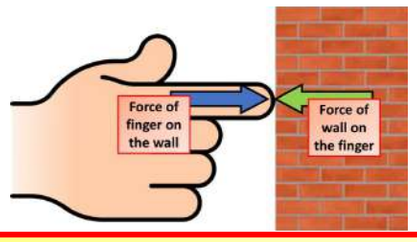
Newton's 1st Law

Newton's first law of motion - sometimes referred to as the law of inertia. An object at rest stays at rest and an object in motion stays in motion with the same speed and in the same direction unless acted upon by an unbalanced force.



Newton's 2nd Law

Newton's second law of motion can be formally stated as follows: The acceleration of an object as produced by a net force is directly proportional to the magnitude of the net force, in the same direction as the net force, and inversely proportional to the mass of the object.



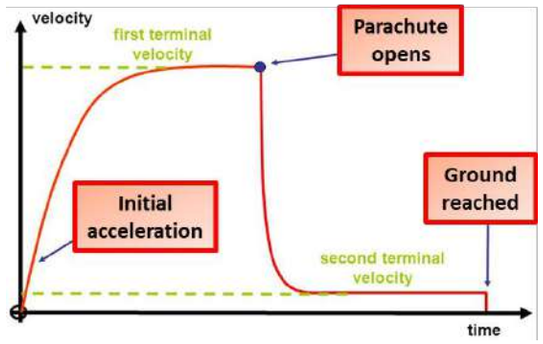
Newton's 3rd Law

Newton's third law is: For every action, there is an equal and opposite reaction. The statement means that in every interaction, there is a pair of forces acting on the two interacting objects. The size of the forces on the first object equals the size of the force on the second

Terminal Velocity

When an object is dropped, we can identify three stages before it hits the ground:

- At the start, the object accelerates downwards because of its weight. There is no air resistance. There is a resultant force acting downwards.
- As it gains speed, the object's weight stays the same, but the air resistance on it increases. There is a resultant force acting downwards.
- Eventually, the object's weight is balanced by the air resistance. There is no resultant force and the object reaches a steady speed, called the **terminal velocity**

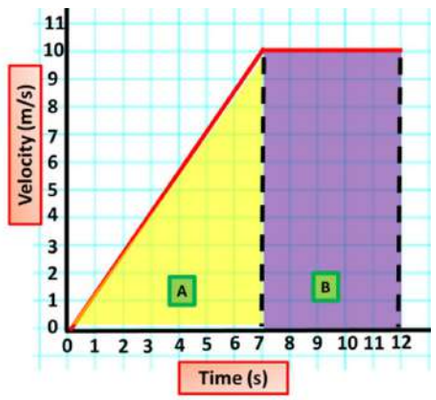


Momentum before = Momentum after

Mass x Velocity = Mass x Velocity

Conservation of Momentum

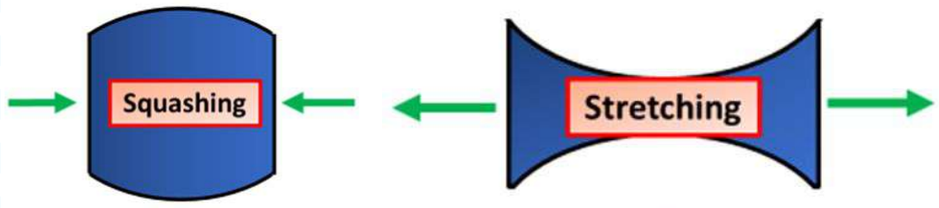
The law of momentum conservation can be stated as follows. For a collision occurring between object 1 and object 2 in an isolated system, the total momentum of the two objects before the collision is equal to the total momentum of the two objects after the collision



Change of Shape

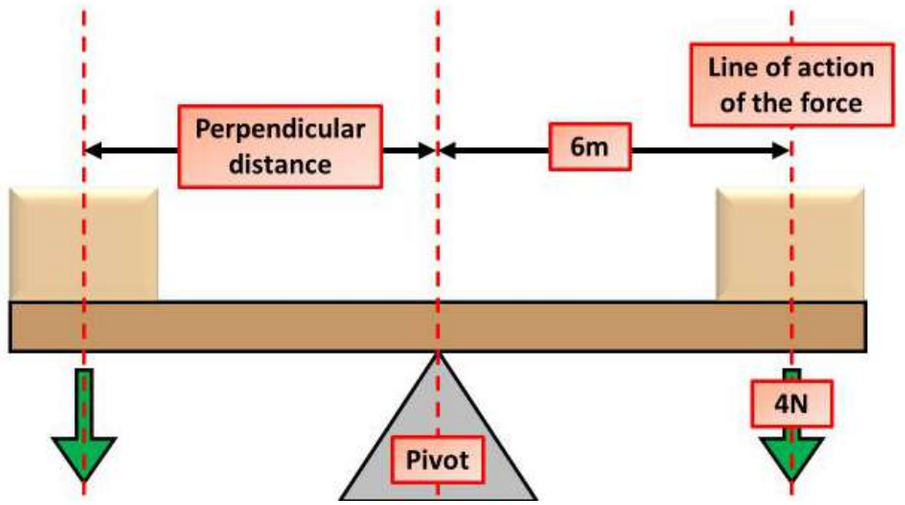
When a force acts on an object, the object may change shape by bending, stretching or compressing - or a combination of all three shape changes.
A change in shape is called deformation:

- elastic deformation is reversed when the force is removed
- inelastic deformation is not fully reversed when the force is removed - there is a permanent change in shape.



Limit of proportionality

Spring constant is a measure of the stiffness of a spring up to its limit of proportionality or elastic limit. The limit of proportionality refers to the point beyond which Hooke's law is no longer true when stretching a material. The elastic limit of a material is the furthest point it can be stretched or deformed while being able to return to its previous shape. Once a material has gone past its elastic limit, its deformation is said to be inelastic.



Turning Forces

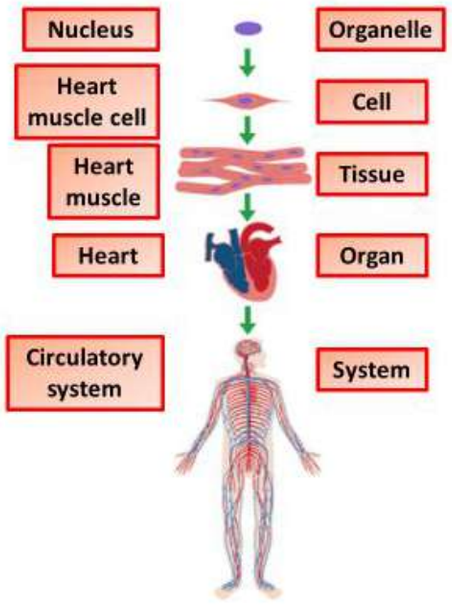
A force or system of forces may cause an object to turn. A moment is the turning effect of a force. Moments act about a point in a clockwise or anticlockwise direction. The point chosen could be any point on the object, but the pivot - also known as the fulcrum - is usually chosen.

Velocity Time Graphs

The area under a velocity-time graph is a representation of the displacement. If the area is over a time interval, then the displacement during that time interval can be measured by the area under the graph bounded by the time interval

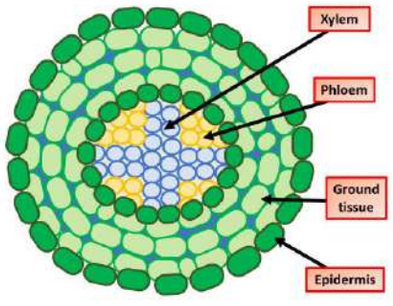
Animal Tissues

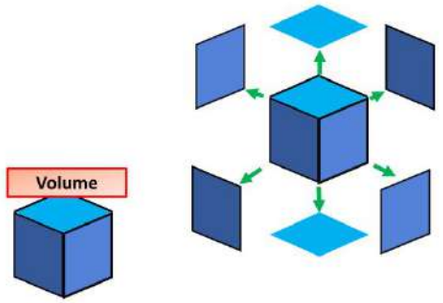
In animals, cells are grouped together to form tissues. These tissues vary in their structure, function, and origin. The four important tissues in an animal body are epithelial, connective, muscular and nervous tissues.



Plant Tissues

Plant tissues come in several forms: vascular, epidermal, ground, and meristematic. Each type of tissue consists of different types of cells, has different functions, and is located in different places.





Exchange Surfaces

Organisms must take in food, oxygen and water, and other essential substances, from the environment. Plants also need carbon dioxide for photosynthesis. Organisms also need to remove waste substances.

Small organisms exchange these essential and waste substances between themselves and the environment. They do this over their body surface. Simple chemical substances can diffuse in and out of their bodies.

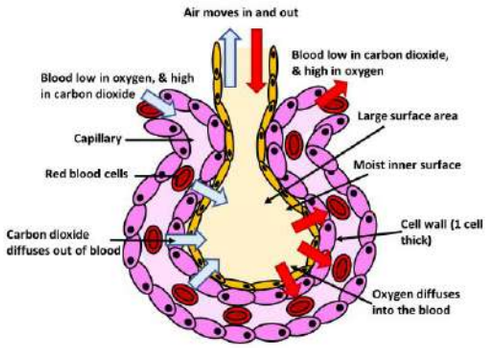
Inside their bodies, in small organisms, substances don't have to move far.

The size of their surface, or surface area, defines how quickly they can absorb substances. The size of their volume defines how much of these substances they need.

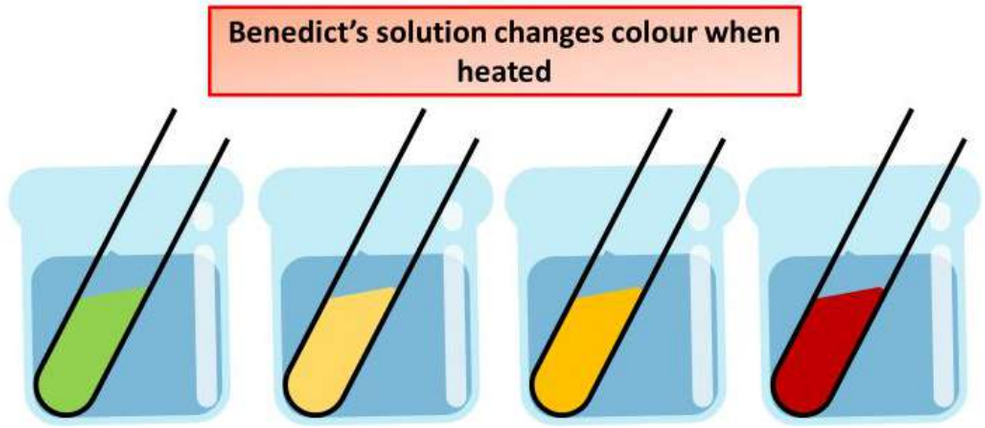
Gaseous Exchange Surfaces

Key Features

- Good ventilation
- Good circulation
- A large surface area
- Moist surface
- Short diffusion distance
- Concentration gradient
- Movement of gases



Testing For Sugars

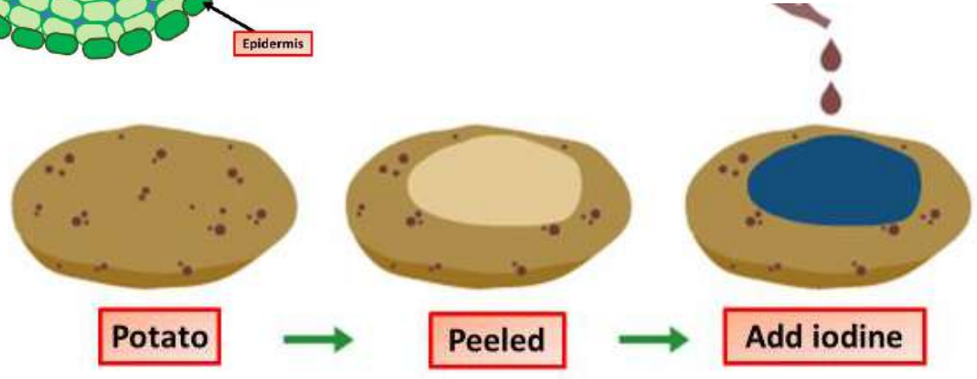


Sugars classed as reducing sugars will react with Benedict's solution on heating for a few minutes. Glucose is an example of a reducing sugar.

Reducing sugars give a red-brown precipitate with Benedict's solution. The precipitate takes a while to settle in the tube – you're more likely to see simply a red or brown colour. If there's not much glucose present, the final colour may be green or yellow, or orange if there's a little more.

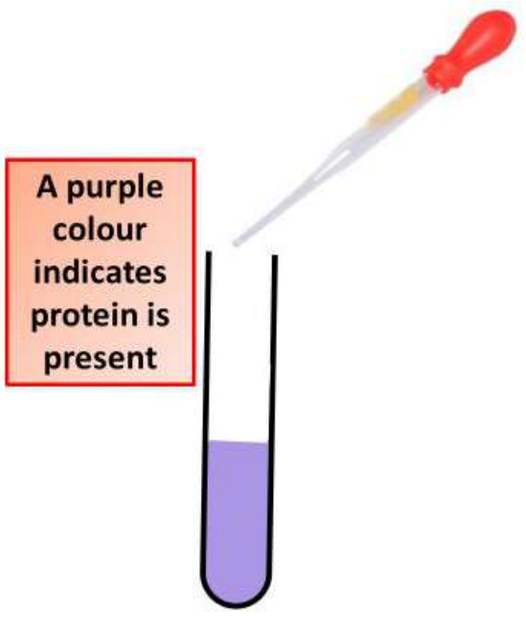
Testing for Starch

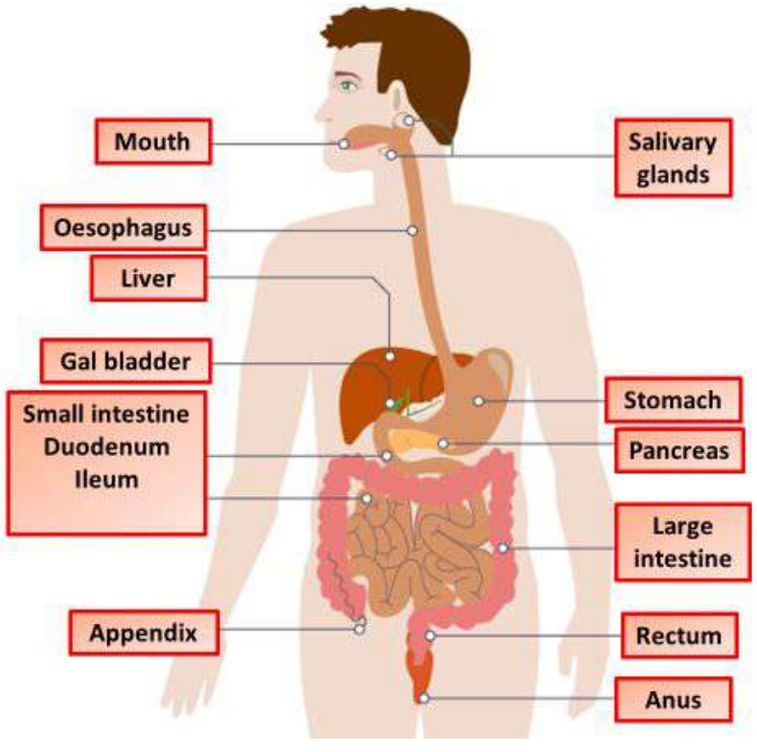
In the presence of starch, iodine turns a blue/black colour. It is possible to distinguish starch from glucose (and other carbohydrates) using this iodine solution test. For example, if iodine is added to a peeled potato then it will turn black. Benedict's reagent can be used to test for glucose.



Testing for Proteins

- Use a pestle and mortar to grind up a small sample of food.
- Transfer the ground up food into a small beaker. Then add distilled water.
- Stir the mixture so that some of the food dissolves in the water.
- Filter using a funnel with filter paper to obtain as clear a solution as possible.
- The solution should be collected in a conical flask.
- Put 2 cm^3 of this solution into a test tube
- Add 2 cm^3 of Biuret solution to the solution in the test tube. Shake gently to mix
- Note any colour change. Proteins will turn the solution pink or purple.



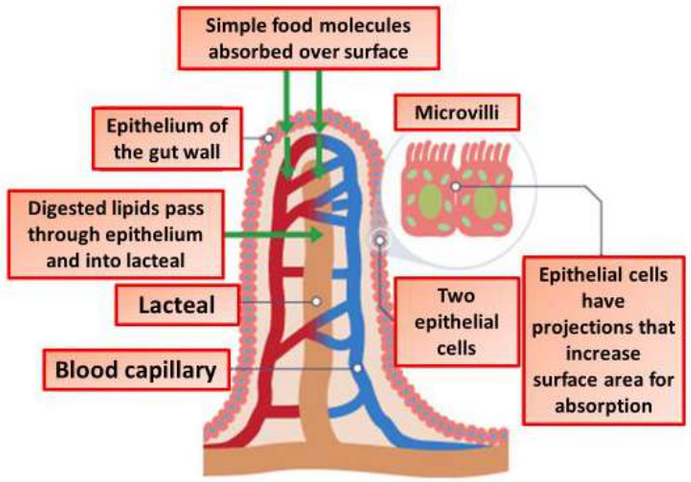


Digestion

The GI tract is a series of hollow organs joined in a long, twisting tube from the mouth to the anus. The hollow organs that make up the GI tract are the mouth, oesophagus, stomach, small intestine, large intestine, and anus. The liver, pancreas, and gallbladder are the solid organs of the digestive system.

Villi

Villi (singular is villus) are small, finger-like structures in the small intestine. They help to absorb digested food. Each villus has micro-villi which increase the surface area of the intestinal walls. A larger surface area allows nutrients to be taken in more quickly.

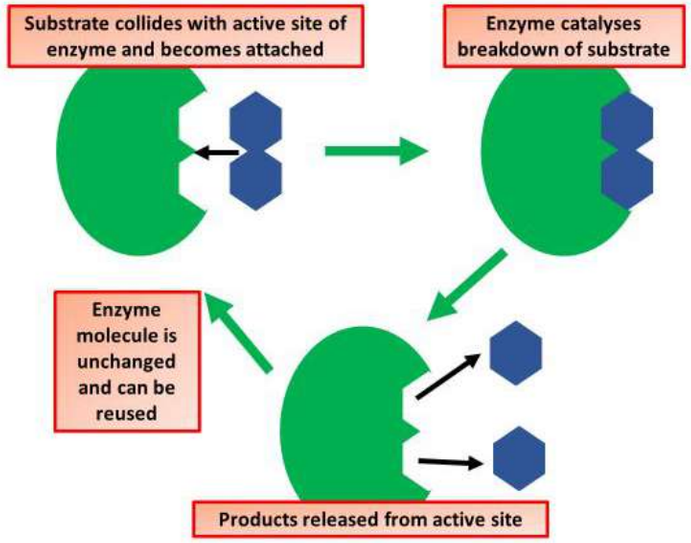


Enzymes

Enzymes are protein molecules in cells which work as catalysts. Enzymes speed up chemical reactions in the body, but do not get used up in the process. Almost all biochemical reactions in living things need enzymes. With an enzyme, chemical reactions go much faster than they would without the enzyme.

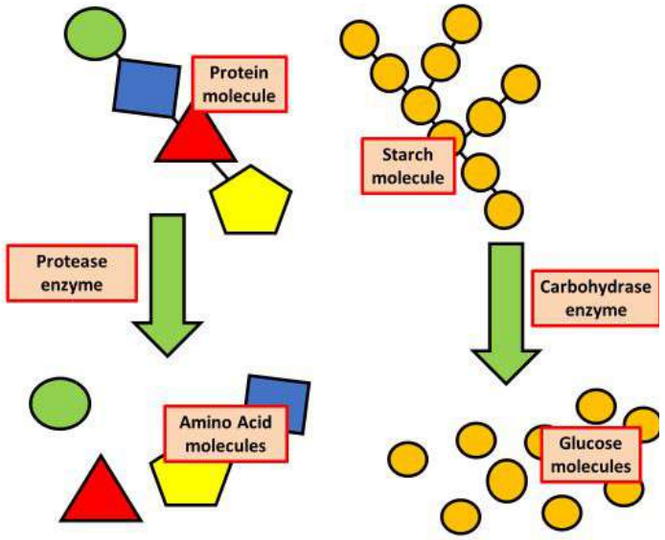
Investigating Enzymes

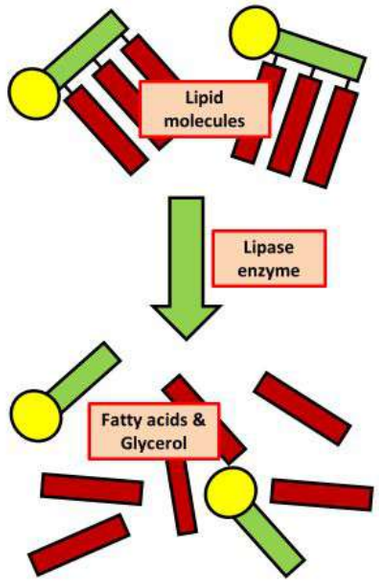
1. You will investigate the breakdown of **starch** by amylase at different pHs.
2. The different pHs under investigation will be produced using **buffer solutions**. Buffer solutions produce a particular pH, and will maintain it if other substances are added.
3. The amylase will break down the starch.
4. A series of test tubes containing a mixture of starch and amylase is set up at different pHs.
5. A sample is removed from the test tubes every 10 seconds to test for the presence of starch. **Iodine solution** will turn a blue/black colour when starch is present, so when all the starch is broken down, a blue-black colour is no longer produced. The iodine solution will remain orange-brown.
6. For each pH investigated, record the time taken for the disappearance of starch, ie when the iodine solution in the spotting tile remains orange-brown.



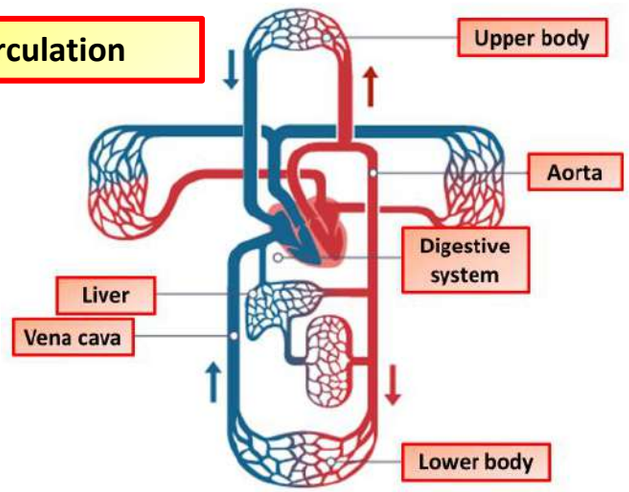
Digestive Enzymes

Digestive enzymes are released, or secreted, by the organs of the digestive system. These enzymes include proteases that digest proteins, and nucleases that digest nucleic acids. Examples of digestive enzymes are: Amylase, produced in the mouth.



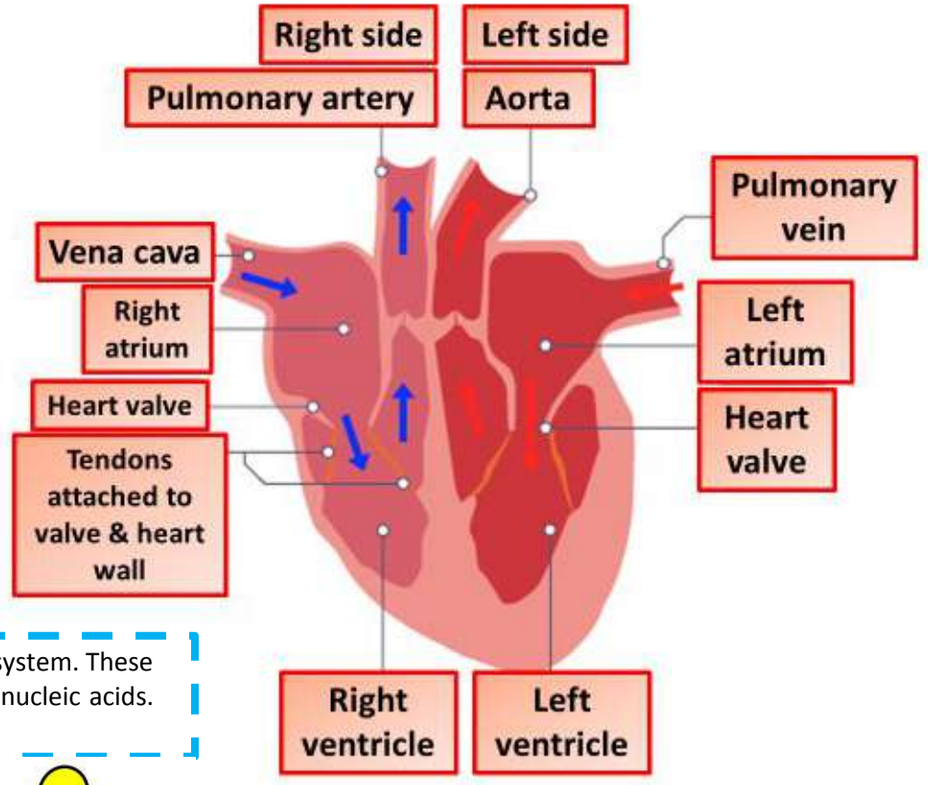


Circulation



Capillary

- Capillaries are very thin, approximately 5 micrometers in diameter, and are composed of only two layers of cells; an inner layer of endothelial cells and an outer layer of epithelial cells.
- They are so small that red blood cells need to flow through them single



The Heart

Blood enters the heart through the atria. Blood from two vena cavae enters the right atrium. Blood from the pulmonary veins enters the left atrium. The atria fill, followed by the ventricles. Blood is prevented from flowing back into the atria by heart valves.

Blood leaves the heart in the body's main artery - the aorta - from the left side, and the pulmonary artery, from the right.

Artery

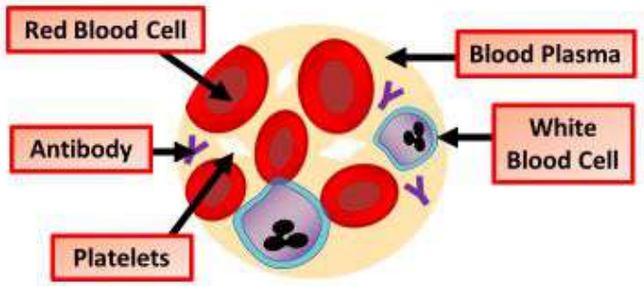
- The arteries are the blood vessels that deliver oxygen-rich blood from the heart to the tissues of the body.
- Each artery is a muscular tube lined by smooth tissue and has three layers:
- The intima, the inner layer lined by a smooth tissue called endothelium.

Veins

- A vein is an elastic blood vessel that transports blood from various regions of the body to the heart.
- Unlike the high pressure arterial system, the venous system is a low pressure system that relies on muscle contractions to return blood to the heart.

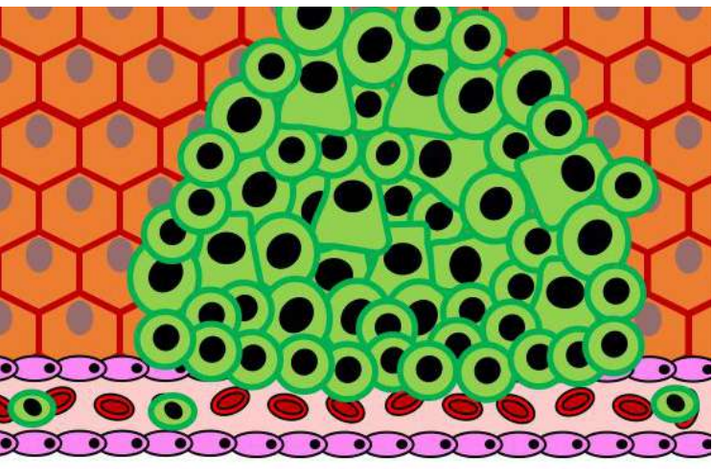
Blood

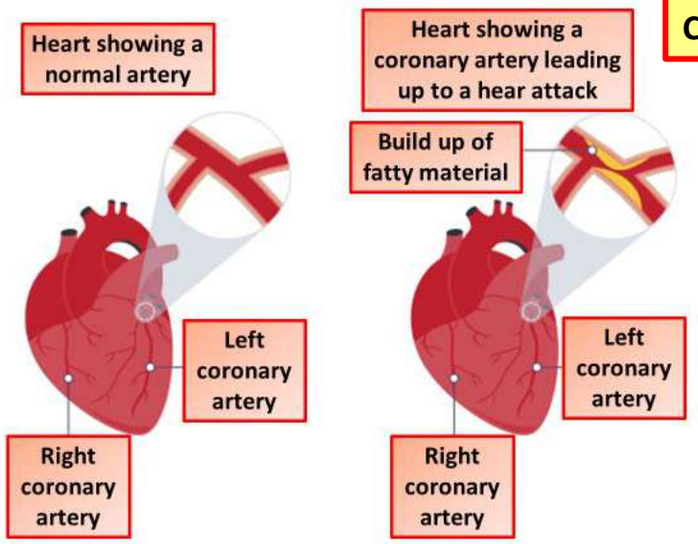
It has four main components: plasma, red blood cells, white blood cells, and platelets. Blood has many different functions, including: transporting oxygen and nutrients to the lungs and tissues. forming blood clots to prevent excess blood loss.



Cancer

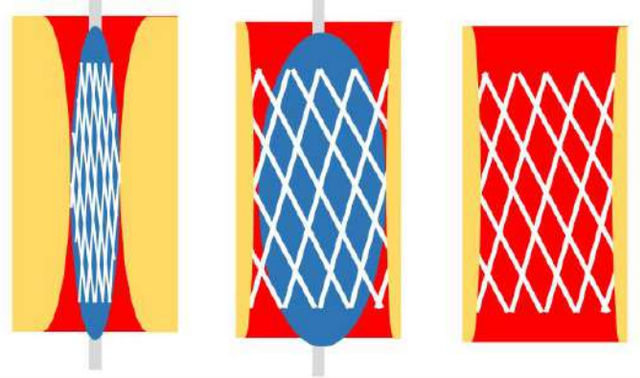
Cancers occur when cell division goes wrong. This causes cells to grow out of control, which form a tumour . There are two types of tumour: malignant - these tumours are cancerous and can break apart, move around the body and start new instances of the same cancers in a process called metastasis.





Coronary Heart Disease

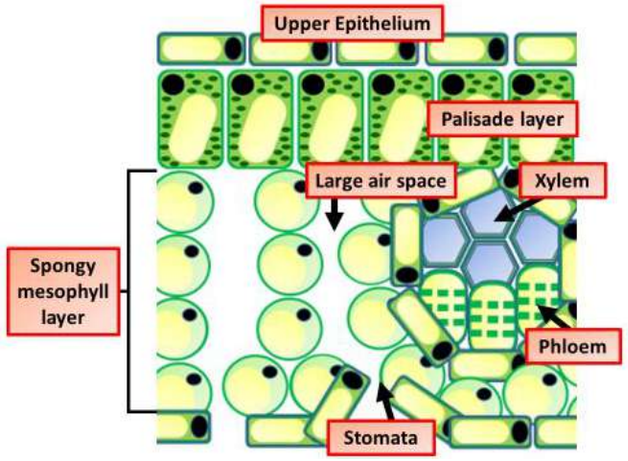
The heart is a muscular pump. Like all muscles, it needs oxygen for aerobic respiration to contract. The coronary arteries supply blood, and therefore oxygen, to the heart muscle.
The coronary arteries may become blocked by a build-up of fatty material, caused by certain kinds of 'bad' cholesterol. As the fatty material increases, one or more coronary arteries narrow, and can become blocked.



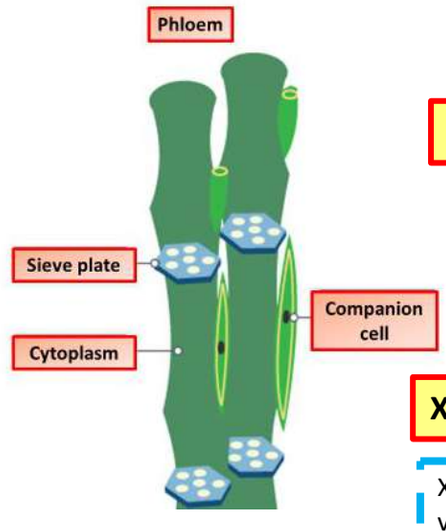
Stents

Coronary arteries that are blocked or have become narrow can be stretched open and have a stent inserted to restore and maintain blood flow. The stent is inserted into a coronary artery in a catheter. Stents are made from metal alloys and do not lead to an immune response in the patient.

Leaf Structure



Plants make food in their leaves. The leaves contain a pigment called chlorophyll, which colors the leaves green. Chlorophyll can make food the plant can use from carbon dioxide, water, nutrients, and energy from sunlight. This process is called photosynthesis.



Phloem

Phloem, also called bast, tissues in plants that conduct foods made in the leaves to all other parts of the plant. Phloem is composed of various specialized cells called sieve tubes, companion cells

Xylem

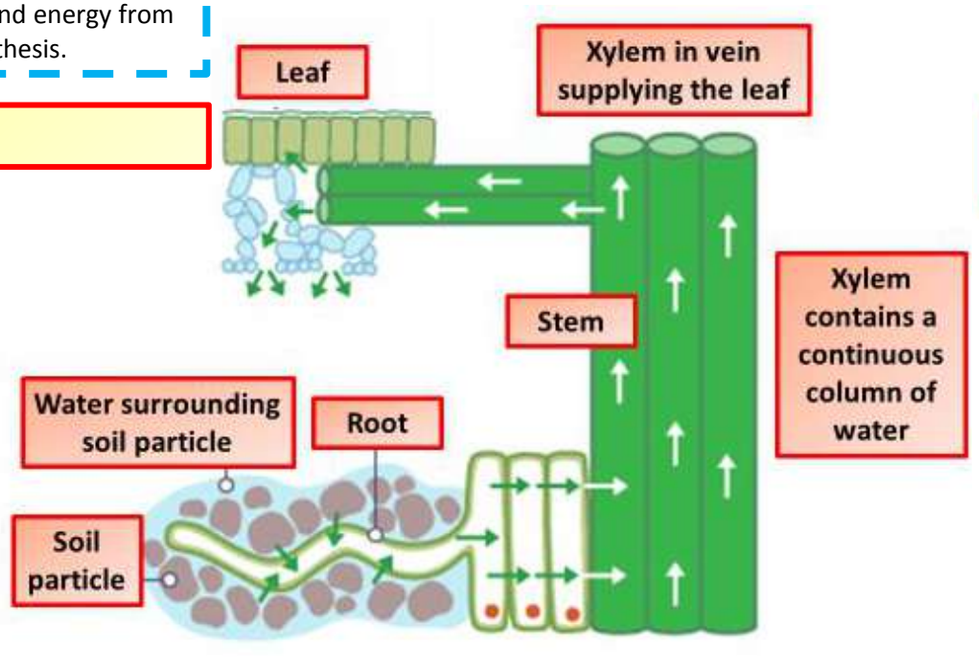
Xylem is one of the two types of transport tissue in vascular plants, phloem being the other. The basic function of xylem is to transport water from roots to stems and leaves, but it also transports nutrients.

Transpiration

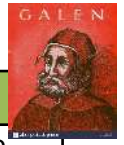
Transpiration is the process by which moisture is carried through plants from roots to small pores on the underside of leaves, where it changes to vapor and is released to the atmosphere. Transpiration is essentially evaporation of water from plant leaves.

When the plant opens its stomata to let in carbon dioxide, water on the surface of the cells of the spongy mesophyll and palisade mesophyll evaporates and diffuses out of the leaf. This process is called transpiration . ... Water molecules inside the xylem cells are strongly attracted to each other.

The water, warmed by the sun, turns into vapor (evaporates), and passes out through thousands of tiny pores (stomata) mostly on the underside of the leaf surface. This is transpiration. It has two main functions: cooling the plant and pumping water and minerals to the leaves for photosynthesis.



Knowledge Organiser – Topic One: Medieval Medicine 1250-1500



Medieval Britain

Medieval Britain is the period between **1250-1500** also known as the 13th-16th century or the Middle Ages.

Key events

1123 Britain's first hospital, St Bartholomew's was set up in London

1350 Average life expectancy is 35 years of age

1348-49 The Black Death kills 1/3 of England's population

1388 Parliament passes the first law requiring streets and rivers to be kept clean by the people

Key Concepts

The Medieval Church –The official religion of medieval Britain was Roman Catholic. Daily life and power was dominated by the Church, they **controlled education** and many people feared God.

The Four Humours. First suggested by Greek doctor Hippocrates. ***Black Bile, Yellow Bile, Blood and Phlegm*** **.** These humours linked to elements and seasons. Hippocrates believed that if these humours became unbalanced you would get ill. To get better, you needed to balance them. Galen, a Greek doctor working in Rome continued the theory and added his own ideas. His ' **Theory of Opposites** ' to heal illness suggested using hot to cure cold.

Galen: Roman doctor who's ideas continued to be used throughout the medieval period. Wrote over 300 medical books, many of which contained many mistakes, as Galen was not allowed to dissect humans, he based his ideas on animal dissection.
The Catholic church supported the teachings of Galen and banned doctors from criticising his work.

Medieval Power The emphasis in Medieval Britain was on authority. The King had total power, but the Church had considerable control. People followed authority and would not question the views of King/Church as it would mean risking their lives.

Key Words

Superstition	A belief, not based on knowledge, but on the supernatural. For example witchcraft or astrology
Purging	To rid the body of an 'excess' like blood or vomit
Leeching	The use of leeches for bloodletting
Cupping	Using glass cups to draw blood to the surface
Fasting	To avoid eating or drinking
Pilgrimage	A journey to a religious shrine and relics to show your love of God and to cure an illness
Mass	Public worship in the Roman Catholic Church
Astrology	Study of the planets and their effect on humans
Miasma	Bad air which was blamed for spreading disease
Apothecary	A medieval pharmacist or chemist
Wise Woman	A female healer, who used folk medicine and herbal remedies to cure illnesses.
Urine Chart	Used to examine urine to define an illness
Physician	A male medically trained doctor
Barber Surgeon	Untrained surgeon, who practiced basic surgery – eg removing cysts and even limbs!
Dissection	To cut open a human and examine the insides
Epidemic	A widespread outbreak of a disease
Amulet	A charm that bought protection from disease
Black Death	A term to describe the bubonic plague
Monastery	A building where monks live, eat and pray
Flagellants	Religious people who whipped themselves to say "sorry" to God for their sins to try to prevent illness / plague.

Knowledge Organiser – Topic Two: The Medical Renaissance in England, 1500-1700

Renaissance England

The Renaissance was the period between 1500-1700 in England. Art and Science were growing in importance.

Key events

1543 – Vesalius published *The Fabric of the Human Body*. It showed how the human body worked.

1565 – the first dissection was carried out in Cambridge

1628 Harvey published his book *An Anatomical Account of the Motion of the Heart and Blood* which showed blood moving around the body

1645 – The first meeting of the Royal Society

1665 The Great Plague in London. 75,000 died

Key Concepts

The King – Despite some scientific developments, people still believed that the King could cure diseases such as **scrofula** (a skin disease). Being touched by the King was as close as you could get to being touched by God.

Renaissance – this was a time of change (re-birth) when people became interested in all things Greek and Roman. Printing was developed so that books could be published (e.g. Galen, Vesalius). People realised the Greeks had loved enquiry – asking questions and challenging old ideas. They started to do the same – e.g challenging Galen's theories

Experiments, not just reading books – rather than believing & accepting old ideas (e.g. The Four Humours) without question, scientists and doctors were more willing to experiment (e.g. dissecting bodies) to make scientific discoveries. People started to look to evidence over tradition.

Key Words

Continuity	Things or ideas that stayed the same over time
London Treacle	A medicine that was solve to cure the Plague. It contained herbs, spices, honey and opium
Autopsy	Dissecting a body after someone has died to establish cause of death
Diagnosing	Finding out what disease someone has by e.g. taking their pulse and observing the patient
Royal Society	A group of people interested in science who met weekly. They had a laboratory with microscopes. King Charles II was a patron.
Anatomy	The study of the human body and how it works
Physiology	The workings of the body
Microscope	A new invention that allowed things to be magnified
Thermometer	A new invention that allowed someone's temperature to be taken
Pesthouse	A hospital for people suffering from infectious diseases, e.g the Plague.
Printing	The process of creating a book. This was developed during the Renaissance

van Leeuwenhoek's Microscope (circa late 1600s)