Triple Science

Examined in May/June

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Aims

Brief outline of course and its assessment

Exams and assessment

What is needed to be successful

Tips and help to be successful

Triple Science structure

Based on Year 9 start

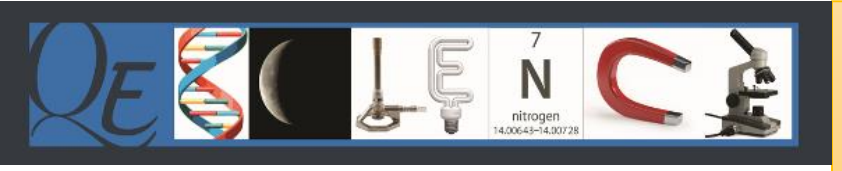
Three separate sciences GCSE's over two years

Biology Unit 1 : Biology Unit 2

Chem Unit 1 : Chem Unit 2

Physics Unit 1 : Physics Unit 2

Three separate grades, no marks carried over or combined



GCSE Triple Science- Examination Key Points

- **<u>Two</u>** exams per subject
- Questions multiple choice, closed short answer and open response

<u>No coursework or controlled assessment</u>

questions in the written exams will draw on the knowledge and understanding students have gained by carrying out the ***<u>28 practical activities</u>***

Biology.

Paper 1

Topics 1–4: Cell biology; Organisation; Infection and response; and Bioenergetics.

Paper 2

Topics 5–7: Homeostasis and response; Inheritance, variation and evolution; and Ecology.

Chemistry.

Paper 1

Topics 1–5: Atomic structure and the periodic table; Bonding, structure, and the properties of matter; Quantitative chemistry, Chemical changes; and Energy changes.

Paper 2

Topics 6–10: The rate and extent of chemical change; Organic chemistry; Chemical analysis, Chemistry of the atmosphere; and Using resources.

Physics.

Paper 1

Topics 1-4: Energy; Electricity; Particle model of matter; and Atomic structure.

Paper 2

Topics 5-8: Forces; Waves; Magnetism and electromagnetism; and Space physics.
Questions in paper 2 may draw on an understanding of energy changes and transfers due to heating, mechanical and electrical work and the concept of energy conservation from Energy and Electricity.

Triple Sciences

Assessment

6 Exams (two in Biology, Chemistry and Physics) - no coursework

Each exam

- Exams: **1 hour 45 minutes**
- Foundation or Higher Tier (can be a mixture between the sciences)
- 100 marks
- 50 % of GCSE each

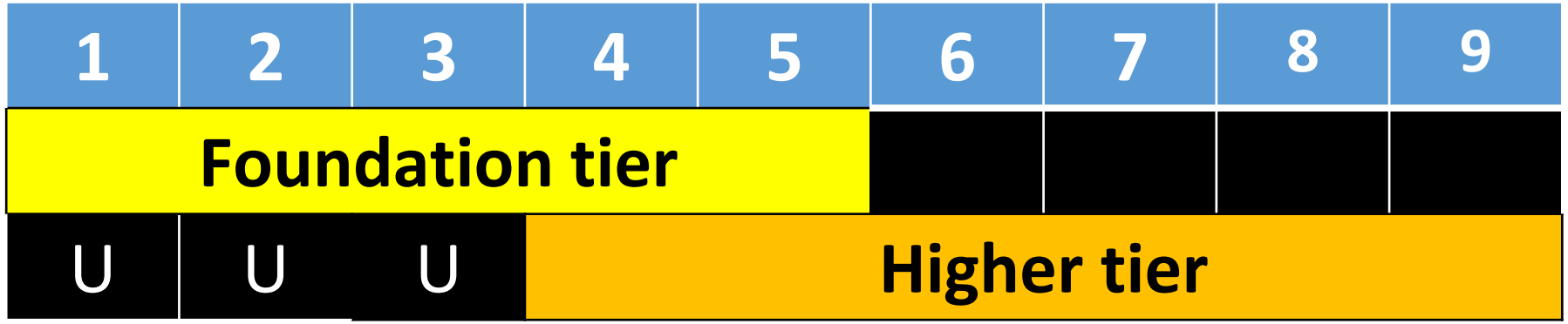
Question type

Multiple choice, structured, closed short answer and open response.

Awarding grades and reporting results

The qualification will be graded on a nine-point scale: 1–9 – where 9 is the best grade.

Two tiers



Each separate science will be one number on this scale

Tier Entries

Exam board and Ofqual guidance

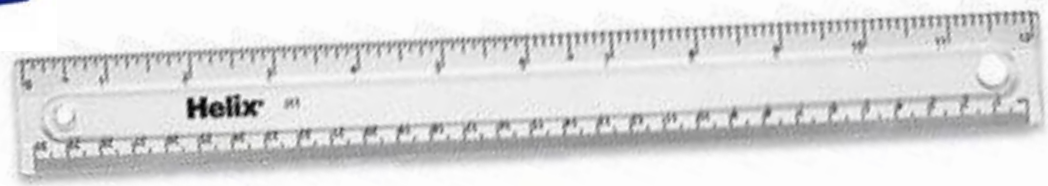
- Tiered exam papers have questions (usually around 20%) that are common to both foundation and higher tier. Exam boards use these to align standards between tiers, ***so it is no easier to get a grade on one tier than another***.
- There is a 'safety net' grade on the higher tier, for those who just miss a grade 4 but it is narrower than a normal grade (typically about half the number of marks). **This is only confirmed near the exam dates**
- If a student misses a grade 4 on higher tier, they will be ungraded.
- ***A student whose target grade is a grade 4 or grade 5 (or expected to achieve those grades) should be entered for foundation tier.***

Examination equipment list

- Pens

- Pencils

- 30 cm <u>Clear</u> Ruler



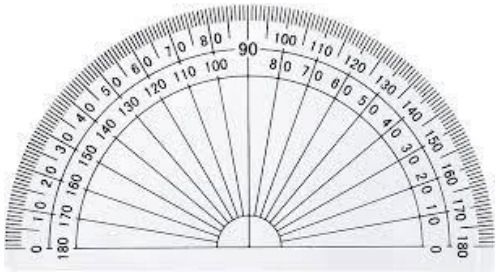
- Scientific calculator
- Clear pencil case

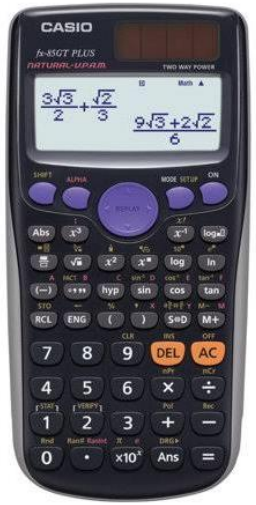
For Physics paper 2

Materials

For this paper you must have:

- a ruler
- a scientific calculator
- a protractor
- the Physics Equations Sheet (enclosed).





What does success in each of the science subjects look like?

Success in Chemistry

‘To get a 9 in GCSE Chemistry, you need to have a strong understanding of the subject, including a wide range of concepts, theories, and practical skills. You also need to be able to apply your knowledge to a variety of ***different scenarios*** and questions, and be able to ***analyse*** and ***interpret*** complex data and information.’

The maths

Chemical formula
Relative formula mass
Moles
Percentage composition
Balancing equations
Concentration in solutions

Rates of reaction and *equilibrium*

Energy changes – *calculations* are high value

Electrolysis

The ‘rules’
Ionic equations
Applications

A thorough knowledge of the Required practical's related to Chemistry

Success in Physics

- Learn to use and apply the equations Learn equations
- Make sure they are familiar with alternative names i.e. potential difference and voltage
- Learn units: **Mass and weight, energy, charge…..**
- Learn key words **density, particles, kinetic energy, melting, transfer, denser, less dense, rises, falls, expands, displaces, hotter/warmer, colder, convection current, repeats and possibly conduction**

A thorough knowledge of the Required practical's related to Physics

An Example of a 4-6 mark descriptive question using key words:

Explain how an ice cube cools a glass of water?

Energy is ***transferred*** from the water to the ice cube by *conduction*.

The ***molecules*** in the ice cube gain ***kinetic energy*** and move further apart breaking the bonds. The water melts.

The colder cold water near the ice cube is ***denser*** than the warmer water around it so it sinks below it to the bottom of the glass.

The warmer water at the bottom of the glass is ***displaced*** and because it is less ***dense*** than the water around it it rises.

This process will repeat as a ***convection*** current in the glass until the ice has all ***melted***

Steps for completing equations (in Physics)

Steps in Physics calculations

- Write the equation.
- Write underneath each term the number in the question that relates to the term.
- Check units – change if necessary.
- Rearrange if needed.
- Do the maths.

AQA

Physics Equations Sheet

GCSE Physics (8463)

FOR USE IN JUNE 2022 ONLY

HT = Higher Tier only equations

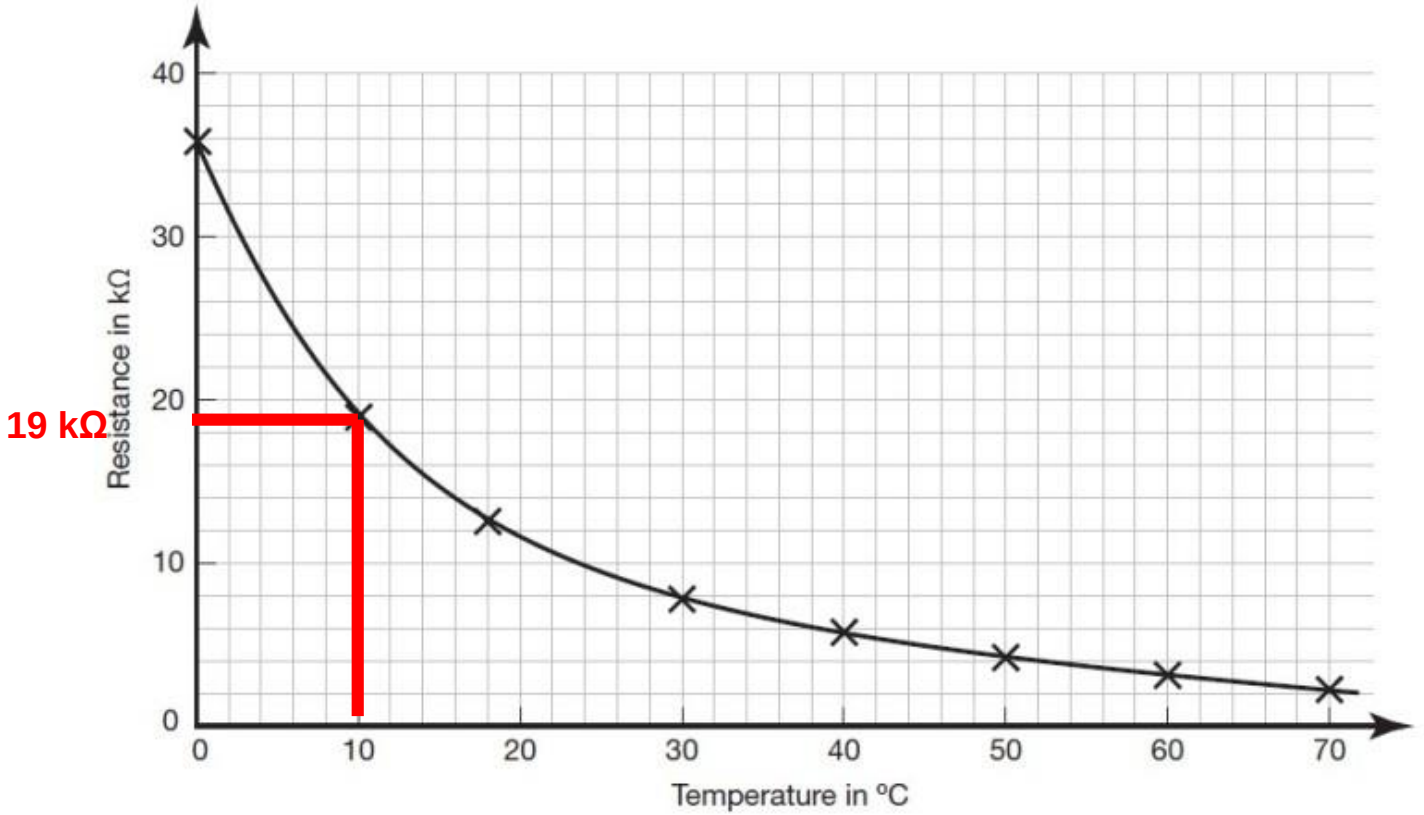
kinetic energy = 0.5 × mass × (speed)^2	$E_k = \frac{1}{2} m v^2$
elastic potential energy = 0.5 × spring constant × (extension)^2	$E_e = \frac{1}{2} k e^2$
gravitational potential energy = mass × gravitational field strength × height	$E_p = m g h$
change in thermal energy = mass × specific heat capacity × temperature change	$\Delta E = m c \Delta\theta$
power = $\frac{\text{energy transferred}}{\text{time}}$	$P = \frac{E}{t}$
power = $\frac{\text{work done}}{\text{time}}$	$P = \frac{W}{t}$
efficiency = $\frac{\text{useful output energy transfer}}{\text{total input energy transfer}}$	
efficiency = $\frac{\text{useful power output}}{\text{total power input}}$	
charge flow = current × time	$Q = I t$
potential difference = current × resistance	$V = I R$
power = potential difference × current	$P = V I$
power = (current)^2 × resistance	$P = I^2 R$
energy transferred = power × time	$E = P t$
energy transferred = charge flow × potential difference	$E = Q V$
density = $\frac{\text{mass}}{\text{volume}}$	$\rho = \frac{m}{V}$

	thermal energy for a change of state = mass × specific latent heat	$E = m L$
	For gases: pressure × volume = constant	$p V = constant$
	weight = mass × gravitational field strength	$W = m g$
	work done = force × distance (along the line of action of the force)	$W = F s$
	force = spring constant × extension	$F = k e$
	moment of a force = force × distance (normal to direction of force)	$M = F d$
	pressure = $\frac{\text{force normal to a surface}}{\text{area of that surface}}$	$p = \frac{F}{A}$
HT	**pressure due to a column of liquid = height of column × density of liquid × gravitational field strength**	$\boldsymbol{p = h \rho g}$
	distance travelled = speed × time	$s = v t$
	acceleration = $\frac{\text{change in velocity}}{\text{time taken}}$	$a = \frac{\Delta v}{t}$
	(final velocity)^2 – (initial velocity)^2 = 2 × acceleration × distance	$v^2 - u^2 = 2 a s$
	resultant force = mass × acceleration	$F = m a$
HT	**momentum = mass × velocity**	$\boldsymbol{p = m v}$
HT	**force = $\frac{\text{change in momentum}}{\text{time taken}}$**	$\boldsymbol{F = \frac{m \Delta v}{\Delta t}}$
	period = $\frac{1}{\text{frequency}}$	$T = \frac{1}{f}$
	wave speed = frequency × wavelength	$v = f \lambda$
	magnification = $\frac{\text{image height}}{\text{object height}}$	
HT	**force on a conductor (at right angles to a magnetic field) carrying a current = magnetic flux density × current × length**	$\boldsymbol{F = B I l}$
HT	**$\frac{\text{potential difference across primary coil}}{\text{potential difference across secondary coil}} = \frac{\text{number of turns in primary coil}}{\text{number of turns in secondary coil}}$**	$\boldsymbol{\frac{V_p}{V_s} = \frac{n_p}{n_s}}$
HT	**potential difference across primary coil × current in primary coil = potential difference across secondary coil × current in secondary coil**	$\boldsymbol{V_p I_p = V_s I_s}$

Success in Physics

Make sure you are comfortable interpreting or drawing graphs

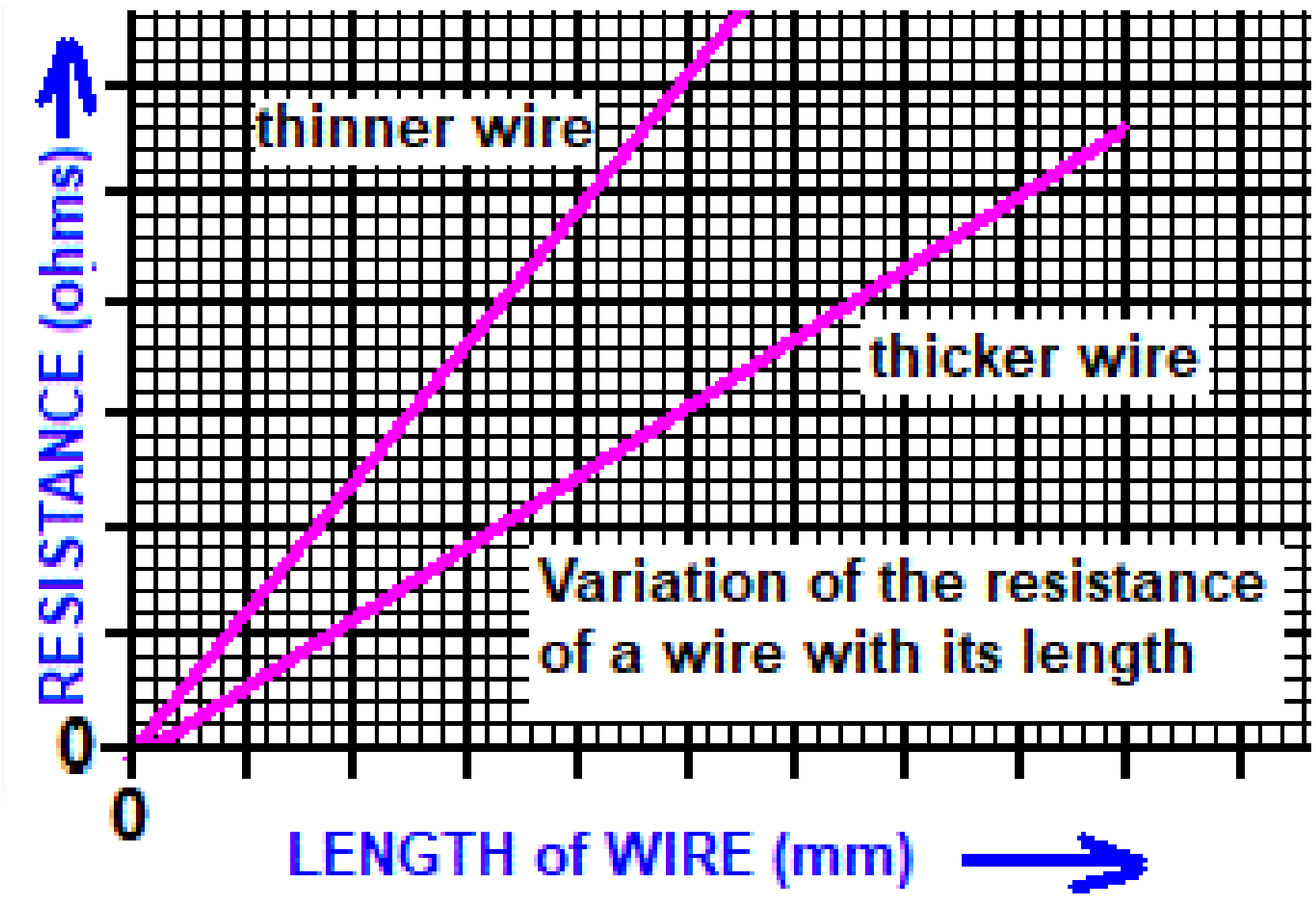
(4) The resistance vs temperature graph for one type of electrical component is drawn below.



Use the x axis to work out the resistance at a specific temperature

Success in Physics

Make sure you are comfortable interpreting or drawing graphs



Success in Biology

To achieve a good grade in Biology the key skills are:

- Being able to interpret data- charts and graphs
- Apply data and ideas to new scenarios i.e. you might learn about potatoes but not carrots but might have an exam question on carrots!
- Learn keywords for topics and list them
- Model six mark answers using key words

0 2 . 6 **Table 3** shows some information about burgers made from meat and meat-free burgers.

Table 3

	Mass per 100 g of burger	
	Burgers made from meat	**Meat-free burgers**
Protein in g	14.0	9.0
Fibre in g	0.9	5.5
Fat in g	16.0	5.2
Carbohydrate in g	15.5	15.1
Cholesterol in mg	120.0	0.0

Evaluate the use of burgers made from meat compared with meat-free burgers in providing humans with a healthy, balanced diet.

Use information from **Table 3** and your own knowledge.

[6 marks]

A thorough knowledge of the Required practical's related to Biology

How can you help ?

Homework Knowledge organisers and Sceneca – and on-line resource

- ✔ Past exam papers.
- ✔ Will be used to help students consolidate and prepare for the summer

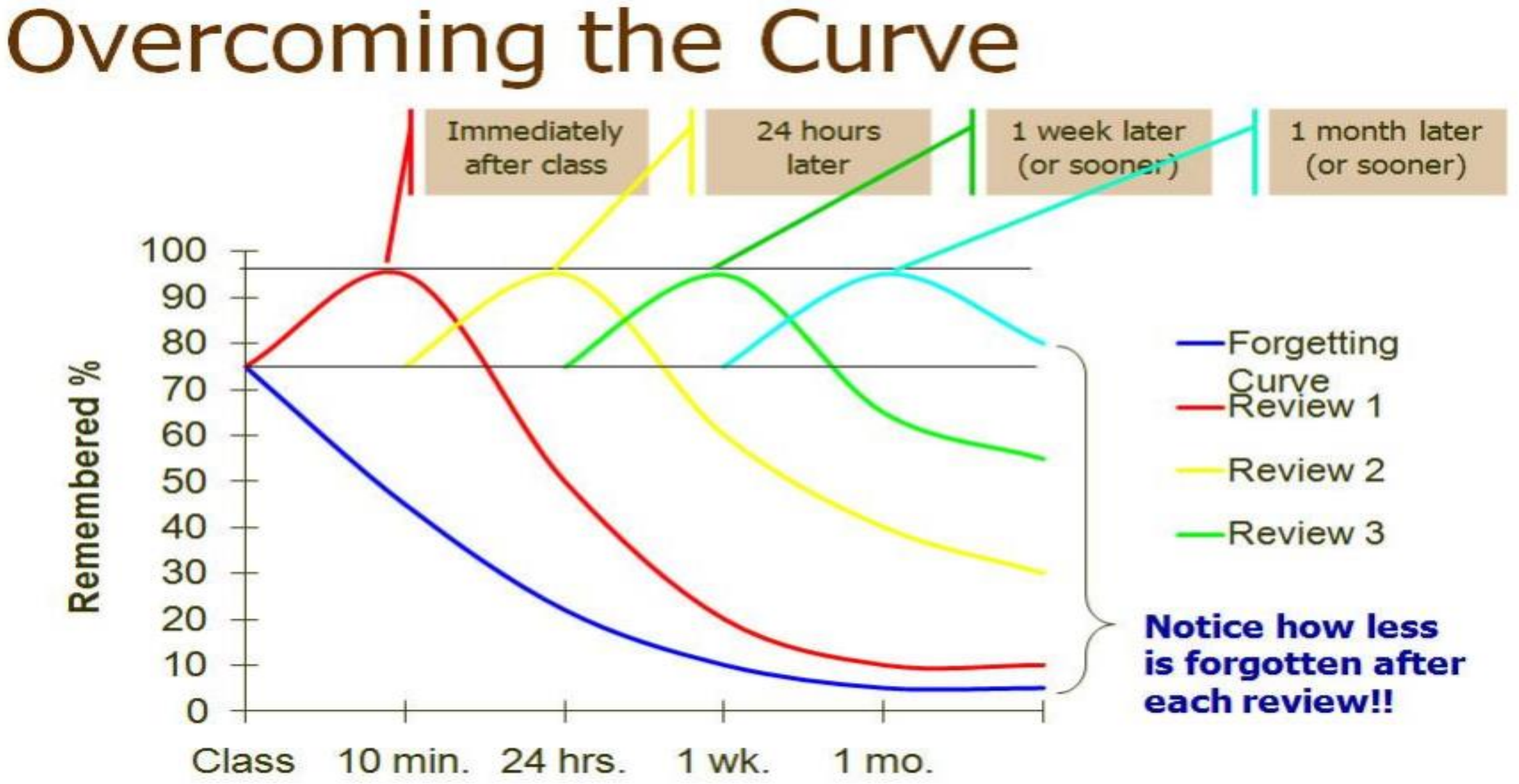
Booklets

- ✔ Booklets are used. Please check you son/daughters booklet as they are completed. All content check lists can be found along with all their assessments. Lessons are put on Google classroom.

Revision

- ✔ Ensure that you have a revision guide at home
- ✔ Pre exam sessions run every 2 weeks (schedule on Google classrooms)
- ✔ Practise physics equations – need to remember the main equations

Revision - The forgetting curve



Recognised revision resources

Anki

Home Docs AnkiWeb

Powerful, intelligent flash cards.
Remembering things just became much easier.

Download

Remember Anything
From images to scientific markup, Anki has got you covered.

Remember Anywhere
Review on Windows, Mac, Linux, iOS, Android, and any device with a web browser.

Remember Efficiently
Only practice the material that you're about to forget.

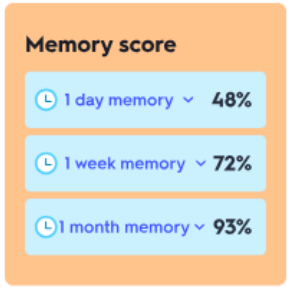
About Anki

Anki is a program which makes remembering things easy. Because it's a lot more efficient than traditional study methods, you can either greatly decrease your time spent studying, or greatly increase the amount you learn.

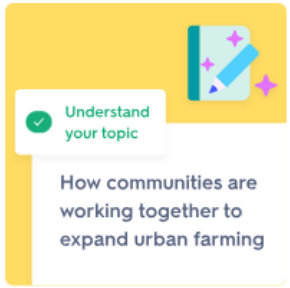
Anyone who needs to remember things in their daily life can benefit from Anki. Since it is content-agnostic and supports images, audio, videos and scientific markup (via LaTeX), the possibilities are endless.
For example:

- Learning a language
- Studying for medical and law exams
- Memorizing people's names and faces
- Brushing up on geography
- Mastering long poems
- Even practicing guitar chords!

Coming soon to Quizlet



Memory Score
Track your Memory Score to follow your long-term recall over time

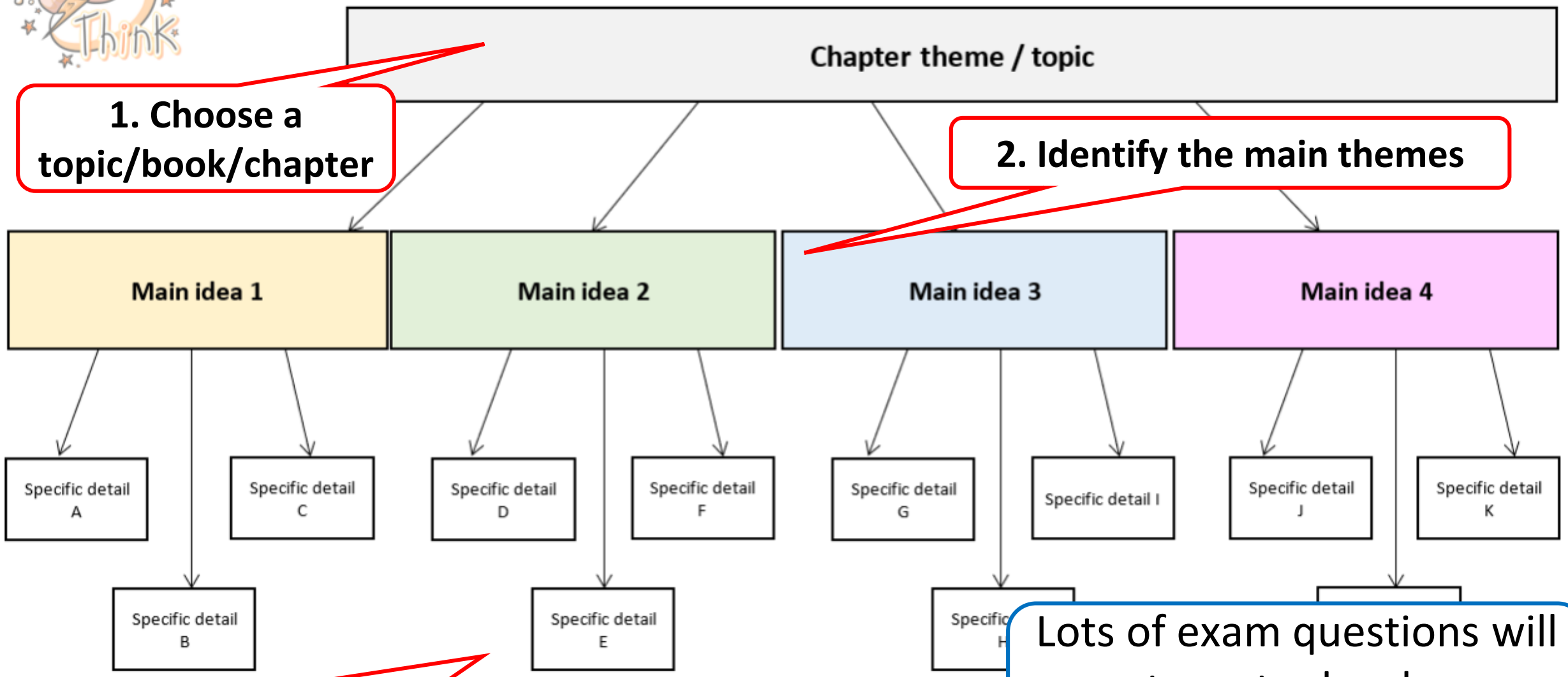


Essay Starter
Tired of staring at a blank page? Get inspiration on how to start writing

Quick Summary
Zero in on the important concepts you need to know

Brain Beats
Make concepts stick with catchy beats set to your very own flashcards

Deconstruct: Make a large amount of learning manageable.



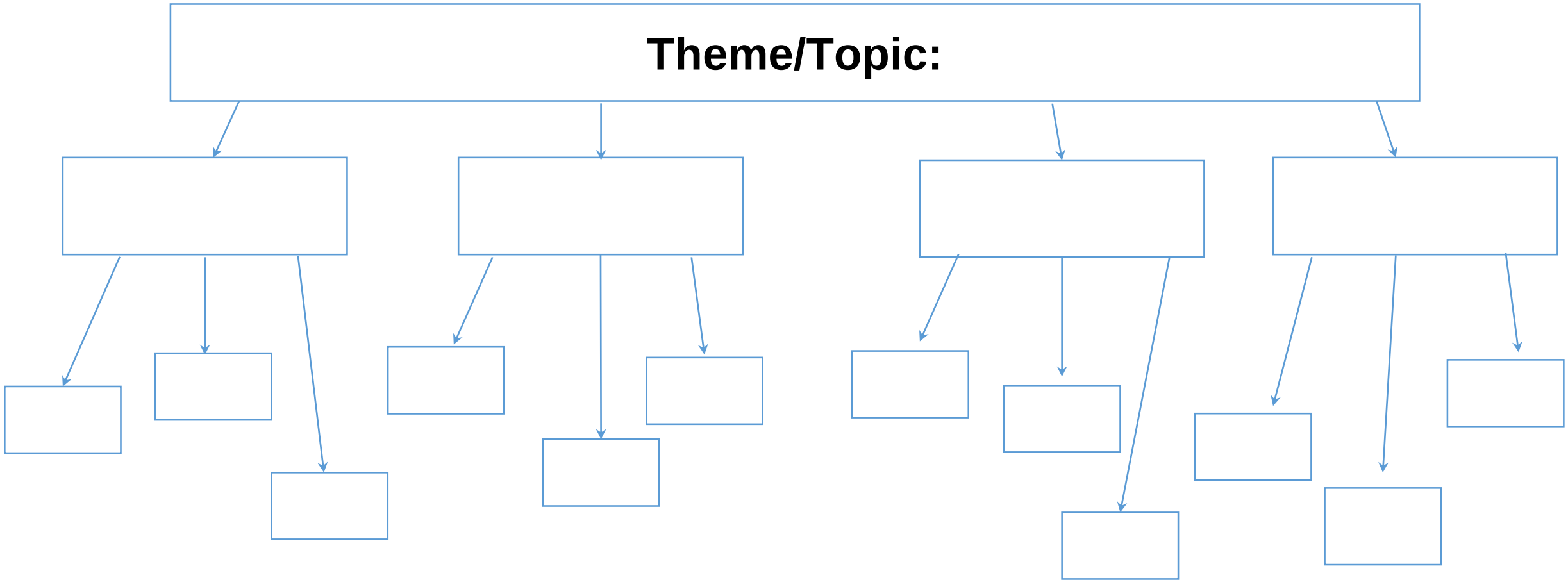
1. Choose a topic/book/chapter

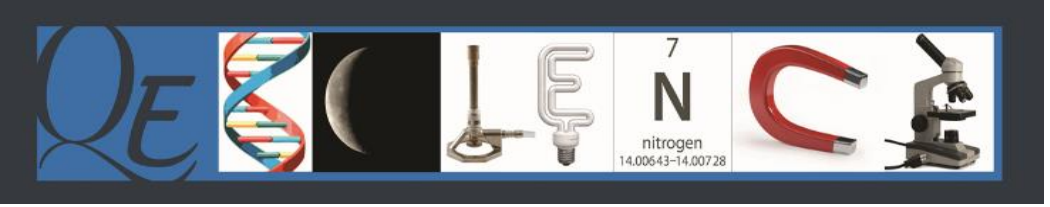
2. Identify the main themes

3. Pick out the details that link to the main ideas: these could be, quotes, places, dates, facts, key words.

Lots of exam questions will expect you to develop your points and use evidence.

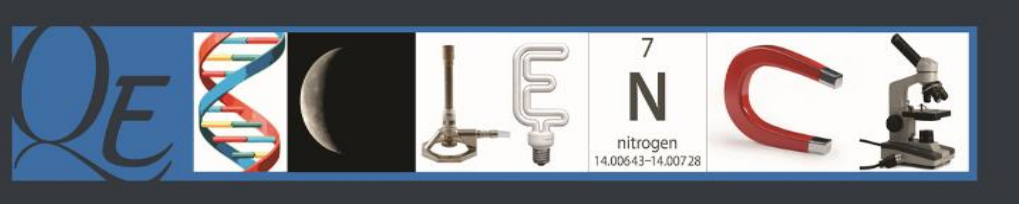
Subject I will choose to revise:





Keypoints

- ✔ Eg: Biology countdown includes past paper questions in topic banks every week
- ✔ Revision guide
- ✔ Past papers
- ✔ **100% attendance to every lesson. Students with 95%+ attendance averaged their target grade plus a quarter of a grade**
- ✔ Catching up on any missing lesson notes from Google classroom
- ✔ Use PLC / specification to monitor progress and identify areas in need of improvement
- ✔ GCSE pod & doddle questions to check understanding



Revision

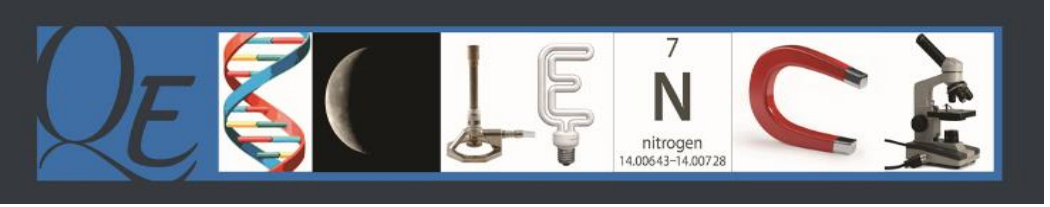
Best ways to revise

✔ PLC's

Personalised Learning Checklist

AQA TRILOGY Biology (8464) from 2016 Topic T4.1 Cell biology

Topic	Student Checklist	R	A	G
4.1.1 Cell structure	Use the terms 'eukaryotic' and 'prokaryotic' to describe types of cells			
	Describe the features of bacterial (prokaryotic) cells			
	Demonstrate an understanding of the scale and size of cells and be able to make order of magnitude calculations, inc standard form			
	Recall the structures found in animal and plant (eukaryotic) cells inc algal cells			
	Use estimations and explain when they should be used to judge the relative size or area of sub-cellular structures			
	Required practical 1: use a light microscope to observe, draw and label a selection of plant and animal cells			
	Describe the functions of the structures in animal and plant (eukaryotic) cells			
	Describe what a specialised cell is, including examples for plants and animals			
	Describe what differentiation is, including differences between animals and plants			
	Define the terms magnification and resolution			
	Compare electron and light microscopes in terms of their magnification and resolution			
	Carry out calculations involving magnification using the formula: magnification = size of image/ size of real object -inc standard form			
4.1.2 Cell division	Describe how genetic information is stored in the nucleus of a cell (inc genes & chromosomes)			
	Describe the processes that happen during the cell cycle, including mitosis (inc regcognise and describe where mitosis occurs)			
	Describe stem cells, including sources of stem cells in plants and animals and their roles			
	Describe the use of stem cells in the production of plant clones and therapeutic cloning			
	Discuss the potential risks, benefits and issues with using stem cells in medical research/treatments (inc diabetes and paralysis)			
sport in cells	Describe the process of diffusion, including examples			
	Explain how diffusion is affected by different factors			
	Define and explain "surface area to volume ratio", and how this relates to single-celled and multicellular organisms (inc calculations)			
	Explain how the effectiveness of an exchange surface can be increased, inc examples of adaptations for small intestines, lungs, gills roots & leaves			



Revision

Useful websites

AQA Science – Youtube by myGCSEscience

https://senecalearning.com/en-GB/

http://www.s-cool.co.uk/

http://www.mygcsescience.com.html

https://cognitoedu.org/home.html

https://www.physicsandmathstutor.com/

Revision

Best ways to revise

✔ Past papers

https://www.aqa.org.uk/subjects/science/gcse/biology-8461/assessment-resources?f.Sub-category%7CF=Sample+papers+and+mark+schemes

5

The rate of photosynthesis in the pondweed is affected by different colours of light.

Describe a method you could use to investigate this.

You should include:

- what you would measure
- variables you would control.

[6 marks]

Calculate the real size of the cell.

Use the equation:

$$\text{magnification} = \frac{\text{image size}}{\text{real size}}$$

Give your answer in micrometres.

[3 marks]

Real size = _____ micrometres

The car has a top speed of 12 m/s and a mass of 800 g.

0 2 . 2 Write down the equation that links kinetic energy, mass and speed.

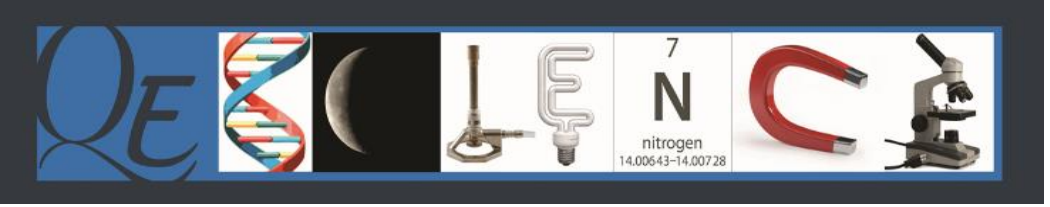
[1 mark]

Equation _____

0 2 . 3 Calculate the maximum kinetic energy of the car.

[2 marks]

Maximum kinetic energy = _____ J



Revision

Key dates

✔ PPE 1 - Autumn Term 2

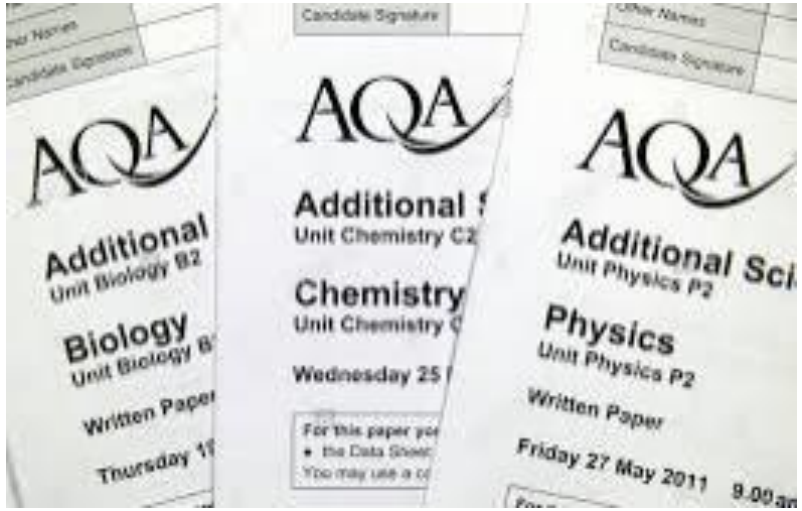
Students will sit a Paper 1 in Biology, Chemistry and Physics

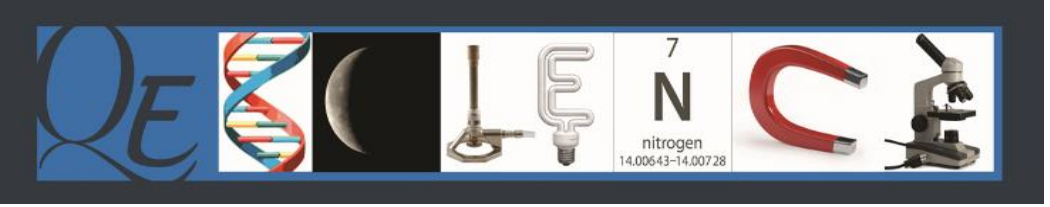
Biology	Chemistry	Physics
1. Cell biology 2. Organisation 3. Infection and response 4. Bioenergetics	8. Atomic structure and the periodic table 9. Bonding, structure, and the properties of matter 10. Quantitative chemistry 11. Chemical changes 12. Energy changes	18. Energy 19. Electricity 20. Particle model of matter 21. Atomic structure

Revision

WTM

- ✔ We offer walking talking mocks in May/June
- ✔ Exam practise in real time focusing on exam technique and structured answers.





What can you do to help?

Check their exam timetable.

- ✔ Help them make a plan/discuss it with them

Get them to complete a *revision timetable*.

- ✔ It should be realistic, cover all subjects and allow them time off to relax.

Organisation

- ✔ Encourage them to clear the clutter
- ✔ Buy them some nice stationary to help them organise

Encourage them to make notes

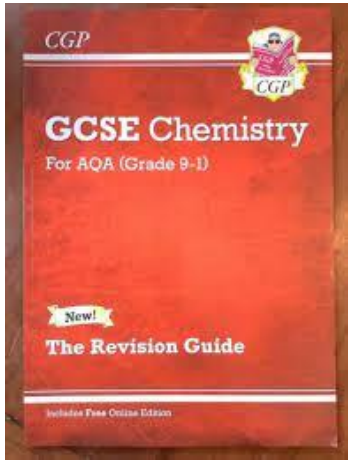
- ✔ Reading or copying is very passive, *making notes* is active and they will remember more.

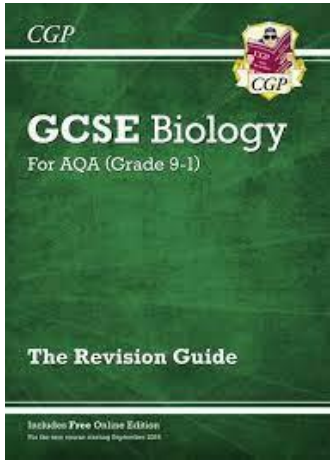
Encourage them to combine words with visuals

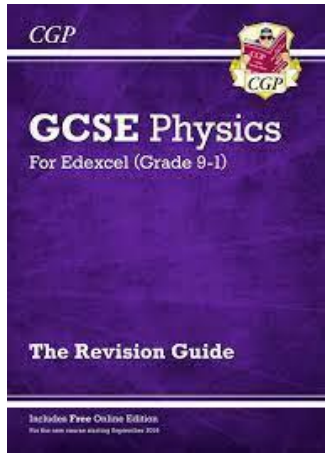
- ✔ “dual coding” facts into series of flowcharts / diagrams etc helps “organise” the knowledge in their brains!

Resources To help support with revision and preparation

Revision Guides – Can be bought through the LRC







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GCSE pod

gcsepod education anywhere

BBC Bitesize

Bitesize

SENECA

GCSE Science & Maths Made Simple

Cognito

AQA science website

AQA Realising potential