

# Course Content, Revision, Revision Guides: How to do it effectively



**AQA Trilogy Combined Science**

# Know Your Course Content

- You are following the AQA Trilogy Science qualification, have a look at the course specification to make sure you are happy you have covered all of the content. Identify areas of weakness to address.
- Link to access course specification:  
<https://filestore.aqa.org.uk/resources/science/specifications/AQA-8464-SP-2016.PDF>
- **Combined Science – Trilogy:** All examinations are 1hr 15 minutes
- **8464/B/1F&H Paper 1: Biology** 1h 15m: 16<sup>th</sup> May – AM Exam
- **8464/B/2F&H Paper 2: Biology** 1h 15m: 9<sup>th</sup> June – PM Exam
- **8464/C/1F&H Paper 1: Chemistry** 1h 15m: 22nd May – AM Exam
- **8464/C/2F&H Paper 2: Chemistry** 1h 15m: 13th June – AM Exam
- **8464/P/1F&H Paper 1: Physics** 1h 15m: 25th May – AM Exam
- **8464/P/2F&H Paper 2: Physics** 1h 15m: 16th June – AM Exam

# Course Content: Biology

## Biology Paper 1

### Cell Biology

Cell Structure (the structure and function of a typical plant and animal cell, prokaryotic and eukaryotic cells, bacterial cell structure, especially location of genetic information)

Investigating Cells (size of cells (cm, mm,  $\mu\text{m}$ , nm), using a microscope, calculating magnification)

Cell Division (chromosomes, mitosis and cell cycle, stem cells and uses)

Transport in and out of Cells (diffusion, factors affecting diffusion, osmosis, active transport and comparing the processes)

### Organisation

Levels of Organisation (specialised cells, tissues, organs, organ systems, enzymes, enzymes in digestion, blood, blood vessels, heart, gaseous exchange)

Transport in Plants (plant tissues, water transport, translocation)

### Infection and Response

Non-Communicable Diseases (health & disease, risk factors, diseases of the heart, cancer)

Pathogens and Disease (pathogens and disease, risk factors, disease of the heart, cancer)

Human Defences against Disease (preventing entry of pathogens, the immune system, boosting immunity (vaccinations and antibodies))

Treating Disease (Antibiotics, developing new drugs)

### Bioenergetics

Photosynthesis (photosynthesis word and symbol equation, factors affecting photosynthesis, converting glucose, how reactants get into plant)

Respiration and Exercise (the importance of respiration, aerobic respiration, anaerobic respiration, exercise and respiration, metabolism)

## Biology Paper 2

### Homeostasis and Response

Homeostasis and The Nervous System (the importance of homeostasis, control systems, the nervous system)

Hormones and Homeostasis (the endocrine system, control of blood glucose)

Hormones and Reproduction (the sex hormones, control of menstrual cycle, reducing fertility)

### Inheritance, Variation & Evolution

Sexual and asexual Reproduction (asexual reproduction, sexual reproduction and meiosis, the genome, DNA)

Patterns of Inheritance (genetic inheritance, genetic crosses, inherited disorders, sex determination)

Variation and Evolution (variation, evolution, evidence for evolution)

Manipulating Genes (selective breeding, genetic engineering)

Classification (principles of classification, extinction, evolutionary trees)

### Ecology

Ecosystems (relationships between organisms, adaptations, studying ecosystems)

Cycles and Feeding Relationships (recycling materials, feeding relationships)

Disrupting Ecosystems (biodiversity, pollution, overexploitation, conserving biodiversity)

# Biology Required Practical Activities

## Paper 1:

Microscopy

Enzymes

Food Tests

Photosynthesis

Osmosis

## Paper 2:

Reaction Times

Ecology Field Investigations

# Prioritise Areas You Need to Work On:

(General areas based on **Biology** November mock results for whole cohort)

## **Foundation Paper**

### Math Skills

- Calculating surface area
- Resolution

### Ecology

- Required Practical Activity
- Biotic / Abiotic factors (ecology terminology in general)

### Structure of the heart

### Variables

## **Higher Paper**

### Math Skills

- Calculating populations
- Resolution

### Ecology

- Required Practical Activity
- Biotic / Abiotic factors (ecology terminology in general)
- Biodiversity

### Hormones & blood sugar

### Variables

# Course Content: Chemistry

## Chemistry Paper 1

### Atomic Structure and The Periodic Table

**Atoms, Elements, Compounds and Mixtures** (atoms, elements, compounds, separating mixtures)

**Atoms and the Periodic Table** (scientific models of the atom, subatomic particles, isotopes and ions, electron configuration)

**The Periodic Table** (development of the periodic table, group 0, group 1, group 7)

### Bonding, Structure and Properties of Matter

**States of Matter** (3 states of matter, changing states, identifying the state of a substance, state symbols)

**Ionic Compounds** (chemical bonds, ionic bonding, properties of ionic compounds)

**Covalent Compounds** (covalent bonding, small molecules, giant covalent structures)

**Metals and Special Metals** (graphene, fullerenes, polymers, metallic bonding, properties of metals, alloys)

### Quantitative Chemistry

**Conservation of Mass** (the conservation of mass, relative formula mass, apparent changes in mass, concentration)

### Chemical Changes

**Reactivity of Metals** (oxidation and reduction, reactivity series, displacement reactions, extraction of metals)

**The pH Scale and Salts** (the pH scale, neutralisation of acids, soluble salts from insoluble bases)

**Electrolysis** (electrolysis, extraction of metals, electrolysis of aqueous solutions)

### Energy Changes

**Exothermic and Endothermic Reactions** (energy transfers, energy level diagrams)

## Chemistry Paper 2

### Rate and Extent

**Rate of Reaction** (calculating the rate of a reaction, collision theory, plotting reaction rates)

**Reversible Reactions** (catalysts, reversible reactions, closed systems)

### Organic Chemistry

**Alkanes** (crude oil and hydrocarbons, fractional distillation, alkanes, burning fuels)

**Cracking Hydrocarbons** (cracking hydrocarbons, bromine water)

Structure & Formulae of Alkenes, Reactions of Alkenes

### Chemical Analysis

Purity, formulations and chromatography.  
Identification of common gasses.

### Chemistry of the Atmosphere:

**The Earth's Atmosphere** (the earth's early atmosphere, the atmosphere today, increase in oxygen levels, decrease in carbon dioxide levels)

**Greenhouse Gasses** (greenhouse gasses, the impact of human activities, global climate change, carbon footprints)

### Using Resources

**Earth's Resources** (sustainable development, drinking water, waste water treatment)

**Using Resources** (life cycle assessment (LCA), reducing the use of resources)  
Corrosion and its prevention, alloys as useful metals, ceramics, polymers and composites

# Chemistry Required Practical Activities

## Paper 1:

Making Salts

Temperature Changes

## Paper 2:

Rates of Reactions

Chromatography

Water Purification

Electrolysis

# Course Content: Physics

## Physics Paper 1

### Energy

**Energy Stores and Transfers** (energy stores and systems, calculating energy changes, specific heat capacity and internal energy)

**Energy Transfers and Resources** (energy transfers, national and global energy resources)

### Electricity

**Electricity** (standard circuit symbols, electric charge and current, resistance and potential difference)

**Circuits and Resistance** (resistors and other components)

**Circuits and Power** (series and parallel circuits, power in circuits)

**Domestic use of Electricity** (direct and alternating potential difference, mains electricity, dangers of mains electricity, power and efficiency)

**Electrical Energy in Devices** (energy transfers in appliances, the national grid)

### Magnetism and Electromagnetism

**Magnetism and Electromagnetism** (magnetic poles and fields, plotting fields, electromagnetism and solenoids, electromagnetic devices)

### Particle Model of Matter

**Particle Model of Matter** (states of matter, density, change of state and specific latent heat, particle motion and pressure in gasses)

### Atomic Structure

**Atoms and Isotopes** (the structure of the atom, isotopes, the plum pudding model, Rutherford, Geiger and Marsden, further developments)

**Nuclear Radiation** (nuclear decay and radiation, alpha, beta and gamma decay, radioactive contamination)

**Half Life** (half-life, nuclear equations)

## Physics Paper 2

### Forces

**Forces - Basics** (scalar and vector quantities, contact, non-contact forces, gravity, resultant forces,)

**Forces in Action** (work done and energy transfer, forces and elasticity)

**Forces and Motion** (distance and displacement, speed, velocity, Newton's first law, distance-time graphs)

**Forces and Acceleration** (acceleration, velocity-time graphs, Newton's second law)

**Terminal Velocity, Stopping and Breaking** (terminal velocity, Newton's third law, stopping distance, reaction time, factors affecting breaking distance)

### Waves

**Waves and Wave Properties** (transverse and longitudinal waves, properties of waves, wave speed)

**Electromagnetic Waves** (electromagnetic waves, refraction, reflection, ray diagrams)

**The Electromagnetic Spectrum** (uses and applications of electromagnetic (EM) waves, hazards of EM waves)

Loudspeakers, Induced Potential, Transformers and the National Grid



# Physics Required Practical Activities

## Paper 1:

Specific Heat Capacity

Resistance

I-V Characteristics

Density

## Paper 2:

Force and Extension

Acceleration

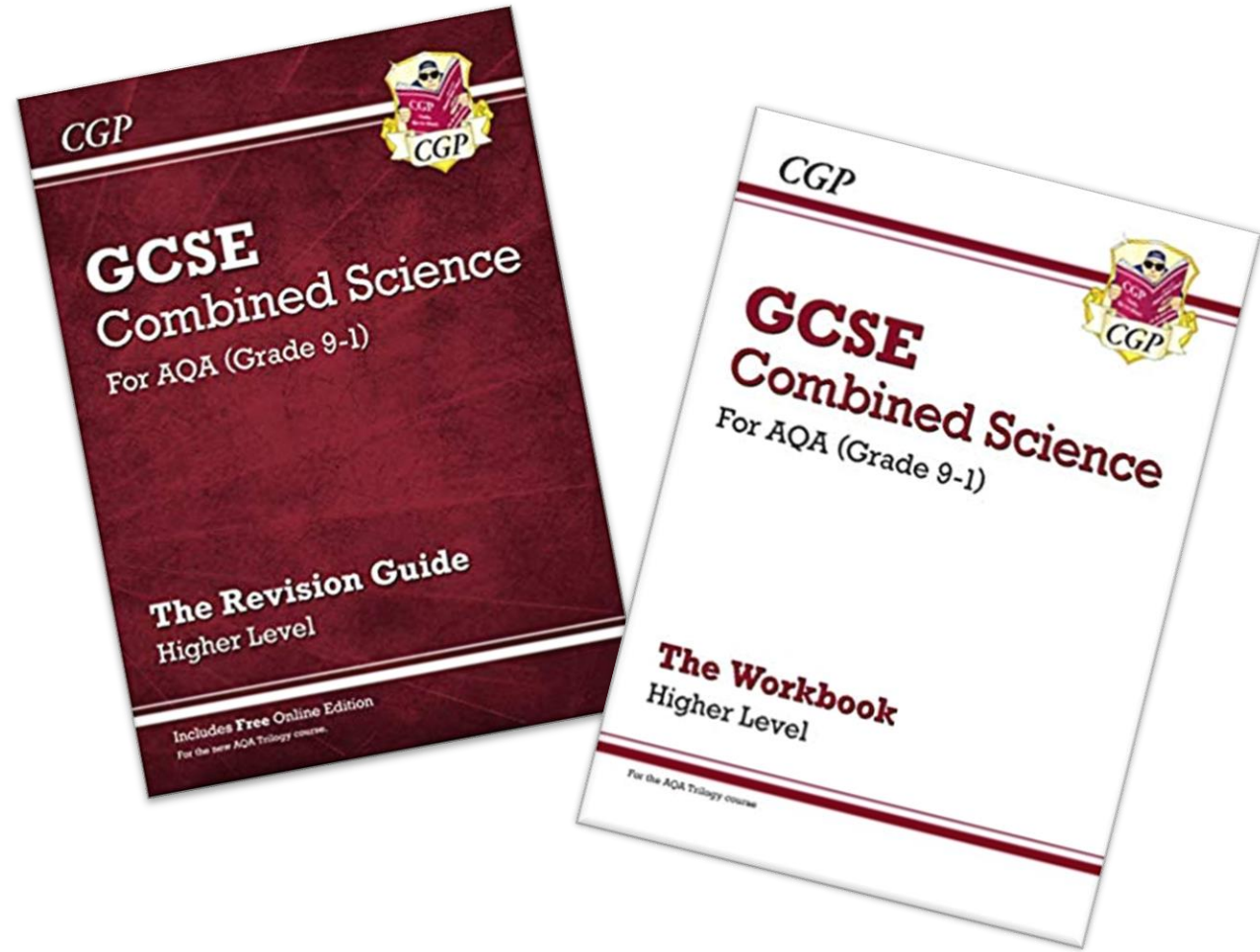
Waves

Radiation and Absorption

# Revision guides and Workbooks

Foundation: [GCSE Combined Science AQA Revision Guide - Foundation includes Online Edition, Videos & Quizzes: superb for the 2023 and 2024 exams \(CGP AQA GCSE Combined Science\)](#) : CGP Books, CGP Books: [Amazon.co.uk: Books](#)

Higher: [GCSE Combined Science AQA Revision Guide - Higher includes Online Edition, Videos & Quizzes: perfect for the 2023 and 2024 exams \(CGP AQA GCSE Combined Science\)](#): [Amazon.co.uk: CGP Books, CGP Books: 9781782945598: Books](#)



If you are just reading the revision guides you are not revising....

# Effective use of revision guides:

## MEDIUM IMPACT

- Mind maps
- Key-words - Post It
- Highlighting

## HIGH IMPACT

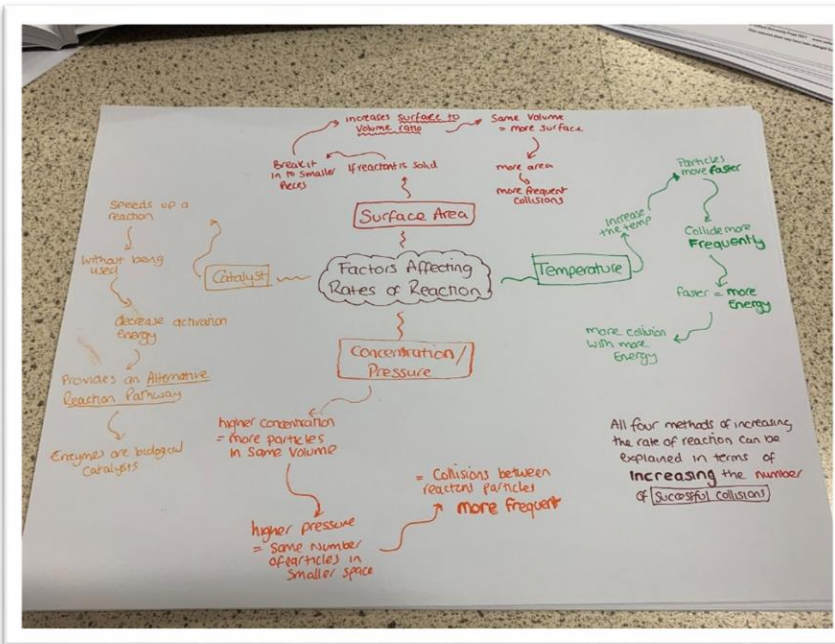
- Flash cards
- Family and friends test

## GREATEST IMPACT

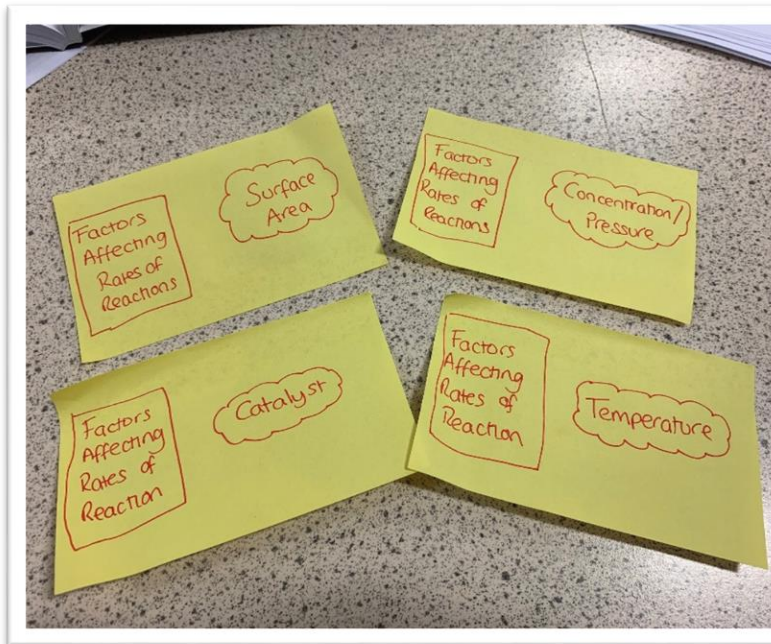
- Applying the knowledge to exam questions and marking them

# Medium Impact

# Highlighting



# Mind Maps

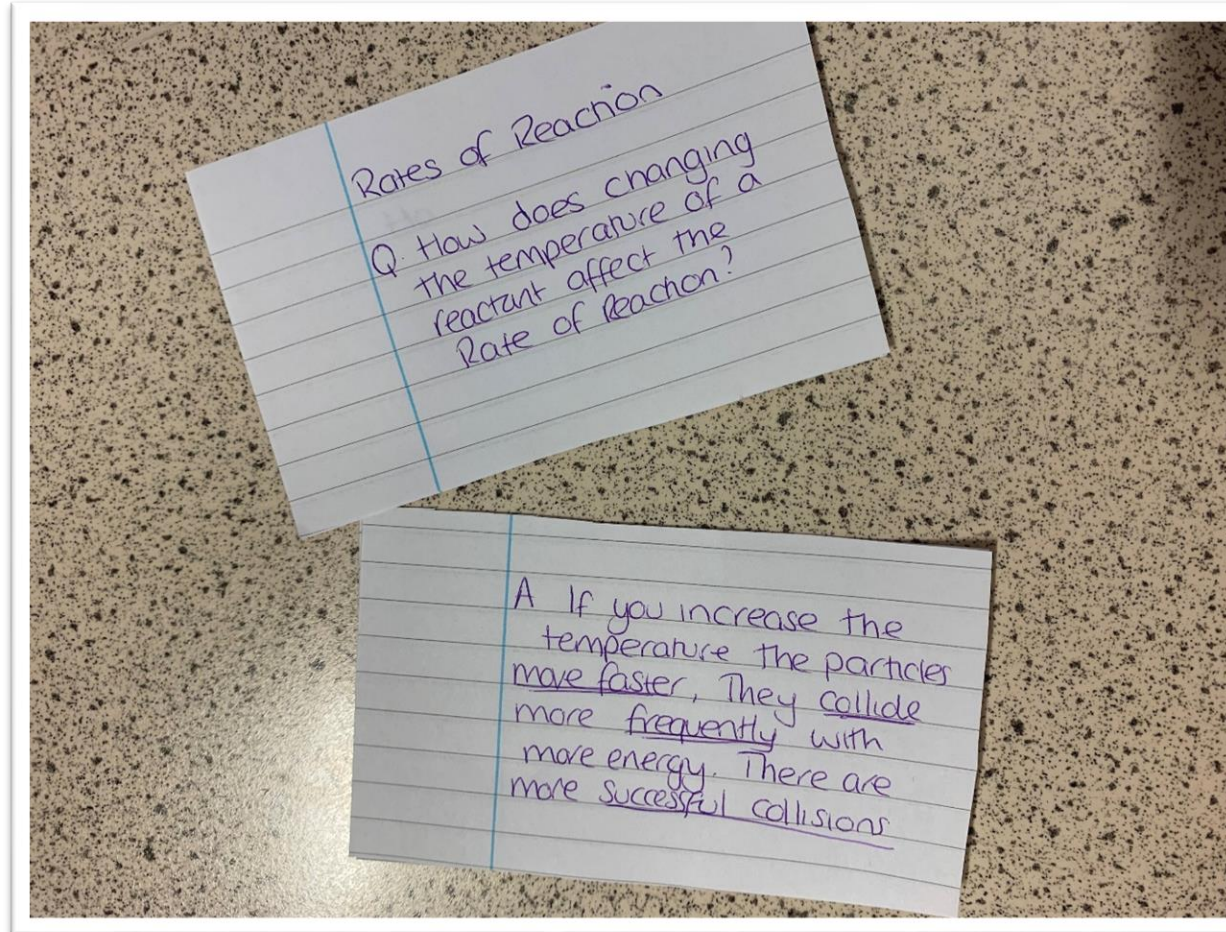


# Post – It Notes



# High Impact

Flash cards



Family and Friends testing

# Greatest Impact

## Practice Exam Questions

Get your skates on — this section's all about speed. Well, sort of anyway...

**Warm-Up**

The rate of reaction is how fast reactants are used up and products are made. Collision theory explains the rate of reaction. The rate is affected by how frequently particles collide. The rate of reaction also depends on particles colliding with enough energy — the activation energy — to react.

The four statements below are about rates of reaction. Circle the correct words from each pair to complete the sentences.

- The higher / lower the temperature, the faster the rate of reaction.
- A higher / lower concentration or pressure will reduce the rate of reaction.
- A smaller surface area of solid reactants increases / decreases the rate of reaction.
- A catalyst does / doesn't change the rate of reaction.

**PRACTICAL**

Q1 A student measured the volume of gas (in cm<sup>3</sup>) produced in a reaction to find out which of three catalysts (R, S or T) was most effective. Figure 1 is a graph of her results.

**Figure 1**

a) Label the y-axis on the dotted lines above.

b) i) Which curve (R, S, or T) represents the reaction using the most effective catalyst? Circle the correct letter on the graph.

ii) Explain your choice with reference to how catalysts change the rate of reaction.

Topic C6 — The Rate and Extent of Chemical Change

**PRACTICAL**

Q2 Saz measured the volume of carbon dioxide produced during a reaction between 5 g of marble chips and 100 cm<sup>3</sup> of hydrochloric acid. She then repeated the experiment keeping all but one of the variables the same. Table 1 shows the results of both reactions.

**Table 1**

Time (s)	Volume of CO <sub>2</sub> (cm <sup>3</sup> )	
	Reaction 1	Reaction 2
10	14	24
20	25	42
30	36	57
40	46	69
50	54	77
60	62	80
70	70	80
80	80	80
90	80	80
100	80	80

**Figure 2**

a) Plot the data from Table 1 onto the grid in Figure 2. Draw each reaction as a separate curve and label the axes.

b) Which reaction is faster? Explain your answer with reference to part a).

c) Suggest three factors which Saz could have changed to change the rate of reaction.

1. ....

2. ....

3. ....

Q3 Ivona is an explorer. She gets lost while exploring in the jungles of Cumbria. Ivona decides to light a fire using her trusty lighter and some large chunks of wood that she finds in the jungle. The wood burns in a combustion reaction with oxygen in the air.

Use collision theory to explain why the fire will burn more quickly if she chops the wood into smaller chunks before burning it.

.....

.....

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.....

**Collision theory has its uses — never find yourself cold in a jungle again.**

Changing some things will affect the frequency of the collisions between reactant particles and this means the rate of reaction will change. This isn't how catalysts increase the rate though — don't let yourself get caught out.

Topic C6 — The Rate and Extent of Chemical Change



# Extra Parts of the Revision Guide

**EXAMPLE:** A 600 W microwave is used for 5 minutes. How long (in minutes) would a 750 W microwave take to do the same amount of work?

- 1) Calculate the energy transferred by the 600 W microwave in five minutes.  
 $E = Pt = 600 \times (5 \times 60) = 180\,000 \text{ J}$
- 2) Rearrange  $E = Pt$  and sub in the energy you calculated and the power of the 750 W microwave.  
 $t = E \div P = 180\,000 \div 750 = 240 \text{ s}$
- 3) Convert the time back to minutes.  
 $240 \div 60 = 4 \text{ minutes}$

So the 750 W microwave would take 4 minutes to do the same amount of work.

Remember that the time must be in seconds.

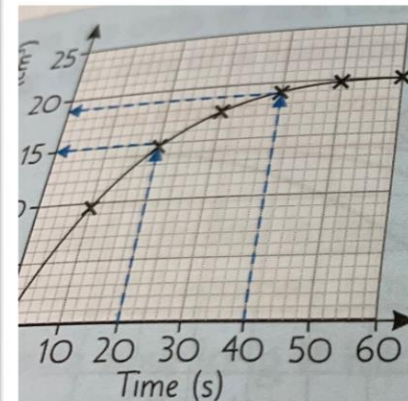
## Exam Tips

## Worked Examples

**EXAMPLE:**

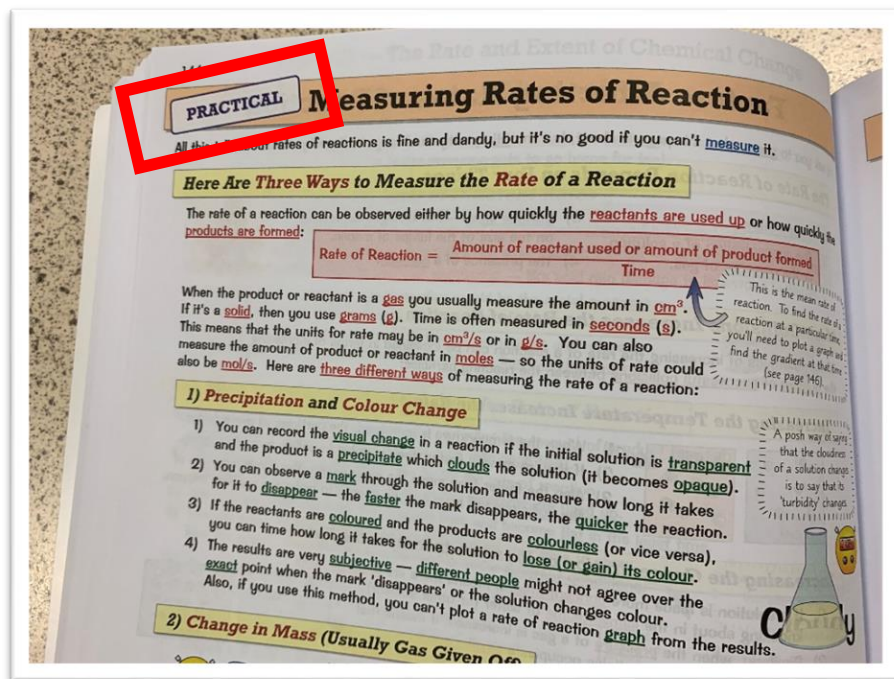
A car of mass 2500 kg is travelling at 20 m/s. Calculate the energy in its kinetic energy store.

$$E_k = \frac{1}{2} \times 2500 \times 20^2 = 500\,000 \text{ J}$$



If you're asked to find the mean rate of reaction for the whole reaction, remember that the reaction finishes as soon as the line on the graph goes flat.

# Practicals



Revision Material

**PRACTICAL**

Student measured the volume of gas (in  $\text{cm}^3$ ) produced in a reaction to find out which of three catalysts (R, S or T) was most effective. Figure 1 is a graph of her results.

**Figure 1**

a) Label the y-axis on the dotted lines above.

b) i) Which curve (R, S, or T) represents the reaction using the most effective catalyst? Circle the correct letter on the graph.

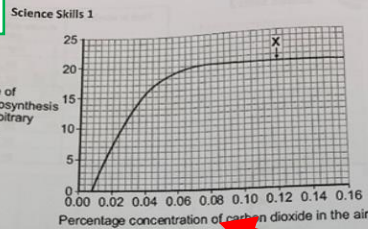
ii) Explain your choice with reference to how catalysts change the rate of reaction.

Practice Questions



# Stuck on an Exam Question???

3. Rate of Photosynthesis



Fully describe the trend shown in the graph  
 As the concentration of carbon dioxide the rate of photosynthesis increases until 0.08 the rate of photosynthesis stops increasing

2. % of Carbon Dioxide

Explain the trend shown in the graph  
 Carbon dioxide is a raw material needed for photosynthesis to take place. If this is not carbon dioxide none of this can take place

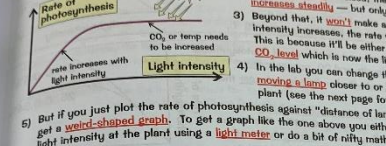
1. Explain the Trend

2. Use the index to find key words

permanent magnets 227  
 pH 129, 130, 234  
 phagocytosis 33, 46  
 phenotype variation 76  
 phenotypes 72  
 phloem cells 14  
 photosynthesis 50-52  
 rate of 51, 52  
 phylum (classification) 81  
 physical changes 193  
 phytomining 162  
 pipettes 232  
 pituitary gland 62, 64, 67  
 placebo effect 49  
 plant cells 11  
 plasma 33  
 plasmids 11, 78  
 platelets 33  
 pleural membranes 30

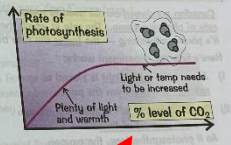
## The Rate of Photosynthesis

### 1) Not Enough Light Slows Down the Rate of Photosynthesis

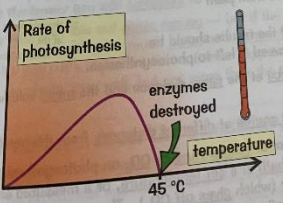


### 2) Too Little Carbon Dioxide Also Slows it Down

- CO<sub>2</sub> is one of the raw materials needed for photosynthesis.
- As with light intensity, the amount of CO<sub>2</sub> will only increase the rate of photosynthesis up to a point. After this the graph flattens out — as the amount of CO<sub>2</sub> increases, the rate no longer increases. This shows that CO<sub>2</sub> is no longer the limiting factor.
- As long as light and CO<sub>2</sub> are in plentiful supply then the factor limiting photosynthesis must be temperature.



### 3) The Temperature has to be Just Right



3. The revision guide Explains the Trend

This happens at about 45 °C (which is pretty hot for outdoors, although greenhouses can get that hot if you're not careful).

# Physics & Maths Tutor:

<https://www.physicsandmathstutor.com/biology-revision/gcse-aqa/cell-biology/#>

Hover over GCSE / IGCSE this will open drop down menu

The screenshot shows the website's navigation bar with the following items: HOME, REVISION COURSES, PAST PAPERS, GCSE / IGCSE, FIN A TUTOR, A-LEVEL, UNI ADMISSIONS, TEACHERS' AREA, CONTACT, and LOG IN. The 'GCSE / IGCSE' item is circled in red. A dropdown menu is open below it, listing subjects: Biology, Chemistry, Physics, Maths, English, Economics, and Geography. Under 'Biology', 'Biology Papers' and 'Biology Revision' are circled in red. Below the navigation bar, there are sections for 'Revision Courses' (Courses for GCSEs, A-levels and University Admissions), 'Maths | Physics' and 'Biology | Chemistry' (by topic from past papers), and 'PMT Education Blog' (PMT Education's advice blogs for students, parents and teachers.).

Select either revision or past papers

It's a FREE RESOURCE

<https://www.physicsandmathstutor.com/past-papers/gcse-biology/>

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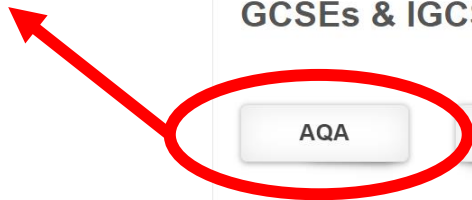
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19:34  
16/01/2023

# Physics & Maths Tutor:

<https://www.physicsandmathstutor.com/biology-revision/gcse-aqa/cell-biology/#>

In the revision section, make sure you select the AQA option to access your course content



Parent & stude x Photosynthesis x Photosynthesis x Photosynthesis x Biology Revisi x GCSE Combine x AQA Trilogy bi x

physicsandmathstutor.com/biology-revision/

For each of the exam boards below, there are revision notes, factsheets, questions from past exam papers separated by topic and other worksheets.

### GCSEs & IGCSEs

**AQA** CIE Edexcel OCR A WJEC (England)  
Edexcel (IGCSE) OCR B WJEC (Wales)

### A-Levels from 2015

AQA Edexcel A OCR A WJEC (England)  
Edexcel B OCR B WJEC (Wales)

https://www.physicsandmathstutor.com/biology-revision/gcse-aqa/

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# Physics & Maths Tutor:

<https://www.physicsandmathstutor.com/biology-revision/gcse-aqa/cell-biology/#>

Here you can select which ever unit you feel you need to revise, start with the areas you find the hardest and remember to ask your teacher if you need more help.

The screenshot shows a web browser with multiple tabs open. The active tab is 'physicsandmathstutor.com/biology-revision/gcse-aqa/'. The main content area is divided into two columns: 'Paper 1' and 'Paper 2'. Under 'Paper 1', there are four topic buttons: 'Topic 1: Cell Biology', 'Topic 2: Organisation', 'Topic 3: Infection and Response', and 'Topic 4: Bioenergetics'. Under 'Paper 2', there are three topic buttons: 'Topic 5: Homeostasis and Response', 'Topic 6: Inheritance, Variation and Evolution', and 'Topic 7: Ecology'. Below these is a 'Practical Skills' button. To the right, there is a sidebar with a 'Share' section containing icons for Facebook, Twitter, and a plus sign, with '981 SHARES' below. A 'Privacy' button is at the bottom right. An 'Ads by Google' section is at the bottom with 'Send feedback' and 'Why this ad?' buttons. A red bracket on the left side of the page highlights the topic buttons.



# Physics & Maths Tutor:

<https://www.physicsandmathstutor.com/biology-revision/gcse-aqa/cell-biology/#>

The screenshot shows a web browser with several tabs open. The active page is [physicsandmathstutor.com/past-papers/gcse-biology/](https://www.physicsandmathstutor.com/past-papers/gcse-biology/). At the top, there is a banner: "Struggling with Biology? Find a one-to-one tutor on our new Tuition Platform." Below this, the section is titled "9-1 GCSEs (UK)". It features a grid of buttons for different exam boards and papers:

Exam Board	Paper 1	Paper 2	Paper 3	Paper 4
AQA	Paper 1	Paper 2		
Edexcel	Paper 1	Paper 2		
OCR (Biology A Gateway)	Paper 1	Paper 2	Paper 3	Paper 4
OCR (Biology B 21 <sup>st</sup> Century)	Paper 1	Paper 2	Paper 3	Paper 4
WJEC (England)	Component 1	Component 2		
Wales	Unit 1			

A red circle highlights the "Paper 1" and "Paper 2" buttons under the "AQA" column. A red arrow points from the text "Select either paper 1 or 2 depending on area you wish to study" to this circle.

Select either paper 1 or 2 depending on area you wish to study

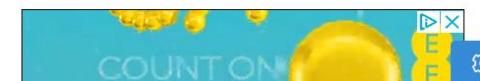


UP NEXT | 'Downtime' done right



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# Physics & Maths Tutor:

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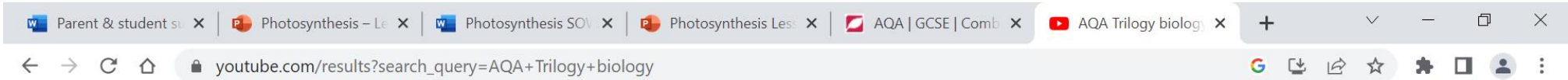
Here you can find real examination past papers, mark schemes, model answers and video solutions, probably one of the most effective ways of revising – use the mark scheme!

The screenshot shows a web browser window with the URL <https://www.physicsandmathstutor.com/past-papers/gcse-biology/aqa-paper-1/>. The page content is organized into two main sections: **Foundation** and **Higher**. Each section contains four columns of links:

- Question Papers:** June 2018 QP, June 2019 QP, June 2020 QP, Specimen QP
- Mark Schemes:** June 2018 MS, June 2019 MS, June 2020 MS, Specimen MS
- Model Answers:** June 2019 MA (Foundation), June 2018 MA, June 2019 MA, Specimen MA (Higher)
- Video Solutions:** June 2018 VS, June 2019 VS, Specimen VS

At the bottom of the page, there is an **Ads by Google** section with a search bar and a 'Send feedback' button. The Windows taskbar at the bottom shows the time as 19:41 on 16/01/2023.

# YouTube



- Home
- Shorts
- Subscriptions
- Library



**PAPER ONE  
ALL IN ONE!**



1:09:31

ALL OF AQA TRILOGY 9-1 BIOLOGY (2023) ★ PAPER 1 ★ | GCSE Biology Revision | Science with Hazel  
13K views • 4 years ago

Science with Hazel  
TOPIC TIMINGS Microscopes 0:45 Calculating Magnification 1:47 Plant and Animal Cells 4:01 Bacterial Cells 5:44 Specialised ...



26:55

GCSE Combined Science : Trilogy / Biology Paper 1  
Biology Breakdown with Mrs H  
3.9K views

Biology Breakdown with Mrs H  
This video walks you through the whole 2019 Biology Trilogy Paper 1, giving you exam tips, showing you techniques and helping ...



https://

rsH

AQA GCSE Biology for Combined Science (Trilogy)

# YouTube: Required Practical Activities

Understanding all of the required practical activities is essential, questions could come up on any of the required practical activities listed on the previous slides. YouTube is a great resource for this as you can see the actual experiment and have an expert talking you through the procedures, results, analysis and variables

The screenshot shows a web browser window with the YouTube search results for 'AQA Trilogy Required Practical Activities'. The search bar is highlighted with a red box, and a red arrow points from it to the left. The search results list three videos:

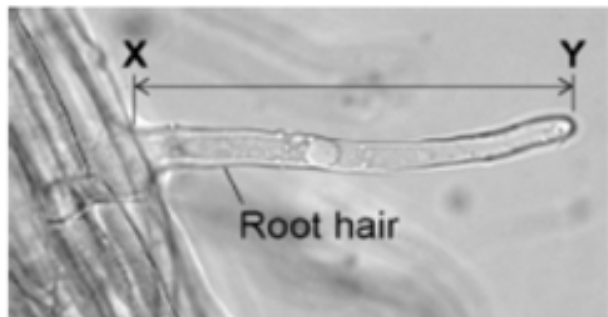
- AQA GCSE Trilogy Chemistry required practical activity 1: Making salts** (1.6K views, 6 years ago) by Dave Moffat. Description: Preparation of a pure, dry sample of a soluble salt from an insoluble oxide, using a Bunsen burner to heat dilute acid and a water ...
- GCSE Science Revision Physics "Required Practical 3: Resistance"** (389K views, 5 years ago) by Freesciencelessons. Description: In this video, we look at a required practical in which we investigate the factors affecting the resistance of a circuit. Around 15% of ...
- Resistance of a Wire - GCSE Science Required Practical** (173K views, 6 years ago) by Melrosebury Education.

The Windows taskbar at the bottom shows the system tray with the date 17/01/2023 and time 14:28.



**Exam Question:**

The diagram below shows a root hair viewed using a microscope.:



The root hair was viewed at a magnification of  $\times 50$

The image length of the root hair X–Y is 43 mm

Calculate the real length of the root hair in micrometres ( $\mu\text{m}$ ).

[4 marks]

**So what do we know from reading the question?**

Magnification =  $\times 50$

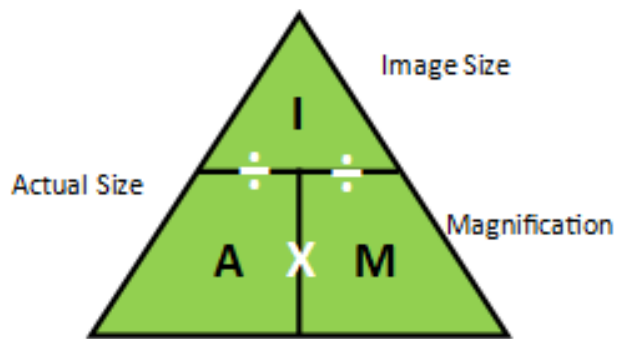
Image size = 43mm

We need to calculate the real length (the actual size)

We will need to make sure our answer is given in  $\mu\text{m}$

**Now, what do we need to know?**

The microscopy calculation



$$\text{Magnification} = \frac{\text{image size}}{\text{actual size}}$$

$$\text{Image size} = \text{actual size} \times \text{magnification}$$

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

**Model Answer**

**Step One:** Place the given values into the equation:

$$50 \times \frac{43}{\text{actual size}} \quad [1 \text{ mark}]$$

**Step Two:** re-arrange the formula to make 'actual size' the focus of the equation:

$$\begin{aligned} \text{Actual size} &= \frac{43}{50} \quad [1 \text{ mark}] \\ &= 0.86\text{mm} \quad [1 \text{ mark}] \end{aligned}$$

**Step Three:** convert the units from mm to  $\mu\text{m}$  by multiplying by 1000:

$$0.86 \times 1000 = 860 \mu\text{m}$$

[1 mark]

Millimetres (mm)	Micrometres ( $\mu\text{m}$ )
1	1000
0.1	100
0.01	10
0.001	1

+ 1000

$\times 1000$

1 millimetre (mm) =  $1/1000$  m or  $10^{-3}$  m

1 micrometre ( $\mu\text{m}$ ) =  $1/1000$  mm or  $10^{-3}$  mm or  $10^{-6}$  m

1 nanometre (nm) =  $1/1000$   $\mu\text{m}$  or  $10^{-3}$   $\mu\text{m}$  or  $10^{-9}$  m

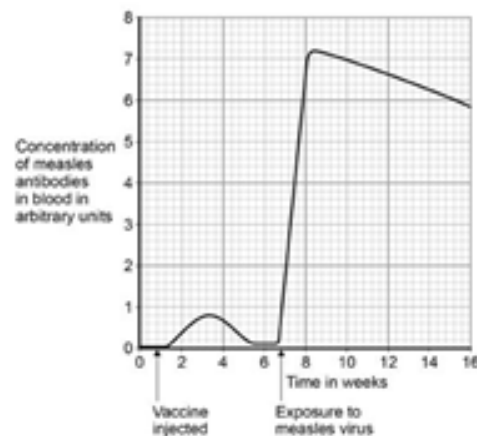
## Exam Question

Measles is a serious disease. A person can die from measles. The table below shows the number of medically confirmed cases of measles in England and Wales between 2012 and 2015

Year	Number of medically confirmed cases of measles
2012	2030
2013	1843
2014	121
2015	91

One reason for the decrease in the number of cases of measles is that more children were vaccinated against the disease. Vaccinating a large proportion of the population reduces the spread of the measles virus.

The graph below shows the concentration of measles antibodies in the blood of a boy



Explain the differences between antibody production after the vaccine injection and after exposure to the measles virus.

You should include data from the graph above

[6 marks]

## Now, what do we need to know?

- Measles is caused by a virus, that means we can not treat it with antibiotics.
- Vaccines allow a dead or altered form of the disease causing pathogen to be introduced into the body, which contain a specific antigen . This causes the immune system, specifically the white blood cells , to produce complementary antibodies , which target and attach to the antigen.

## Model Answer

### differences (after exposure to measles virus):

- greater number / higher concentration of antibodies produced
- quantitative statement, e.g. 9 times higher or 0.8 to 7.2
- antibodies produced sooner – idea of immediate response
- antibodies produced quicker
- antibodies stay (in higher concentration) for longer

### explanation

- white blood cells / leucocytes / lymphocytes / B cells
- ignore phagocytes / macrophages
- reference to previous exposure (of white blood cells) to pathogen / virus
- (white blood cells) recognise pathogen / virus / antigen
- memory cells
- production of specific / correct antibodies

# Long Answer or Multi-step Questions

## Exam Question

Arteries and veins have different structures and different functions. Explain how the different structures of arteries and veins relates to their different functions. [6 marks]

What do we need to know?

	Arteries	Veins
Function	Carry blood <b>away</b> from the heart at <b>high</b> pressure	<b>Return</b> blood to the heart at <b>low</b> pressure
Structure of wall	- <b>Thick</b> , strong - Contain <b>muscles</b> , <b>elastic</b> fibres and <b>fibrous</b> tissue	- <b>Thin</b> - Mainly <b>fibrous</b> tissue - Contain far <b>less muscle</b> and <b>elastic</b> tissue than arteries
Lumen	- <b>Narrow</b> - Varies with heartbeat (increases as a pulse of blood passes through)	<b>Wide</b>
Valves	(-)	(+) Prevent backflow
How structure fits function	- Strength and elasticity needed to withstand the pulsing of the blood, prevent bursting and maintain pressure wave - Helps to maintain <b>high blood pressure</b> , preventing blood flowing backwards	- No need for strong walls, as most of the blood pressure has been lost - Wide lumen offers <b>less resistance</b> to blood flow

What is the question asking us?



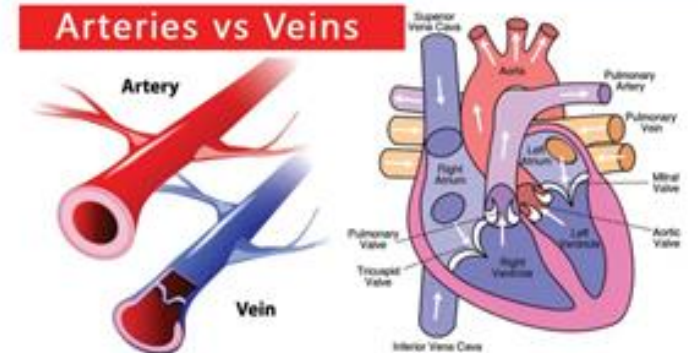
Identify the different structures.

Relate structure to function, what do they do?

What do veins and do? Wat is their job? Arteries and veins have different structures? How does this make them more efficient at carrying out their function/job?

Command word: Explain:

Students should make something clear, or state the reasons for something happening.



# Long Answer or Multi-step

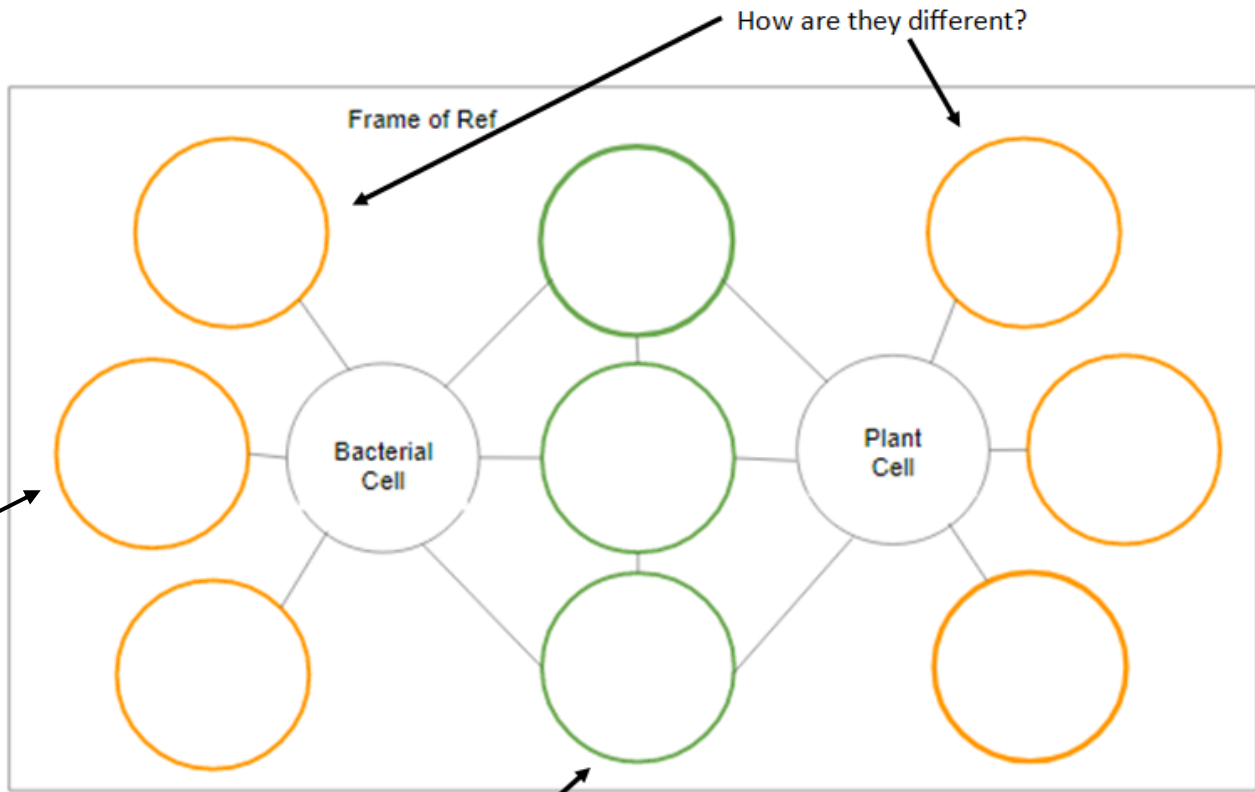
## Questions

Cells are the basic units of all forms of life.

(a) Describe **four** differences between a bacterial cell and a plant cell.

1. \_\_\_\_\_  
\_\_\_\_\_
2. \_\_\_\_\_  
\_\_\_\_\_
3. \_\_\_\_\_  
\_\_\_\_\_
4. \_\_\_\_\_  
\_\_\_\_\_

Organise your ideas, use the 'double bubble' thinking map to identify similarities and differences



This information can then be used to structure your answer

Frame of reference—add information why there are similarities and differences, e.g. why doesn't a bacterial cell have a nucleus?



