

Successful scientists!

Year 11 Information evening

Helping your child in science

1. Check your daughter/son's science class
 - If they are in 11A1 or 11C1 they are completing AQA separate sciences
 - If they are in 11S1, 11S2, 11S3, 11T1, 11T2, 11T3, 11T4, 11M1 or 11M2 they are completing AQA **Trilogy** combined science
 - Please follow the links to see more information about the course and content
<https://www.aqa.org.uk/subjects/science/gcse>



Helping your child in science

2. What will they be examined on?

Biology	Chemistry	Physics
Paper 1 (topics 1-4)	Paper 1 (topics 1-5)	Paper 1 topics 1-4)
Paper 2 (topics 5-7)	Paper 2 (topics 6-10)	Paper 2 (topics 5-7)

- For separate science, each paper is 100 marks and 1 hour 45 minutes long
- For trilogy combined science, each paper is 70 marks and 1 hour 15 minutes long



Helping your child in science

3. 5 top tips for great revision . . .



1. Learning facts and equations made easy!

- Our students need to memorise equations for the science exams
- And be able to rearrange them!
- Normally it would be all the Physics equations, however this year they will be getting a full equation list!
- But there are lots of key facts and some equations to learn for Biology and Chemistry



1. Learning facts and equations made easy!

- Try Quizlet!
- Quizlet is free to sign up for
- It has lots of ready made sets of flashcards
- You can print them off or play an online game with them

Make sure you search for either AQA Trilogy:
Combined science or AQA
Biology/Chemistry/Physics
GCSE



1. Learning facts and equations made easy!


- Try

The screenshot shows a web browser window with the URL quizlet.com/gb/361308976/gcse-aqa-chemistry-c8-flash-cards/. The page title is "GCSE AQA Chemistry - C8". The main content area displays a flashcard with the question "What is a pure substance?". The flashcard is part of a set of 48 terms, as indicated by the "1/48" and "Terms in this set (48)" text. The page includes a navigation menu with options like "Flashcards", "Learn", "Write", "Spell", "Test", "Match", and "Gravity". There are also two Google ads on the right side of the page, each with a "Stop seeing this ad" button and a "Why this ad?" link. The Quizlet logo and navigation links are visible at the top of the page.



Cell structure: Cell biology: Biology: GCSE (9:1)

STUDY

 Flashcards


 Learn

 Write

 Spell

 Test **New stuff!**

Play

 Match

 Gravity

Eukaryotic cell




1/16



Cell structure: Cell biology: Biology: GCSE (9:1)

STUDY

 Flashcards


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Eukaryotic cell



1/16



Cell structure: Cell biology: Biology: GCSE (9:1)

STUDY

 Flashcards

 Learn

 Write

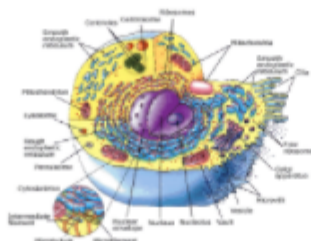
 Spell

 Test **New stuff!**

Play

 Match

 Gravity



A cell type where the genetic material is enclosed within a nucleus



1/16



Created by
Biology2-Creator-TD




Back

Match

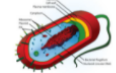
TIME
3.4

DNA loop



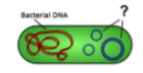
A type of eukaryotic cell with a cell membrane, mitochondria, chloroplasts and a cell wall

Plant cell



A cell type where the genetic material is free within the cytoplasm and sometimes within plasmids


Prokaryotic cell



A single molecule of DNA that is found free in the cytoplasm of prokaryotes

Cell membrane

Ribosomes

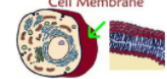


Where protein synthesis takes place

Eukaryotic cell



A cell type where the genetic material is enclosed within a nucleus



Controls the entry of substances into and outside of the cell



2. Using Equations made easy

(e) Write the equation which links current, potential difference and resistance.

(1)

(f) The current in the resistor was 0.12 A when the potential difference across the resistor was 3.0 V

Calculate the resistance of the resistor.

$$V = I \times R$$

$$R = V/I$$

$$R = 3 \times 0.12$$

$$R = 25$$

Resistance = _____ Ω

(3)



2. Using Equations made easy

A student used paper chromatography to identify the pigments in spinach leaves.

She used propanone as a solvent.

Figure 1 shows the student's results.

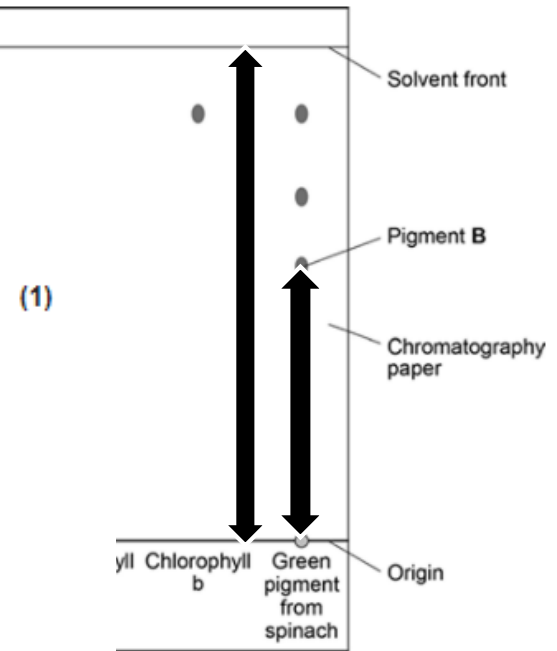
(c) Write the equation that links distance moved by solvent, distance moved by solute and R_f value.

(d) Use Figure 1 to calculate the R_f value for pigment B.

Correctly measured the distance travelled by the pigment: 5cm and the distance travelled by the solvent: 9cm
 $R_f = 5/9$
 R_f of pigment B = 0.56

R_f value = _____

Figure 1



(3)

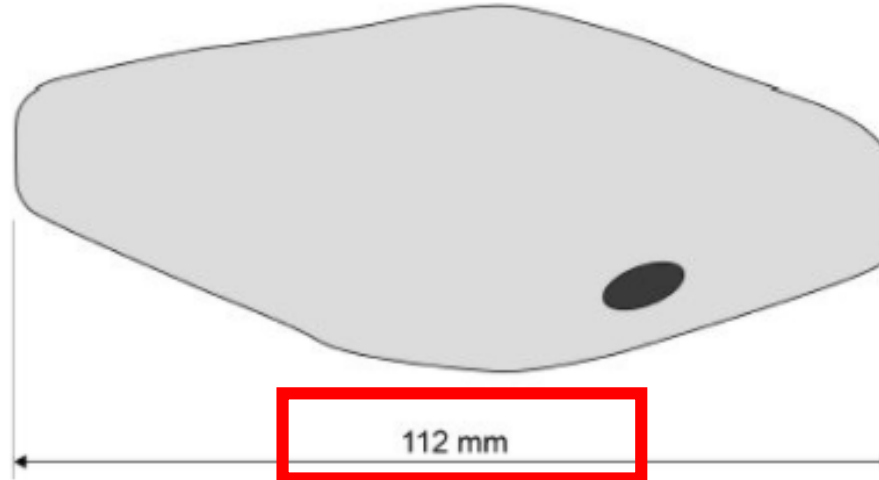


2. Using Equations made easy

The student made the necessary adjustments to get a clear image.

Figure 3 shows the student's drawing of one of the cells.

Figure 3



The real length of the cell was 280 micrometres (μm).

Calculate the magnification of the drawing.

Equation is: image = actual x magnification

Rearranged equation is: $M = I/A$

$$= 112 \text{ mm} / 280 \text{ micrometres} = 0.4$$

divide

$$1 \text{ mm} = 1000 \text{ micrometres}$$
$$0.4 \times 1000 = 400$$

Magnification = \times _____

(3)



3. planning experiments

- These can often be 6 mark questions in ALL three sciences
- They involve the variables and describing how to use the equipment
- As well as how you collect your results and what to do with them



3. planning experiments

- Review the required practicals for each science
- Use your revision guide or BBC bitesize to make a summary card for each one
- Then try and recall each method for each one and try the exam practice



A student wanted to determine the density of the irregular shaped object shown in Figure 1

Figure 1

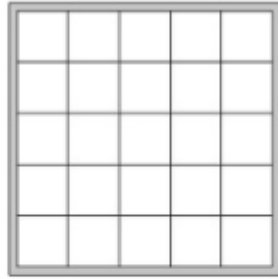


(a) Plan an experiment that would allow the student to determine the density of the object.

Physics required practical: Working out the density of Irregular objects	
Variables	Equipment: Eureka can Mass balance Measuring cylinder Beaker Irregular object(s)
Independent = the irregular objects	
Dependent = the mass and volume	
Control = same amount of water in the eureka can, just below the spout	Method: Fill the eureka can up to the hole below the spout. Then place a small beaker under the spout. Place your object on the mass balance and record the mass in kg. Then lower the object into the eureka can. Measure the collected water in the beaker using a measuring cylinder. Then work out the density by calculating the mass divided by the volume.
Getting accurate results: You could repeat the experiment 3 times, this allows identification of anomalies and then you can remove them. Then you can calculate a mean.	



Tape measure



Not to scale

Describe a method to investigate the distribution of plants on the school field at different distances from the school building.

Biology required practical: sampling plants in a population	
Variables	Equipment: Quadrat Tape measure Identification chart for plants
Independent = the location	
Dependent = % coverage of plants/number of plants	Method: Lay out your tape measure, decide on intervals, for example intervals over 100m of every 5m. Every 5m place your quadrat down and record the % coverage of plants or the number of a plant species, identified using your plant identification chart. Repeat for the whole length of the tape measure. And then set up another transect line with your tape measure and repeat. You could then calculate an average of the number of plant species.
Control = same size quadrat, same interval on tape measure	
Getting accurate results: You could repeat the experiment 3 times, this allows identification of anomalies and then you can remove them. Then you can calculate a mean.	



Describe a method to investigate how the temperature changes when different masses of ammonium nitrate are dissolved in water.

You do not need to write about safety precautions.

Chemistry required practical: measuring the temperature change	
Variables	Equipment: Test tube Thermometer Insulation Ammonium nitrate Measuring cylinder Water Mass balance
Independent = the amount of ammonium nitrate	
Dependent = the temperature change	
Control = same volume of water, amount of insulation	Method: Place 10ml of water in a test tube, surround it with insulation. Measure the start temperature of the water using the thermometer and record this. Then add 1g of ammonium nitrate and measure the temperature at the end of the reaction, stirring. Then take the start away from the end temperature and record the change in temperature. Repeat for 2g, 3, 4g, 5g of ammonium nitrate, keep 10ml of water.
Getting accurate results: You could repeat the experiment 3 times, this allows identification of anomalies and then you can remove them. Then you can calculate a mean.	



4. graphs

- Students can get up to 5 marks for drawing tables and graphs in exam questions!
- It is an important skill in all three sciences!

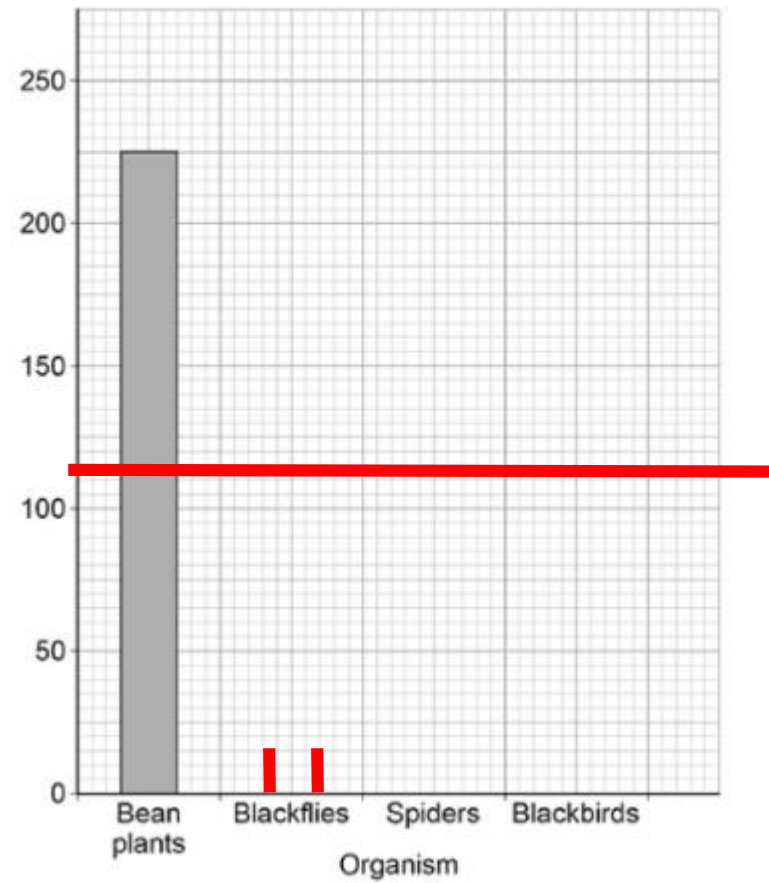


(e) Complete Figure 2.

You should:

- label the y-axis
- plot the data from the table above.

Figure 2



Organism	Biomass in g
Bean plants	225
Blackflies	115
Spiders	65
Blackbirds	10

(3)

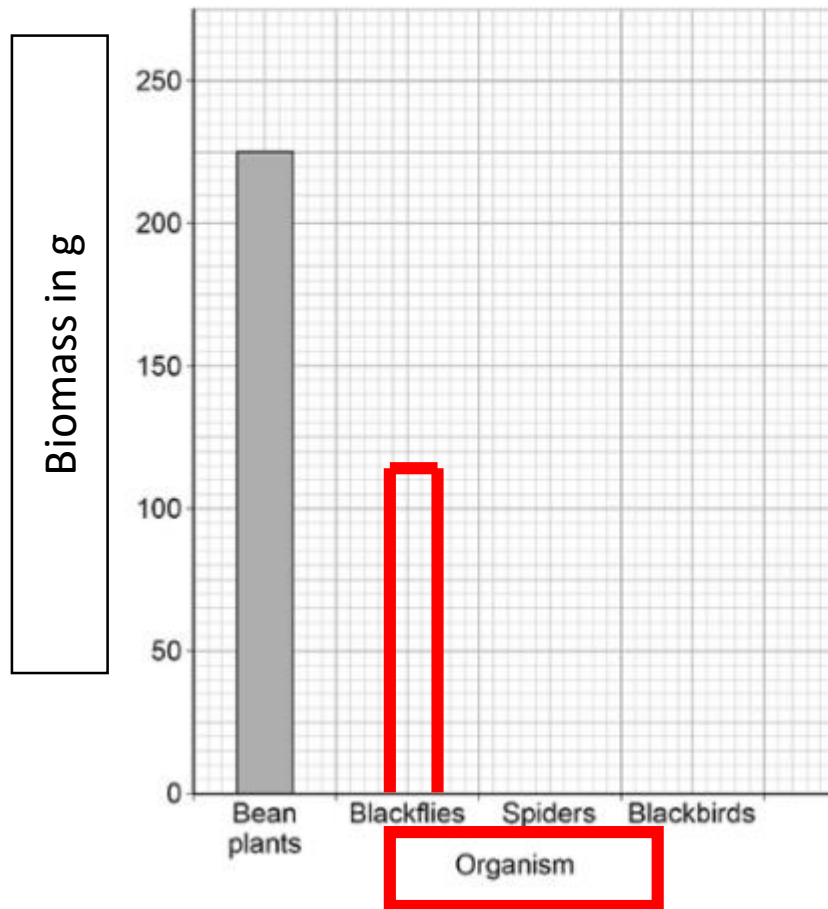


(e) Complete Figure 2.

You should:

- label the y-axis
- plot the data from the table above.

Figure 2



Organism	Biomass in g
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(3)



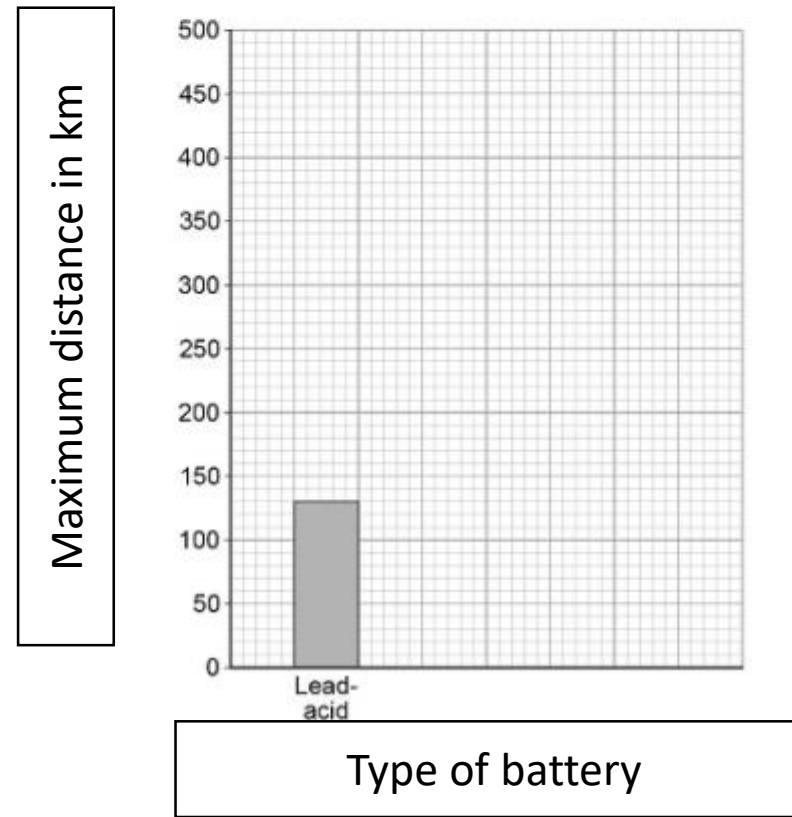
Type of battery	Maximum distance in km
Lead-acid	130
Lithium-ion	480
Nickel-metal hydride	200

(b) Complete Figure 1.

You should:

- label the x-axis
- label the y-axis
- plot the data from the table above.

Figure 1



Another student investigated a different hydrocarbon.

Table 2 shows the results.

Table 2

Temperature in °C	Time to flow through the viscometer in s
20	66
25	50
30	40
40	30
50	25

(e) Complete Figure 3.

Figure 3

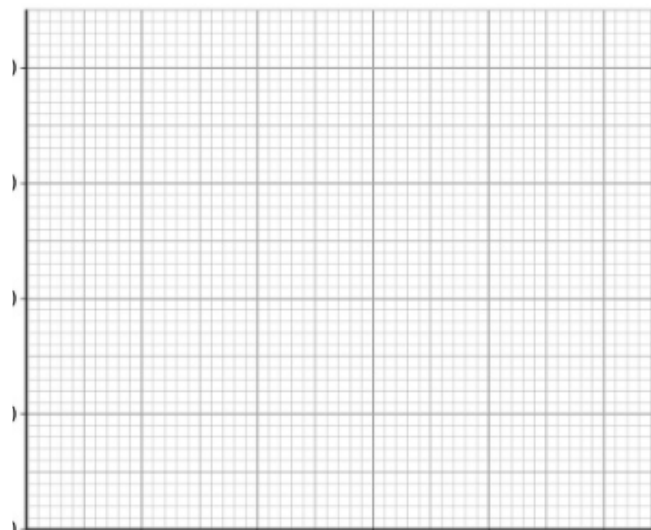


Table 2 shows the results.

Table 2

Temperature in °C	Time to flow through the viscometer in s
20	66
25	50
30	40
40	30
50	25

(e) Complete Figure 3.

You should:

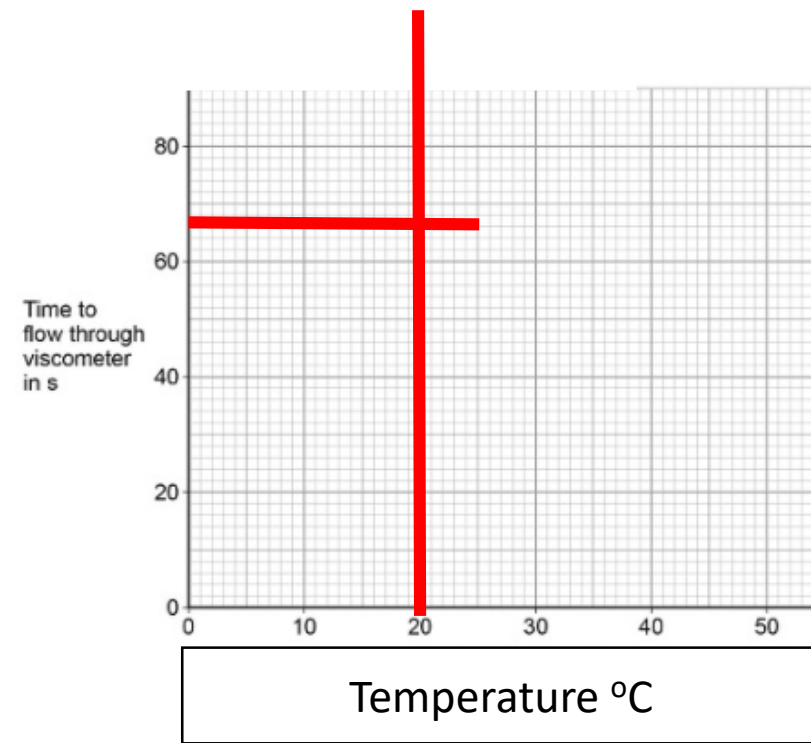


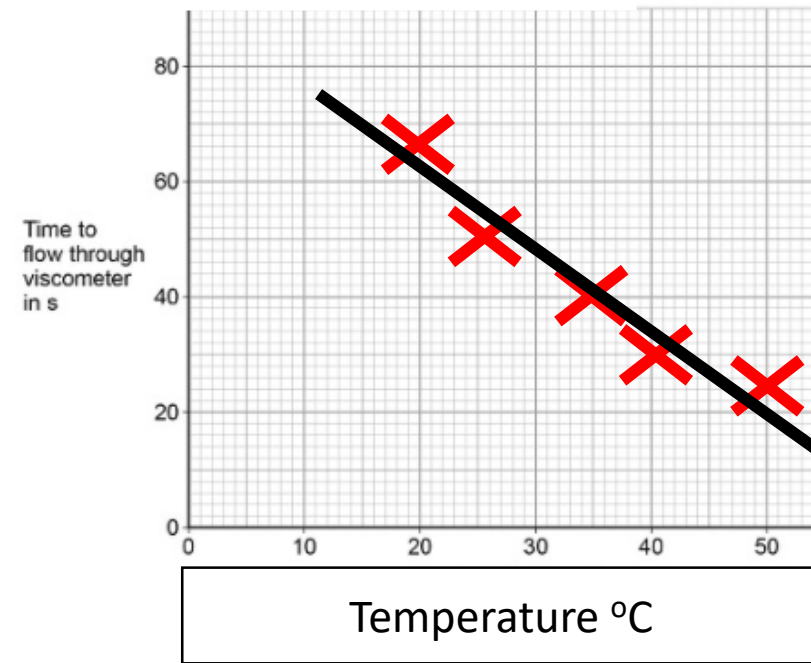
Table 2 shows the results.

Table 2

Temperature in °C	Time to flow through the viscometer in s
20	66
25	50
30	40
40	30
50	25

(e) Complete Figure 3.





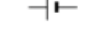









You should:



5. Testing your Knowledge and facts



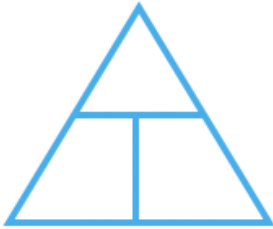
GCSE ELECTRICITY KNOWLEDGE ORGANISER

SECTION 1: Circuit Symbols	
	
	
	
	
	
	
	

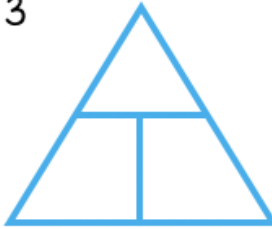
SECTION 2: Equations	
2	
3	
4	
5	
6	
7	

SECTION 3: Units	
8	Charge
9	Current
10	Time
11	Energy
12	Resistance
13	Power
14	Potential

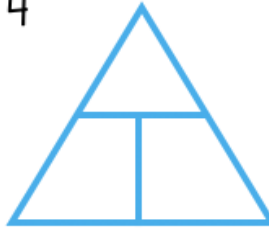
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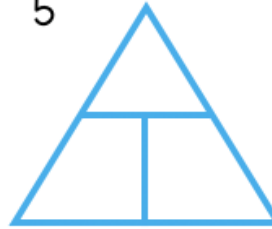
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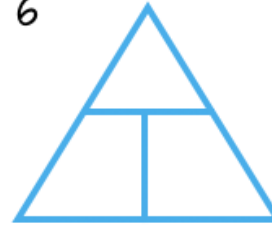
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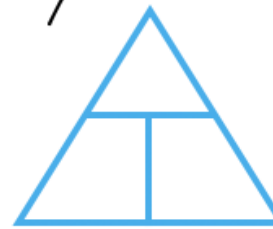
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6
















7



SECTION 4: Keywords	
15	Charge
16	Current
17	Voltage Potential Difference
18	Resistance
19	Series circuit
20	Parallel circuit
21	Ohms Law
22	Power

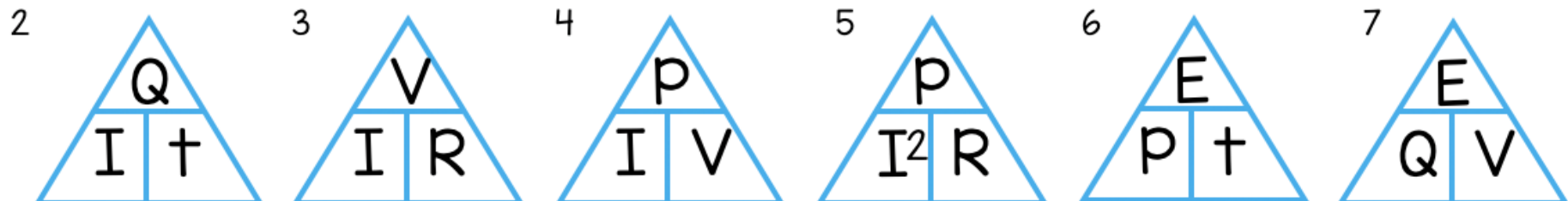
SECTION 5: Circuit Rules		
Current	Voltage	Resistance
23	Series	
24	Parallel	

GCSE ELECTRICITY KNOWLEDGE ORGANISER

SECTION 1: Circuit Symbols	
	switch (open)
	switch (closed)
	cell
	battery
	diode
	resistor
	variable resistor
	lamp
	fuse
	voltmeter
	ammeter
	thermistor
	LDR

SECTION 2: Equations		
2	charge flow = current × time	$Q = I t$
3	potential difference = current × resistance	$V = I R$
4	power = potential difference × current	$P = V I$
5	power = current ² × resistance	$P = I^2 R$
6	energy transferred = power × time	$E = P t$
7	energy transferred = charge flow × potential difference	$E = Q V$

SECTION 3: Units	
8	Charge = coulomb = C
9	Current = amps = A
10	Time = seconds = s
11	Energy = joules = J
12	Resistance = ohms = Ω
13	Power = watts = W
14	Potential = volts = V difference



SECTION 4: Keywords		
15	Charge	Electrons flowing in a circuit
16	Current	Rate of flow of electrons
17	Voltage Potential Difference	Voltage causes charge to flow Work done (energy transferred) when a coulomb of charge passes between 2 points in a circuit
18	Resistance	Opposition to the flow of electric charge
19	Series circuit	Charges can only take one route
20	Parallel circuit	Charges can take more than one route
21	Ohms Law	Current is directly proportional to voltage at constant resistance and constant temperature
22	Power	Rate of energy transfer Work done per unit time

SECTION 5: Circuit Rules			
	Current	Voltage	Resistance
23	Series	Current is the same at every point in the circuit and in every component	The total voltage provided by the power supply is shared between each component
24	Parallel	The total current through the whole circuit is the sum of the current through each separate component	The voltage is same on each branch and is equal to the voltage provided by the power pack
			As more resistors are added the total resistance increases. The total resistance is the sum of the resistance of each component
			Adding more resistors in parallel decreases the total resistance as the current has more pathways. Total resistance will be less than the smallest resistor

GCSE Combined Science: Trilogy Chemistry Topic 1: Atomic Structure and the periodic table

	A substance made of one type of atom only.
	Two or more different types of atoms chemically bonded together
	Elements and/or compounds combined together but not bonded. Can easily be separated

Particle	Mass
Proton	
Neutron	
Electron	

Particle	Relative charge
Proton	
Neutron	
Electron	

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23

Na

sodium

11


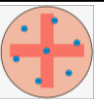
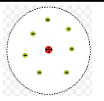
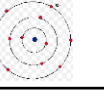
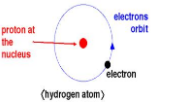
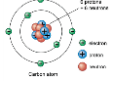
_____ = _____ + _____

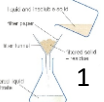


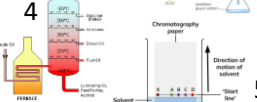
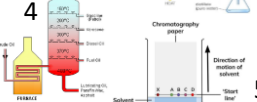
_____ = _____

- Atoms have the same number of _____ and _____
- Atoms of the same element can have different numbers of _____; these atoms are called _____ of that element.
- Isotopes of the same element have the same number of _____ and _____
- To calculate the _____ of an element taking into consideration isotopes then you need the following equation:

$$\frac{(\text{percentage of isotope 1} \times \text{mass of isotope 1}) + (\text{percentage of isotope 2} \times \text{mass of isotope 2})}{100}$$

Steps in the development of the periodic table
Before the discovery of protons, neutrons and electrons, scientists attempted to classify the elements by arranging them in order of their _____.
The early periodic tables were _____ and some _____ were placed in inappropriate groups if the strict order of atomic weights was followed.
Mendeleev overcame some of the problems by _____ for elements that he thought had not been _____ and in some places changed the _____ based on atomic weights.
Elements with _____ predicted by Mendeleev were _____ and filled the gaps. Knowledge of _____ made it possible to explain why the order based on atomic weights was not always correct.

Development of the atomic model					
					
	JJ Thomson	Ernest Rutherford	Niels Bohr	(hydrogen atom)	James Chadwick

Separation techniques	
1. _____	
2. _____	
3. _____	
4. _____	
5. _____	

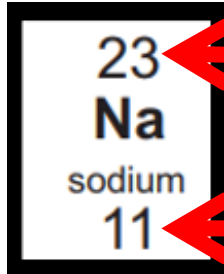
GCSE Combined Science: Trilogy Chemistry Topic 1: Atomic Structure and the periodic table

Element	A substance made of one type of atom only.
Compound	Two or more different types of atoms chemically bonded together
Mixture	Elements and/or compounds combined together but not bonded. Can easily be separated

Particle	Mass
Proton	1
Neutron	1
Electron	Very small

Particle	Relative charge
Proton	+1
Neutron	0
Electron	-1

H
tie
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← Relative atomic mass = protons + neutrons

← Atomic number = number of protons

1. Atoms have the same number of protons and electrons
2. Atoms of the same element can have different numbers of neutrons; these atoms are called isotopes of that element.
3. Isotopes of the same element have the same number of protons and electrons
4. To calculate the relative atomic mass of an element taking into consideration isotopes then you need the following equation:

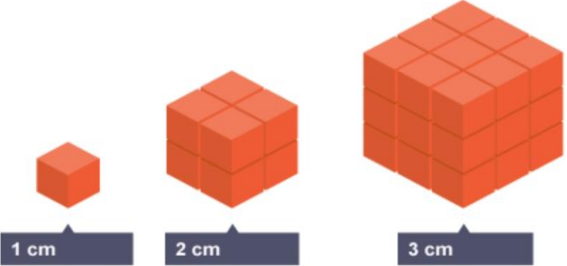
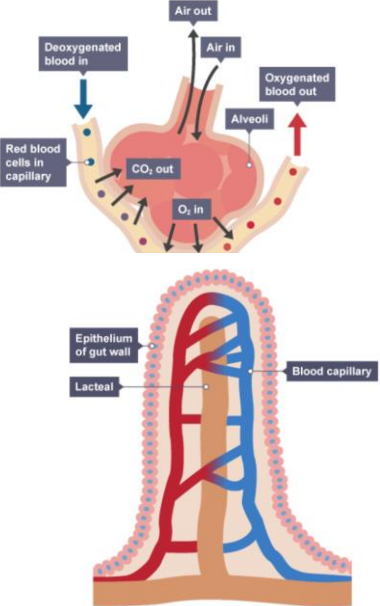
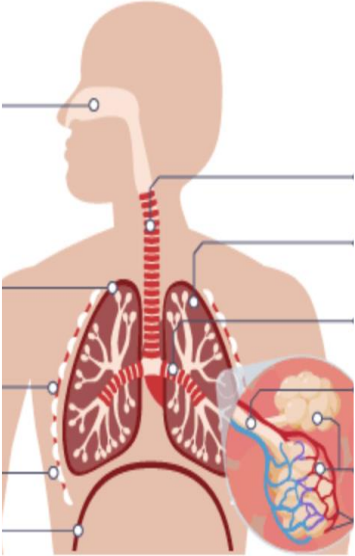
$$\frac{(\text{percentage of isotope 1} \times \text{mass of isotope 1}) + (\text{percentage of isotope 2} \times \text{mass of isotope 2})}{100}$$

Steps in the development of the periodic table
Before the discovery of protons, neutrons and electrons, scientists attempted to classify the elements by arranging them in order of their atomic weights.
The early periodic tables were incomplete and some elements were placed in inappropriate groups if the strict order of atomic weights was followed.
Mendeleev overcame some of the problems by leaving gaps for elements that he thought had not been discovered and in some places changed the order based on atomic weights.
Elements with properties predicted by Mendeleev were discovered and filled the gaps. Knowledge of isotopes made it possible to explain why the order based on atomic weights was not always correct.

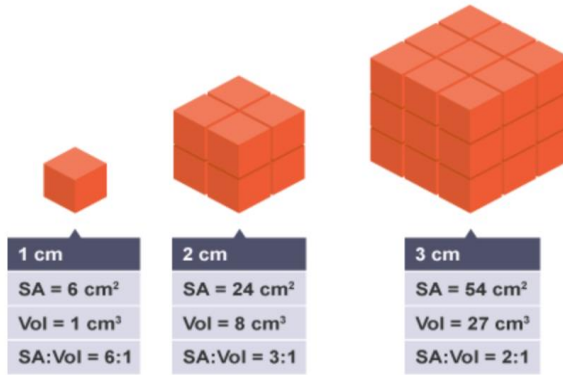
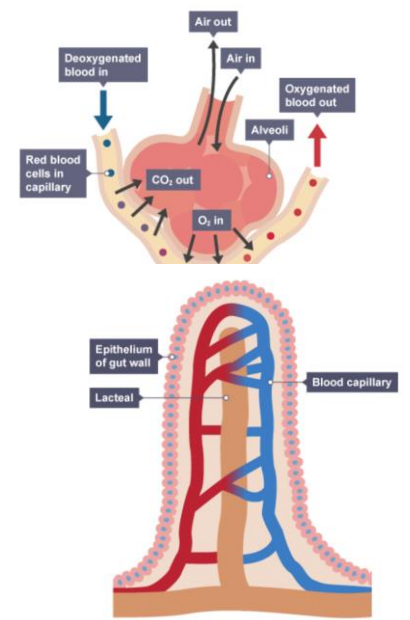
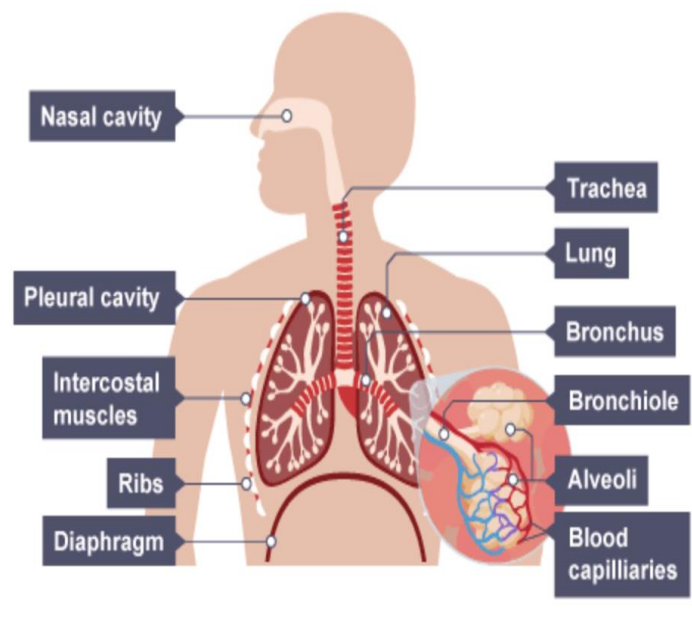
Development of the atomic model					
Solid spheres	JJ Thomson Plum pudding model	Ernest Rutherford Nuclear model	Niels Bohr Electrons in shells	Protons (hydrogen atom)	James Chadwick Neutrons

Separation techniques	
1. Filtration	
2. Crystallisation	
3. Simple distillation	
4. Fractional distillation	
5. Chromatography	

Aqa trilogy Gcse Biology: 4.2.1 ORGANISATION IN ANIMALS

Levels of organisation	Gas Exchange	
<p>Organelle -></p> <p>Organisms must take in</p> <p>The size of their surface, or surface area, defines</p>	<p>Surface area to volume ratio</p> <p>This is what happens when the cube increases in size:</p> 	<p>A large surface area:</p> <p>A short distance required for diffusion:</p>
Exchange Surfaces	Respiratory System	Respiratory Adaptations
		<p>The human lungs provide an <u>exchange surface</u> adapted for:</p> <p>The alveoli are adapted to provide a very large surface area for gaseous exchange:</p>

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Levels of organisation	Gas Exchange													
<p>Organelle -> Cell -> Tissue -> Organ -> Organism</p> <p>Organisms must take in food, oxygen and water, and other essential substances, from the environment. Organisms also need to remove waste substances.</p> <p>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.</p>	<p>Surface area to volume ratio</p> <p>This is what happens when the cube increases in size:</p>  <table border="1" data-bbox="917 485 1477 628"> <thead> <tr> <th>1 cm</th> <th>2 cm</th> <th>3 cm</th> </tr> </thead> <tbody> <tr> <td>SA = 6 cm²</td> <td>SA = 24 cm²</td> <td>SA = 54 cm²</td> </tr> <tr> <td>Vol = 1 cm³</td> <td>Vol = 8 cm³</td> <td>Vol = 27 cm³</td> </tr> <tr> <td>SA:Vol = 6:1</td> <td>SA:Vol = 3:1</td> <td>SA:Vol = 2:1</td> </tr> </tbody> </table>	1 cm	2 cm	3 cm	SA = 6 cm ²	SA = 24 cm ²	SA = 54 cm ²	Vol = 1 cm ³	Vol = 8 cm ³	Vol = 27 cm ³	SA:Vol = 6:1	SA:Vol = 3:1	SA:Vol = 2:1	<p>A large surface area:</p> <ul style="list-style-type: none"> the flattened shape of structures such as leaves the alveoli in the respiratory system the villi in the digestive system <p>A short distance required for diffusion:</p> <ul style="list-style-type: none"> the membranes of cells the flattened shape of structures such as leaves the walls of blood capillaries are one cell thick the epithelia of alveoli in the respiratory system and the villi in the small intestine are only one cell thick
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Exchange Surfaces	Respiratory System	Respiratory Adaptations												
		<p>The human lungs provide an exchange surface adapted for:</p> <ul style="list-style-type: none"> absorbing oxygen – needed for respiration – into the blood from the air transferring carbon dioxide – produced by respiration – from the blood into the lungs then the air <p>The alveoli are adapted to provide a very large surface area for gaseous exchange:</p> <ul style="list-style-type: none"> small size - each alveolus is a small sphere about 300 μm in diameter number - there are around 700 million alveoli There is also a short diffusion path - the walls of blood capillaries and alveoli are just one cell thick. 												