

B1 – 4.1.2.1-4.1.2.2 Chromosomes, Mitosis & The Cell Cycle

1. DNA is arranged into chromosomes and stored in which organelle of a eukaryote cell?

1. How many pairs of chromosomes does each human body cell (exc. gametes) contain?

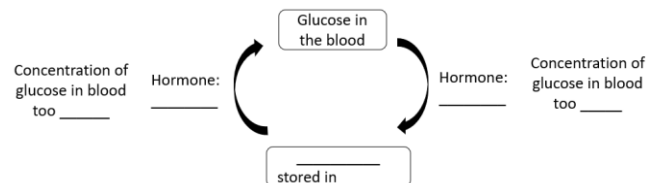
1. Why are chromosomes arranged into pairs?

4. Number these statements in the order of the cell cycle

- Cytoplasm and cell membranes divide to form two identical cells.
- DNA is replicated – 2 copies of each chromosome
- Cell grows in size and number of organelles such mitochondria and ribosomes increase
- Mitosis - one set of chromosomes is pulled to each end of the cell and the nucleus divides.

B2 – 4.5.3.2 – Control of blood glucose concentration

- Which organ monitors and controls blood glucose concentration?
- Complete this diagram to show the negative feedback cycle to control blood glucose levels



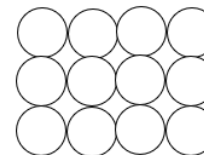
- How is Type 1 diabetes treated?
- What is Type 2 diabetes?

1. How is Type 2 diabetes treated?

1. What are the risk factors of Type 2 diabetes?

C1 – 5.2.2.3 – Properties of ionic compounds

1. Draw the correct charges into this diagram to represent an ionic lattice



1. Match the property of an ionic compound to its explanation

High melting and boiling points

Ions are not free to move and carry a charge

Do not conduct electricity when solid

Strong electrostatic forces of attraction between oppositely charged ions

Conduct electricity when liquid (l) or aqueous (aq)

Ions are free to move and carry a charge

C2 – 5.6.1.2-5.6.1.3 Collision theory, activation energy & factors affecting rate of reaction

Complete to describe collision theory

Chemical reactions can occur only when reacting particles _____ with each other, with enough _____. The minimum amount of energy that particles must have, to react is called the _____

Increasing the concentration of aqueous reactants, the pressure of reacting gases, and the surface area of solid reactants, increases the _____ of collisions and so _____ the rate of reaction. Increasing the temperature increases the _____ of collisions and makes them more _____, and so increases the _____ of reaction

P1 – 6.1.1.4 & 6.2.4.1 - Power

1. Change the subject of this equation to calculate the energy transferred by a device.

$$\text{Power} = \text{energy transferred} / \text{time}$$

2. Change the subject of this equation to calculate the potential difference of a component

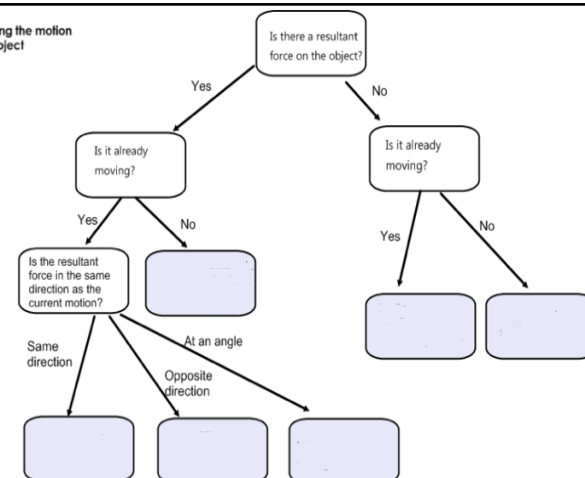
$$\text{Power} = \text{potential difference} \times \text{current}$$

3. Change the subject of this equation to calculate the current through a component

$$\text{Power} = \text{current}^2 \times \text{resistance}$$

P2 - 6.5.4.2.1 Newton's First Law

Predicting the motion of an object



B1 – 4.1.2.1-4.1.2.2 Chromosomes, Mitosis & The Cell Cycle

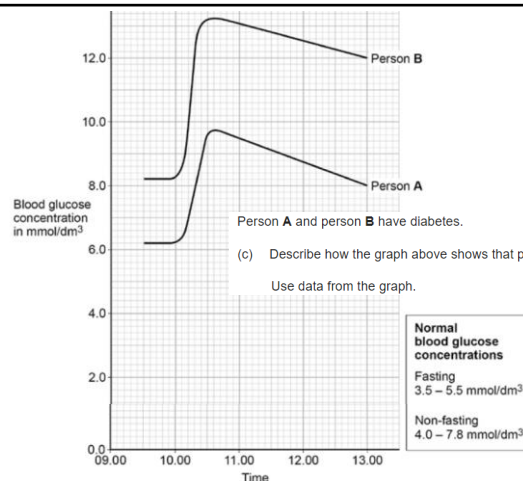
(c) Cloning is used to reproduce edible banana plants.

The cloned cells divide by mitosis.

Describe the process of mitosis.

(4)

B2 – 4.5.3.2 – Control of blood glucose concentration



(3)

(c) Describe how the graph above shows that person **B** has diabetes.

Use data from the graph.

Normal blood glucose concentrations

Fasting
3.5 – 5.5 mmol/dm³

Non-fasting
4.0 – 7.8 mmol/dm³

C2 – 5.6.1.2-5.6.1.3 Collision theory, activation energy & factors affecting rate of reaction

This question is about magnesium.

A student investigated the rate of the reaction between magnesium and hydrochloric acid.

(c) The table shows the student's results.

Time in seconds	0	10	35	50	95	120	140
Volume of gas in cm²	0.0	12.5	36.0	43.5	59.0	60.0	60.0

(e) Explain why the rate of this reaction changes.

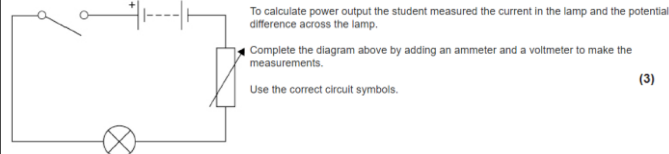
Give your answer in terms of collision theory.

(3)

P1 – 6.1.1.4 & 6.2.4.1 - Power

A student investigated how the power output of a filament lamp varied with the current in the lamp.

The diagram below shows part of the circuit the student used.



(3)

(b) Which energy store in the battery decreases when the lamp is switched on?

(1)

(c) What happens to the energy transferred by the lamp?

(1)

(f) Determine the resistance of the lamp when the current in the lamp is 0.22 A

Resistance = Ω

(4)

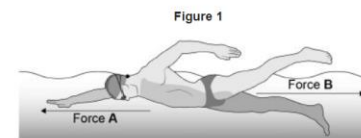
C1 – 5.2.2.3 – Properties of ionic compounds

Explain why potassium chloride has a high melting point.

(4)

P2 - 6.5.4.2.1 Newton's First Law

Figure 1 shows the horizontal forces acting on a man swimming in the sea.



(a) Describe the movement of the man when the resultant horizontal force is 0 N

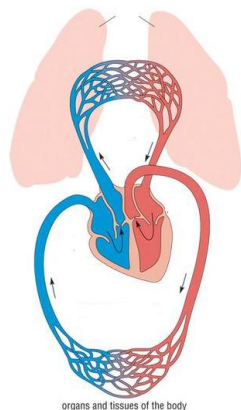
(b) The man increases Force **A**.

Explain what happens to Force **B** and to the movement of the man.

(4)

B1 – 4.2.2.2 The Heart and Blood Vessels

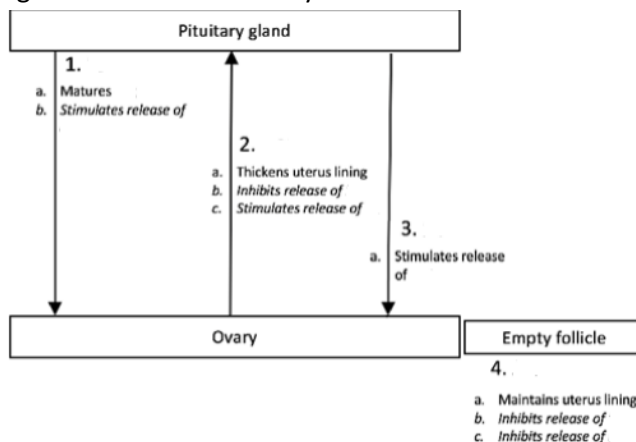
Label the structures of the heart and the blood vessels



Why is the human circulatory system described as a 'double' circulatory system?

B2 – 4.5.3.3 – hormones in human reproduction

Fill in the missing gaps on this diagram to show the hormonal dialogue between the ovaries and pituitary gland in the menstrual cycle



C1 – 5.2.2.4 – Properties of small molecules

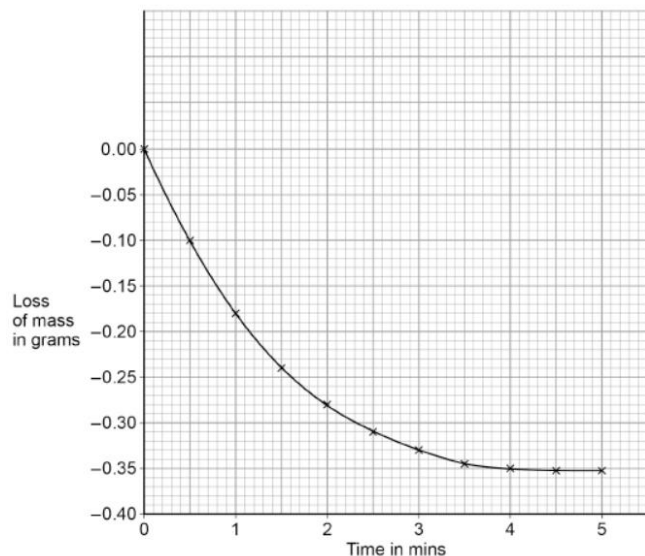
1. Give the formula of 5 covalent substances that exist as small molecules

1. Complete the sentences to explain the properties of simple covalent molecules

Simple covalent molecules have _____ boiling points because there are _____ forces of attraction between the _____ that require little _____ to overcome.

They do not conduct _____ as they do not contain _____ or _____ that are free to _____ and carry a _____.

C2 – 5.6.1.1 Calculating Rates of Reaction



P1 – 6.3.1.1 Density of materials

1. Which 2 measurements would you need to take to determine the density of an object?

1. Describe how you would calculate the volume of a regular shaped object e.g. a cube

1. Describe how you would calculate the volume of an irregular shaped object e.g. a chess piece?

1. Put the states of matter in order of decreasing

P2 -6.5.4.1.3 & 6.5.4.1.5 Velocity & Acceleration

1. Describe the difference between speed and velocity.

1. What do these features of a velocity-time graph

Key	Velocity-time graph
Horizontal line	
Upwards diagonal line	
Downwards diagonal line	
Area under the graph	

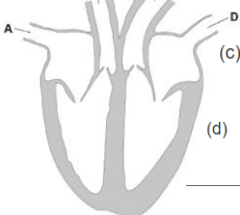
3. How can acceleration be calculated from a velocity-time graph?

B1 – 4.2.2.2 The Heart and Blood Vessels

Some animals have a single circulatory system.

- (a) Why is the human heart referred to as part of a dual circulatory system?

- (b) Which label shows the pulmonary vein? (1)



- (c) Which blood vessel takes oxygenated blood away from the heart?

- (d) Name the blood vessels that deliver oxygen to the capillaries in heart muscle.

- (e) Pacemaker cells are a group of cells that control heart rate.

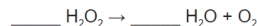
Where in the heart are the pacemaker cells located?

- (f) What type of signal is sent from the pacemaker cells to the heart muscle?

C2 – 5.6.1.1 Calculating Rates of Reaction

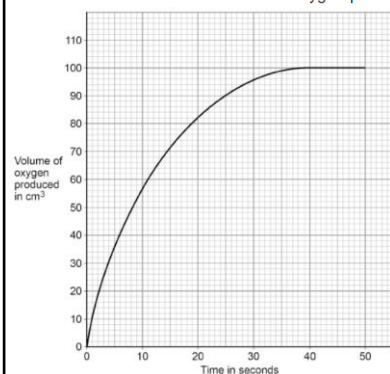
Hydrogen peroxide (H_2O_2) decomposes to produce oxygen gas and water.

- (a) Balance the equation for the reaction.



The student then investigated the rate of decomposition of hydrogen peroxide using manganese dioxide as the catalyst.

The student measured the volume of oxygen produced every 5 seconds for 50 seconds.

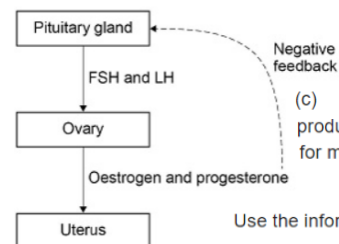


Determine the rate of reaction at 15 s

Rate = _____ cm^3/s

B2 – 4.5.3.3 – hormones in human reproduction

The diagram shows part of the hormonal control of the menstrual cycle



- (c) Explain how the body regulates the production of oestrogen and progesterone for most of the menstrual cycle.

Use the information shown in the diagram above.

- (d) A woman is most fertile at about day 15 of the menstrual cycle.

From day 12 to day 14 of the menstrual cycle, the negative feedback shown in the figure above stops. Explain what happens when the negative feedback stops.

P1 – 6.3.1.1 Density of materials

- (b) The volume of the balloon is $14\,000\text{ cm}^3$
The density of the helium in the balloon is 0.180 kg/m^3
Calculate the mass of helium in the balloon

$$1\text{ cm}^3 = 1 \times 10^{-6}\text{ m}^3$$

Mass = _____ kg

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



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

C1 – 5.2.2.4 – Properties of small molecules

- (e) Solid sodium chloride does not conduct electricity.

Give **two** ways in which sodium chloride can be made to conduct electricity.

1. _____ (2)
2. _____

The table shows the boiling points of fluorine, chlorine and bromine.

Element	Boiling point in $^{\circ}\text{C}$
Fluorine	-186
Chlorine	-34
Bromine	+59

- (c) Explain why the boiling points in the table are low.

- (d) Explain the trend in the boiling points in the table above.

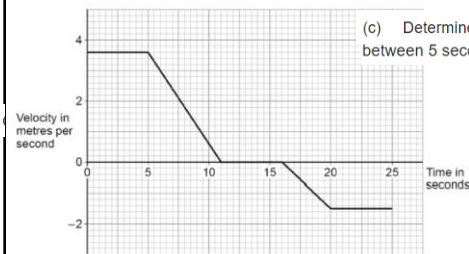
P2 -6.5.4.1.3 & 6.5.4.1.5 Velocity & Acceleration

- (a) Velocity is a vector quantity, speed is a scalar quantity.

Describe what is meant by a vector quantity and a scalar quantity.

Vector quantity _____

Scalar quantity _____ (2)



- (c) Determine the acceleration of the train between 5 seconds and 11 seconds.

- (d) Determine the total displacement of the train between 0 seconds and 25 seconds.

(5)

B1 – 4.2.2.1 The Human Digestive System

1. In which organ do small digested molecules diffuse into the blood?
2. Describe 2 adaptations of this organ for efficient diffusion
3. Why are enzymes described as catalysts?
4. Complete this table

Enzyme	Found in the:				Breaks Down	Into
	Salivary Glands	Stomach	Pancreas	Small Intestine		
Amylase						→
Lipase						→
Protease						→

B2 – 4.7.2.1 – Levels of Organisation

1. What type of organism is first in a food chain/web?
2. What chemical reaction does this type of organism perform?
3. Define the term 'prey'
1. Define the term 'predator'
1. What happens to the population of prey, if the population of predators increase? Why?
1. What happens to the population of predators, if the population of prey increases? Why?

C1 – 5.3.2.1 - Moles

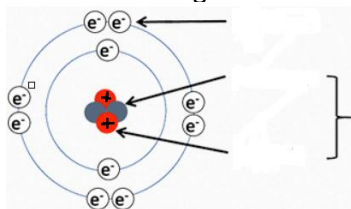
1. Define the unit 'mole'
1. What is the mass of 6 moles of fluorine?
1. What is the mass of 0.5 moles of calcium?
1. How many moles are in 14g of lithium?
1. How many moles are in 6g of H₂?
1. How many moles are in 24g of H₂O?
1. How many atoms/molecules are in 1 mole of every substance?

C2 – Required Practical 12 - Chromatography

1. In paper chromatography, What is the stationary phase?
2. What is the mobile phase?
3. Why is the start line drawn in pencil not ink?
4. Why must the starting solvent level be below the pencil line?
5. What property of the components of the mixture does chromatography exploit to be able to separate them?
6. How are the components of the mixture identified?

P1 – 6.4.1.1-6.4.1.2 Structure of an atom

1. Label this diagram of an atom



1. Complete this table

Sub-atomic particle	Charge	Relative mass
Proton		
Neutron		
Electron		

1. Atomic number is number of ...
2. Mass number is number of.....
5. Max of ____ electrons can fit on 1st shell
6. Max of ____ electrons can fit on 2nd and 3rd shell

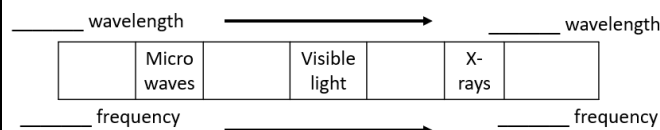
P2 – 6.6.2.1. – Types of EM Waves

EM waves are transverse waves.

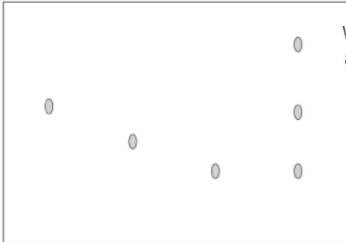
1. **Complete the definition of a transverse wave**
Vibrations are _____ to the direction of _____ transfer

2. What speed do all EM waves travel at through a vacuum?

3. Fill in the gaps on the diagram



4. Describe the relationship between frequency and rate of energy transfer

B1 – 4.2.2.1 The Human Digestive System Starch is digested to form sugar molecules in the digestive system. (a) What is the name of the enzyme that digests starch? (b) Where are most food molecules absorbed? Large intestine Small intestine Liver Stomach (a) Which organs in the digestive system produce protease enzymes? Mouth and liver Pancreas and liver Mouth and stomach Stomach and pancreas (b) Bile helps digestion. Where is bile produced? liver mouth stomach	B2 – 4.7.2.1 – Levels of Organisation Algae → Crab → Loggerhead turtle → Shark <table><tr><th>Description</th><th>Organism in the food chain</th></tr><tr><td>Primary consumer</td><td>Algae</td></tr><tr><td>Producer</td><td>Crab</td></tr><tr><td>Tertiary consumer</td><td>Shark</td></tr><tr><td></td><td>Loggerhead turtle</td></tr></table> Explain what will happen to the number of loggerhead turtles if t there are fewer crabs. What type of factor is a new predator? Abiotic Biotic Control	Description	Organism in the food chain	Primary consumer	Algae	Producer	Crab	Tertiary consumer	Shark		Loggerhead turtle	C1 – 5.3.2.1 - Moles A bag of fertiliser contains 14.52 kg of ammonium nitrate (NH₄NO₃). Calculate the number of moles of ammonium nitrate in the bag of fertiliser. Give your answer in standard form to 2 significant figures. The fertiliser also contains potassium chloride. Explain why potassium chloride has a high melting point.
Description	Organism in the food chain											
Primary consumer	Algae											
Producer	Crab											
Tertiary consumer	Shark											
	Loggerhead turtle											
C2 – Required Practical 12 - Chromatography A student investigated a purple food colouring, Y, using chromatography. The student compares Y with dyes A, B and C.  What three conclusions can you make : about the dyes in food colouring Y? In a different experiment a student recorded these results: Distance moved by dye G = 60 mm Distance moved by solvent = 80 mm Calculate the R_f value of dye G.	P1 – 6.4.1.1-6.4.1.2 Structure of an atom The diagram below shows two isotopes of neon. Neon-20 $^{20}_{10}\text{Ne}$ Neon-21 $^{21}_{10}\text{Ne}$ Compare the number of sub-atomic particles in an atom of neon-20 and an atom of neon- 21 (a) An atom of one isotope of protactinium contains 91 protons and 143 neutrons. What is the correct symbol for this atom? $^{143}_{91}\text{Pa}$ $^{234}_{91}\text{Pa}$ $^{234}_{143}\text{Pa}$ $^{91}_{52}\text{Pa}$	P2 – 6.6.2.1. – Types of EM Waves (a) Give the type of electromagnetic wave with the lowest frequency. (a) Complete the sentences. In a vacuum, all electromagnetic waves travel at the same . Gamma waves have the greatest . Radio waves have the greatest . Which type of electromagnetic wave has the shortest wavelength? P microwaves Q visible light R S gamma rays (a) Which letter shows the position of ultraviolet (UV) radiation within the electromagnetic spectrum? P Q R S										

B1 – Required Practical 3 – Food Tests

Complete this table

Food group	Reagent to test for	Positive result	Negative result
Starch			
Sugars			
Protein			
Lipids			

What must be done with solid samples of food first, before they are tested?

C2 – 5.7.1.2 – Fractional Distillation

1. Which different property of the hydrocarbon chains are they separated based upon?

2. Describe the temperature gradient of the column

3. **Complete the gaps**

Crude oil is heated until it becomes a _____.
The different fractions then _____ at different _____ and are collected.

4. Where are the shorter hydrocarbon chains collected?

5. Where are the longest hydrocarbon chains collected?

B2 – 4.7.2.2. – How Materials are Cycled

1. Name two chemical reactions that increase the concentration of carbon dioxide in the atmosphere

1. Name two processes that remove carbon dioxide from the atmosphere

1. Describe 2 human activities that are increasing the concentration of CO₂ in the atmosphere

1. What physical changes and processes are involved in the water cycle?

P1 – 6.3.3.1 – Particle motion in gases

1. Describe the motion of particles in a gas

1. **Complete the sentence**

Gas pressure is caused by the _____ of particles _____ with the _____ of its container

3. Describe and explain the effect of increasing the temp of the gas on gas pressure

4. Describe and explain the effect of decreasing the volume of the gas on gas pressure

C1 – 5.4.1.3 – Extraction of Metals & Reduction

1. What is an ore?

1. How are metals, less reactive than carbon, extracted from their ores? Give an example word equation

1. How are metals, more reactive than carbon, extracted from their ores?

P2 – 6.6.2.2 – Properties of EM waves 1

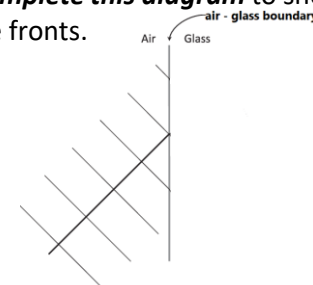
1. What 4 things can substances do to EM waves?

When a wave is refracted moving from a less dense substance into a more dense substance..

2. What happens to the speed of the wave?

3. In which direction is the wave refracted?

4. **Complete this diagram** to show the refracted wave fronts.



B1 – Required Practical 3 – Food Tests

Food	Test for starch: colour after iodine test	Test for sugar: colour after Benedict's test	Test for protein: colour after Biuret test
A	Blue-Black	Brick red	Blue
B	Orange	Blue	Lilac
C	Blue-Black	Yellow	Blue
D	Orange	Orange	Lilac

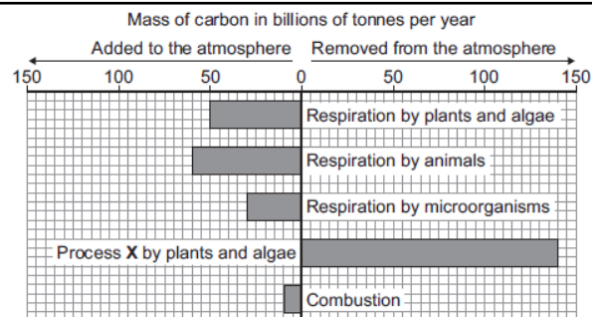
(a) Give **three** conclusions about food **D**.

(3)

Which food in the table above would be the most suitable for a person with Type 2 diabetes to eat? Give **two** reasons for your answer.

(3)

B2 – 4.7.2.2. – How Materials are Cycled



Name process **X**.

Calculate the mass of carbon added to the atmosphere by respiration per year.

Some scientists are concerned that the mass of carbon in the atmosphere is changing.

How does the data in the graph support this idea?

C1 – 5.4.1.3 – Extraction of Metals & Reduction



In the blast furnace iron oxide reacts with carbon monoxide to form iron and carbon dioxide.

Complete the equation for the reaction between iron oxide and carbon monoxide.

You should balance the equation.



Iron oxide is reduced in the reaction with carbon monoxide.

What does 'reduced' mean in this reaction?

(1)

C2 – 5.7.1.2 – Fractional Distillation

Describe how crude oil is separated into fractions by fractional distillation.

P1 – 6.3.3.1 – Particle motion in gases

A scientist cooled the air inside a container.

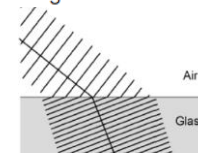
(a) The temperature of the air changed from 20 °C to 0 °C

The volume of the container of air stayed the same.

Explain how the motion of the air molecules caused the pressure in the container to change as the temperature decreased.

P2 – 6.6.2.2 – Properties of EM waves 1

(a) Explain why the light refracts as it passes from air into glass.

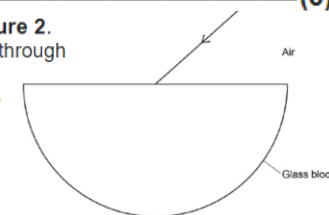


(a) Explain why the light refracts as it passes from air into glass.

(3)

Complete the ray diagram in **Figure 2**.

- Draw the ray of light passing through and leaving the glass block.
- Label the angle of refraction.

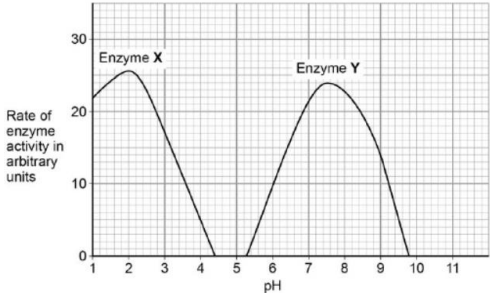


(4)

(3)

B1 – 4.2.2.1 Effect of pH on Enzyme activity 1. Why are enzymes described as biological catalysts? 2. Describe the ‘lock and key theory’ of enzyme activity 3. Extreme pH denatures enzymes. What does this mean? 4. Where in the digestive system is low pH? 5. Where in the digestive system is high pH?	B2 – 4.7.1.2 – 4.7.1.3 Biotic & Abiotic Factors 1. Name 5 abiotic factors that can affect communities 2. Name 4 biotic factors that can affect communities	C1 – Required Practical 8: Making Soluble Salts 1. What two reactants are needed to make copper sulfate salts? 1. Why is the acid warmed with a Bunsen burner? 1. Why is the solid reactant added until no more will dissolve? 1. Why is the mixture produced filtered? 1. How are copper sulfate crystals obtained from the filtrate solution?
C2 – 5.9.1.2-5.9.1.4 – Earth’s early and changing atmosphere 1. Describe and explain the composition of Earth’s early atmosphere 2. Describe the composition of Earth’s atmosphere at present 3. How did the levels of carbon dioxide in the atmosphere decrease? 4. How did the levels of water vapour in the atmosphere decrease? 5. How did the levels of oxygen in the atmosphere increase?	P1 – 6.4.1.3 – Development of the model of the atom 1. Which model of the atom did J.J. Thompson develop. Describe this model 2. Which experiments lead to the plum pudding model being replaced by the nuclear model? 3. What adaptations to the nuclear model did Niels Bohr propose? 4. What adaptations to the nuclear model did James Chadwick provide evidence for?	P2 – 6.5.1.3 – Gravity 1. What is the unit of weight? 2. What is the unit of mass? 3. Describe the relationship between weight and mass 4. Change the subject of this equation <i>Weight = mass x gravitational field strength</i> to calculate the mass of an object the gravitational field strength

B1 – 4.2.2.1 Effect of pH on Enzyme activity



What is the optimum pH for enzyme Y?
Explain why pH affects enzyme activity.

_____ (2)

B2 – 4.7.1.2 – 4.7.1.3 Biotic & Abiotic Factors

Tick **one** box for each factor.

Factor	Biotic	Abiotic
Diseases		
Herbivores		
Temperature		
Water		

(2)

Give **two** abiotic (non-living) factors which will affect the growth of plants on a school playing field.

Give a reason why each factor will affect the growth of the plants.

_____ (4)

C1 – Required Practical 8: Making Soluble Salts

A student planned to make copper sulfate crystals from excess copper oxide and dilute sulfuric acid.

Why is it necessary to add excess copper oxide?

_____ (1)

This is the method used.

1. Add 25 cm³ of dilute sulfuric acid to a conical flask.
2. Gently warm the dilute sulfuric acid.
3. Add excess copper oxide to the dilute sulfuric acid.
4. Stir the mixture.
5. Heat to evaporate all the water from the mixture.

Suggest **two** improvements to the method.

Explain why each improvement is needed.

_____ (4)

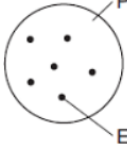
C2 – 5.9.1.2-5.9.1.4 – Earth’s early and changing atmosphere

Describe how and why the percentages of carbon dioxide and oxygen in the Earth’s atmosphere have changed.

_____ (5)

P1 – 6.4.1.3 – Development of the model of the atom

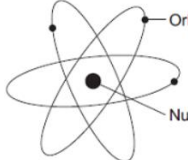
'plum pudding' model



Positive charge

Electrons

'nuclear' model,



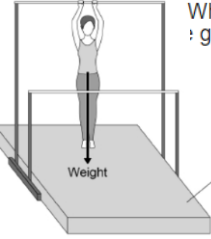
Orbiting electrons

Nucleus

Describe the differences between the two models of the atom.

_____ (4)

P2 - 6.5.1.3 – Gravity



What is the size of the upward force acting on the gymnast from the bar?

It is greater than the downward force. ☐

It is less than the downward force. ☐

It is the same size as the downward force. ☐

Why is the weight of the gymnast represented by an arrow?

Weight is a constant. ☐ Weight is a unit. ☐

Weight is a scalar. ☐ Weight is a vector. ☐

The gymnast has a mass of 45 kg
gravitational field strength = 9.8 N/kg
Calculate the weight of the gymnast.

B1 –Required Practical 4: pH on Enzyme Activity	B2 – 4.7.3.1 & 4.7.3.6 Biodiversity	C1 – 5.2.2.6 - Giant Covalent Structures
1. What is the independent variable? 2. Which reagent is used to detect the presence of starch? 3. Which enzyme digests the starch? 4. When the enzyme has digested all the starch – how will you know? 5. What is the dependent variable? 6. Identify the control variables	1. What is ‘biodiversity’? 1. What human activities are resulting in the reduction of biodiversity? 1. Describe the programmes being put in place to reduce the negative effects of humans on biodiversity	1. What element are both diamond and graphite made from? 2. Why do graphite and diamond have high melting points? 1. Why can graphite conduct electricity? 1. Why is graphite soft and slippery?
C2 – 5.6.2.1-5.6.2.2 Reversible reactions and energy changes on reversible reactions	P1 – 6.4.2.1 – Radioactive decay and nuclear radiation	P2 – Required Practical 21 – IR radiation
1. What symbol is used to represent a reversible reaction? 2. What does a reversible reaction mean? 1. Explain how the law of the conservation of energy applies to reversible reactions	1. What is an alpha particle? 2. What is a beta particle? 3. What is a gamma ray? 4. Which type of nuclear radiation has the highest ionising power? 5. Which type of nuclear radiation has the longest range in air? 6. What material can stop alpha radiation? 7. What material can stop beta radiation? 8. What material can stop gamma radiation?	1. What is the independent variable? 1. What is the dependent variable? 1. What piece of equipment is used to measure the dependent variable? 1. Identify the control variables. 1. How will you know which surface was the best emitter of IR radiation? 1. What type of surface is this likely to be?

B1 –Required Practical 4: pH on Enzyme Activity

A student investigated the effect of pH on the rate of starch digestion.

(a) What is the independent variable in the investigation?

pH of amylase solution ☐ Temperature of water bath ☐

Volume of starch solution ☐

(b) Describe the test for starch.

Give the result of the test if starch is present.

(2)

How could the investigation be improved to get a more accurate value for the optimum pH?

Remove one drop of the amylase-starch mixture every minute. ☐

Use a less concentrated amylase solution. ☐

Use smaller pH intervals. ☐

B2 – 4.7.3.1 & 4.7.3.6 Biodiversity

There is a need to grow enough food for all the people in the world.

Growing enough food affects habitats and biodiversity.

(a) What is meant by the term biodiversity?

(1)

Give **two** effects of global warming that could reduce biodiversity in an area.

1. _____

2. _____

(2)

CC1 – 5.2.2.6 - Giant Covalent Structures

Diamond has a giant covalent structure.

(d) What is the number of bonds formed by each carbon atom in diamond?

2 ☐

3 ☐

4 ☐

8 ☐

Give **two** physical properties of diamond.

1. _____

2. _____ (2)

Explain why graphite is soft and slippery.

(3)

C2 – 5.6.2.1-5.6.2.2 Reversible reactions and energy changes on reversible reactions

Oxygen reacts with sulfur dioxide.

The reaction is reversible.

What is the symbol for a reversible reaction? _____ (1)

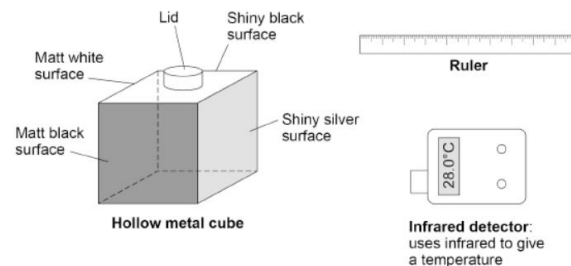
In a reversible reaction the forward reaction is exothermic, so the reverse reaction is _____ (1)

Equilibrium is reached when the forward and reverse reactions happen at exactly the same _____ (1)

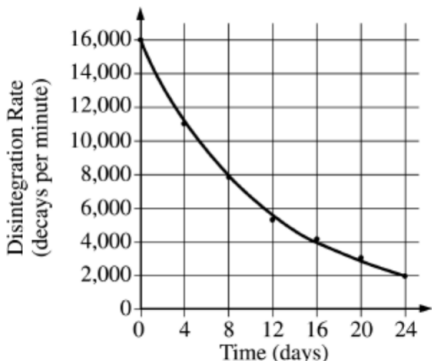
P1 – 6.4.2.1 – Radioactive decay and nuclear radiation

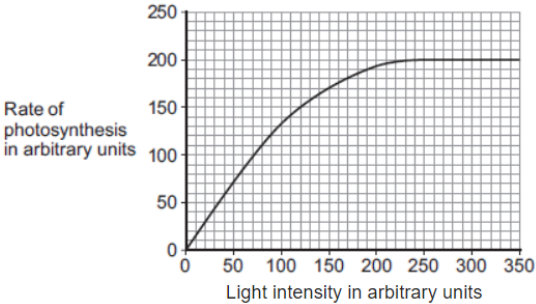
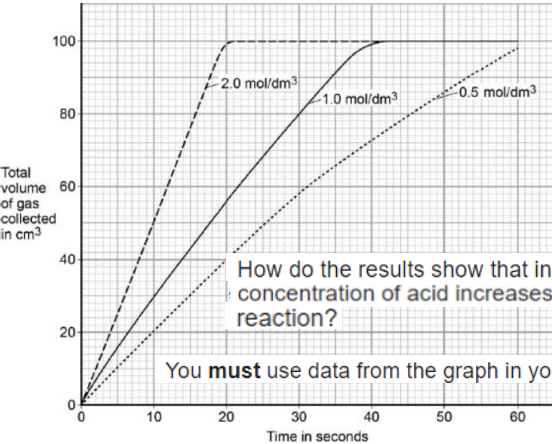
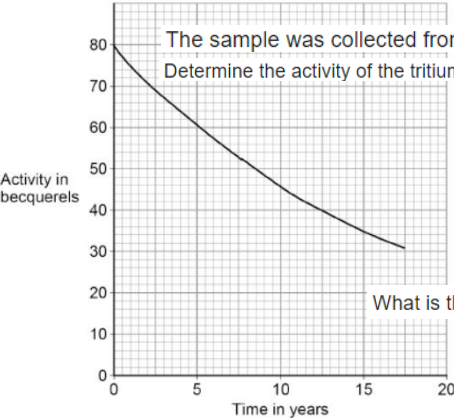
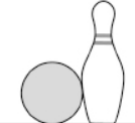
Explain the differences between the properties of alpha, beta and gamma radiations.

P2 - Required Practical 21 – IR radiation



Variable	Independent	Dependent	Control
Distance between infrared detector and surface of cube			✓
Starting temperature of water inside cube			
Temperature measured by infrared detector			
Type of surface			

B1 – 4.4.1.1 - 4.4.1.2 Photosynthesis	B2 – Required Practical 7: Sampling Techniques	C1 – 5.4.2.5 – Strong & Weak Acids
1. Write a word equation for photosynthesis 2. Is photosynthesis an exo or endothermic reaction? Explain why 3. What is the function of chlorophyll? Where is it stored? 4. State 3 factors that will effect the rate of photosynthesis	1. What is ‘random sampling’ used for? 1. What piece of equipment is used in random sampling? 2. Why is it important that a large number of random locations are sampled? 1. What must be done with the results for number of organisms in each of these locations? 1. How can your answer to Q4 be used to estimate the total population size of organisms in the area?	1. What ion makes solutions acidic? 2. What ion makes solutions alkaline? 3. Write an ionic equation for the neutralisation reaction 4. Describe the relationship between the strength of the acid and the concentration of the ion in Q1 in solution 1. Describe the difference between a strong and weak acid 1. How many times more concentrated is the ion in Q1 in a solution of pH 2 to a solution of pH 3? 7.A solution of pH 1 compared to pH 3?
C2 – Required Practical 11 – Effect of concentration on rate of reaction	P1 – 6.4.2.3 – Half lives	P2 – 6.5.5.1 – Momentum
1. What is the independent variable? 1. The dependent variable can either be.... Or.... 3. Identify the control variables	1. What is the half life of this radioactive isotope?  1. If a radioactive isotopes starting count rate is 544 decays per min. How many half-lives has it undergone by the time it reaches 17?	1. Momentum is a property of moving objects. It is a vector quantity. What does this mean? 2. Change the subject of this equation Momentum = mass x velocity to calculate the mass of an object the velocity of an object 3. What is the unit of mass? 4. What is the unit of velocity? 5. What is the unit of momentum?

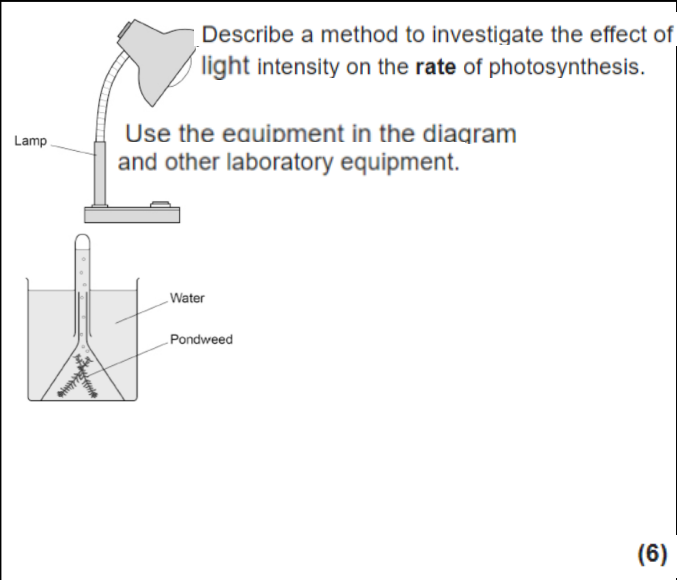
B1 – 4.4.1.1 - 4.4.1.2 Photosynthesis  Rate of photosynthesis in arbitrary units Light intensity in arbitrary units Describe the effect of increasing light intensity on the rate of photosynthesis. You should include numbers from Figure 3 in your description. At a light intensity of 250 arbitrary units, light is not a limiting factor of photosynthesis. What is the evidence for this in Figure 3?	B2 – Required Practical 7: Sampling Techniques Describe how quadrats should be used to estimate the number of dandelion plants in a field. _____ _____ _____ _____ (4) The field measured 40 m by 145 m. The students used 0.25 m² quadrats. The students found a mean of 0.42 dandelions per quadrat. (2) Estimate the population of dandelions on the field. How could the students make their estimate more accurate? (1)	C1 – 5.4.2.5 – Strong & Weak Acids Hydrochloric acid is a strong acid. Ethanoic acid is a weak acid. Describe a reaction that could be used to show the difference between a weak acid and a strong acid. You should explain why the weak acid and the strong acid give different results. _____ _____ _____ _____ _____ _____ (6)
C2 – Required Practical 11 – Effect of concentration on rate of reaction  Total volume of gas collected in cm³ Time in seconds 2.0 mol/dm³ 1.0 mol/dm³ 0.5 mol/dm³ How do the results show that increasing the concentration of acid increases the rate of reaction? You must use data from the graph in your answer.	P1 – 6.4.2.3 – Half lives Why is rolling dice a suitable model for radioactive decay? (1)  Activity in becquerels Time in years The sample was collected from the desert in 1992. Determine the activity of the tritium in the sample in 2007 What is the half-life of tritium?	P2 – 6.5.5.1 – Momentum The diagram below shows the bowling ball hitting one of the pins.  The bowling ball has a velocity of 5.0 m/s when it hits the pin. The momentum of the bowling ball is 26 kg m/s Calculate the mass of the bowling ball. (3)

B1 – Required Practical 5: Effect of light intensity on rate of photosynthesis	B2 – 4.6.4 - Classification	C1 – 5.2.2.7 Properties of Metals & Alloys													
1. What is the independent variable? 2. How is the independent variable changed? 3. What is the dependent variable? 4. Identify the control variables 5. What is the function of the sodium hydrogen carbonate solution?	1. What are the order of the Linnean categories of classification? K P C O F G S Which two of these categories of classification is used to derive the binomial name for each species?	1. Why are metals good conductors of heat and electricity? 1. Why are pure metals soft and malleable? 1. What is an alloy? 1. Why are alloys harder than pure metals?													
C2 – 5.10.1.2 – Potable Water	P1 – 6.4.2.4 – Radioactive contamination	P2 – 6.5.4.1.4 – Distance – time relationship													
1. What is potable water? 2. Ground water (where rainfall collects) must first be sterilised. What does this mean and what is used to sterilise it? 3. In countries with limited rainfall, desalination is performed on sea water. How is this done? 4. What are the disadvantages of desalination?	1. What is irradiation? 2. What can it be used for? 3. What are the risks associated for the workers that irradiate objects? 4. What precautions can they take for.. Alpha radiation? Beta and gamma radiation? 5. What is radioactive contamination? 6. What does ‘peer review’ mean?	1.What do these features of a distance-time graph show? <table><tr><th>Key</th><th>Distance-time graph</th></tr><tr><td>Horizontal line</td><td></td></tr><tr><td>Upwards diagonal line</td><td></td></tr><tr><td>Downwards diagonal line</td><td></td></tr><tr><td>Curved line upwards</td><td></td></tr><tr><td>Curved line downwards</td><td></td></tr></table> 2. How can speed be calculated from a distance-time graphs? 3. What is the relationship between speed and the gradient of the line?		Key	Distance-time graph	Horizontal line		Upwards diagonal line		Downwards diagonal line		Curved line upwards		Curved line downwards	
Key	Distance-time graph														
Horizontal line															
Upwards diagonal line															
Downwards diagonal line															
Curved line upwards															
Curved line downwards															

B1 – Required Practical 5: Effect of light intensity on rate of photosynthesis

Describe a method to investigate the effect of light intensity on the rate of photosynthesis.

Use the equipment in the diagram and other laboratory equipment.



(6)

B2 –4.6.4 - Classification

Table 1 shows the classification of one species of wheat.

Kingdom	Plant	Family	Poaceae
Phylum	Angiosperms	Genus	Triticum
Class	Monocotyledons	Species	spelta
Order	Commelinids		

What is the binomial name for the wheat in Table 1?

	DNA Codes								Number of differences in DNA code compared with the human sequence
Human	A	B	C	D	E	F	G	H	I
Pig	J	F	C	D	E	F	G	H	I
Wheat	C	I	K	D	M	F	G	H	I
Yeast	C	I	K	D	L	M	G	H	I
Chicken	J	F	C	D	M	F	G	H	I

Which organism in Table 2 appears to be most closely related to humans?

(4)

C1 – 5.2.2.7 Properties of Metals & Alloys

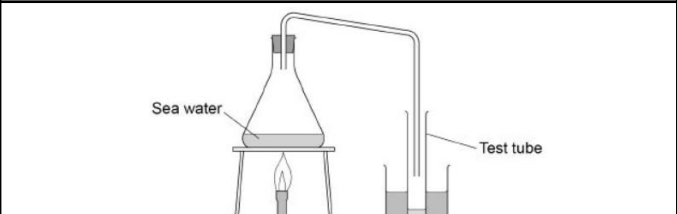
Pure iron

Cast iron

Copper is a metal. Explain how it conducts electricity.

(2)

C2 – 5.10.1.2 – Potable Water



What change of state is happening at the surface of the sea water in Figure 2?

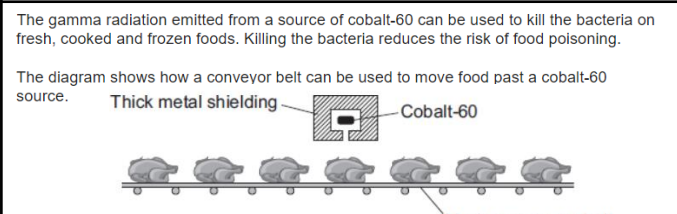
Describe how the water in the test tube in Figure 2 is different from the sea water.

Why does producing drinking water from sea water using distillation cost a lot of money?

P1 – 6.4.2.4 – Radioactive contamination

The gamma radiation emitted from a source of cobalt-60 can be used to kill the bacteria on fresh, cooked and frozen foods. Killing the bacteria reduces the risk of food poisoning.

The diagram shows how a conveyor belt can be used to move food past a cobalt-60 source.



Which one of the following gives a way of increasing the amount of gamma radiation the food receives?

Increase the temperature of the cobalt-60 source. ☐

Make the conveyor belt move more slowly. ☐

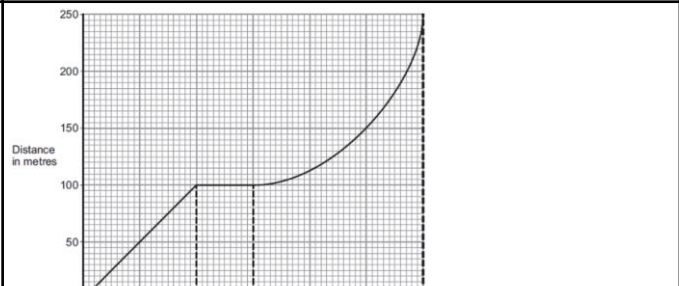
Move the cobalt-60 source away from the conveyor belt. ☐

To protect people from the harmful effects of the gamma radiation, the cobalt-60 source has thick metal shielding.

Which one of the following metals should be used?

aluminium copper lead

P2 - 6.5.4.1.4 – Distance – time relationship

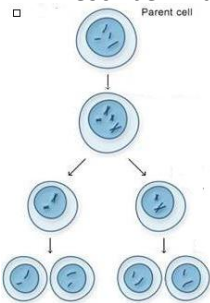


Describe the motion of the bus between 20 seconds and 30 seconds.

Describe the motion of the bus between 30 seconds and 60 seconds.

What is the speed of the bus at 45 seconds?

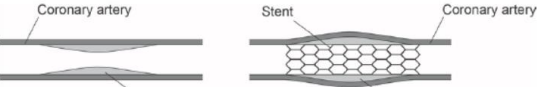
Show clearly on the figure above how you obtained your answer.

B1 – 4.2.2.4 – Coronary Heart Disease 1. CHD is a non-communicable disease – what does this mean? 2. In CHD – there is a build up of fatty material in the coronary arteries a. What effect does this have on the coronary arteries? b. Which substance in the blood is now delivered less to cells? c. Which chemical reaction is this substance needed for in heart cells? 3. Describe the role of stents and statins.	B2 – 4.6.1.2 - Meiosis 1. What type of cells is meiosis used to produce? 1. Describe what is being shown in the diagram  1. Compare the daughter cells produced from meiosis and mitosis	C1 – 5.4.2.1 Reaction of Metals & Acids Complete these word equations: 1. zinc + hydrochloric acid ? 1. iron + sulfuric acid ? 3. Define the term ‘displacement reaction’ 4. Which element is displaced in the two reactions above? 5. Is this element oxidised or reduced?
C2 – 5.8.1.1 - 5.8.1.2 - Pure substances & Formulations 1. What does a pure substance mean in chemistry? 2. How can a pure substance be identified? 3. What is a formulation? 4. Give examples of some formulations	P1 – 6.2.1.2 – Electrical Charge and Current 1. What is electrical current? 2. Change the subject of this equation to calculate current $\text{charge flow} = \text{current} \times \text{time}$ 2. Change the subject of this equation to calculate time $\text{charge flow} = \text{current} \times \text{time}$ 3. What is the unit of charge? 4. What is the unit of current?	P2 – 6.5.5.2 – Conservation of momentum 1. Describe the principle of the conservation of momentum 2. Under the visualiser A blue snooker ball collides with a red snooker ball that is travelling towards it. Calculate the velocity of the blue ball after the collision. 

B1 – 4.2.2.4 – Coronary Heart Disease

Explain what happens to the heart in coronary heart disease.

(3)



Explain why the stent helps to prevent a heart attack.

(4)

B2 – 4.6.1.2 - Meiosis

In sexual reproduction, cells divide by meiosis to form gametes.

Which **two** statements are true for cell division by meiosis?

Daughter cells have two sets of chromosomes. ☐

Four daughter cells are formed. ☐

The daughter cells are genetically identical. ☐

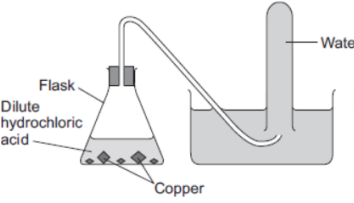
The DNA replicates twice. ☐

The parent cell divides twice. ☐

(2)

C1 – 5.4.2.1 Reaction of Metals & Acids

A student was trying to produce hydrogen gas.



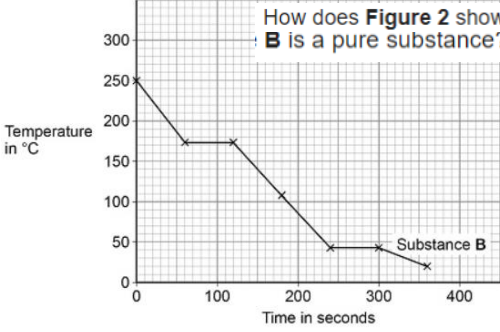
No gas was produced.

The student's teacher said that this was because the substances in the flask did **not** react. Suggest why

Experiment	Volume of hydrogen collected in one minute in cm ³
1	49
2	50
3	35
4	48

Calculate the mean volume of hydrogen collected in one minute.

C2 – 5.8.1.1 - 5.8.1.2 - Pure substances & Formulations

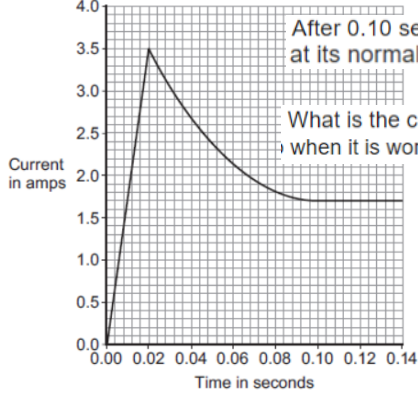


How does **Figure 2** show that substance **B** is a pure substance?

Determine the melting point of substance **B**.

What name is given to mixtures that are designed as useful products?

P1 – 6.2.1.2 – Electrical Charge and Current



After 0.10 seconds, the bulb works at its normal brightness.

What is the current through the bulb when it is working at normal brightness?

The bulb works at normal brightness for 30 seconds before it is switched off.

Calculate the charge that flows through the bulb in the 30 seconds before it is switched off. Give the unit.

P2 - 6.5.5.2 – Conservation of momentum

Person **A** collides with person **B**. After the collision they move together with the same velocity.

Before collision

Person A mass = 60 kg
Person B mass, m

Speed of Person A = 5.5 m/s
Speed of Person B = 2.0 m/s

After collision

Person A and person B moving off together

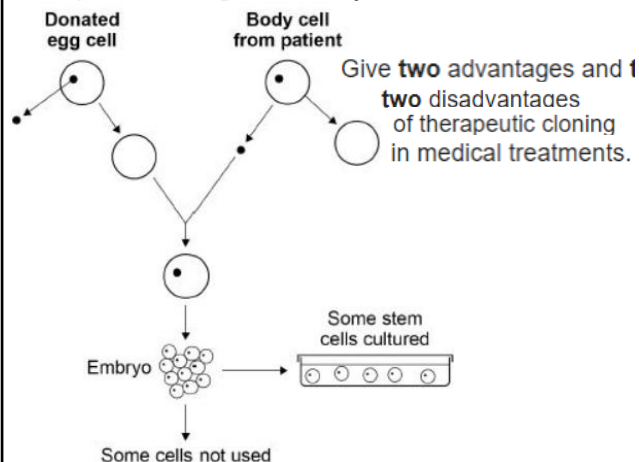
Speed of Person A and Person B = 4.0 m/s

Calculate the mass, m , of person **B**.

B1 – 4.1.2.3 – Stem Cells	B2 – 4.5.1 & 4.5.3.1 Homeostasis & Endocrine System	C1 – 5.3.2.2. – Amounts of substances in equations
1. What is a stem cell? 2. State two places where stem cells can be found in humans 3. State where stem cells are found in plants 4. Describe the disadvantages of treatments involving the transfer of stem cells you mentioned in Q2.	1. What is homeostasis? 2. The maintenance of which conditions are controlled by the endocrine system? 3. Define the term ‘hormone’ 4. Name some glands 5. Compare the effects of endocrine system to that of nervous system	Under the visualiser Calculate the mass of carbon dioxide which is formed by decomposing 14g of calcium carbonate. $\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$ Calculate the mass of oxygen which is needed to react with magnesium to form 72g of magnesium oxide. $2 \text{ Mg} + \text{O}_2 \rightarrow 2 \text{ MgO}$
C2 – 5.6.2.6 – Effect of changing temperature on equilibrium	P1 – Required Practical 14: Specific heat capacity	P2 – 6.7.2.1 – Electromagnetism
1. State Le Chatelier’s principle 2. What effect on the position of equilibrium does increasing the temperature have on a reversible reaction? 3. What effect on the position of equilibrium does increasing the temperature have on these reactions? a. $\text{N}_2 + 3\text{H}_2 \rightleftharpoons 2\text{NH}_3$ forward $\Delta H = -93 \text{ kJ/mol}$ b. $\text{N}_2 + \text{O}_2 \rightleftharpoons 2\text{NO}$ forward $\Delta H = +18 \text{ kJ/mol}$	1. Complete the definition The specific heat capacity of a substance is the _____ required to raise the _____ of _____ of a substance by _____. 2. What piece of equipment is needed to measure: the mass of the substance? the change in temp of the substance? the energy supplied to the substance? 3. Change the subject of this equation to calculate specific heat capacity (SHC) Energy transferred = mass x SHC x change in temp 0.95kg of oil was heated from 20 to 75°C. 87258J of energy is supplied by the heater. Calculate the SHC of the oil.	1. Draw the magnetic field of this solenoid  2. Why does shaping the wire into a solenoid increase the strength of the magnetic field created by the current through the wire? 3. Describe 3 ways of increasing the strength of an electromagnet

B1 – 4.1.2.3 – Stem Cells

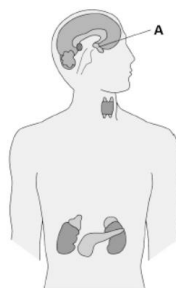
Figure 2 shows how embryonic stem cells are produced in therapeutic cloning for use in patients.



B2 – 4.5.1 & 4.5.3.1 Homeostasis & Endocrine System

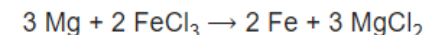
Which **two** processes are regulated by homeostasis?

Controlling water output in urine
 Defending the body against pathogens
 How quickly you walk
 Keeping cool on a hot day
 Waking up in the morning



What is the name of gland **A**?

C1 – 5.3.2.2. – Amounts of substances in equations



0.120 g of magnesium reacts with excess iron chloride solution.

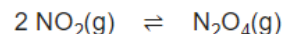
Relative atomic masses (A_r): Mg = 24 Fe = 56

Calculate the mass of iron produced, in mg

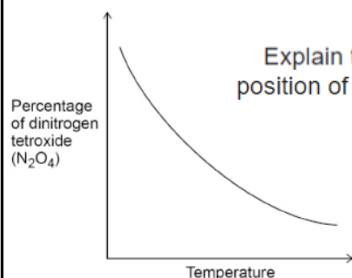
(5)

C2 – 5.6.2.6 – Effect of changing temperature on equilibrium

Nitrogen dioxide gas reacts to form dinitrogen tetroxide gas.



Explain the effect on the equilibrium position of increasing the temperature.



P1 – Required Practical 14: Specific heat capacity

Students investigated the specific heat capacity of different oils.

- Put 200 g of an oil in a beaker.
- Record the temperature of the oil.
- Switch on the heater.
- After 5 minutes, record the temperature of the oil and the reading on the joulemeter.
- Repeat steps 1–4 with different oils.

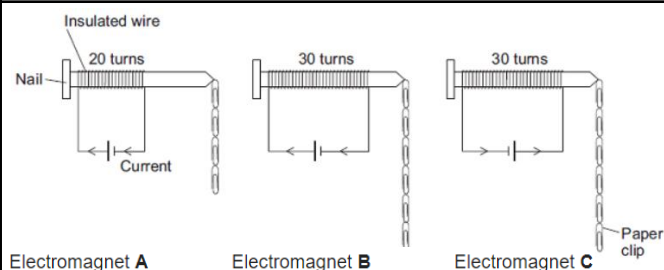
Give **one** variable the students controlled in the investigation.

Temperature at start in $^{\circ}\text{C}$	Temperature after 5 minutes in $^{\circ}\text{C}$
21	68

What is the resolution of the thermometer used in the investigation?

(3)

P2 - 6.7.2.1 – Electromagnetism

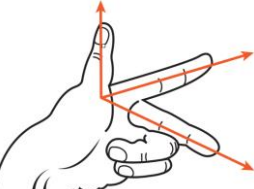


Complete the conclusion that the student should make from this investigation.

Increasing the number of turns of wire wrapped around the nail will _____ the strength of the electromagnet.

Suggest **two** variables that the student should control in this investigation.

- _____
- _____

B1 – 4.3.1.1 – Communicable Diseases 1. Define the term ‘communicable disease’ 2. Define the term ‘pathogen’ 3. State the 4 different types of pathogen 4. Give a disease caused by each of these methods of transfer, and a way to reduce the spread Droplets in air Bodily fluids Vectors	B2 – 4.7.3.5. – Global Warming 1. The rising concentrations of which gases in the atmosphere are contributing to global warming? 1. Which human activities are resulting in the rising concentration of these gases in the atmosphere? 3. Describe the consequences of global warming	C1 – 5.4.1.4 – Oxidation & Reduction in terms of electrons 1. Define oxidation in terms of electrons 1. Define reduction in terms of electrons Complete the half equations by balancing them, and then adding the correct number of electrons (+ e) to the left or right hand side to show the loss or gain. $\text{Cu}^{2+} \quad ? \quad \text{Cu}$ (oxidation/reduction) $\text{O}^{2-} \quad ? \quad \text{O}_2$ (oxidation/reduction) $\text{Li}^+ \quad ? \quad \text{Li}$ (oxidation/reduction) $\text{H}^+ \quad ? \quad \text{H}_2$ (oxidation/reduction) $\text{Al}^{3+} \quad ? \quad \text{Al}$ (oxidation/reduction)
C2 – 5.6.2.7 – Effect of changing pressure on equilibrium 1. State Le Chatelier’s principle 2. What effect on the position of equilibrium does increasing the pressure have on a rev. reaction? 3. What effect on the position of equilibrium does increasing the temperature have on these reactions? a. $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightleftharpoons 2\text{NH}_3(\text{g})$ a. $\text{N}_2\text{O}_4(\text{g}) \rightleftharpoons 2\text{NO}_2(\text{g})$	P1 – 6.2.4.3 – The National Grid 1. What is the function of step- up transformers? 1. Where in the National Grid are they placed? 1. What is the function of step-down transformers? 1. Where in the National Grid are they placed?	P2 – 6.7.2.2 – Fleming’s Left Hand Rule When the direction of current through a wire is perpendicular to the magnetic field of another magnet – a force is exerted on the wire and it moves. The direction of the force (and movement of the wire) can be determined by using Fleming’s left hand rule. What does each finger represent?  The equation to calculate the size of the force is: Force = magnetic flux density x current x length of wire Change the subject to calculate length of wire.

B1 – 4.3.1.1 – Communicable Diseases

Draw **one** line from each disease to the type of pathogen that causes the disease.

Disease

Type of pathogen

Gonorrhoea

Bacterium

Fungus

Protist

Measles

Virus

(2)

Give **two** ways that the body prevents pathogens entering the body.

(2)

Give **two** ways to prevent the spread of HIV.

(2)

B2 – 4.7.3.5. – Global Warming

The area of ocean with sea ice in the arctic has changed.

Most scientists believe this is due to the activities of humans.

Explain the activities of humans that have led to the changes in sea ice

(6)

C1 – 5.4.1.4 – Oxidation & Reduction in terms of electrons

Calcium reacts with fluorine to produce calcium fluoride (CaF₂).

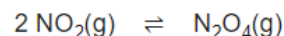
Explain how oxidation and reduction have taken place in this reaction.

Write about electron transfer in your answer.

(4)

C2 – 5.6.2.7 – Effect of changing pressure on equilibrium

Nitrogen dioxide gas reacts to form dinitrogen tetraoxide gas.

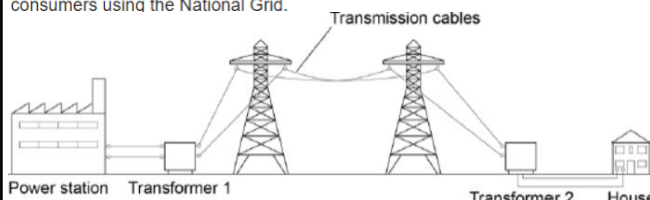


Explain the effect on the equilibrium position of increasing the pressure.

(2)

P1 – 6.2.4.3 – The National Grid

The figure below shows how electrical power is transferred from power stations to consumers using the National Grid.



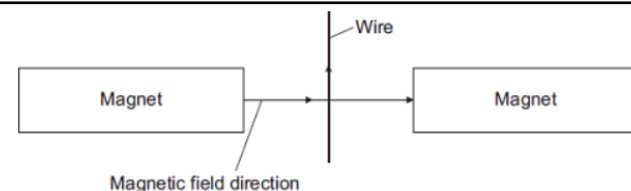
Transformer 1 is a step-up transformer.

Explain why step-up transformers are used in the National Grid.

What is the purpose of Transformer 2?

(1)

P2 - 6.7.2.2 – Fleming's Left Hand Rule



In which direction does the force on the wire act?

Suggest **three** changes that would **decrease** the force acting on the wire.

1. _____
2. _____
3. _____

In one experiment, the teacher determined that the force on the wire was 2.14 mN
The current in the wire was 0.32 A

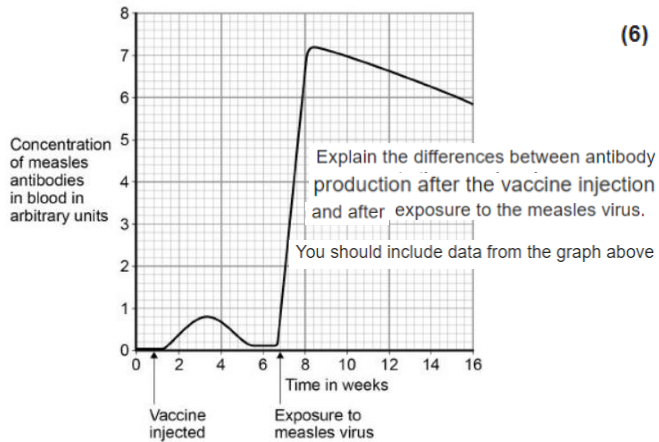
The length of wire within the magnetic field was 0.048 m
Calculate the magnetic flux density between the two magnets.

Give your answer to 2 significant figures.

(3)

B1 – 4.3.1.7 – Vaccination Number these statements to describe how vaccination will prevent illness caused by a pathogen • The white blood cells respond by producing the correct antibodies, that are complimentary to the antigen on the pathogen's surface, to destroy the pathogen • The antibodies are made much quicker and in higher quantities than after the vaccine • A small amount of a dead or inactive version of the pathogen is injected into the body • The pathogen is destroyed before it is able to make the individual ill • If the same pathogen re-enters the body, the white blood cells identify the pathogen from the antigen on its surface	B2 – 4.7.3.2 – Waste Management How can pollution occur in the following places: Water Air On land What is the biological impact of pollution?	C1 – 5.4.3.2 – Electrolysis of molten ionic compounds 1. Why do the ionic compounds used as the electrolyte have to be molten or aqueous? 1. Why are the electrode made of graphite? 1. Lithium bromide is made of Li^+ and Br^- ions a. Which electrode do the lithium ions move towards and why? b. What happens to them there in terms of electrons? c. Which electrode do the bromide ions move towards and why? d. What happens to them there in terms of electrons?
C2 – 5.10.1.3 – Waste water treatment Urban lifestyles and industrial processes produce large amounts of waste water. Why does it require treatment before being released into the environment? What is removed? How is it removed?	P1 – 6.2.1.3 – Current, resistance and potential difference 1. What is electrical current? 2. What is the relationship between the resistance of a component and the current through it? 3. Change the subject of this equation <i>potential difference = current × resistance</i> to calculate the current through a component the resistance through a component 4. What are the units of potential difference? 5. What are the units of resistance?	P2 – 6.5.1.1 – Scalar and Vector Quantities 1. Define the term 'scalar' quantity 1. Give examples of scalar quantities 1. Define the term 'vector' quantity 1. Give examples of vector quantities

B1 – 4.3.1.7 – Vaccination



(6)

B2 – 4.7.3.2 – Waste Management

Agricultural waste water requires the removal of harmful _____.

Industrial waste water may require the removal of harmful _____.

(2)

Use words from the list to complete the sentences about pollution.

oxygen pesticides sewage sulphur dioxide

The air might be polluted by _____ from the industrial site.

The river might be polluted by _____ from the village and by _____ from the farmland.

(3)

The owners of the quarry want to make it larger.

Give **one** effect that this might have on wild plants and animals that live near the quarry.

C1 – 5.4.3.2 – Electrolysis of molten ionic compounds

A student investigates a potassium salt, **X**.

She finds that salt **X**:

- has a high melting point
- does not conduct electricity when it is solid
- dissolves in water and the solution does conduct electricity.

What is the type of bonding in salt **X**?

Covalent Giant molecular Ionic Metallic

Why does a solution of salt **X** in water conduct electricity? (1)

the electrolysis of molten lead bromide.

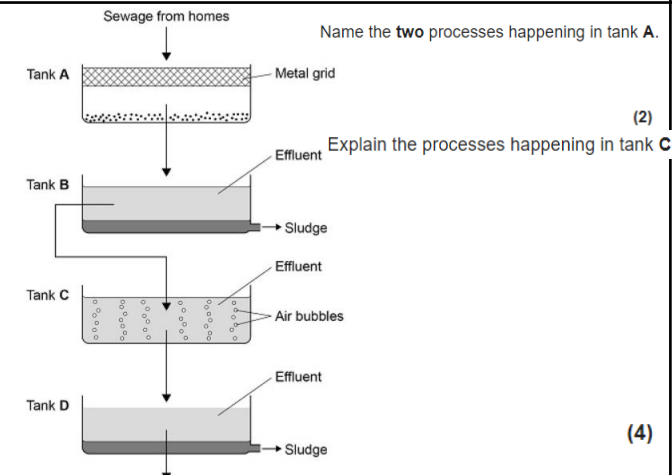
The electrolyte contains lead ions (Pb^{2+}) and bromide ions (Br^-).

At the positive electrode the gas produced is _____

At the negative electrode lead _____ gain electrons

(2)

C2 – 5.10.1.3 – Waste water treatment



Name the **two** processes happening in tank A.

(2)

Explain the processes happening in tank C.

(4)

The water from tank **D** is sterilised. Why is the water from tank **D** sterilised?

(1)

P1 – 6.2.1.3 – Current, resistance and potential difference

A student investigated how the current in a resistor varies with the potential difference across the resistor.

The student increased the resistance of the variable resistor. How did increasing the resistance affect the current in the circuit? (1)

How should the student change the circuit to give negative values for current and potential difference? (1)

Name the type of relationship between current and potential difference for a resistor at constant temperature. (1)

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. (2)

P2 – 6.5.1.1 – Scalar and Vector Quantities

Which of the following quantities are scalars?

Tick (✓) **two** boxes.

Distance ☐ Speed ☐ Velocity ☐
Displacement ☐ Force ☐

Give the difference between a vector quantity and a scalar quantity.

_____ (1)

Give **two** ways that the force arrows show that forces are vector quantities.

1. _____

2. _____

(2)

B1 – 4.4.2.1 – Aerobic & Anaerobic Respiration

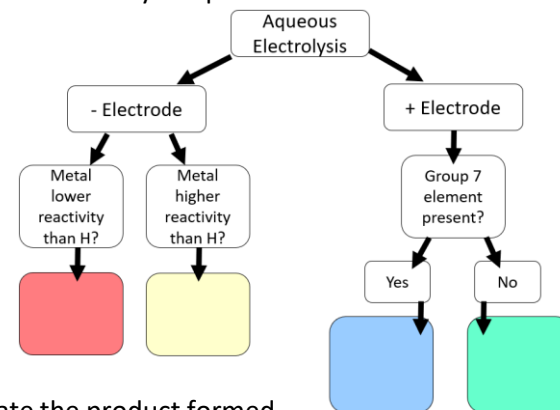
1. Write the word equation for aerobic respiration
1. On which organelle does aerobic respiration take place?
3. Is respiration and endo or exothermic reaction?
4. Write the word equation for anaerobic respiration in humans
5. Describe the main differences between aerobic and anaerobic respiration
6. Write the word equation for anaerobic respiration in yeast cells

B2 – 4.5.3.5 Use of Hormones to Treat Infertility

1. In IVF, what are the functions of the following hormones being given to the woman?
FSH
LH
2. Number the statements to put the stages of IVF in the correct order
 - At the stage when they are tiny balls of cells, one or two embryos are inserted into the mother's uterus (womb).
 - The eggs are collected from the mother and fertilised by sperm from the father in the laboratory.
 - The woman is given FSH and LH
 - The fertilised eggs develop into embryos.

C1 – Required Practical 9: Electrolysis of aqueous solutions

Fill in the blank boxes of the flow diagram to show how to identify the product formed at each electrode



State the product formed at each electrode from the following solutions

- Magnesium bromide
- Copper sulfate

C2 – 5.9.3.1 – Atmospheric pollutants

1. How is sulfur dioxide (SO₂) released into the atmosphere?
2. What is the effect of SO₂ in the atmosphere?
3. What is the effect of CO₂ in the atmosphere?
4. How is carbon monoxide (CO) released into the atmosphere?
4. What is the effect of CO in the atmosphere?
5. What is the effect of carbon particulates in the atmosphere?

P1 – Required Practical 16 – IV characteristics

1. What component is used to measure the potential difference across the component?
2. How is it connected?
3. What component is used to measure the current through the component?
4. How is it connected?
5. Draw the circuit symbol for a resistor
6. Draw the circuit symbol for a diode
7. How do you reverse the direction of the current?

P2 – 6.5.4.2.2 Newton's Second Law

Change the subject of this equation
resultant force = mass x acceleration
 to calculate the mass of the object

to calculate the acceleration of the object

4. What are the units of force?
5. What are the units of mass?
6. What are the units of acceleration?
7. Define acceleration

B1 – 4.4.2.1 – Aerobic & Anaerobic Respiration

Aerobic respiration and anaerobic respiration are the two types of cell respiration.

Give **three** differences between aerobic and anaerobic respiration.

1. _____
2. _____
3. _____

(3)

Compare the processes of anaerobic respiration in muscle and plant cells.

_____ (4)

B2 – 4.5.3.5 Use of Hormones to Treat Infertility

A woman is not able to become pregnant. The woman does not produce mature eggs. The woman decides to have In Vitro Fertilisation (IVF) treatment.

Which **two** hormones will help the woman produce and release mature eggs?

FSH and Luteinising Hormone (LH) ☐

FSH and oestrogen ☐

Luteinising Hormone (LH) and oestrogen ☐

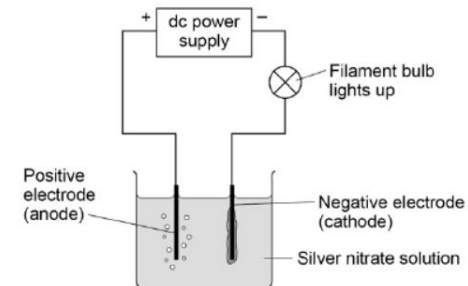
Giving these hormones to the woman helps her to produce several mature eggs. Doctors collect the mature eggs from the woman in an operation.

Describe how the mature eggs are used in IVF treatment so that the woman may become pregnant.

_____ (3)

C1 – Required Practical 9: Electrolysis of aqueous solutions

Figure 1 shows the apparatus used to electrolyse silver nitrate (AgNO_3) solution.



Name the product discharged at each electrode.

Write a half equation for the reaction at each electrode.

(4)

C2 – 5.9.3.1 – Atmospheric pollutants

Burning fuels causes atmospheric pollution.

Write **one** effect for each pollutant in Table 1.

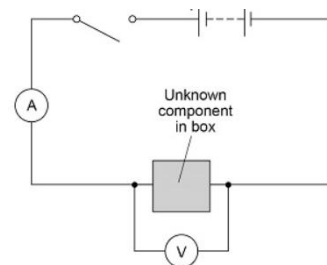
Pollutant	Effect
Carbon monoxide	
Sulfur dioxide	
Particulates	

Explain why soot forms.

_____ (2)

P1 – Required Practical 16 – IV characteristics

A teacher gave a student an unknown electrical component hidden in a box.



(3) The student measured the potential difference across the component and the current in the component.

She repeated this for several values of potential difference.

Give **one** way the circuit could be altered so that the potential difference across the component could be varied.

P2 – 6.5.4.2.2 Newton's Second Law

The mass of the paper clip is 0.0012 kg

Calculate the acceleration of the paper clip when the resultant force on it is 0.000168 N

Give the unit.

Acceleration = _____ Unit _____ (4)

When the resultant force on the trolley was 0.63 N the acceleration of the trolley was 2.1 m/s^2

Calculate the mass of the trolley.

Mass of trolley = _____ kg (3)

B1– 4.3.1.9 –Discovery & Development of drugs

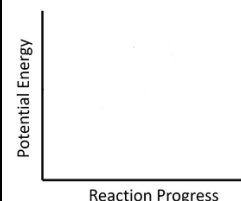
1. Which plant does the heart drug digitalis originate from?
2. Which tree does the painkiller aspirin originate from?
3. Which antibiotic was discovered by Alexander Fleming from mould?
4. What are new drugs tested on, before humans? Why is this?
5. Why are very low doses given to healthy volunteers during testing?
6. What does a 'double blind' trial mean?

B2 – 4.5.3.6 – Feedback Systems

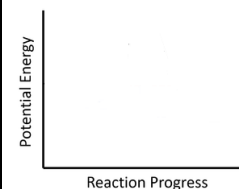
1. Where is adrenaline produced?
1. What is the role of the hormone adrenaline?
1. Where is thyroxine produced?
1. What is the role of the hormone thyroxine?
1. What is control by 'negative feedback'?

C1 – 5.5.1.2 – Reaction Profiles

Draw a reaction profile for an exothermic reaction and label & describe its features

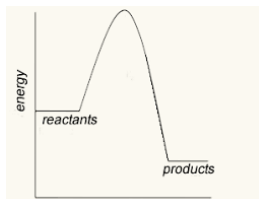


Draw a reaction profile for an endothermic reaction and label & describe its features



C2 – 5.6.1.4 - Catalysts

1. How do catalysts increase the rate of reactions?
2. Add a line onto this reaction profile to show the effect of adding a catalyst to this exothermic reaction



3. What effect does adding a catalyst have on the position of equilibrium in a reversible reaction?

P1 – 6.1.1.1 – Energy stores and systems

kinetic energy = $0.5 \times mass \times speed^2$
Elastic P.E. = $0.5 \times spring\ constant \times extension^2$
G.P.E. = $mass \times gravitational\ field\ strength \times height$

1. An 80 kg diver climbs 10m to the top of the platform, how much GPE does he acquire?
2. Calculate the mass of an object that has a G.P.E of 250J and is up at a height of 20cm.
3. Calculate the kinetic energy of a car that travels at a speed of 20m/s and has a mass of 1200 kg.
4. Calculate the mass of an automatic door closing 0.2m/s, with a kinetic energy of 1.6J.
5. A spring with $k = 520\text{ N/m}$ stores 7.04 J. How far is it extended?

P2 – 6.6.2.4 – Uses and dangers of EM Waves

Part of EM wave	Uses	Dangers
Radio waves		
Microwaves		
Infrared		
Visible light		
Ultraviolet		
X-rays		
Gamma		

Explain why x-rays and gamma rays are used for these reasons

B1– 4.3.1.9 –Discovery & Development of drugs

Before the clinical trials, drugs are tested in the laboratory.
The laboratory trials are **not** trials on people.
What is the drug tested on in these laboratory trials?

(1)

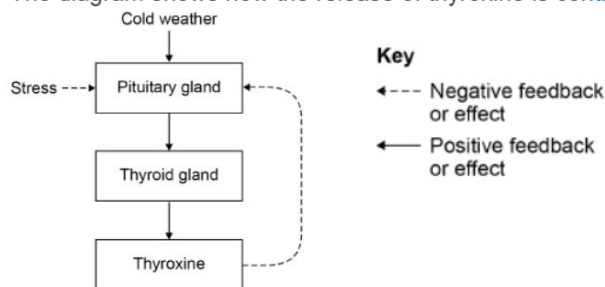
Drugs must be trialled before the drugs can be used on patients.
Give **three** reasons why.

(3)
In a double blind trial, who knows which volunteers are given the drug and which volunteers are given the placebo?

The doctors but not the volunteers	
The doctors and the volunteers	
The volunteers but not the doctors	
Neither the volunteers nor the doctors	

B2 – 4.5.3.6 – Feedback Systems

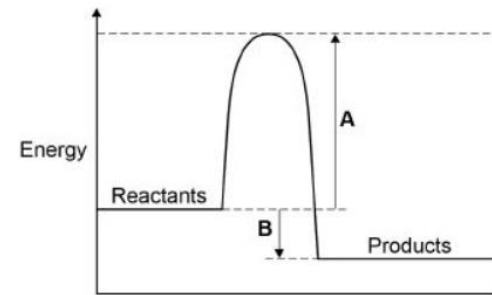
The diagram shows how the release of thyroxine is controlled.



Explain how the body regulates the amount of thyroxine that is produced if the body is **not** stressed or cold.
Use information shown in the diagram.

(2)

C1 – 5.5.1.2 – Reaction Profiles



What do **A** and **B** represent on **Figure 2**?

A _____

B _____ (2)

How does the reaction profile diagram show that the reaction is exothermic?

(1)

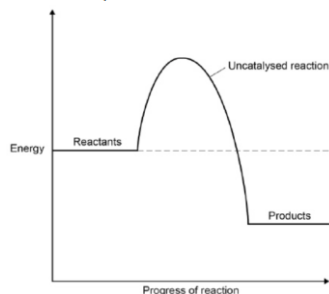
C2 – 5.6.1.4 - Catalysts

Hydrogen is obtained from natural gas.

One stage in the process is to react carbon monoxide with steam.
Give **two** reasons why a catalyst is used in the reaction between carbon monoxide and steam.

(2)

Draw the reaction profile for the reaction **with a catalyst** on **Figure 1**.



(2)

P1 – 6.1.1.1 – Energy stores and systems

A kangaroo has a maximum gravitational potential energy during one jump of 770 J

When the kangaroo lands on the ground 14% of the maximum gravitational potential energy is transferred to elastic potential energy in one tendon.

The tendon has an unstretched length of 35.0 cm

When the kangaroo lands on the ground the tendon stretches to a length of 42.0 cm

Calculate the spring constant of the tendon.

Spring constant = _____ N/m (5)

P2 - 6.6.2.4 – Uses of EM Waves

Some small fractures do not show up on an X-ray image.

To see the fracture doctors inject the patient with a radioactive isotope.

The image is formed by detecting radiation as it leaves the body.

Technetium-99 emits gamma radiation.

What is gamma radiation?

(1)

Explain why a gamma emitter is used.

(2)