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NAME	CLASS	INDEX NO.
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ST. PATRICK'S SCHOOL END-OF-YEAR EXAMINATIONS 2017

Subject : GENERAL SCIENCE **Date** : 4 OCTOBER 2017
Level : SECONDARY 2 EXPRESS **Duration** : 2 HOUR

INSTRUCTIONS TO CANDIDATES

DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO.

- Write your name, class and index number on the **Question Paper** and the **Optical Answer Sheet** in the spaces provided. **It is also required that you SHADE your index number on the Optical Answer Sheet.**
- This paper consists of **Three (3) Sections: Section A, Section B and Section C.**
- Answer **ALL** questions in **Section A** on the **Optical Answer Sheet** provided.
- Answer **ALL** questions in **Section B** in the spaces provided.
- Answer **ALL** questions in **Section C** in on the **writing paper** provided. Start each question on a new sheet of paper.
- Calculators may be used where necessary. **Give numerical answers to Three (3) significant figures.**
- DO NOT DETACH** any sections from this paper.
- At the end of the examination, arrange your answers to **Section C in order.**
- Submit the Optical Answer Sheet, this paper and answers to Section C **SEPARATELY.**

For Examiner's Use Only

Section	A (30 m)	B (40 m)	C (30 m)	Total (100 m)	Grade	Target Grade
Score						

*This question paper consists of 24 printed pages including this cover page.
 A copy of the Periodic Table is provided on page 24*

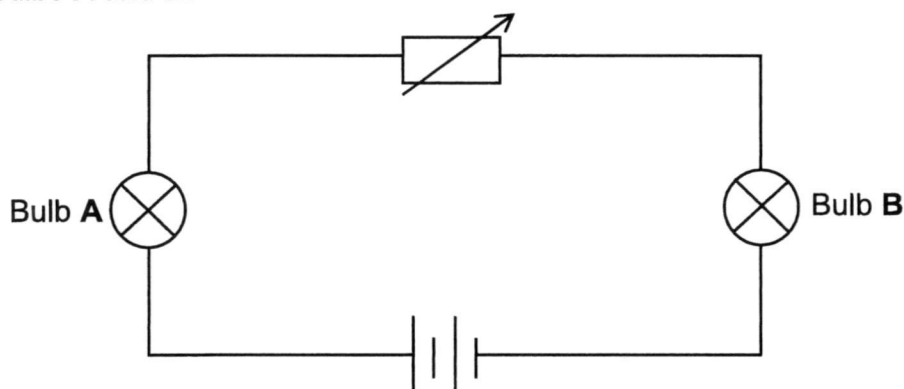
SECTION A [30 marks]:

Each question is provided with **four** possible answers (**A, B, C, and D**). Select the most appropriate answer and **shade** your choice in the **Optical Answer Sheet** provided.

- 1 An electric current is formed by the flow of _____.

A	atoms	B	electrons
C	neutrons	D	molecules

- 2 The following diagram shows a circuit with a variable resistor placed between the two light bulbs **A** and **B**.



Which one of the following options shows the change in brightness of the bulbs when the resistance is increased?

	<u>Bulb A</u>	<u>Bulb B</u>
A	Brighter	Dimmer
B	Brighter	Brighter
C	Dimmer	Brighter
D	Dimmer	Dimmer

- 3 Which of the following effect(s) can be achieved through an electric current?

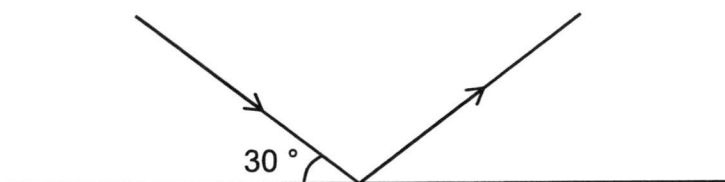
I Copper-plating a key
II Magnetizing an iron bar
III Produce heat through a high resistance wire

A	I only	B	II only
C	I and III only	D	I, II and III

- 4 Which one of the following terms **cannot** be used to describe an image formed by a plane mirror?

A	Virtual	B	Inverted
C	Same size	D	Laterally inverted

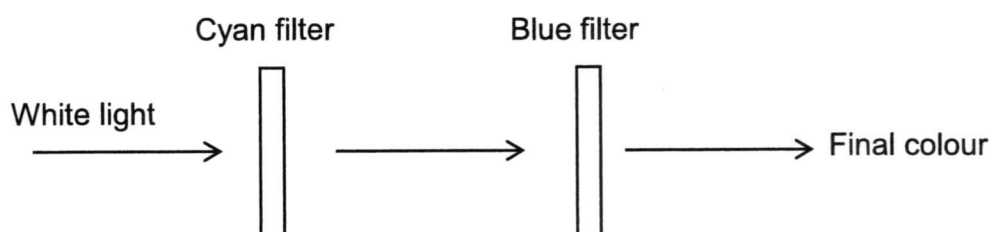
- 5 The following diagram shows a light ray hitting a reflective surface.



Which one of the following options correctly shows the angle of incidence ($\angle i$) and angle of reflection ($\angle r$)?

	$\angle i$	$\angle r$
A	30°	30°
B	30°	60°
C	60°	30°
D	60°	60°

- 6 A beam of white light was shone through two colour filters. What is the final colour produced?



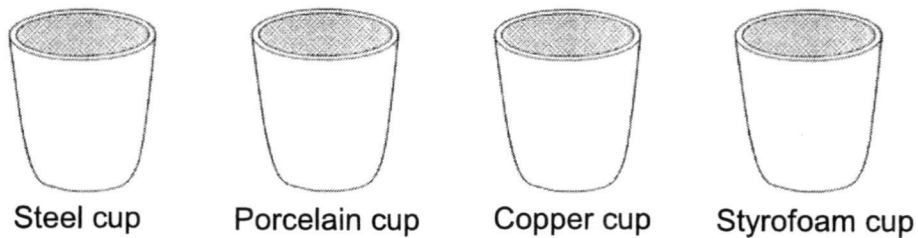
- | | | | |
|----------|-------|----------|-------|
| A | Blue | B | Black |
| C | Green | D | White |

- 7 Which of the following option(s) show(s) a possible effect of heat?

- I Increase size of particles
- II Increase mass of particles
- III Increase spacing between particles

- | | | | |
|----------|-----------------|----------|---------------|
| A | I only | B | III only |
| C | II and III only | D | I, II and III |

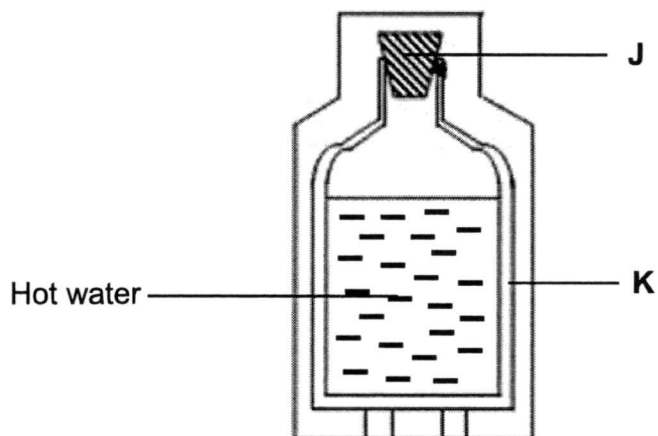
- 8 Four cups, made of different materials, were filled with equal amounts of boiling water. Over time, the temperature of the water decreases.



Which one of the following options shows the correct order of temperature of the water in the cups after 15 minutes?

	<u>Lowest</u> <u>Temperature</u>	→		<u>Highest</u> <u>Temperature</u>
A	Copper	Steel	Porcelain	Styrofoam
B	Copper	Porcelain	Steel	Styrofoam
C	Styrofoam	Porcelain	Steel	Copper
D	Styrofoam	Steel	Porcelain	Copper

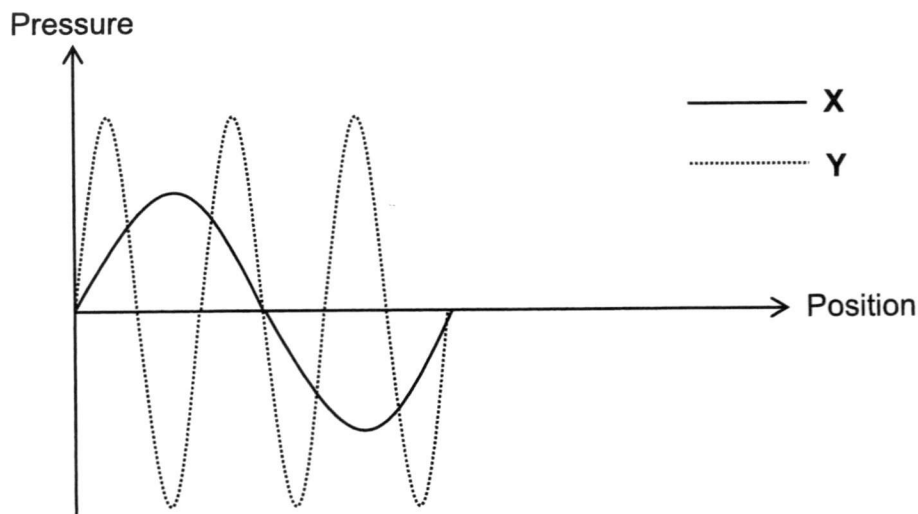
- 9 The following diagram shows a vacuum flask filled with water.



Which one of the following options correctly matches the features **J** and **K** of the vacuum flask to the ways they prevent heat loss of the hot water?

	<u>J</u>	<u>K</u>
A	Convection	Radiation
B	Convection	Conduction
C	Radiation	Radiation
D	Radiation	Conduction

- 10 The following diagram shows two sound waves X and Y.



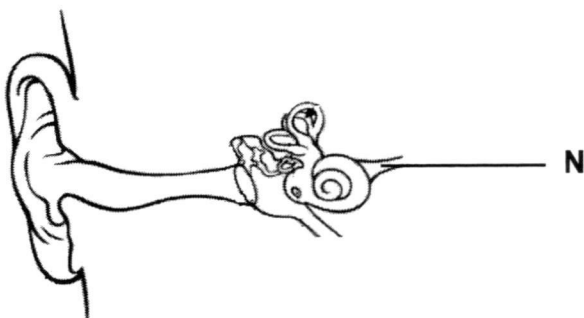
Which of the following option(s) is/are true?

- I X is louder than Y.
- II X has a lower pitch than Y.
- III X is a higher frequency than Y.

- A I only
- C II and III only

- B II only
- D I, II and III

- 11 The following diagram shows the structure of a human ear.



What is the function of part N?

- A Collect sound waves
- B Sends electrical signals to other nerves
- C Increases or decreases amplitude of sound
- D Vibrates according to the frequency of sound

12 Which of the following mixtures can be separated via magnetic attraction?

- I Nickel and oil
- II Iron and sand
- III Silver and water

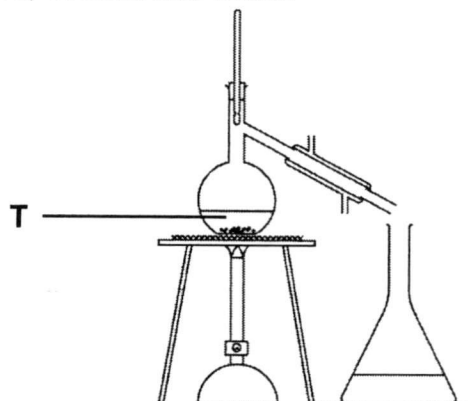
A I only

C I and II only

B III only

D I, II and III

13 The following diagram shows the experimental set-up for distillation. The distillation mixture contains sand, ethanol and water.



Which one of the following substances is left in apparatus T at 200 °C?

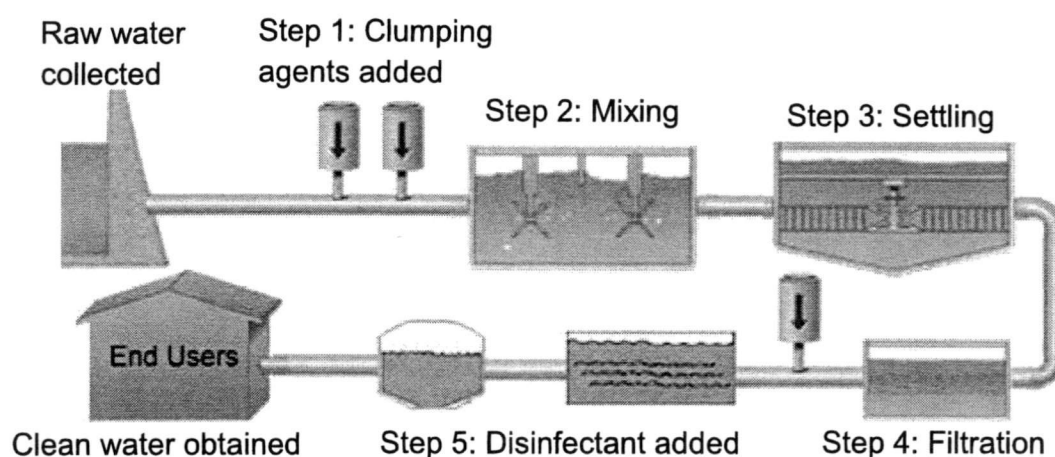
A Sand

C Ethanol

B Water

D No substances left

14 The following diagram shows the process taking place at a water-treatment plant that processes raw water into clean, potable water.



Which of the following step(s) show(s) a physical separation technique?

A Step 4 and 5

C Step 1, 2, 3 and 4

B Step 3 and 4

D Step 1, 2, 3, 4 and 5

15 An atom was found to have 14 protons, 14 neutrons and 14 electrons. Using the Periodic table provided on page 24, what is the identity of the atom?

- A Silicon
- C Nitrogen

- B Nickel
- D Molybdenum

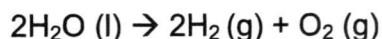
16 Some chalk was added into water and mixed well. Which one of the following statements is true about the resulting mixture?

- A It is a homogenous mixture.
- B It can be separated through physical means.
- C Heat was evolved when the mixture was formed.
- D The chemical composition of the substances has changed.

17 Which one of the following options best describes the similarity between oxidation and combustion processes?

- A Both processes produce a visible flame.
- B Both processes only occur in non-living things.
- C Both processes require the presence of oxygen.
- D Both processes involve the breaking down of chemical substances.

18 The following chemical equation shows the electrolysis of water.



Which one of the following options is true about the number of hydrogen atoms and oxygen atoms at the end of the reaction?

	<u>Number of hydrogen atoms</u>	<u>Number of oxygen atoms</u>
A	Increase	Decrease
B	Increase	Remain the same
C	Remain the same	Decrease
D	Remain the same	Remain the same

19 Magnesium hydroxide is a compound that is used to relief gastric pains. Which one of the following shows a property of magnesium hydroxide?

- A It is not corrosive.
- B It has a sour taste.
- C It has a pH of below 7.
- D It turns red litmus paper blue.

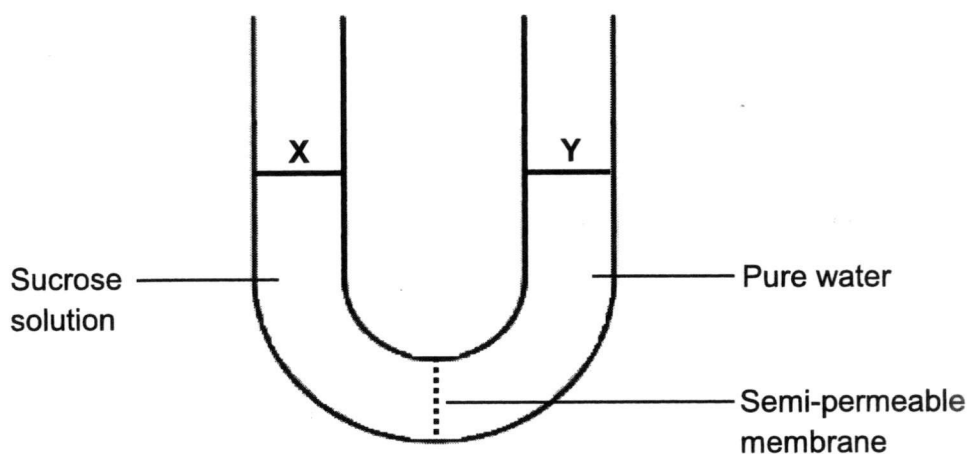
- 20 A beaker contains equal amounts of bromothymol blue indicator and methyl orange indicator. The following tables show the pH range at which they change colour.

	Bromothymol blue
Colour below pH 6	Yellow
Colour above pH 6	Blue

	Methyl Orange
Colour below pH 3	Red
Colour above pH 3	Yellow

A strong acid was added into the mixture. What is the final colour of the mixture?

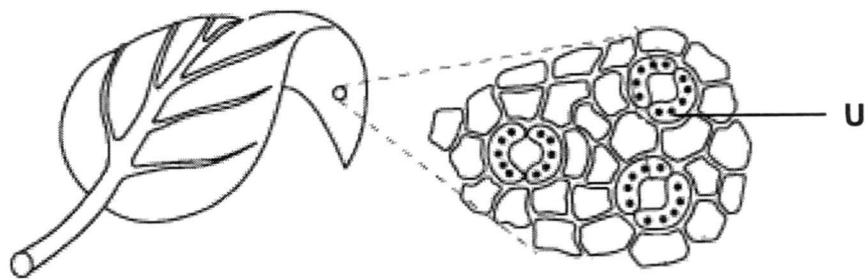
- A** Blue
B Green
C Yellow
D Orange
- 21 The following diagram shows a U-shaped tube with a partially-permeable membrane. One end of the tube is filled with sucrose solution, while the other end is filled with pure water.



Which one of the following options shows the changes in water levels at points X and Y after 30 minutes?

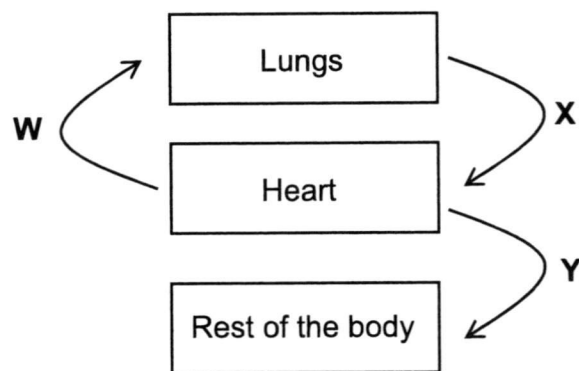
- | | <u>X</u> | <u>Y</u> |
|----------|----------|----------|
| A | Increase | Increase |
| B | Increase | Decrease |
| C | Decrease | Increase |
| D | Decrease | Decrease |

- 22 The following diagram shows some cells obtained from the leaf of a plant.



What is the main function of part **U**?

- A** Transport food
 - B** Produce cell sap
 - C** Storage of water
 - D** Control the movement of oxygen and carbon dioxide
- 23 The following diagram shows the movement of blood within the human circulatory system.



Which one of the following options shows the correct description of blood in each pathway?

- | | <u>W</u> | <u>X</u> | <u>Y</u> |
|----------|--------------------|--------------------|--------------------|
| A | Oxygenated blood | Oxygenated blood | Oxygenated blood |
| B | Oxygenated blood | Deoxygenated blood | Oxygenated blood |
| C | Deoxygenated blood | Oxygenated blood | Oxygenated blood |
| D | Deoxygenated blood | Oxygenated blood | Deoxygenated blood |
- 24 Which of the following option(s) best describes the function(s) of proteins in the human body?

- I** Building of enzymes
- II** Provide heat insulation
- III** Repair of worn-out tissues

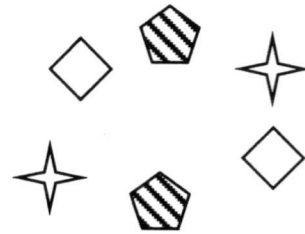
- A** I only
- B** I and III only
- C** II and III only
- D** I, II and III

- 25 A piece of fat was broken down by lipase. Which one of the following diagrams shows the possible products of digestion?

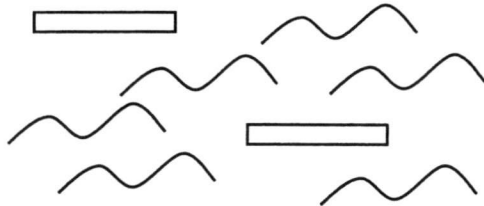
A



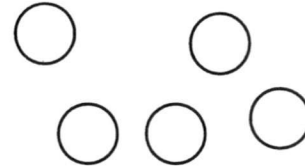
B



C



D



- 26 Which one of the following options is true about the small intestine?

- A It contains salivary amylase.
- B It helps in the storage of faeces.
- C It has numerous folds and glands.
- D It secretes hydrochloric acid to kill germs.

- 27 The following diagram shows a sperm cell.



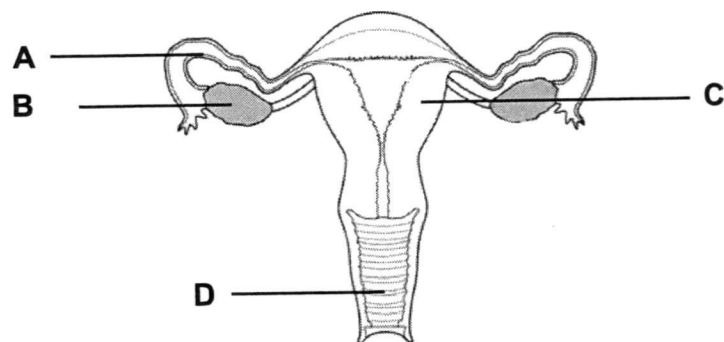
What is the function of part Z?

- A Contains genetic material
- B Contains energy for the sperm to move
- C Helps in the movement of the sperm cell
- D Helps to burrow through the cell layer of the ovum

- 28 Mrs Tan and her husband wish to start a family. Given that her period starts on the 1st of February and her menstrual cycle lasts for 28 days, which one of the following dates is she most fertile?

- | | |
|-----------------------------|-----------------------------|
| A 5 th February | B 10 th February |
| C 15 th February | D 25 th February |

29 The following diagram shows the female reproductive system.



At which part is an egg implanted after fertilisation?

30 Which one of the following methods is a form of permanent birth control in men?

A Vasectomy
C Contraceptive pills

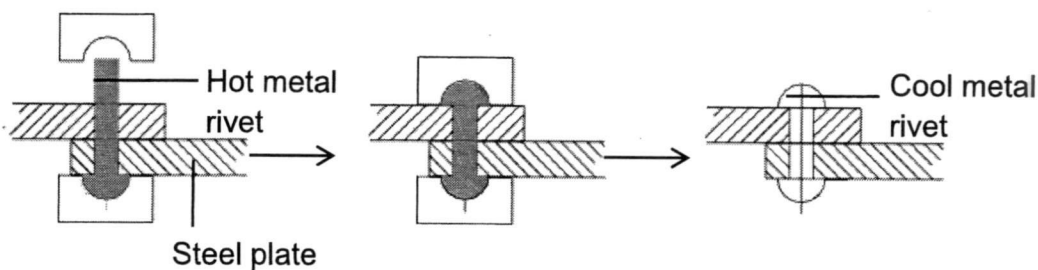
B Tubal ligation
D Intra-uterine devices

END OF SECTION A

SECTION B: [40 MARKS]

Answer **ALL** the questions. Show your working and your answers in the space provided.

- 1 Hot riveting is a process used to securely fasten two pieces of steel plates. The following diagram shows the process of hot-riveting.



- (a) With the help of the diagram, briefly explain the process of hot riveting.

.....

.....

.....

.....

[3]

- (b) Explain why rivets cannot be made using other materials such as ceramic or glass.

.....

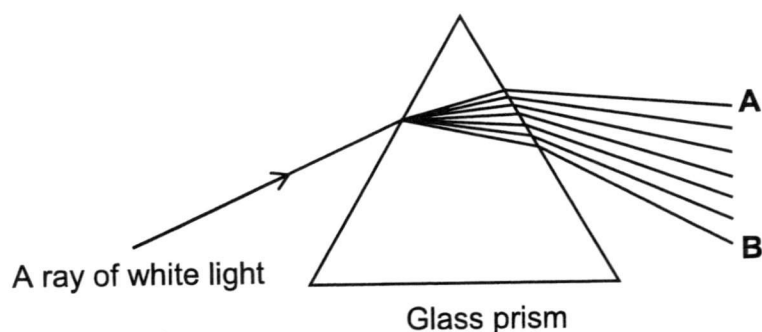
[1]

- (c) Suggest how the density of the metal rivet changes when it cools down.

.....

[1]

- 2 A glass prism can be used to separate a beam of white light.



- (a) Explain why the beam of white light separates into rays of different colours when it enters the glass prism.

.....

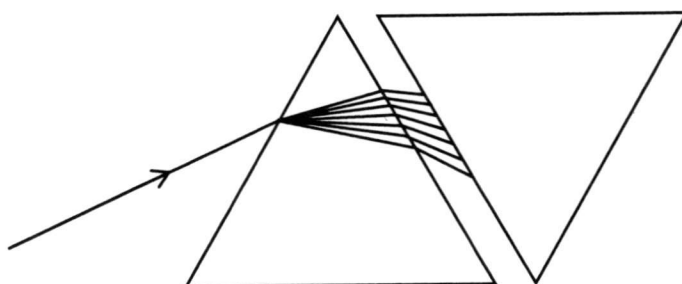
.....

..... [2]

- (b) State the colours of ray **A** and ray **B**.

Ray **A**: Ray **B**: [1]

- (c) The following diagram shows a second glass prism inverted and placed at the end of the separated light rays. When the light rays enter the second prism, they merge to form one beam of white light.



Complete the diagram to show what happens to the separated light rays as they enter and leave the second glass prism. [2]

- 3 An experiment was conducted to determine the speed of sound in different mediums. The results are recorded in the following table.

Medium	Distance Travelled by Sound (m)	Time Taken (s)
Air	800	2.42
Sea water	1500	1.07
Iron	8772	1.71

- (a) Calculate the speed of sound in iron.

[1]

- (b) The experimental results suggest that sound travels much faster in sea water than in air. Explain why.

[1]

- (c) The experiment was repeated using sea water at higher temperatures. Would you expect the speed of sound in sea water to **increase**, **remain the same** or **decrease** at higher temperatures? Explain your answer.

[2]

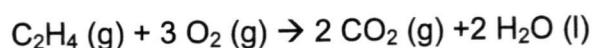
4 The following chemical equations show several types of chemical reactions.

(a) Based on the word equations, state the type of chemical reactions.

Word Equation	Type of Chemical Reaction
Glucose + Oxygen $\rightarrow$ Carbon dioxide + Water	
Sodium hydroxide + Hydrochloric acid $\rightarrow$ Sodium chloride + Water	

[2]

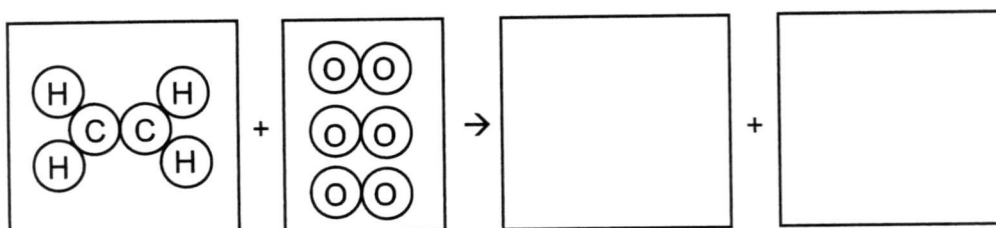
(b) The following chemical equation shows a combustion reaction between ethene (C_2H_4) and oxygen.



In this process, large amount of heat energy is produced, making ethene a suitable source of fuel.

Using the legend provided, draw the arrangement of atoms and molecules after the reaction of ethene and oxygen.

Legend	
C atom	
H atom	
O atom	



[2]

- 5 (a) The following table contains information about substances **J**, **K** and **L**.

Substance	Solubility in 100 cm ³ of water	Decomposes on high heat	Magnetic attraction
J	0 g	No	No
K	25 g	Yes	No
L	0 g	No	Yes

You are given a mixture containing 10 g each of substances **J**, **K** and **L**.

Using the information provided, outline the key separation techniques and procedures you will use to separate the mixture and obtain pure samples of **J**, **K** and **L**. Clearly state which substance is obtained at each stage.

.....

.....

.....

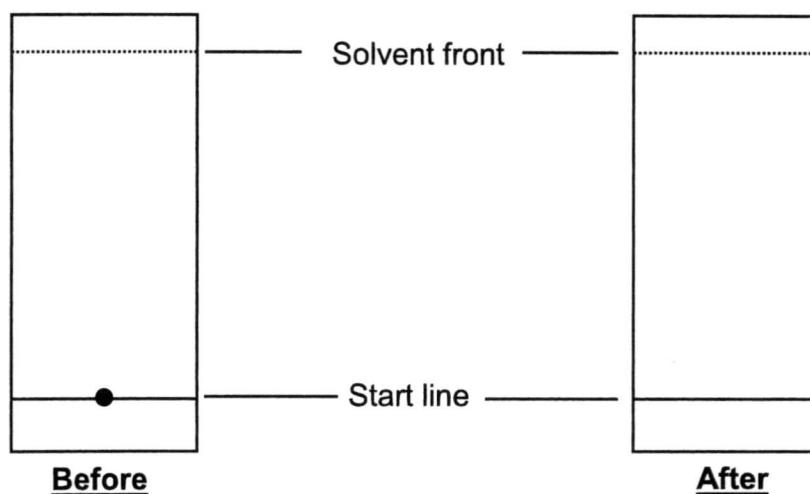
.....

.....

[3]

- (b) A mixture of containing 10 g each of substances **M** and **N** was dissolved in 100 cm³ of water and a paper chromatography was conducted. Draw the predicted positions of the **M** and **N** on the chromatography paper after the experiment and label your drawing.

Solubility of **M** = 12.6 g/100 cm³ of water
 Solubility of **N** = 4.9 g/100 cm³ of water



[2]

- 6 Nitrogen is an element that can form many different compounds with oxygen. One of them is nitrogen dioxide (NO₂), which exists as a colourless gas at room temperature.

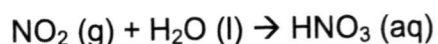
- (a) The following equation shows how nitrogen dioxide can be formed through the combustion of nitric oxide (NO) with oxygen.

Balance the equation.



- (b) Nitrogen dioxide is also an air pollutant, typically produced by vehicles. It can dissolve in water to form nitric acid. When nitric acid is dissolved in rainwater, it forms acid rain.

The following chemical equation shows this process.



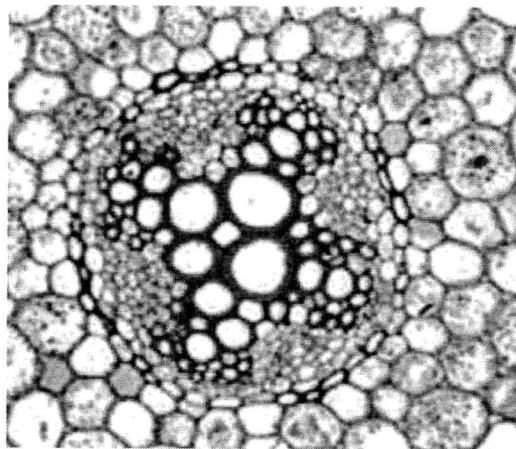
- (i) Suggest two ways that acid rain can be harmful to our daily lives.

.....
..... [2]

- (ii) State a substance that can neutralise nitric acid.

..... [1]

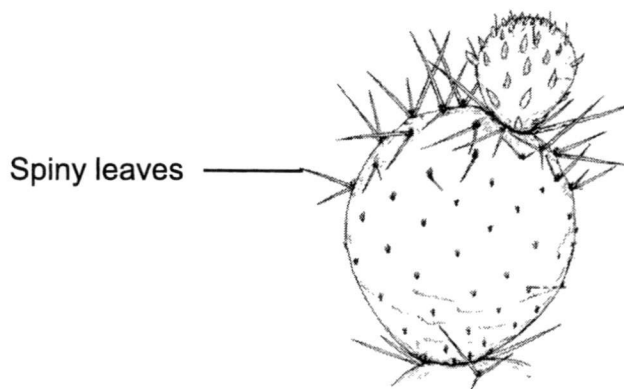
- 7 The following diagram shows a microscopic view of the middle section of a cactus stem.



- (a) (i) On the diagram, label the parts “phloem” and “xylem”. [2]
(ii) State the function of a xylem.

[1]

- (b) The following diagram shows an adaptive feature of a cactus plant.



Suggest how the spiny leaves of a cactus help it to survive in the hot and dry conditions of the desert.

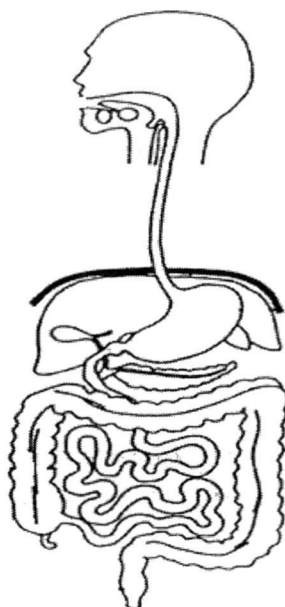
[2]

- 8 Carbohydrates constitute a major part of our daily diets. They play important roles in cellular respiration, storage of energy and the formation of DNA.

(a) Explain how chewing helps in the physical digestion of carbohydrates.

..... [1]

(b) The following diagram shows the major components of the human digestive system.



Using the diagram provided, name the different enzymes used for the digestion of starch.

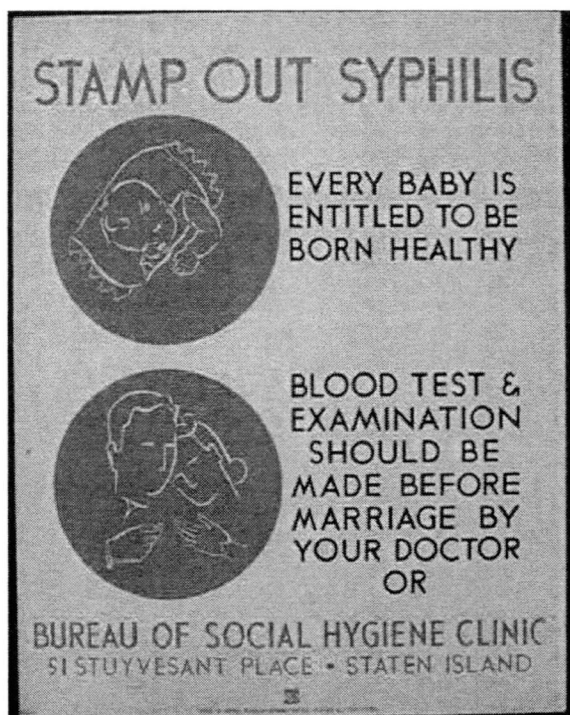
Part of Body	Enzyme
Mouth	
Throat	
Small intestine	

[2]

(c) The pH level of the small intestine is maintained at around pH 8. Explain why this is necessary.

..... [1]

- 9 The following poster was designed to inform the public about the disease syphilis.



- (a) Based on the poster or your own knowledge, state **two** ways that syphilis can be spread.

.....

.....

[2]

- (b) State two methods that can greatly reduce the transmission of syphilis and other sexually transmitted infections.

.....

.....

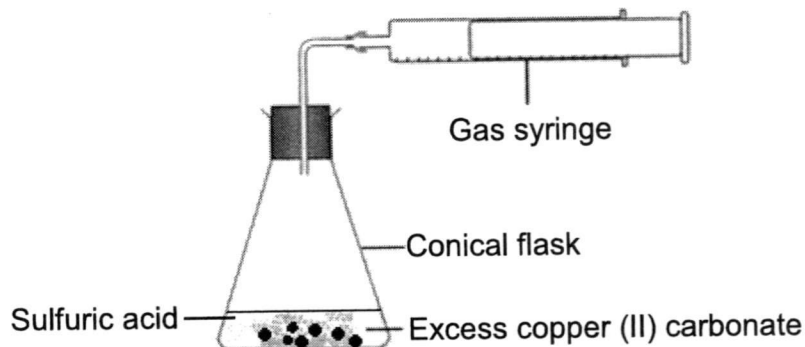
[2]

END OF SECTION B

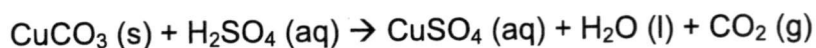
SECTION C: [30 MARKS]

Answer all questions in this section. Write your working and answers in the writing paper provided. Start each question on a new piece of writing paper.

- 1 (a) The following diagram shows the production of copper (II) sulfate (CuSO_4) through the reaction of copper (II) carbonate (CuCO_3) and sulfuric acid.

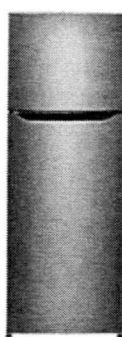


The chemical equation is given as:



- (i) State two physical properties of sulfuric acid. [2]
- (ii) State two observations during the reaction that suggest a chemical reaction is taking place. [2]
- (iii) The pH of the reaction mixture can be monitored using blue litmus paper.
State the colour change of a blue litmus paper at the start of the reaction and the colour change of a blue litmus paper at the end of the reaction. [2]
- (iv) A gas was collected during this reaction. Suggest a test to identify the gas and state what observations you would expect to see. [2]
- (b) Magnesium sulfate is a chemical compound that can be produced through the reaction of magnesium and sulfuric acid.
- (i) Write down the word equation for the reaction between magnesium and sulfuric acid. [1]
- (ii) The same experiment was repeated using ethanoic acid and magnesium. It was observed that the reaction was much slower. Suggest why this is so. [1]

- 2 The following diagram shows part of a sales brochure of a refrigerator sold in Singapore.



Eco-Friendly Features	
Energy Rating	3
Refrigerant	R600A
Lighting	LED
Annual energy consumption	300 kWh

- (a) (i) Given that 1 kWh of electricity costs \$0.30, calculate the annual cost of using the refrigerator. [1]

- (ii) Hence, suggest why it is important to consider the energy rating of a refrigerator when purchasing one. [1]

- (b) (i) The following formula shows the calculation of current drawn by an electrical appliance.

$$\text{Power (W)} = \text{Current (A)} \times \text{Voltage (V)}$$

Given that the standard voltage of household electrical supply in Singapore is 240 V and the power of the refrigerator is approximately 200 W, calculate the current used by the refrigerator. [1]

- (ii) The following formula shows the calculation of fuse ratings required in an electrical appliance.

$$\text{Required fuse rating} = 1.25 \times \text{Current of appliance}$$

Using your answer in (b)(i), calculate the required fuse rating in the refrigerator. Hence, suggest which fuse (3 A, 5 A or 13 A) is suitable to be fitted for the refrigerator. [2]

- (iii) Explain how a fuse acts as a safety feature in electrical appliances. [2]

- (c) Most refrigerators are fitted with a standard three-pin plug. Explain why an earth wire is necessary for a large electrical appliance such as a refrigerator. [2]

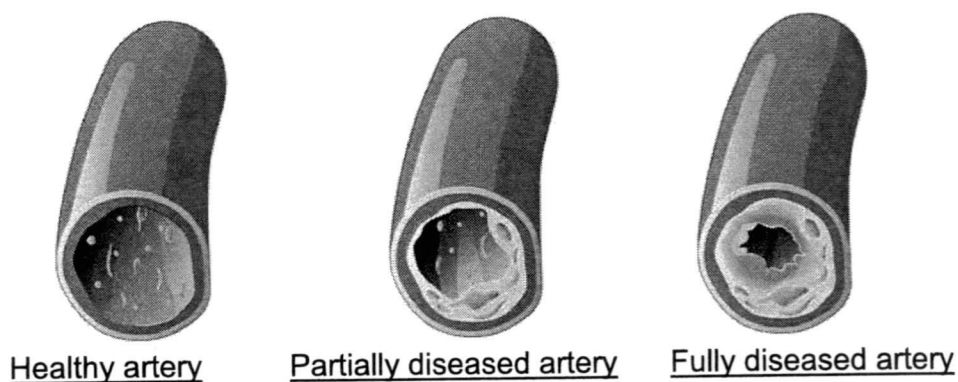
- (d) Statistics have shown that Singapore still relies heavily on imported oil to operate electricity plants. Suggest one reason why it is difficult for Singapore to rely on alternative or renewable sources of energy. [1]

- 3 The human circulatory system helps in the transport of important nutrients around the body. Essential features of the human transport system include red blood cells, platelets and different types of blood vessels.

(a) State one adaptation of a red blood cell. Explain how it helps the red blood cell to achieve its function. [2]

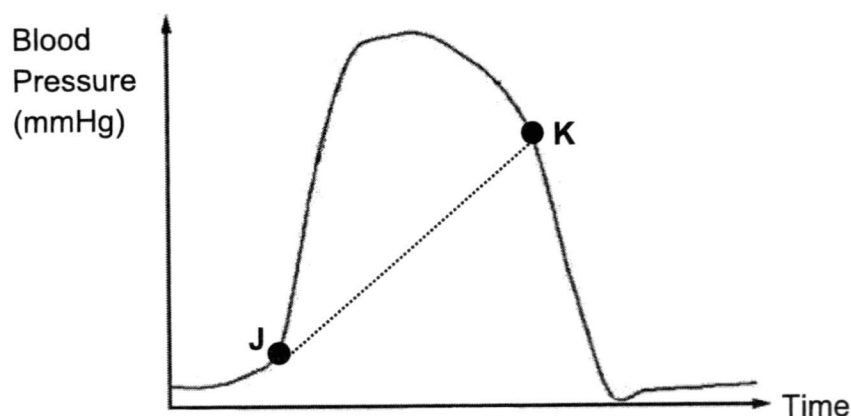
(b) Thrombocytopenia is a medical condition where a person has a reduced platelet count in his blood. Explain why this is dangerous when the person suffers from a wound. [2]

(c) Coronary arteries transport blood to the heart cells. The following diagram shows the differences between a healthy coronary artery and diseased coronary arteries.



Using the diagram, state the function of an artery and explain how diseased arteries can be harmful to our body. [3]

(d) The following graph shows the change in blood pressure in the left ventricle of a heart.



Describe the change in blood pressure from point J to K. Suggest what happens in the left ventricle that caused the change of blood pressure from point J to K. [3]

END OF PAPER

Group				
		III	IV	V

[illegible]

57	La	lanthanum	138
58	Ce	cerium	140
59	Pr	praseodymium	141
60	Nd	neodymium	144
61	Pm	promethium	—
62	Sm	samarium	150
63	Eu	europlum	152
64	Gd	gadolinium	157
65	Tb	terbium	159
66	Dy	dysprosium	163
67	Ho	holmium	165
68	Er	erbium	167



ST. PATRICK'S SCHOOL

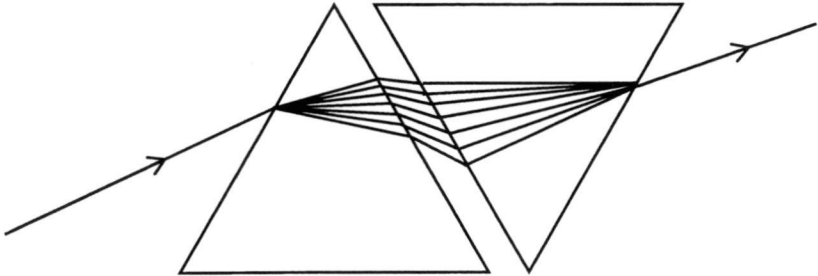
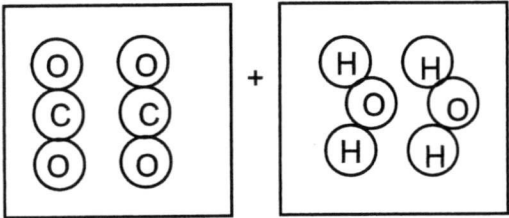
END OF YEAR EXAMINATIONS 2017

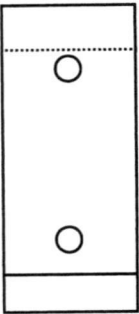
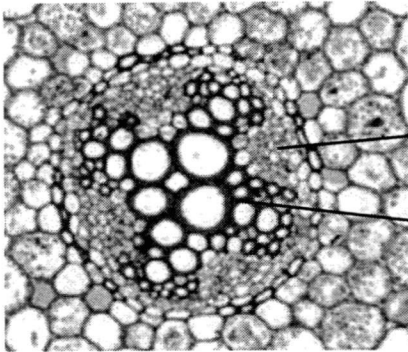
SECTION A MCQ: [30 MARKS]

1	2	3	4	5	6	7	8	9	10
B	D	D	D	D	A	B	A	B	B
11	12	13	14	15	16	17	18	19	20
B	C	A	B	A	B	C	D	D	D
21	22	23	24	25	26	27	28	29	30
B	D	C	B	C	C	A	C	C	A

SECTION B STRUCTURED QUESTIONS: [40 MARKS]

Qn	Answers	Marks	Total Marks
1(a)	The hot rivet <u>placed the between the steel plates</u> [0.5] and <u>capped</u> [0.5]. When the rivet <u>cools down</u> [0.5], it <u>contracts</u> [0.5]. Thus the <u>steel plates are tightened</u> . [1]	[3]	[5]
(b)	The other materials do not contract/expand as much during heating or cooling. Or The other materials may not be able to change shape as easily as metals. Fragile / may break easily / not malleable	[1]	
(c)	Density increases	[1]	
2(a)	The glass prism has a <u>optically denser</u> compared to air [1]. When the light ray enters the prism, it <u>slow down</u> [0.5] and <u>refracts/bends</u> [0.5]	[2]	[5]
(b)	Ray A: Red Ray B: Violet [0.5] each	[1]	

(c)	 Bending of 7 light rays towards normal [1] One combined light beam leaving second prism [1] Penalise [0.5] if light rays bends too much (exceeds normal)	[2]	
3(a)	Speed = Distance / Time = 8772 m / 1.71 s = 5130 m/s (3.s.f) [1] Deduct [0.5] for no units or not 3.s.f (total [1] deduction for whole paper)	[1]	[4]
(b)	Particles in seawater are <u>more closely packed</u>.	[1]	
(c)	The speed of sound will <u>increase</u> [1] at higher temperatures, because the particles will have <u>more energy/vibrate more/move faster</u> [1], thus causing sound energy to be transferred faster.	[2]	
4(a)	Oxidation/ respiration [1] Neutralisation [1]	[2]	[4]
(b)	 Award [1] for correct drawing of CO₂ Award [1] for correct drawing of H₂O Deduct [0.5] each if incorrect numbers of CO₂ and/or H₂O Do not penalise if orientation of molecule is wrong (i.e. OOC or HHO)	[2]	

5(a)	1. Dissolve mixture in water [0.5] 2. Filter [1/2] and obtain substance J and L as residue (insoluble in water) [0.5] (No L at this step if magnetic separation already done) 3. Use magnet separation [0.5] to obtain L [0.5] (this step can appear before or after filtration) 4. Crystallisation [0.5] for remaining mixture of water and K to obtain K	[2]	[6]
(b)		[2]	
6(a)	2, 1, 2	[1]	[4]
(b)(i)	• Causes damage to buildings • Kills plant life and animal life • Causes water sources (rivers, lakes) to be too acidic, harming aquatic life • Causes aluminium deposits to be absorbed and released into lakes • Any other reasonable answer Award [1] each	[2]	
(ii)	Sodium hydroxide/ calcium hydroxide/ magnesium hydroxide or any other alkaline substances	[1]	
7(a)	 Award [1] each	[2]	[5]
(ii)	Helps to <u>transport water</u>	[1]	
(b)	The spiny leaves have a <u>smaller surface area</u> [1], which <u>reduces the amount of water lost</u> due to transpiration [1]	[2]	

8(a)	Helps to <u>increase the surface area</u> of carbohydrates for enzymes to act on			[1]	[4]
(b)	Part of Body	Enzyme		[2]	
	Mouth	Salivary amylase			
	Throat	Salivary amylase			
	Small intestine	Amylase			
		Maltase			
(c)	Enzymes can only function at a specific pH level			[1]	
9(a)	• sexual intercourse • Blood transfusions • From a pregnant woman to her baby Any two, [1] each			[2]	[4]
(b)	• Usage of condoms • Not to share needles / drugs / personal hygiene items • use sterile needles for blood transfusion/ medical treatment • Avoid sex with many partners Any two, [1] each			[2]	

SECTION C FREE RESPONSE QUESTIONS: [30 MARKS]

Qn	Answers	Marks	Total Marks
1(a)	• Tastes sour • Has a pH of below 7 • Turns blue litmus paper red • Corrosive • Able to conduct electricity Any two, [1] each Do not accept: Liquid / Acidic / Inedible	[2]	[10]
(b)(i)	• Effervescence / bubbles given out / Gas syringe moved back. • Amount of copper carbonate reduces over time • Heat is produced • Change in colour Any two, [1] each Do not accept: • New substances formed • Any answers that cannot be observed.	[2]	
(ii)	Colour at start of reaction: blue litmus paper is red in colour [1] Colour at end of reaction: blue litmus paper is blue in colour[1]	[2]	
(c)	Bubble into / Pass through [0.5] limewater [0.5] White precipitate obtained [1]	[2]	
(d)	Magnesium + sulfuric acid → Magnesium sulfate + hydrogen gas	[1]	
(e)	Ethanoic acid is a weak acid. Accept: • Ethanoic acid is a weaker acid than sulphuric acid. Vice versa. • Ethanoic acid has a higher pH than sulphuric acid. Vice versa. • Ethanoic acid is less acidic than sulphuric acid. Vice versa.	[1]	
2(a)(i)	Annual cost = \$0.30 x 300 kWh = \$90 [1]	[1]	[10]
(ii)	Helps to prevent the wastage of electricity / ensures that refrigerator is energy efficient/ helps to keep the cost low	[1]	

(b)(i)	Current = Power / Voltage = 200 W / 240 V = <u>0.833 A</u> [1] Deduct [0.5] if no units or 3.s.f, total [1] for entire paper	[1]	
(ii)	Required fuse rating = $1.25 \times 0.833 \text{ A}$ = <u>1.04125 A</u> [1] Thus, the <u>3 A fuse</u> is suitable. [1] ECF from (bi) applies.	[2]	
(iii)	When the <u>current is too high</u> [0.5], the fuse <u>melts / blows</u> [0.5], thus causing an <u>open circuit / breaking the circuit</u>. [1] Do not accept: Fuse <u>breaks</u>	[2]	
(c)	The earth wire helps to <u>direct current down to the earth</u> [1], in case the <u>live wire touches the appliance</u> [1]. If the following is written in place of <u>direct current down to the earth</u>, direct energy down to the earth [0] direct electricity down to the earth [0.5]	[2]	
(d)	• Imported oil is still cheaper and more convenient • Renewable energy is too expensive • No land available for wind energy, nuclear energy or solar energy • No natural sources of geothermal energy or available location for hydroelectrical plant • Any other reasonable answer Do not accept: Not enough sources of renewable energy. <- Too vague Renewable energy does not produce enough energy.	[1]	
3(a)	Red blood cell is <u>biconcave / has no nucleus</u> [1]. It <u>increases the surface area</u> [0.5] which helps the <u>cell to absorb oxygen more quickly</u> [0.5].	[2]	
(b)	Platelets helps to <u>clot blood</u> [1]. In the absence of platelets, a person may suffering from a wound may <u>bleed too much</u> [1].	[2]	[10]
(c)	The artery helps to transport blood away from the heart [1]. Diseased arteries are <u>more narrow</u> [0.5] and <u>may slow down/block the blood</u> from leaving the heart [1], thus <u>causing a heart attack</u> [0.5].	[3]	

(d)	The blood pressure <u>increases then decreases</u>. [1] The <u>left ventricle is contracting</u> [1], causing <u>blood to leave the heart</u>. [1]	[3]	
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