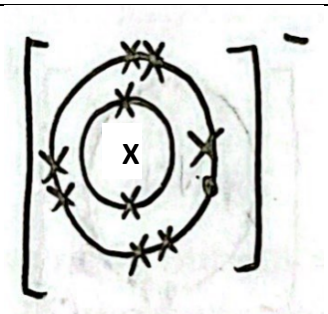
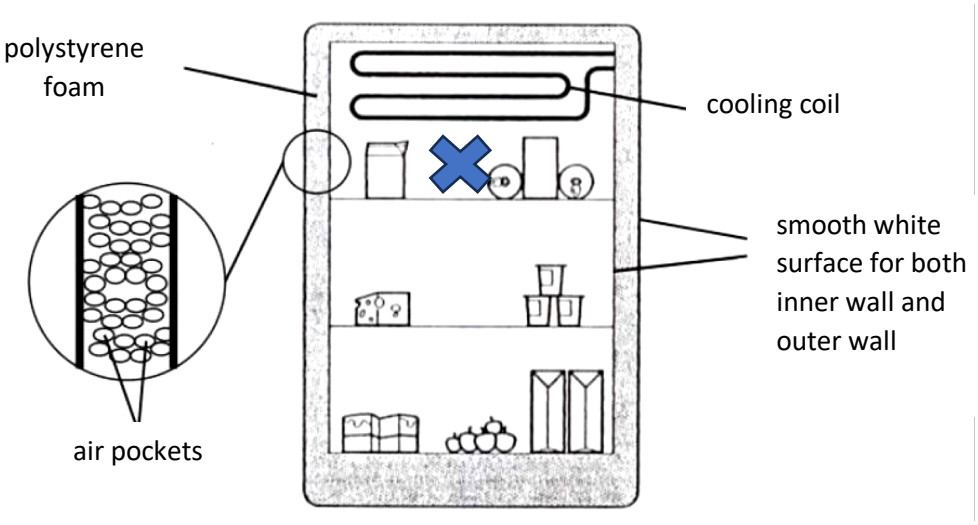
Sec 2 G3 Revision Paper 1 2024 Science EOY Mark Scheme

Section A

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

Section B

B1a	It is **<u>renewable/does not produce pollution</u>/<u>clean energy</u>** Reject sustainable without explanation.	**1**
B1b	gravitational potential energy → kinetic energy → electrical energy *One energy conversion – 1m each* *Accept also gravitational potential energy → kinetic energy of water → kinetic energy of turbine → electrical energy* *-1m if students wrote additional incorrect energy conversions to demonstrate how electrical energy is used without context.*	**2**
B1c	The **<u>water pressure increases with depth</u>/<u>water pressure is highest/water pressure is higher</u>** at the base and hence the base need to be thicker to resist the pressure to avoid breaking. *Reject atmospheric pressure*	**1**
B2a	Q and R	**1**
B2b	P	**1**
B2c	Particles will be **<u>closely packed in a disorderly arrangement</u>** and the particles will **<u>slide</u>** past **<u>each other in a random manner.</u>** *Note all keywords to be present.*	**1** **1**
B2di	X and Z	**1**
B2dii	 *Accept if students wrote 1- or -1 for this time only. Reject if no square brackets given. Reject if the gained electron is not of a different symbol.*	**1**

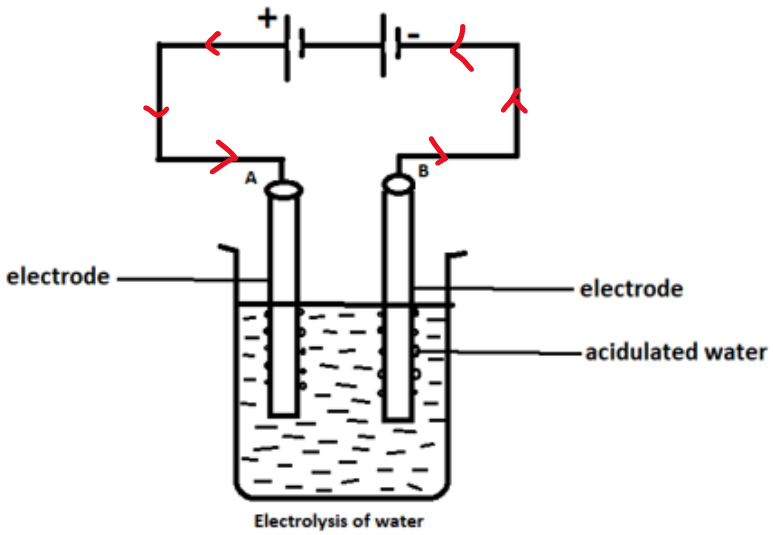
B3a	**Smooth and white surface is a poor absorber** of infrared radiation/ This **slows** down heat gain by the rate of **radiation.**	**1**
B3b	**Polystyrene foam contains many air pockets**; and **air is a poor conductor of heat.** **Polystyrene foam is a poor conductor of heat/**This **reduces heat gained** by the refrigerator through **conduction/** This **reduces heat gained** by the refrigerator through **convection**	**1** **1** **1**
B3c	The air near the cooling coil/at the top **cools and contracts**, causing its **density to increase and sinks to the bottom**. The **warmer air** at the bottom, which is **less dense, rises to the top** and get cooled This cycle of sinking and rising repeats and **set up the convection currents** in the air which cools the refrigerator. Reject float.	**1** **1** **1**
B3d	 To be placed at the **top shelf** of the refrigerator.	**1**
B4a	A: **Oesophagus/Gullet/Esophagus** B: **Rectum**	**1** **1**
B4b	physical digestion: **Chewing of food** breaks the food pieces down in **smaller** sizes and mixes the food with saliva to increase action by enzymes. chemical digestion: **Carbohydrase/Amylase in saliva** breaks down **carbohydrates** in the food to **simpler carbohydrates/simpler sugars.**	**1** **1**
B4c	The **stomach** is partially removed surgically; as only the amount of amino acids had **significantly decreased from 8.7 units to 4.1 units before and after removal of organ.** With parts of the stomach removed, **rate of protein digestion to form partially digested protein is slower / lesser protease produced by stomach** to digest proteins in a same amount of time.	**1** **1** **1**

B4d	Side effect: The patient will **lose the good bacteria in his gut/small intestine/** The patient will have **lower ability to absorb nutrients and mineral salts.** Explanation: Bacteria will be **killed by antibiotics.** **OR** Side effect: The patient will have **lowered immunity/be less able to fight off certain diseases.** Explanation: Bacteria will be **killed by antibiotics/ Bacteria to evolve resistance to antibiotics rapidly**	**1** **1** **1** **1**
B5a	oxygen	**1**
B5b	Glucose will move from **a region of higher concentration to a region of lower concentration / blood in capillary to body cells** via **diffusion.**	**1** **1**

Section C

C1a	C: **magnesium carbonate** D: **water** E: **carbon dioxide**	**1** **1** **1**
C1b	Similarity: both reactions produces magnesium nitrate/salt/ both reactions produce a gas. Difference: The first reaction in Fig. C1.1 **produces carbon dioxide gas/water** but the second reaction **produces hydrogen gas./**	**1** **1**
C1ci	He can add a few drops of **bromothymol blue** to both solutions. If the final **colour of the solution is green, solution is A.** If the final **colour of the solution is blue, solution is B.** OR He can add a few drops of **red cabbage solution** to both solutions. If the final **colour of the solution is purple, solution is A.** If the final **colour of the solution is yellow, solution is B.** Reject methyl orange and universal indicator. Students must state correct indicator to get the credit for subsequent colour changes/	**1** **1** **1**
C1cii	**Quicklime is an alkaline** substance as it turns two indicators (bromothymol blue and red cabbage solution) blue. Quicklime will **neutralize** the acidic soil/ Quicklime will **increase the pH** of soil to 7.0/Quicklime will **reduce acidity** in soil.	**1** **1**
C2a	Mangrove tree **makes food** using carbon dioxide and water in the presence of light **through photosynthesis**.	**1**
C2b	**Structural adaptation.** Mangroves has exposed roots that allows it to **obtain oxygen** gas as the water has low oxygen content/ The roots allows it to **anchor the tree in the mud./** The roots allows the tree to be **stable/withstand strong tides.**	**1** **1**

C2c	Worm acts as a **decomposer** that feeds on the remains of dead organisms. They break down the faeces of organisms and **return the nutrients to the environment** to create a cyclical flow of nutrients in an ecosystem.	**1** **1**
C2di	**Mangrove tree → mangrove crab → plover bird → monitor lizard → crocodile** **Decayed leaf → mangrove crab → plover bird → monitor lizard → crocodile** **Decayed leaf → worm → archer fish → otter → crocodile** **Decayed leaf → worm → plover bird → monitor lizard → crocodile** Accept any answers with 5 levels in the food chain	**1**
C2dii	It is the **least energy efficient** food chain. / 90% energy is lost in each trophic level and as the number of tertiary consumers increase, **little energy is transferred to the last consumer in the food chain. /** More energy is lost.	**1**
C2e	**Mutualism** exists between plover bird and crocodile. *Bird benefits*: **Crocodile protects the plover bird from predator**/ monitor lizard./ **Plover bird eats from the leftover food** stuck between the teeth of the crocodile. *Crocodile benefits*: Crocodile gets its **teeth cleaned by the bird**/**reduce possibility of tooth decay** by removing food from teeth. *Students must describe how both organisms benefit to get 1 m.*	**1** **1**
C2f	The pets when released into the wild, will become an invasive species that can feed on existing populations in the ecosystem, which can **destabilise the ecosystem./result in the ecosystem becoming imbalanced/disrupt the eocsystem** /**introduce competition./**disrupt communities by **causing one group of organisms to decrease and hence affect the numbers of the other organisms with feeding relationships.** *Students can get 1m if they use predator prey relationships to explain how introducing new species affects the organisms in the whole food web and causes it to be destabilised.*	**1**
C3a	**I_B is larger**; as resistors are connected in parallel so the **total/circuit/effective resistance decreases** and current is larger OR Resistors in series in I_A so total/circuit/effective resistance increases	**1** **1**
C3b	Wire E1 : 1.5 V Wire E2 : 0.5 V *Penalize if no units are given*	**1**

C3bii	Resistance of wire E1 = voltage / current = 1.5 V / 0.3 A = 5.00 Ω Resistance of wire E2 = voltage / current = 0.5 V / 0.3 A = 1.67 Ω **<u>Wire E1 has a higher resistance</u>** than wire E2. *Students must apply the formula correctly, and use the correct set of data. Penalise if answers are in fractions.* *Award if students did not include units.*	**1** **1**
C3biii	E1 (Allow accurate/logical ECF)	**1**
C3biv	Ensure that the **<u>wires are not exposed to prevent electric shocks</u>**.	**1**
C3ci	 Electrolysis of water	**1**
C3cii	**<u>Chemical Change.</u>** Liquid water **<u>decomposed</u>** to **<u>form different gaseous products</u>**, hydrogen gas and oxygen gas / Decomposition of liquid water is an **<u>irreversible process.</u>**	**1** **1**
C4a	**<u>Osmosis</u>**	**1**
C4b	As the concentration of sugar solution increases **<u>from A to C</u>**, the **<u>length of potato increases</u>**. As the concentration of sugar solution increases from **<u>D to F,</u>** the **<u>length of potato decreases.</u>** OR	**1** **1**

	As the concentration of sugar solution increases from 0.0 to 1.0, the **percentage change** in **length decreases.** **Percentage change in length went from +7.0 to -6.0.** *Students need to conclude trend for 1m and to draw reference from table for 1m. For this question, there are many types of data that can be drawn from the table. As such, the students will need to be precise in their language to clearly indicate how the final length changes for the solutions A to F. Students will also need to recognize percentage difference in length presents a different trend as concentration of sugar solution increases.*	**1** **1**
C4ci	**0.5** mol/dm^3	**1**
C4cii	When the potato strip was placed in set up **C**, the potato strip increased in length as **water entered the potato via osmosis since potato has a lower water potential/concentration of water than the sugar solution**. **OR** When the potato strip was placed in set up **D**, the potato strip decreased in length as **water left the potato via osmosis since potato has a higher water potential/ concentration of water than the sugar solution**. Based the results in set up C and D, the concentration of sugar solution must be **between 0.4 mol/dm^3 to 0.6 mol/dm^3**	**1** **1**
C4di	Vein transports blood with **high levels of waste substances** that can be removed via the dialysis machine./ Blood **pressure in vein is lower.**	**1**
C4dii	Platelets, plasma, white blood cells. *Any two to get 1m.*	**1**
C4diii	Patients will need to eat food with low sugar content/ eat more vegetables/ avoid drinks with high level of sugars/ exercise regular/ monitor blood sugar level regularly using blood monitors. *Accept any plausible answers.*	**1**
C4div	*Possible ethical considerations:* **If the decision will increase the chances of the patient's survival**./ If there **are alternative treatments are available to the patient waiting for an organ transplant**./ If the **age of the recipient should be considered when allocating an available organ to a potential recipient./** If the **patient's quality of life will be enhanced greatly.**	**1**
C5a	ovulation: day 14 menstruation: day 1 to day 4/day 1 to 5	**1** **1**
C5b	The uterine lining **thickens,** to **prepare for implantation of fertilised egg./** for **implantation of embryo on to lining of uterus wall./** *Accept embedding of embryo.*	**1**
C5ci	Ligation	**1**
C5dii	(34 + 4 =) 38 (ligation + vasectomy)	**1**

C5iii	Intra-uterine device is **placed in the uterus;** and **prevents the implantation of the fertilised egg onto the uterine lining**./**prevents fertilisation/prevent sperms from fertilising an egg.** /**copper** in **IUD kill sperms** This prevents the development of foetus.	**1** **1**
C5iv	Condom	**1**
C5d	By sharing of needles/ by having **unprotected** sexual intercourse with another infected patient/ by exchanging fluids with another patient/by breastfeeding/through blood tranfusion / in *Any two for 2m. Reject transmission via saliva*	**1** **1**