

SEC 2 SCIENCE 2023 EOY PAPER ANSWERS

Section A

Qn	Answer				
A1	D	A11	A	A21	C
A2	A	A12	C	A22	C
A3	A	A13	A	A23	B
A4	D	A14	A	A24	D
A5	B	A15	A	A25	B
A6	B	A16	C	A26	D
A7	D	A17	B	A27	A
A8	B	A18	D	A28	C
A9	A	A19	B	A29	C
A10	B	A20	D	A30	A

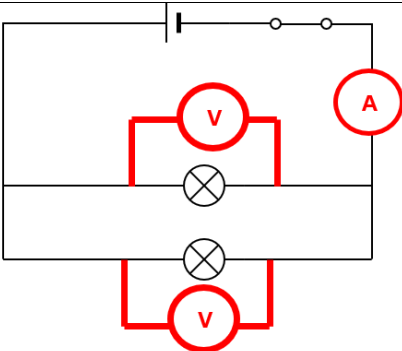
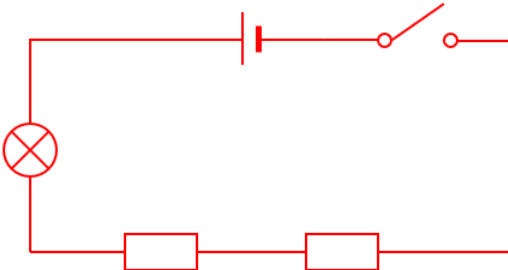
(Penalise 1 mark throughout the whole paper for no working in a calculation question.)

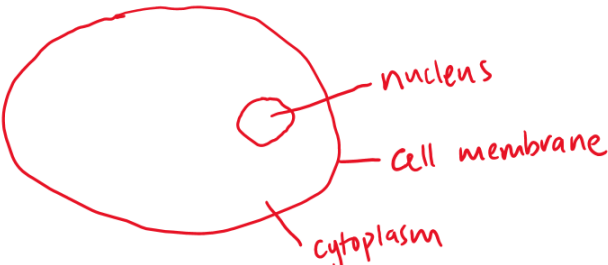
Qn	Answer	Mks	Remarks
B1(a)	<u>(simple) Distillation</u>	1	penalise for spelling mistake
(b)	<u>100 °C</u>	1	reject: no units
(c)	<u>(in from bottom, out from top)</u>	1	
(d)(i)	The <u>water vapour</u> formed will <u>escape/not be trapped/not be collected</u> .	1	accept OWTTE as long as the idea that the water vapour would have escaped is present in the answer. BOD: steam escaped
(d)(ii)	<u>White residue/solid/crystal</u> remains in the dish.	1	reject: white salt / salt / white powder Students must include colour

B2(a)(i)	K	1	
(a)(ii)	N	1	
(a) (iii)	L and M	1	
(b)	sodium	1	
B3(a)(i)	OP	1	BOD: O
(a)(ii)	Q (or QP)	1	
(a)(iii)	T (or OPR)	1	
(b)	Virtual / upright / laterally inverted / same size as object / same distance between object to mirror and mirror to image	1	
B4(a)	The smaller object will exert a greater pressure / depth / depth of impact when dropped onto the sand.	1	Accept: - relationship statement “deeper” impact - Statement written must correlate dependant and independent variables reject: - aim - impact - volume - surface
(b)(i)	Zero error	1	
(b)(ii)	Weight = $3.0 - 0.2 = 2.8 \text{ N}$ OR Weight = $(3.0 - 0.2) \times 2 = 5.6 \text{ N}$	2	(1 m for answer, 1 m for correct unit)
(c)	Pressure = $F / A = 2.8 \text{ N} / (1 \text{ cm} \times 1 \text{ cm}) = 2.8 \text{ N/cm}^2$ or 28000 Pa (N/m^2)	1	(1 m for correct answer. Ignore if units are not given) Penalize if wrong units are given. Note: Pascal = N/m^2 Allow ECF
(d)	<u>Yes.</u> (No marks) As object X has a <u>smaller area in contact</u> with the sand than object Y, [1]	1 1	Reject: discussion based on size only without mention of area in contact

	it will exert a <u>greater pressure on the sand</u> . [1] Hence, the depth of impact on sand for object X should be larger than for object Y.		
B5(a)	Carbon dioxide: white precipitate observed / solution turned chalky / cloudy Hydrogen: insert lighted splint	1 1	BOD: “use lighted splint”. reject: “lighted splint test”. Students need to describe the test.
(b)	Alkaline	1	Reject: - It is an alkali./ It is alkali. - it has a pH higher than 7.
(c)	Hydrochloric acid + calcium carbonate → calcium chloride + carbon dioxide + water	2	(1m: water 1m: correct word equation - only award if all products are correct)
B6(a)	The <u>teeth in the mouth cuts and crushes / chews</u> the food into <u>smaller pieces</u> ; OR The <u>stomach churns food</u> into <u>smaller pieces</u> ;	1	BOD: mouth chews (no mention of teeth) accept: to increase surface area to volume ratio (instead of smaller pieces) Reject: to increase surface area
(b)	- Proteins are first being <u>digested in the stomach</u> by <u>proteases</u> present in gastric juice into <u>partially digested proteins/amino acids</u>; [1] - The <u>small intestine</u> also <u>contains proteases</u>, and will continue to digest proteins to produce <u>amino acids</u>.; [1]	1 1	1m: stomach, small intestine 1m: proteases, amino acids Accept: Proteins are digested in the stomach and small intestines by proteases into amino acids.
(c)	observations Iodine solution remains <u>yellow-brown</u>.; [1] explanations	1 1	BOD: yellow / brown Reject: remain the same, orange BOD: glucose / maltose

	- Carbohydrase <u>catalyse the breakdown of starch into simple sugars</u> ; [1] - With <u>absence of starch</u> (or all starch has been broken down), [1] iodine solution did not change colour and remains yellow-brown	1	
(d)	- No. (No marks) - Diabetes is a disease where the <u>sugar level in the blood is too high</u> [1]; - Since pasta contains a <u>high proportion of/mainly starch(carbohydrates)</u> / this will cause a <u>large amount of simple sugars to be absorbed into the blood</u> [1] after digestion ;	1 1	BOD: Diabetics cannot eat too much sugar.
B7(a)(i)	Label both ovaries [1] and both oviducts [1]	2	BOD: label only 1 ovary, 1 oviduct
(ii)	oviduct: Site of fertilisation / moves the (fertilised) egg to the uterus.	1	
	Ovary: <u>Releases mature eggs</u> or ovum OR <u>Produces female sex hormones</u> that controls sexual development in the body.	1	reject: produces mature egg
(b)(i)	<i>Any section on both of the fallopian tubes</i>	1	
(ii)	Advantage: Reliable method to prevent pregnancies Disadvantage: Irreversible process	2	Accept: as long as students wrote about no pregnancies
C1(a)	<u>Plastic / rubber / ceramic;</u> <u>It is a poor conductor/good insulator of heat.;</u>	2	
(b)	Process: <u>convection</u> ; Explanation: When the water at the bottom is <u>heated up</u> , it <u>expands and become less dense, hence, rises.</u> ; The <u>cooler, denser water, then sinks</u> to the bottom to get heated up.;	3	
(c)(i)	It is the amount of electrical energy converted to heat energy per unit time (per second).	1	
(ii)	Time taken to boil 6 cups of water = $6 \times 1 \text{ min} = 6 \text{ min} = 6/60 = 0.1 \text{ hr}$; [M] Energy required to boil 6 cups of water = $0.5 \text{ kW} \times 0.1 \text{ hr} = 0.05 \text{ kWh}$; [A]	2	
(iii)	Cost of electricity = $0.05 \text{ kWh} \times 25 \text{ cents} = 1.25 \text{ cents}$; [A]	1	allow ecf

(d)	The water molecules changed from <u>sliding over one another</u> to <u>moving at high speed in constant random motion</u> .	1	BOD: no constant random motion is mentioned
C2(a)(i) (ii)	 (voltmeter to be placed in either position)	1 1	(voltmeter to be placed in either position)
(b)(i)		2	[1m: resistors connected in series; 1m: all other components correctly drawn and connected properly]
(ii)	The <u>bulb will shine brighter in the parallel circuit.</u> ; [1] Because the effective (total) <u>resistance in a parallel</u> circuit is <u>lower</u> , [1] and hence, a <u>higher current</u> will flow through the circuit.; [1]	3	
(c)(i)	Fuse	1	
(ii)	When a large amount of <u>current</u> flows through the device (fuse) and is <u>larger than its current rating</u> , [1] a short, <u>thin wire</u> in the fuse heats up and <u>melt</u> causing the <u>circuit to break/open</u> [1] This protects the device from damage from excessive/high current flow.	1 1	reject: fuse blow
C2(a)(i)	Increase in average RBC count = $6.6 - 5.0 = 1.6$ million cells per microlitre	1	BOD: $6.55 - 5.0 = 1.55$ Reject: if students read day 8 as 6.5
(ii)	They need to <u>increase the number of red blood cells</u> OR	1	

	in their body to <u>increase the rate of oxygen being transported;</u> to all parts of their bodies, as there is <u>a lack of oxygen at high altitudes.;</u>	1	BOD: need more oxygen in the high altitudes (on the mountains)
(b)(i)	A: vein/veins B: artery/arteries	1 1	Penalise for spelling mistake
(ii)	<u>Blood vessel C has a higher concentration of oxygen compared to</u> [1] surrounding tissue cells/body tissues, <u>This causes oxygen to move out via diffusion</u> [1] OR <u>oxygen diffuses out of blood vessel C to the tissues</u>	1 1	
(c)		2	(Labels include: "cell membrane", "nucleus" and "cytoplasm" labelled.) [2m for all 3 correct structures, 1m for 2, 0m for only 1] [1m] Clearly defined lines – no shading, solid lines used 0 for plant cell drawn