Cambridge Assessment International Education

Cambridge IGCSE™

COMBINED SCIENCE **0653/42**

Paper 4 Extended Theory **October/November 2020**

MARK SCHEME

Maximum Mark: 80

Published

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[Turn over

Question	Answer	Marks
1(a)	(vegetable noodles) contain (more) vitamin C ;	1
1(b)	(vegetable noodles) contain less energy ; excess energy would be stored as fat / owtte ;	2
1(c)	carbohydrate / fat / protein ;	1
1(d)	prevents constipation ;	1
1(e)(i)	by haemoglobin ; in red blood cells ;	2
1(e)(ii)	rate / depth of breathing increases ; (due to) increased carbon dioxide (concentration in the blood) ; (because), (rate of) respiration increases / CO_2 is a product of respiration ;	3

Question	Answer	Marks
2(a)(i)	(compound containing only carbon and hydrogen and) **only** single (covalent) bonds (between carbon atoms) ;	1
2(a)(ii)	$x = 4$; $y = 8$;	2
2(b)(i)	double bond between carbon atoms; all else correct including chemical symbols ;	2
2(b)(ii)	orange to colourless ;	1
2(c)(i)	carbon dioxide / CO_2 ; water / H_2O ;	2
2(c)(ii)	(bond breaking is) endothermic **AND** (bond forming is) exothermic ; more energy released during bond formation than energy required for bond breaking ;	2

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Question	Answer	Marks
3(a)(i)	Q ;	1
3(a)(ii)	equal (magnitude) **AND** opposite (direction) ;	1
3(b)(i)	**X** drawn to show region between (0,0) and (3,0.4) ;	1
3(b)(ii)	**Y** drawn to show region between (10,0.2) and (14,0.3) ;	1
3(b)(iii)	acceleration = change of speed ÷ time / –0.2 ÷ 3 ; –0.07 ; m / s^2 ;	3
3(c)(i)	ΔG.P.E. = *mgΔh in any form* / 200 × 10 × 1.2 ; 2400 J (= 2.4 kJ) ;	2
3(c)(ii)	*any two from:* thermal energy lost to surroundings / work done against friction ; man also has to gain PE going up onto the platform ; kinetic energy transferred / work also done in moving the man (and load) forward ;	2

Question	Answer	Marks
4(a)(i)	guard cell labelled with letter **P** ;	1
4(a)(ii)	contains, chloroplasts / chlorophyll ;	1
4(b)	*any three from:* water molecules have increased (kinetic) energy ; increased (rate of) evaporation (from surface of mesophyll cells) ; increased (rate of) diffusion, through stomata / out of leaves ;	3
4(c)(i)	leaves / trees → snails → thrushes → hawks organisms in correct order ; arrows in correct direction ;	2

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Question	Answer	Marks
4(c)(ii)	snails ; herbivores / feed on producers / second trophic level ;	**2**
4(c)(iii)	*any two from:* respiration / heat / movement ; death ; excretion (of waste / urine) / loss of solid waste / faeces ; not all organisms in the chain, eaten / digested ;	**2**

Question	Answer	Marks
5(a)	iron oxide ;	**1**
5(b)	*any one from:* forms coloured compounds ; has high melting point ; has high density ; reference to use as a catalyst ;	**1**
5(c)(i)	ions must be mobile ;	**1**
5(c)(ii)	Al_2O_3 ;	**1**
5(c)(iii)	(type of bonding) aluminium oxide is ionic **AND** methane is covalent ; stronger forces of attraction (between oppositely charged ions) in aluminium oxide / weaker forces of attraction (between molecules) in methane ; so more energy needed to separate particles / overcome attraction (hence higher melting point) / ora ;	**3**
5(d)	as number of (outer shell) electrons increases, element changes from metallic to non-metallic ;	**1**

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Question	Answer	Marks
6(a)(i)	forces decrease / weaken ; distances increase ; move, (more) freely / away from surface (of liquid water) ;	**3**
6(a)(ii)	black is a good absorber (of radiation) ; warm base of pool transfers thermal energy to water / increase in temperature of water (increases rate of evaporation) ;	**2**
6(a)(iii)	more-energetic molecules escape ; remaining molecules are less energetic (so lower temperature) ;	**2**
6(b)	radiation ;	**1**

Question	Answer	Marks
7(a)	*any two paired responses:* strong / thick wall, prevents bursting / withstands high pressure ; elastic fibres in wall, prevent bursting / stretch to accommodate high pressure of blood / enable wall to recoil and maintain pressure ; narrow lumen, maintains high pressure ;	**2**
7(b)	(capillaries have) thin walls ;	**1**
7(c)(i)	vena cava ;	**1**
7(c)(ii)	valve **1** opens **AND** valve **2** closes ;	**1**
7(d)	prevent backflow of blood / ensure that blood only travels in one direction ;	**1**

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Question	Answer	Marks
8(a)	line with shallower gradient showing slower rate of reaction ; line starting and finishing at same mass ;	**2**
8(b)	enhanced greenhouse effect / global warming / example of a consequence of climate change ;	**1**
8(c)	measure distance to spot (from base line) ; measure distance to solvent front (from base line) ; show that R_f = distance to spot ÷ distance to solvent front = 0.4 ;	**3**
8(d)	idea of electrons gained by copper ions ; two electrons gained (per ion) / ions discharged ;	**2**

Question	Answer	Marks
9(a)(i)	$R = V \div I$ *in any form* / 6.0 ÷ 0.9 ; (total resistance =) 6.7 (Ω) ; so resistance of bell = total resistance – resistance of L1 / 6.7 – 4.0 (= 2.7 Ω) ;	**3**
9(a)(ii)	use of parallel formula $R_{combined} = R_1R_2 \div R_1+R_2$ / 16 ÷ 8.0 (= 2.0 Ω) ; (calculation of total resistance in circuit R_{total} = 2.7 + 2.0) = 4.7 Ω ; (current in bell = $V \div R_{total}$ = 6.0 ÷ 4.7 = 1.28) = 1.3 (A) ;	**3**
9(b)	*any two from:* if one lamp breaks, the other can still work ; the lamps can be used independently ; each bulb, gets the same voltage / has same brightness ;	**2**

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