



Cambridge IGCSE™

COMBINED SCIENCE

0653/41

Paper 4 Extended Theory

October/November 2020

MARK SCHEME

Maximum Mark: 80

Published

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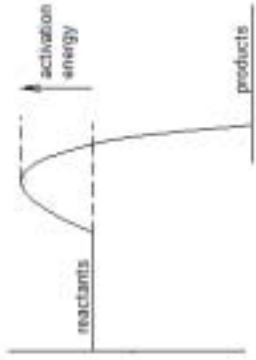
Question	Answer	Marks
1(a)(i)	<i>any two from:</i> oxygen moves into the blood; carbon dioxide moves into the, air / lungs / alveoli; by diffusion ;	2
1(a)(ii)	alveoli ;	1
1(a)(iii)	<i>any two from:</i> thin / one, layer of cells ; good blood supply ; large surface area ; well ventilated ;	2
1(b)(i)	(contains blood vessels for) taking substances / correct named substances, to (and from) the placenta / fetus ;	1
1(b)(ii)	protects the fetus from mechanical shock ;	1
1(b)(iii)	amino acids circled ; glucose circled ;	2

Question	Answer	Marks
2(a)	<i>trend:</i> boiling point increases ; <i>explanation:</i> molecules are larger ; stronger (intermolecular) forces ;	3
2(b)(i)	(family of compounds with) the same general formula ; similar chemical properties ;	2
2(b)(ii)	two double bonds shown ; all else correct including chemical symbols ;	2

Question	Answer	Marks
2(b)(iii)	$(C_7H_{16}) + 11 O_2 \rightarrow 7 (CO_2) + 8 H_2O$ all formulae correct ; balanced correctly dependent on correct formulae ;	2
2(c)	global warming / <u>enhanced</u> greenhouse effect / climate change / consequence of climate change ;	1

Question	Answer	Marks
3(a)(i)	use of area under graph OR distance = speed $\times$ time ; correct area identified / 1.5×5.0 ; 7.5 (m) ;	3
3(a)(ii)	25 (s) ;	1
3(a)(iii)	X anywhere on curved section between 25 s and 35 s ;	1
3(b)(i)	$\Delta G.P.E = mg\Delta h$ / $\Delta G.P.E = W\Delta h$ / 600×9.0 ; 5 400 (J) ;	2
3(b)(ii)	conversion of 48 kW to 48 000 W ; energy = power $\times$ time / $48\,000 \times 20$; 960 000 (J) ;	3
3(b)(iii)	<i>any two from:</i> work is done moving the woman forward horizontally / KE of woman ; work is done moving the escalator / KE of escalator ; work is done against friction / thermal energy produced / heat produced ;	2

Question	Answer	Marks
4(a)	coronary artery correctly labelled ;	1
4(b)	haemoglobin ;	1
4(c)	<i>any three from:</i> so more oxygen / glucose, taken to the muscles ; so more energy can be released ; correct reference to respiration ; so more carbon dioxide can be removed (from the muscles) ;	3
4(d)(i)	a chemical substance produced by a <u>gland</u> , carried by blood ; which alters the <u>activity</u> of one or more specific target organs ;	2
4(d)(ii)	adrenaline ;	1

Question	Answer	Marks
5(a)(i)	 reactants and products labelled ; activation energy labelled ;	2
5(a)(ii)	(sodium) particles gain (sufficient) energy ; to (overcome the attractive forces and) break the bonds between particles ;	2
5(a)(iii)	8–14 AND sodium hydroxide is a base ;	1
5(a)(iv)	Na ⁺ AND OH ⁻ ;	1

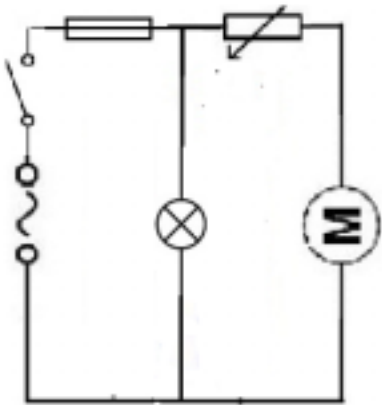
Question	Answer	Marks
5(b)	too reactive / very reactive / explosive ;	1
5(c)	chlorine ;	1
5(d)	as number of (outer shell) electrons increases the element becomes more non-metallic / ora ;	1

Question	Answer	Marks
6(a)	distances between molecules inside the tyre are smaller / molecules inside tyre are closer together / ora ;	1
6(b)	use of $P = F / A$; ($F = P \times A = 3 \times 10^5 \times 0.25 = 0.75 \times 10^5 / 75\,000\text{ (N)}$) ;	2
6(c)(i)	<i>any two from:</i> holes help air flow (over the surface of the skin on her head) ; holes allow water to escape ; which increases rate of evaporation ;	2
6(c)(ii)	make, shiny / white / light in colour ; reflects (the Sun's radiation) ;	2
6(d)	$v = f \lambda$ in <i>any form</i> / $330 \div 1320$; 0.25 (m) ;	2

Question	Answer	Marks
7(a)	correct reference to, fusion / joining / combining ; of <u>nuclei</u> of pollen and ovule ;	2
7(b)(i)	(anthers) are long ; hang outside the flower ;	2

Question	Answer	Marks
7(b)(ii)	<i>any two from:</i> the reproductive organs / anther (and stigma), are inside the flower ; large petals ; the stigma is above the anther ;	2
7(c)	(they are) organisms that make (their own) nutrients ; using light energy / by photosynthesis ;	2
7(d)	<i>any two from:</i> energy is lost / wasted, throughout the food chain ; not enough energy to support many higher levels ; further detail, e.g. by respiration (heat), excretion, death ;	2

Question	Answer	Marks
8(a)	copper oxide / copper sulfide ;	1
8(b)(i)	solid (at RT) / high density / malleable / ductile / shiny / (good) conductor of, heat / electricity ;	1
8(b)(ii)	coloured (other than white) / reference to catalysis ;	1
8(c)	reduction and oxidation both occur (redox) ; copper <u>oxide</u> is reduced / carbon is oxidised ; copper <u>oxide</u> loses oxygen / carbon gains oxygen ;	3
8(d)	alloy AND mixture both circled ;	1

Question	Answer	Marks
9(a)	 switch and fuse symbols correct ; variable resistor symbol correct ; switch and fuse in main circuit ; variable resistor in motor branch ;	4
9(b)	$V = IR$ in any form / $230 \div 0.25$; $920 (\Omega)$;	2