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CO-ORDINATED SCIENCES **0654/32**

Paper 3 Theory (Core) **October/November 2017**

MARK SCHEME

Maximum Mark: 120

Published

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Question	Answer	Marks
1(a)(i)	**C** ; **A** ; **D** ;	**3**
1(a)(ii)	where fetus / baby, develops ;	**1**
1(b)(i)	joining of male and female gamete / sperm and egg ; joining / fusion, of nuclei ;	**2**
1(b)(ii)	zygote ;	**1**
1(c)	requires two parents ; produces genetically dissimilar offspring ; involves haploid cell / gametes / sex cells ;	**max 2**

Question	Answer	Marks
2(a)	nucleus *then* protons and neutrons ; negative ; positive ;	**3**
2(b)(i)	lithium, sodium, potassium ; copper, potassium ;	**2**
2(b)(ii)	potassium sodium lithium copper ;	**1**
2(b)(iii)	burning / lighted splint ; pops ;	**2**

Question	Answer	Marks
2(c)	no change / no reaction AND argon is unreactive / is an inert gas ; solution becomes orange ; bromine is released / chlorine displaces bromine / chlorine more reactive than bromine ;	**3**

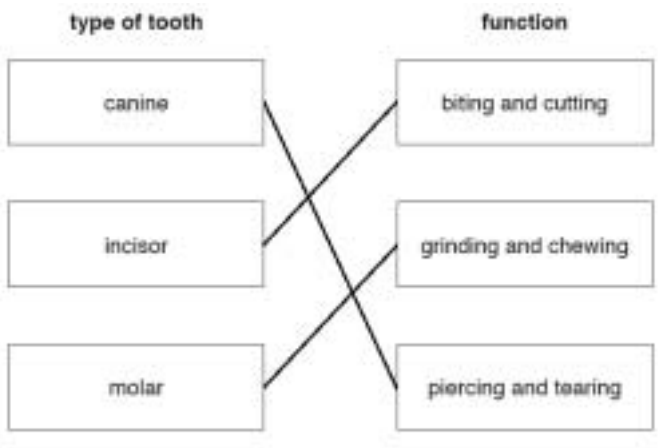
Question	Answer	Marks
3(a)(i)	angle of incidence correctly labelled ;	**1**
3(a)(ii)	30° ; angle of incidence = angle of reflection ;	**2**
3(a)(iii)	electrical energy to light energy ;	**1**
3(b)(i)	GM tube etc. ;	**1**
3(b)(ii)	Electron ;	**1**
3(b)(iii)	reference to background radiation / decay is a random process ;	**1**
3(b)(iv)	(β–)radiation cannot penetrate lead ;	**1**
3(c)(i)	54 (N) ;	**1**
3(c)(ii)	change in speed / direction of motion ;	**1**

Question	Answer	Marks
4(a)(i)	(thorn) acacias → (desert) mice → snake → hawk organisms in correct order ; arrows in the correct direction ;	**2**
4(a)(ii)	(thorn) acacias ;	**1**
4(a)(iii)	(desert) mice ;	**1**
4(b)	Sun ;	**1**
4(c)	greater chance of passing on genes ; by the best adapted organisms / AW ;	**2**

Question	Answer	Marks
5(a)(i)	<table><tr><th>substance</th><th>element</th><th>ionic compound</th><th>covalent compound</th><th>mixture</th></tr><tr><td>air</td><td></td><td></td><td></td><td>✓</td></tr><tr><td>bromine</td><td>✓</td><td></td><td></td><td></td></tr><tr><td>carbon dioxide</td><td></td><td></td><td>✓</td><td></td></tr><tr><td>iron oxide</td><td></td><td>✓</td><td></td><td></td></tr></table> 1 or 2 ticks correct ; 3 ticks correct ; 4 ticks correct ;	**3**
5(a)(ii)	contains carbon hydrogen and oxygen ; shows 6 × C 12 × H 6 × O <u>atoms</u> ;	**2**
5(b)(i)	electrolysis ;	**1**

Question	Answer	Marks
5(b)(ii)	anode – bubbles / gas released ; cathode – colour change / coloured layer forms / pink / orange layer forms ;	**2**
5(b)(iii)	lead oxide + carbon → (lead) + carbon dioxide / monoxide LHS correct ; RHS correct ;	**2**
5(b)(iv)	(lead oxide) oxygen removed ;	**1**

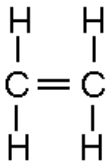
Question	Answer	Marks
6(a)(i)	small amplitude because quiet noise / amplitude determines loudness ;	**1**
6(a)(ii)	high frequency because high pitch / frequency determines pitch ;	**1**
6(b)(i)	**B** anywhere from 2 minutes to 5 minutes ; temperature is constant when boiling / water boils at 100 °C ;	**2**
6(b)(ii)	<u>temperature</u> at which a liquid boils / turns into a gas ;	**1**
6(b)(iii)	water – **B** **AND** particles are close together / touching and randomly arranged ; steam – **C** **AND** particles are widely spaced / spread out (and randomly arranged) ;	**2**
6(c)	cable broken / no insulation / wire exposed ; danger of electrocution / short circuit / electric shock / fire ;	**2**
6(d)	visible light is missing ; microwaves and / or infra-red in wrong place / in each other's place ;	**2**

Question	Answer	Marks
7(a)(i)	 1 or 2 correct ; 3 correct ;	**2**
7(a)(ii)	*(molar is)* flatter / broader / larger surface area / has cusps / uneven surface / more than one root ;	**1**
7(b)	<u>bacteria</u> ;	**1**
7(c)(i)	ref to no consumer choice ; side effects **/** long term effects not known ; fluorosis / discolouration of teeth ;	**max 1**
7(c)(ii)	brushing teeth ; avoid sugary, food / drinks ; visiting dentist **/** regular checkups ;	**max 2**

Question	Answer	Marks
8(a)(i)	7 ;	**1**
8(a)(ii)	salt ; water ;	**2**
8(a)(iii)	soil too acidic / calcium oxide is a base ; calcium oxide neutralises / reacts with the acid in the soil ; improves conditions for plant growth ;	**max 2**
8(b)(i)	burning fossil fuels (that still contain sulfur) ; reference to volcanism / hot springs ;	**2**
8(b)(ii)	reference to the formation of acid rain / example of a consequence of acid rain ;	**1**

Question	Answer	Marks
9(a)(i)	accelerating / increasing speed ;	**1**
9(a)(ii)	speed = distance / time / = 560 / 60 ; = 9.33 (m / s) ;	**2**
9(a)(iii)	kinetic energy to thermal / sound ;	**1**
9(b)	volume = 15 $\times$ 15 $\times$ 12 / = 2700 cm^3 ; density = mass/volume or 7500 / 2700 ; = 2.78 (g / cm^3) ;	**3**
9(c)	first reflection ; second reflection parallel to incident ray ;	**2**
9(d)(i)	Parallel ;	**1**
9(d)(ii)	I = V / R or 12 / 5 ; = 2.4 (A) ;	**2**

Question	Answer	Marks
10(a)	geotropism ;	**1**
10(b)(i)	respiration ;	**1**
10(b)(ii)	moisture / water ; warm (temperature) / suitable temperature ;	**2**
10(c)(i)	(seedling is) underground / no light ;	**1**
10(c)(ii)	LHS carbon dioxide + water ; RHS glucose + oxygen ;	**2**
10(d)	magnesium ;	**1**

Question	Answer	Marks
11(a)(i)	ethane ;	**1**
11(a)(ii)	 double bond shown ; four hydrogen atoms – two on each carbon atom ;	**2**
11(b)(i)	CO_2 and H_2O from the (complete) combustion of propane / the fuel / the hydrocarbon ;	**1**
11(b)(ii)	nitrogen and argon from / in the air (taken in with the fuel) ; nitrogen and argon are inert / do not react / burn ;	**2**
11(c)(i)	calcium carbonate / $CaCO_3$; calcium oxide / lime / CaO / carbon dioxide / CO_2 ;	**2**

Question	Answer	Marks
11(c)(ii)	cobalt oxide / CoO and copper oxide / CuO ; reference to transition metals ;	**2**

Question	Answer	Marks
12(a)	Friction / description of friction ; transfer of electrons ;	**2**
12(b)	low a magnetic iron switch high 2 correct ; 4 correct ;	**2**
12(c)	coal / gas ; solar / wind / waves / tides / geothermal / hydroelectricity ;	**2**
12(d)	use a magnet (no mark) steel is magnetic / will attract magnet or aluminium is not magnetic / will not attract magnet ;	**1**

Question	Answer	Marks
13(a)	70 ;	**1**
13(b)(i)	poaching / hunting / animal predators ; disease ; pollution ; competition ;	**max 2**

Question	Answer	Marks
13(b)(ii)	soil erosion / loss of soil ; flooding ; carbon dioxide build-up ; species extinction / endangerment ;	**max 2**
13(c)	creating national parks / protected areas ; legislation / banning hunting ; breeding programmes ; eco-tourism / ref to raising awareness / education ;	**max 2**
13(d)	water ; fossil fuels ;	**2**