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COMBINED SCIENCE **0653/31**

Paper 3 Core Theory **May/June 2017**

MARK SCHEME

Maximum Mark: 80

Published

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Question	Answer	Marks
1(a)	three lines drawn to produce haploid pollen ; need oxygen for germination of seeds ; have root hair cells for water uptake ;	**3**
1(b)(i)	any two from (large) petals ; (bright) colour ; scented ; nectar ;	**Max 2**
1(b)(ii)	anthers / stamens are below stigma in **2** and level with stigma in **1** ;	**1**
1(c)	flower **2** (no mark) the stigma is higher than the anthers / anthers lower than the stigma ;	**1**

Question	Answer	Marks
2(a)(i)	covalent ;	**1**
2(a)(ii)	non-metal(lic) ;	**1**
2(b)(i)	(methane) + oxygen → carbon dioxide + water Oxygen on LHS ; RHS any order ;	**2**
2(b)(ii)	releases <u>heat</u> / <u>thermal</u> energy when it reacts / burns / is used ;	**1**
2(c)(i)	<u>natural gas</u> ;	**1**
2(c)(ii)	coal **and** petroleum (either order) ;	**1**
2(d)(i)	<u>fractional distillation</u> ;	**1**

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Question	Answer	Marks
2(d)(ii)	heating / cooking ;	1

Question	Answer	Marks
3(a)(i)	<table><tr><th>name of force</th><th>letter on Fig. 1.1</th></tr><tr><td>driving force</td><td>B</td></tr><tr><td>frictional force</td><td>D</td></tr><tr><td>upthrust of water</td><td>C</td></tr><tr><td>weight</td><td>A</td></tr></table> two letters correct ; two more letters correct ;	2
3(a)(ii)	(Force C is 1200 N) no mark no vertical motion / forces (**A** and **C**) must balance ;	1
3(a)(iii)	**B** / driving force ;	1
3(b)	12 km / h (= 12 000 m / h = 200 m / min) = 3.3 m / s ;	1
3(c)(i)	(magnitude of) force ; distance (moved) ;	2
3(c)(ii)	kinetic (energy) / KE ;	1
3(c)(iii)	transferred to other forms of energy ;	1

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Question	Answer	Marks
4(a)	an animal that gets its energy / eats (only) plants ; an animal that gets its energy / eats (only) animals ;	**2**
4(b)(i)	(amount of) light / light intensity ; (amount of) carbon dioxide / concentration of carbon dioxide ;	**2**
4(b)(ii)	food chains, any one from seaweed→limpet→crab→seagull / phytoplankton→mussel→ crab→seagull / phytoplankton→zooplankton→mussel →crab→seagull ; arrows in correct direction ;	**2**
4(b)(iii)	(increase) crabs no longer feeding on the mussels ; (decrease) seagulls have fewer crabs to feed on ; so they eat more mussels instead ;	**3**

Question	Answer	Marks
5(a)(i)	carbon dioxide ; copper sulfate ;	**2**
5(a)(ii)	increases ; salt making / neutralisation ;	**2**
5(b)	runs out of / no more (sulfuric) acid / copper carbonate / powder ;	**1**
5(c)	higher temperature / more concentrated (acid) / decrease particle size (of powder) / agitate the flask ;	**1**
5(d)(i)	three / 3 ; seven / 7 ;	**2**
5(d)(ii)	(acidified) barium ions / barium nitrate (soln) ; (result) white ppt / white solid ;	**2**

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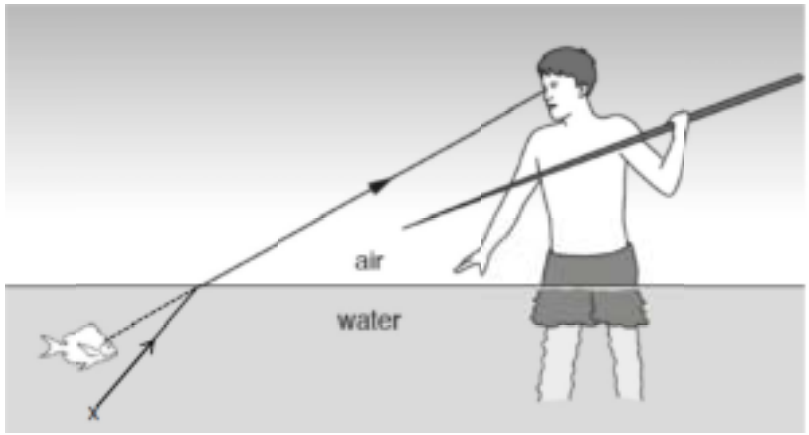
Question	Answer	Marks
6(a)(i)	(transfer by) radiation ; infra-red ;	**2**
6(a)(ii)	idea of feet lose heat / thermal energy ; heat / thermal energy lost to water ; water is colder (than the feet of the man) ;	**Max 2**
6(a)(iii)	(line 1) (more) energetic/faster **and** (line 3) energy / speed ; (line 4) temperature ;	**2**
6(b)(i)	 (position of X implies) correct refraction at surface ; unbroken ray in a straight line from X joining with ray to eye ;	**2**
6(b)(ii)	refraction ;	**1**
6(c)	gamma rays | | | visible light | | **micro-waves** ; | radio waves	**1**

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Question	Answer	Marks
7(a)	vitamins ; mineral salts / minerals ;	**2**
7(b)	energy from eggs = 37 × 11 + 17 + 13 × 17 ; = 645 (kJ) ;	**2**
7(c)(i)	carbon dioxide and water ; *either order*	**1**
7(c)(ii)	carried by haemoglobin ; in red blood cells ; red cells carried in plasma ;	**Max 2**
7(d)	in any order mouth ; stomach ; small intestine duodenum / ileum ;	**3**

Question	Answer	Marks
8(a)(i)	transition ;	**1**
8(a)(ii)	copper oxide / CuO ;	**1**
8(a)(iii)	ductile / high melting point ;	**1**
8(a)(iv)	Iron / Fe is too reactive / reacts / rusts (with water) / copper is less reactive (than iron);	**1**
8(a)(v)	stronger / does not get damaged ;	**1**
8(b)	(metal) magnesium ; (gas) hydrogen ;	**2**

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Question	Answer	Marks
9(a)(i)	any two from one or two metals *or* alloys (other than copper) ; graphite / carbon ;	**1**
9(a)(ii)	any two non-metallic materials (other than carbon / graphite) ;	**1**
9(a)(iii)	insulators ;	**1**
9(b)	to limit the current / protect the circuit ;	**1**
9(c)(i)	voltmeter symbol ; parallel connection ;	**2**
9(c)(ii)	R = V / I ; = 2 / 0.5 = 4 ; ohms / Ω ;	**3**

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