Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

CO-ORDINTED SCIENCES **0654/33**

Paper 3 Theory (Core) **May/June 2018**

MARK SCHEME

Maximum Mark: 120

Published

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge International will not enter into discussions about these mark schemes.

Cambridge International is publishing the mark schemes for the May/June 2018 series for most Cambridge IGCSE™, Cambridge International A and AS Level and Cambridge Pre-U components, and some Cambridge O Level components.

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Generic Marking Principles

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptors for a question. Each question paper and mark scheme will also comply with these marking principles.

GENERIC MARKING PRINCIPLE 1:

Marks must be awarded in line with:

- the specific content of the mark scheme or the generic level descriptors for the question
- the specific skills defined in the mark scheme or in the generic level descriptors for the question
- the standard of response required by a candidate as exemplified by the standardisation scripts.

GENERIC MARKING PRINCIPLE 2:

Marks awarded are always **whole marks** (not half marks, or other fractions).

GENERIC MARKING PRINCIPLE 3:

Marks must be awarded **positively**:

- marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
- marks are awarded when candidates clearly demonstrate what they know and can do
- marks are not deducted for errors
- marks are not deducted for omissions
- answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.

GENERIC MARKING PRINCIPLE 4:

Rules must be applied consistently e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

GENERIC MARKING PRINCIPLE 5: Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).
GENERIC MARKING PRINCIPLE 6: Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>1(a)(i)</td><td>thick wall ;
thick muscle / elastic layer ;
narrow lumen ;</td><td>max 2</td></tr>
<tr><td>1(a)(ii)</td><td>thinner wall ;
thinner muscle / elastic layer ;
larger lumen ;
presence of valves ;</td><td>max 2</td></tr>
<tr><td>1(b)</td><td><table><tr><th>organ</th><th>blood vessel bringing blood to the organ</th><th>blood vessel taking blood away from the organ</th></tr><tr><td>heart</td><td>vena cava / pulmonary vein</td><td>aorta</td></tr><tr><td>kidney</td><td>renal artery</td><td>renal vein</td></tr><tr><td>liver</td><td>hepatic artery / hepatic portal vein</td><td>hepatic vein</td></tr><tr><td>lungs</td><td>pulmonary artery</td><td>pulmonary vein</td></tr></table>one mark for each correct row ;;;;</td><td>4</td></tr>
</table>

Question	Answer	Marks
2(a)(i)	(good) conductor of electrical energy / electricity (good) conductor of thermal energy / heat malleable ductile lustrous / shiny ;	**1**
2(a)(ii)	transition ;	**1**
2(a)(iii)	high density ; reference to coloured compounds ; catalysis ;	**max 2**
2(b)(i)	copper oxide + carbon → (carbon dioxide) + copper ;	**1**
2(b)(ii)	carbon ; (carbon) gains oxygen ;	**2**
2(b)(iii)	limewater ; turns cloudy ;	**2**

Question	Answer	Marks
3(a)(i)	at time = 0 s or time = 50 s ;	**1**
3(a)(ii)	somewhere between time = 20 s and time = 40 s ;	**1**
3(a)(iii)	20 s ;	**1**
3(b)	force **A** is greater than force **F** ;	**1**
3(c)(i)	wavelength correctly shown ;	**1**
3(c)(ii)	vertical distance from still water level to peak or trough / owtte ;	**1**
3(d)	chemical ; sound and thermal ;	**2**
3(e)	water molecules are moving / have a range of kinetic energies ; more energetic molecules escape ; break bonds / break forces of attraction between molecules ; ref to increased energy on a sunny day ;	**max 3**

Question	Answer	Marks
4(a)(i)	39.4 – 36.8 = 2.6 (°C) ;	**1**
4(a)(ii)	decrease back to original temperature ;	**1**
4(b)	sweating ; goes red ; vasodilation; / increased blood flow to skin ;	**max 2**
4(c)	(respiration) releases energy ; in the form of thermal energy ;	**2**
4(d)	more frequent muscle contraction / beating, of heart ;	**1**

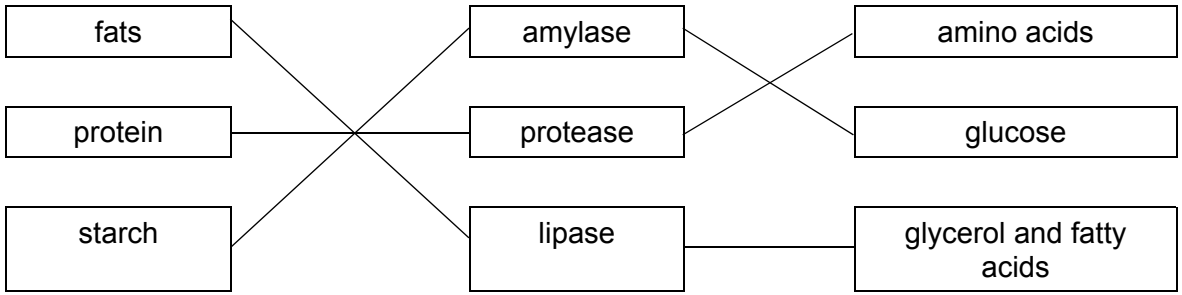
Question	Answer	Marks
5(a)(i)	green ; to blue / purple ;	**2**
5(a)(ii)	7 to >7 and 14 or less ;	**1**
5(a)(iii)	lighted splint / flame causes pop / explosive burn ;	**1**
5(a)(iv)	measure temperature change / place thermometer in mixture ; temperature increases ;	**2**
5(b)(i)	ionic / electrovalent ;	**1**
5(b)(ii)	electrolysis ;	**1**
5(b)(iii)	label line to positive electrode ;	**1**
5(b)(iv)	chlorine ;	**1**

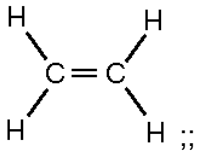
Question	Answer	Marks
6(a)(i)	10 (cm) ;	**1**
6(a)(ii)	principal focus / focal point ;	**1**
6(b)(i)	**A** X-rays ; **B** infra-red ;	**2**
6(b)(ii)	gamma rays / left-hand side ;	**1**
6(c)(i)	time = distance / speed or 400 / 300 000 ; = 0.0013 (s) ;	**2**
6(c)(ii)	sound needs a medium / sound needs air / there is no air / there is a vacuum ;	**1**
6(d)(i)	wind / geothermal / tidal / HEP / waves ;	**1**
6(d)(ii)	coal / petroleum / gas ;	**1**

Question	Answer	Marks
7(a)	**A** ; **E** ; **C** ; **D** ;	**4**
7(b)(i)	(pollen transferred by) wind ;	**1**
7(b)(ii)	involves gametes ticked ; involves fusion of nuclei ticked ; produces genetically dissimilar offspring ticked ;	**3**

Question	Answer	Marks
8(a)(i)	alloy ;	**1**
8(a)(ii)	strength / malleability / density / conductivity / colour ;	**1**
8(b)	provides barrier / owtte ; between oxygen / air and water (and iron) ;	**2**
8(c)(i)	25 ÷ 50 = 0.5 (cm^3) ;	**1**
8(c)(ii)	increase temperature ; increase concentration of acid ; increased surface area / grind up magnesium ;	**max 2**
8(d)	magnesium oxide ; magnesium carbonate ;	**2**

Question	Answer	Marks
9(a)(i)	any correct application ;	**1**
9(a)(ii)	railway tracks / bridges / roads ;	**1**
9(b)	density = mass / volume or 40.5 / 15 ; = 2.7 ; g / cm^3 ;	**3**
9(c)	protons = 13 ; neutrons = 15 ;	**2**
9(d)	neutron number ;	**1**
9(e)(i)	(wire) **K** ; shortest length and largest diameter ;	**2**
9(e)(ii)	R = V / I or 6 / 5000 ; = 0.0012 (Ω) ;	**2**

Question	Answer	Marks
10(a)(i)	any value between 41–43 (°C) ;	**1**
10(a)(ii)	any value between 0–10 (°C) **OR** 60–80 (°C) ;	**1**
10(b)	close to / same as body temperature ;	**1**
10(c)	 one mark for each correct set of links ;;;	**3**
10(d)	breakdown large (food) molecules to small (food) molecules ; from insoluble to soluble ; so they are easily absorbed ; reference to catalyst ;	**3**

Question	Answer	Marks
11(a)(i)	fractional distillation ;	**1**
11(a)(ii)	carbon and hydrogen ;	**1**
11(a)(iii)	refinery gas ; heating / cooking / other correct ; diesel / diesel oil / gasoil ; fuel for diesel engines ; other correct product and use ;;	**2**
11(b)(i)	substance that increases reaction rate ; but is not (permanently) chemically changed ;	**2**
11(b)(ii)	use of bromine / bromine solution ; changes from orange to colourless with alkenes / unsaturation ;	**2**
11(c)(i)	 ;;	**2**
11(c)(ii)	H_2O ;	**1**
11(c)(iii)	many ethene molecules join to form poly(ethene) / owtte ;	**1**

Question	Answer	Marks
12(a)	reference to electron transfer ;	**1**
12(b)	symbols correct ; only lamps in parallel ; switch in suitable place ;	**3**
12(c)	conduction ;	**1**
12(d)	two reflections ; two correct reflections **and** ray emerges approx. parallel to original ;	**2**

Question	Answer	Marks
13(a)(i)	46 ;	**1**
13(a)(ii)	male **and** the presence of XY chromosomes ;	**1**
13(a)(iii)	X inherited from, mother / egg / female gamete ; Y inherited from, father / sperm / male gamete ;	**2**
13(b)	DNA ; genes ;	**2**
13(c)	joining of nuclei ; (of) sperm and egg / male and female gamete / sex cells ;	**2**