Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

CO-ORDINATED SCIENCES **0654/31**

Paper 3 Theory (Core) **October/November 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 October/November 2018 series for most Cambridge IGCSE™, Cambridge International A and AS Level components and some Cambridge O Level components.

PUBLISHED

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.

Question	Answer	Marks
1(a)	incisor(s) ;	**1**
1(b)	*canine* cut / tear / rip food (into smaller pieces) ; *molar* grind / crush food (into smaller pieces) ;	**2**
1(c)	break food into smaller pieces ; increasing the surface area ; for enzymes to act ;	**max 2**
1(d)	bacteria feed on sugar ; ref to respiration ; producing acid ; acid causes the teeth to decay / corrode / wear away ;	**max 3**
1(e)	(regular) brushing / antibacterial mouth wash / flossing / regular visits to dentist ;	**1**

Question	Answer	Marks
2(a)(i)	3 ;	**1**
2(a)(ii)	carbon dioxide ; water ;	**2**
2(a)(iii)	effervescence ; temperature increase ; AVP	**max 1**
2(a)(iv)	(dilute nitric acid, then) silver nitrate ; white ppt. ;	**2**
2(b)(i)	(thermal) decomposition ;	**1**
2(b)(ii)	gas / carbon dioxide released / given off ;	**1**
2(b)(iii)	calcium oxide / quicklime / lime ;	**1**
2(c)	reference to the reduction of acidity ;	**1**

Question	Answer	Marks
3(a)(i)	no of oscillations / vibrations / sec ;	**1**
3(a)(ii)	20 000 (Hz) ; 20 (Hz) ;	**2**
3(a)(iii)	elephant ;	**1**
3(b)(i)	distance = speed × time or 340 × 0.4 ; 136 (m) ;	**2**
3(b)(ii)	68 (m) ;	**1**
3(c)(i)	do not work if too much / too little wind ; noisy ; visual pollution ;	**max 2**
3(c)(ii)	HEP / solar / tides / waves / geothermal ;	**1**

Question	Answer	Marks
4(a)	evaporation ; mesophyll ; stomata ;	**3**
4(b)(i)	0.9 – 0.35 ; 0.55 ;	**2**
4(b)(ii)	kept at a higher temperature ; increased rate of transpiration / more water (vapour) is lost ;	**2**
4(c)	enters through root hair (cells) ; by diffusion ; transported by xylem ; up the stem ;	**max 3**

Question	Answer	Marks
5(a)	gaseous to liquid to solid ;	**1**
5(b)(i)	(protons) 17 (neutrons) 18 ;	**1**
5(b)(ii)	nucleus ;	**1**
5(c)(i)	(sodium chloride) ionic / electrovalent ; (chlorine oxide) covalent ;	**2**
5(c)(ii)	(sodium atoms) lose electrons ; (chlorine atoms) gain electrons ;	**2**
5(d)	chlorine – no mark chlorine more reactive than bromine ;	**1**
5(e)	at positive gas is released / bubbles produced ; at negative brown / copper-coloured solid (layer) ;	**2**

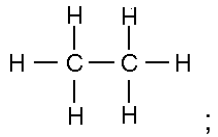
Question	Answer	Marks
6(a)(i)	radiation ;	**1**
6(a)(ii)	infrared ;	**1**
6(a)(iii)	between visible and microwaves ;	**1**
6(b)(i)	pressure caused by collisions with tyre wall ;	**1**
6(b)(ii)	thermal energy causes particles to move faster / particles have more KE ; more frequent collisions / collisions exert a greater force;	**max 2**
6(c)(i)	**A** and **B** ;	**1**
6(c)(ii)	**A** and **C** ;	**1**
6(c)(iii)	resistance = voltage / current or 12 / 0.5 ; = 24 (Ω) ;	**2**
6(c)(iv)	1 (Ω) ;	**1**

Question	Answer	Marks
7(a)(i)	**D** ; **E** ; **A** ;	**3**
7(a)(ii)	arrow drawn, entering the trachea / pointing into the trachea ;	**1**
7(b)	carrying a heavy load ; running a marathon ;	**2**

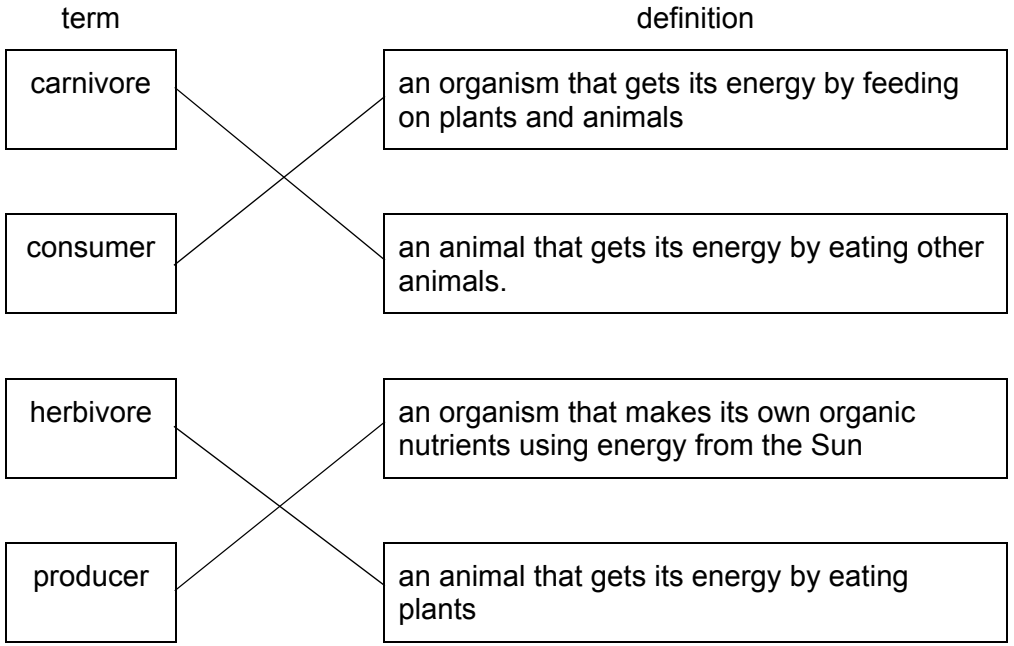
Question	Answer	Marks
8(a)(i)	1.0 + 4.0 + 8.8 + 1.7 + 2.0 = 17.5 ; 100 – 17.5 / 82.5 ;	**2**
8(a)(ii)	chromium, vanadium ;	**1**
8(a)(iii)	transition (metals) ;	**1**
8(b)(i)	(21.2 – 20.0 =) 1.2 (g) ;	**1**
8(b)(ii)	(1.2 ÷ 10) = 0.1(2) (g) ;	**1**
8(b)(iii)	reference to a reaction with oxygen / water ; the idea that oxygen / water (in rust) is added material ;	**max 1**
8(b)(iv)	greater than 20.0 g and smaller than 21.2 g ;	**1**

Question	Answer	Marks
9(a)(i)	iron and steel ;	**1**
9(a)(ii)	iron magnetises quicker / iron loses magnetism quicker ;	**1**
9(b)(i)	lead ;	**1**
9(b)(ii)	alpha ;	**1**
9(b)(ii)	damages / mutates cells ; cancer ; radiation burns ;	**max 2**
9(c)(i)	density = mass / volume or 134.4 / 15.0 ; = 8.96 ; g / cm^3 ;	**3**
9(c)(ii)	upright ; laterally inverted ;	**2**

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>10(a)</td><td>
<table>
<tr><th>name of part</th><th>letter</th><th>function</th></tr>
<tr><td>anther</td><td>E</td><td>produces / releases pollen</td></tr>
<tr><td>petal</td><td>D</td><td>attracting insects for pollination</td></tr>
<tr><td>sepal</td><td>B</td><td>protecting the plant when in bud</td></tr>
</table>
1 row correct ;
2 rows correct ;
3 rows correct ;
</td><td>3</td></tr>
<tr><td>10(b)</td><td>attached to the body of insects ticked ;
carried by wind ticked ;</td><td>2</td></tr>
<tr><td>10(c)</td><td>genetically identical offspring ;
only one parent required ;
doesn’t involve gametes ;
AVP ;</td><td>max 2</td></tr>
</table>

Question	Answer	Marks
11(a)	fractional distillation ;	**1**
11(b)(i)	exothermic ;	**1**
11(b)(ii)	carbon dioxide ; water ;	**2**
11(c)	methane ;  ;	**2**
11(d)(i)	(catalytic / thermal) cracking ;	**1**
11(d)(ii)	speeds up a reaction ;	**1**
11(d)(iii)	ethanol ;	**1**
11(e)	(react with / shake with) bromine (solution) ; (with alkane) no change / no reaction / mixture remains orange ; (with alkene) orange to colourless ;	**3**

Question	Answer	Marks
12(a)	magnitude = 500 (N) ; direction to right ;	**2**
12(b)	solid gas solid 1 or 2 correct ; 3 correct ;	**2**
12(c)	kinetic energy ; gravitational (potential) energy ;	**2**
12(d)	ray reflects from other surface ; emerges parallel to incident ray ;	**2**

Question	Answer	Marks
13(a)	respiration ;	**1**
13(b)	combustion releases carbon dioxide ; carbon dioxide is a greenhouse gas ; (enhanced) greenhouse effect leads to global warming ;	**max 2**
13(c)	ref photosynthesis ; remove carbon dioxide (from the atmosphere) / reducing greenhouse effect ;	**2**
13(d)	 1 correct ; 2 or 3 correct ; 4 correct ;	**3**