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**CO-ORDINATED SCIENCES**

**0654/33**

Paper 3 Theory (Core)

**October/November 2018**

MARK SCHEME

Maximum Mark: 120

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**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.

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This document consists of **16** printed pages.

**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.

<b>Question</b>	<b>Answer</b>	<b>Marks</b>
1(a)(i)	willow (tree) / spruce (tree) ;	<b>1</b>
1(a)(ii)	hare / caterpillar ;	<b>1</b>
1(b)(i)	<i>population increase – no mark idea of less predation ;</i>	<b>1</b>
1(b)(ii)	<i>population increase – no mark idea of less competition ; increased food (availability) ;</i>	<b>2</b>
1(c)	<i>population decrease – no mark less food ; habitat / shelter / breeding sites removed ; food, chains / webs, disrupted ;</i>	<b>max 2</b>

<b>Question</b>	<b>Answer</b>	<b>Marks</b>
2(a)(i)	gas liquid solid 1 or 2 correct ; 3 correct ;	<b>2</b>
2(a)(ii)	chlorine atoms contain 17 protons ;	<b>1</b>
2(a)(iii)	(35) number of electrons equal to number of protons / atomic number ;	<b>1</b>
2(b)(i)	they have opposite electrical charges / opposite charges attract ;	<b>1</b>
2(b)(ii)	outer electron is lost (from sodium) / it is transferred to the chlorine atom ;	<b>1</b>
2(c)(i)	filtration / decantation ;	<b>1</b>
2(c)(ii)	heat (solution) ; so all water evaporates / leave to evaporate ;	<b>2</b>
2(d)	white precipitate / goes cloudy ; solution contains chloride (anions) / this is the chloride ion test / silver chloride is insoluble ;	<b>2</b>

Question	Answer	Marks
3(a)	fan to kinetic ; kettle to thermal ; torch to light ;	<b>3</b>
3(b)	symbols correct ; two cells, lamp and switch all in series ;	<b>2</b>
3(c)	$r = V / I$ or $3.0 / 0.6$ ; $5 (\Omega)$ ;	<b>2</b>
3(d)(i)	reflection ;	<b>1</b>
3(d)(ii)	angle of incidence ( <i>i</i> ) correctly labelled ;	<b>1</b>
3(e)(i)	wind / waves / HEP / geothermal / tides ;	<b>1</b>
3(e)(ii)	oil / coal / natural gas / peat ;	<b>1</b>

Question	Answer	Marks
4(a)	transpiration ;	<b>1</b>
4(b)(i)	0.10 g ;	<b>1</b>
4(b)(ii)	<i>leaf A loses less mass – no mark</i> increased humidity ; less transpiration / evaporation ; less water lost ;	<b>max 2</b>
4(c)	absorbed / uptake through root <u>hair</u> (cells) ; by diffusion ;	<b>2</b>
4(d)(i)	water ; mineral ions ;	<b>2</b>
4(d)(ii)	support ;	<b>1</b>

<b>Question</b>	<b>Answer</b>	<b>Marks</b>
5(a)(i)	potassium calcium iron copper ;	<b>1</b>
5(a)(ii)	copper and iron ;	<b>1</b>
5(b)(i)	hydrogen / H <sub>2</sub> ;	<b>1</b>
5(b)(ii)	9–14 ; solution becomes alkaline / contains a base / calcium hydroxide ;	<b>2</b>
5(b)(iii)	acid – red / orange / yellow ; alkali – blue / purple ;	<b>2</b>
5(b)(iv)	temperature increases ; (thermal) energy given out;	<b>max 1</b>
5(c)(i)	oxygen ;	<b>1</b>
5(c)(ii)	cover with oil / grease / paint / electroplate ; (form a barrier to) prevent contact / reaction (between iron and air / water) ;	<b>2</b>



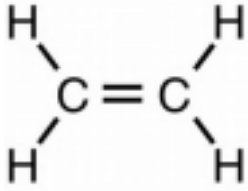
<b>Question</b>	<b>Answer</b>	<b>Marks</b>
6(a)(i)	range of frequencies that can be heard by an organism ;	<b>1</b>
6(a)(ii)	20 Hz ; 20 000 Hz ;	<b>2</b>
6(a)(iii)	bat ;	<b>1</b>
6(a)(iv)	elephant ;	<b>1</b>
6(b)	speed = distance / time or $1000 / 2.9$ ; $340 \text{ m / s}$ ; ( <i>allow 344.8 m / s</i> )	<b>2</b>
6(c)	density = mass / volume or $3000 / 2.9$ ; $1034.5$ ; $\text{kg / m}^3$ ;	<b>3</b>

Question	Answer	Marks
7(a)	<b>X</b> on either or both ovaries ;	<b>1</b>
7(b)	<div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">cervix</div> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">oviduct</div> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">uterus</div> <div style="border: 1px solid black; padding: 2px;">vagina</div> </div> <div style="text-align: center;"> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">keeps baby in place during pregnancy</div> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">penis placed here during intercourse</div> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">where fertilisation occurs</div> <div style="border: 1px solid black; padding: 2px;">where growing baby develops</div> </div> </div> <p style="margin-top: 20px;">1 correct ;                  2 or 3 correct ;                  4 correct ;</p>	<b>3</b>
7(c)	<p><i>Days 0–5</i>                      (uterus lining) shed / menstruation ;</p> <p><i>Days 5–18</i>                      (uterus lining) builds up / thickens ;</p> <p><i>Days 18–28</i>                      (uterus lining) is maintained / stays thick / remains the same ;</p>	<b>3</b>
7(d)	travels, down oviduct / into uterus ; divides ; forms a ball of cells ; implants into uterus <u>wall</u> ;	<b>max 3</b>

<b>Question</b>	<b>Answer</b>	<b>Marks</b>
8(a)(i)	oxygen ;	<b>1</b>
8(a)(ii)	sulfur dioxide ;	<b>1</b>
8(a)(iii)	sulfur dioxide is poisonous / causes breathing ;	<b>1</b>
8(b)(i)	coloured compounds ; catalysts ;	<b>2</b>
8(b)(ii)	covalent ; hydrogen sulfide is non-metal bonded to non-metal ;	<b>2</b>
8(b)(iii)	idea that a magnet / water can separate the mixture or that dilute acid produces different gases with the mixture and compound or a lens shows separate pieces of sulfur and iron in the mixture or AVP ;	<b>1</b>

<b>Question</b>	<b>Answer</b>	<b>Marks</b>
9(a)	does not corrode / does not react with food / low density ;	<b>1</b>
9(b)(i)	move faster ;	<b>1</b>
9(b)(ii)	ref. to collision with wall more frequent / collisions exert greater force ;	<b>max 2</b>
9(c)	laterally inverted same size upright  1 or 2 correct ; 3 correct ;	<b>2</b>
9(d)(i)	radiation ;	<b>1</b>
9(d)(ii)	infrared ;	<b>1</b>
9(d)(iii)	between visible and microwaves ;	<b>1</b>
9(d)(iv)	beta more ionising ; beta less penetrating ; gamma no charge but beta negative ;	<b>max 2</b>

<b>Question</b>	<b>Answer</b>	<b>Marks</b>
10(c)	albinism only expressed if both / two recessive alleles present ; less likely to inherit both / two recessive alleles ; AVP ;	<b>max 2</b>
10(a)	genetic ; generation ;	<b>2</b>
10(b)(i)	aa ;	<b>1</b>
10(b)(ii)	heterozygous ;	<b>1</b>
10(c)	albinism only expressed if both / two recessive alleles present ; less likely to inherit both / two recessive alleles ; AVP ;	<b>max 2</b>

Question	Answer	Marks
11(a)(i)	 <p>carbon - carbon double bond ; 4 carbon hydrogen bonds ;</p>	<b>2</b>
11(a)(ii)	(catalytic / thermal) cracking ;	<b>1</b>
11(b)(i)	(orange solution) becomes colourless ;	<b>1</b>
11(b)(ii)	get the same result if ethene is impure ; get the same result with other alkenes ;	<b>2</b>
11(c)(i)	alkanes contain <b>only</b> hydrogen and carbon / do not contain oxygen ;	<b>1</b>
11(c)(ii)	solvent / fuel ;	<b>1</b>
11(d)	reading decreases ; water (vapour) / carbon dioxide are released / the idea that the amount of matter in the burner reduces ;	<b>2</b>

Question	Answer	Marks
12(a)(i)	<p><b>Solid:</b> close-packed regular arrangement</p> <p><b>Liquid:</b> close-packed irregular arrangement 2 or 3 correct ; 4 correct ;</p>	<b>2</b>
12(a)(ii)	<p>solidification 0 Melting</p> <p>2 correct ; 3 correct ;</p>	<b>2</b>
12(b)	convection ;	<b>1</b>
12(c)	= 9000 ( $\Omega$ ) ;	<b>1</b>
12(d)(i)	2000 $\Omega$ ;	<b>1</b>
12(d)(ii)	combined resistance in parallel is less than resistance of either resistance ;	<b>1</b>

<b>Question</b>	<b>Answer</b>	<b>Marks</b>
13(a)(i)	thicker wall ; thicker muscle / elastic layer ; narrower lumen ;	<b>3</b>
13(a)(ii)	valves ;	<b>1</b>
13(b)	combined / AW, to haemoglobin ; in red blood cells ;	<b>2</b>
13(c)	vena cava ; pulmonary vein ;	<b>2</b>