
COMBINED SCIENCE**5129/21**

Paper 2 Theory

October/November 2018

MARK SCHEME

Maximum Mark: 100

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.

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This document consists of **11** 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.

Question	Answer	Marks
1	testa ; water; and oxygen ; cotyledon ; plumule ;	5

Question	Answer	Marks
2(a)(i)	102 ;	1
2(a)(ii)	204 ; 384 ; 5.1 ;	3
2(b)	aluminium any one from: <ul style="list-style-type: none"> • aircraft parts • food containers • window frames ; copper any one from: <ul style="list-style-type: none"> • making brass • electrical wiring • jewellery • pans ; 	2

Question	Answer	Marks
3(a)	ammeter symbol ; in series with variable resistor ; voltmeter symbol in parallel with variable resistor ;	3
3(b)(i)	1.85 (A) ;	1
3(b)(ii)	$V = IR$ or $V = 1.6 \times 10$; 16 ; V ;	3

Question	Answer	Marks
4(a)	carbon dioxide ; glucose and oxygen ;	2
4(b)(i)	A = <u>cuticle</u> ; B = <u>vacuole</u> ; C = <u>nucleus</u> ;	3
4(b)(ii)	traps / absorbs light (energy);	1
4(b)(iii)	any two from: <ul style="list-style-type: none"> • more light (available to absorb) • for more photosynthesis to occur • on the upper surface (of the leaf) ;; 	2

Question	Answer	Marks
5(a)	pipette ; burette ; green ;	3
5(b)	neutralisation ;	1
5(c)	$\text{H}^+(\text{aq}) + \text{OH}^-(\text{aq}) \rightarrow \text{H}_2\text{O}(\text{l})$	2

Question	Answer	Marks
6(a)(i)	line perpendicular to scale touching scale and right edge of clip ;	1
6(a)(ii)	5.2 (cm) ;	1
6(a)(iii)	$(1.5 \times 5.2/10) = 7.8 \text{ mm}$;	1
6(b)(i)	$(3/8) = 0.375 \text{ (cm}^3\text{)}$;	1
6(b)(ii)	the volume of one clip is too small ;	1
6(b)(iii)	$d = m / v$; 7.2 ;	2

Question	Answer	Marks
7(a)	any two from: <ul style="list-style-type: none"> • glycogen • urea • carbon dioxide • water • glucose (from glycogen) • fats (from excess glucose) • (non-essential) amino acids • cholesterol • bile ;; 	2
7(b)	any two from <ul style="list-style-type: none"> • glucose • amino acids • hormones • drugs • haemoglobin • alcohol • lactic acid ;; 	2

Question	Answer	Marks
8(a)	cracking ;	1
8(b)(i)	C_nH_{2n} ;	1
8(b)(ii)	<u>carbon to carbon</u> double bond ;	1
8(b)(iii)	bromine ;	1
8(c)	addition ;	1
8(d)	carbon dioxide water ;	1

Question	Answer	Marks
9(a)	line from neutral wire labelled N ;	1
9(b)	live – carries current to appliance at high voltage ; neutral – carries current away from appliance at 0 V ;	2
9(c)	$P = VI$; 13(.04) A ;	2

Question	Answer	Marks
10(a)	F = (left) atrium ; G = (left atrio-ventricular) valve ; H = (left) ventricle ;	3
10(b)	line along aorta with arrow pointing away from heart ;	1

Question	Answer	Marks
11(a)	A = 15 ; Z = 7 ;	2
11(b)	five electrons ; in outermost shell ;	2
11(c)	acidic ;	1
11(d)	covalent ; non-metal bonded to non-metal ;	2

Question	Answer	Marks
12(a)	continuous ray refracted through lens ; straight line through focal point (towards mirror) ; correct reflection on mirror ;	3
12(b)(i)	$350 \text{ to } 400 \times 10^{-9} \text{ (m) or } 50 \times 10^{-9} \text{ (m) ;}$	1
12(b)(ii)	$3 \times 10^8 \text{ (m / s) ;}$	1
12(b)(iii)	selects $600 \times 10^{-9} \text{ m ;}$ $v = f\lambda ;$ $5 \times 10^{14} \text{ Hz ;}$	3

Question	Answer	Marks
13(a)	cervix E ; ovary B ; vagina F ;	3
13(b)	oviduct any one from: <ul style="list-style-type: none"> • transport egg to uterus • tube for sperm to pass up • site of fertilisation ; uterus any one from: <ul style="list-style-type: none"> • place where implantation occurs • place where placenta develops • place where baby / fetus develops ; 	2

Question	Answer	Marks
13(c)	any two from: <ul style="list-style-type: none"> • milk is sterile • contains antibodies (for the baby) • at correct temperature • instantly available • promotes bonding with mother • correct consistency (for the baby) • contains all the right nutrients • sucking develops jaw muscles ;; 	2

Question	Answer	Marks
14(a)	carbon dioxide ;	1
14(b)	nitrogen dioxide ;	1
14(c)	chlorine ;	1
14(d)	helium ;	1
14(e)	oxygen ;	1

Question	Answer	Marks
15(a)	70 s ;	1
15(b)	line drawn on graph with steeper initial gradient ; reaching maximum before 70 s ;	2
15(c)	$W = fd$; 0.015 ; J ;	3

Question	Answer	Marks
16(a)(i)	M ;	1
16(a)(ii)	K ;	1
16(b)	lower number of white blood cells ; fewer antibodies produced ; leading to reduced phagocytosis ;	3

Question	Answer	Marks
17	<p>iodine</p> <p>magnesium</p> <p>chlorine</p> <p>sodium chloride</p> <p>conducts electricity when molten but not when solid</p> <p>is a solid which melts at a low temperature</p> <p>conducts electricity when solid</p> <p>is a diatomic gas</p>	4