



---

**COMBINED SCIENCE**

**5129/21**

Paper 2 Theory

**October/November 2017**

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.

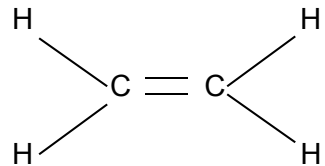
Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

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

Cambridge International is publishing the mark schemes for the October/November 2017 series for most Cambridge IGCSE<sup>®</sup>, Cambridge International A and AS Level components and some Cambridge O Level components.

Question	Answer	Marks
1(a)	$W = fd$ or $50 \times 10 \times 2.4$ ; 1200 ;	2
1(b)	$P = W/t$ or $1200 \div 0.8$ 1500 ;	2

Question	Answer	Marks
2	<u>amino acids</u> ; <u>kidneys</u> ; <u>glycogen</u> ; <u>hormones</u> ;	4

Question	Answer	Marks
3(a)(i)	44 ;	1
3(a)(ii)	88 ;    36 ; 2.2 ;	3
3(b)		1

Question	Answer	Marks
4	16 ;	3

Question	Answer			Marks
5	point	aerobic resp	anaerobic resp	4
	oxygen used	✓	×	
	glucose used	✓	✓	
	carbon dioxide produced	✓	×	
	lactic acid produced	×	✓	

Question	Answer	Marks
6(a)(i)	450 ; 200 ;	2
6(a)(ii)	Iron ;	1
6(a)(iii)	3    2 ;	1
6(b)		2
6(c)	making fertilisers ;	1

Question	Answer	Marks
7(a)(i)	any <b>one</b> from <ul style="list-style-type: none"> <li>• infra-red ;</li> <li>• visible light ;</li> <li>• UV ;</li> <li>• X-ray ;</li> <li>• gamma ;</li> </ul>	1
7(a)(ii)	$3 \times 10^8$ (m/s) ;	1
7(b)	$v = f\lambda$ or $3 \times 10^8 = 2.4 \times 10^9 \times \text{wavelength}$ ; $0.125 / 1.25 \times 10^{-1}$ ;	2
7(c)	normal perpendicular to top surface of metal ; reflected ray ;	2

Question	Answer	Marks
8(a)	line (labelled N) ending on any part of the nucleus ;	1
8(b)(i)	contains haemoglobin ; to carry oxygen ;	2
8(b)(ii)	any <b>two</b> from <ul style="list-style-type: none"> <li>• mesophyll cell has a cell wall (but WBC does not) ;</li> <li>• mesophyll cell contains chloroplasts (but WBC does not) ;</li> <li>• mesophyll cell has large (sap) vacuole (but WBC does not) ;</li> <li>• mesophyll cell has a spherical nucleus, whereas WBC has a lobed nucleus ;</li> </ul>	2

Question	Answer	Marks
9(a)	<p>calcium</p> <p>no reaction with cold water but reacts vigorously with steam</p> <p>copper</p> <p>reacts vigorously with cold water</p> <p>sodium</p> <p>no reaction with hydrochloric acid or steam</p> <p>zinc</p> <p>reacts slowly with cold water</p>	<b>4</b>
9(b)	lighted splint ; burns with a 'pop' ;	<b>2</b>

Question	Answer	Marks
10(a)(i)	5 (dm <sup>3</sup> per min) 32 (dm <sup>3</sup> per min) ;	1
10(a)(ii)	32 – 5 = 27 ;	1
10(a)(iii)	$27/5 \times 100 = 540\%$ ;	1
10(b)	heart pumps faster ; heart pumps more blood per beat ;	2
10(c)	any <b>one</b> from <ul style="list-style-type: none"> <li>• fitness ;</li> <li>• age ;</li> <li>• sex ;</li> <li>• strength of heart ;</li> <li>• body size / weight ;</li> <li>• illness;</li> </ul>	1

Question	Answer	Marks
11	any <b>three</b> from <ul style="list-style-type: none"> <li>• electrons / <u>negative</u> charges ;</li> <li>• move / transfer / loss of electrons ;</li> <li>• opposite charge induced in glass ;</li> <li>• opposite charges attract ;</li> </ul>	3

Question	Answer	Marks
12	proton number ; 14      16 ; Neutrons ; 2, 8, 4 ;	4

Question	Answer	Marks
13	<b>D ; C ;</b> <b>A ;</b> <b>B ;</b>	4

Question	Answer	Marks
14(a)	<b>H</b> = testa / seed coat ; <b>J</b> = radicle ; <b>K</b> = cotyledon ;	3
14(b)	seed surrounded by water ;	1
	any <b>one</b> from <ul style="list-style-type: none"> <li>• prevents oxygen reaching seed ;</li> <li>• oxygen needed for germination ;</li> <li>• seed cannot respire without oxygen ;</li> </ul>	1

Question	Answer	Marks
15(a)	condenser ;	1
15(b)	burette ;	1
15(c)	beaker ;	1
15(d)	burette / pipette ;	1

Question	Answer	Marks
16(a)	any <b>three</b> from <ul style="list-style-type: none"> <li>• magnetic field in coil X is produced (as switch is closed) ;</li> <li>• magnetic field changes when switch is closed / links / cuts coil Y ;</li> <li>• e.m.f induced ;</li> <li>• e.m.f induced / reading <b>only</b> when field changes ;</li> </ul>	3
16(b)	smaller e.m.f. ; smaller <b>change</b> in magnetic field ;	2

Question	Answer	Marks
17(a)	line going from flies to spiders with arrow pointing to spiders ; line going from spiders to blue tits with arrow pointing to blue tits ;	2
17(b)	(oak) tree;	1
17(c)	number of blue tits would decrease ; as owls would eat more blue tits ; <b>or</b> number of blue tits would increase ; as there are more caterpillars to eat (as not eaten by wood-peckers) ;	2



Question	Answer	Marks
18	sulfur contains <u>one type</u> of atom ; water contains two <u>different</u> atoms ; chemically combined ;	3

Question	Answer	Marks
19(a)	element / atom ;	1
	nucleon / mass ; proton / atomic ;	1
19(b)(i)	any <b>three</b> from <ul style="list-style-type: none"> <li>• alpha emission ;</li> <li>• helium nucleus emitted ;</li> <li>• from nucleus (of Am) ;</li> <li>• to produce a different element ;</li> </ul>	3
19(b)(ii)	Ionisation ;	1
19(b)(iii)	$V = IR$ or $V = 1.0 \times 10^{-11} \times 4.5 \times 10^7$ ; $4.5 \times 10^{-4}$ ; V ;	3

Question	Answer	Marks
20(a)	L = stomach ; R = colon ;	2
20(b)	any <b>two</b> from <ul style="list-style-type: none"> <li>• peristalsis ;</li> <li>• (circular/ileum) muscles contract behind the food ;</li> <li>• wave (of contraction) passes along ileum ;</li> <li>• muscles in front of food relax ;</li> </ul>	2

Question	Answer	Marks
21(a)	methane ;	1
21(b)	fractional distillation ;	1
21(c)	exothermic ;	1
21(d)	compound / molecule containing of carbon and hydrogen only ;	1