

---

**COMBINED SCIENCE**

**5129/21**

Paper 2 Theory

**May/June 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 will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the May/June 2017 series for most Cambridge IGCSE<sup>®</sup>, Cambridge International A and AS Level and Cambridge Pre-U components, and some Cambridge O Level components.

---

© IGCSE is a registered trademark.

This document consists of **11** printed pages.

Question	Answer	Marks
1(a)	mass – amount of substance ; weight – effect of gravity on a mass ;	2
(b)(i)	rock one side of fulcrum, hammer other side equidistant on each side ;	1
(b)(ii)	$F=ma$ or $1.25 = 0.75 \times a$ or $F/m=a$ or $1.25/0.75 (=a)$ ; 1.67 ; $m/s^2$ ;	3
	<b>Total:</b>	<b>6</b>

Question	Answer	Marks
2(a)(i)	28 ;	1
(a)(ii)	56 ; 1.4 ;	2
2(b)	incomplete combustion ; of carbon-containing substances / fuels ;	2
2(c)	3    2    3 ;	1
	<b>Total:</b>	<b>6</b>

**PUBLISHED**

Question	Answer			Marks
3(a)(i)	structure	arteries	veins	2
	thickness of wall	thick	thin ;	
	size of lumen	small / narrow	large / wide ;	
3(a)(ii)		arteries	veins	2
	blood pressure	high / fluctuating	low / steady ;	
	direction of blood flow	away from the heart	towards the heart ;	
3(b)	any <b>one</b> from <ul style="list-style-type: none"> <li>• small diffusion distance / rapid diffusion ;</li> <li>• chemicals are easily exchanged (between blood and cells / tissue fluid) ;</li> </ul>			1
3(c)(i)	to prevent backflow of blood (by closing) ;			1
3(c)(ii)	any <b>two</b> from blood pressure (in arteries) is high ; so blood will not flow backwards ;			2
	<b>Total:</b>			<b>8</b>

Question	Answer	Marks
4	any <b>three</b> from <ul style="list-style-type: none"> <li>• electrons ;</li> <li>• electrons have negative charge ;</li> <li>• transfer / movement to the (girl's) hand ;</li> <li>• opposite charges attract ;</li> </ul>	<b>3</b>
	<b>Total:</b>	<b>3</b>

Question	Answer	Marks
5(a)(i)	<u>halogens</u> ;	<b>1</b>
5(a)(ii)	increase ;	<b>1</b>
5(b)	a <u>molecule</u> containing two atoms ;	<b>1</b>
5(c)	iodine is less reactive ;	<b>1</b>
5(d)	<u>kills</u> bacteria ;	<b>1</b>
	<b>Total:</b>	<b>5</b>

Question	Answer	Marks
6(a)	arrow from tree going to finch ; 2 arrows from finch going to hawk and to eagle ;	<b>2</b>
6(b)(i)	the sun ;	<b>1</b>
6(b)(ii)	locust / aphid / finch ;	<b>1</b>
6(c)	finches would increase in number ; because they are not eaten by the eagles ;  <b>OR</b>  finches would decrease in number ; because there would be more hawks (as not eaten by eagles) so they would eat more finches ;	<b>2</b>
	<b>Total:</b>	<b>6</b>

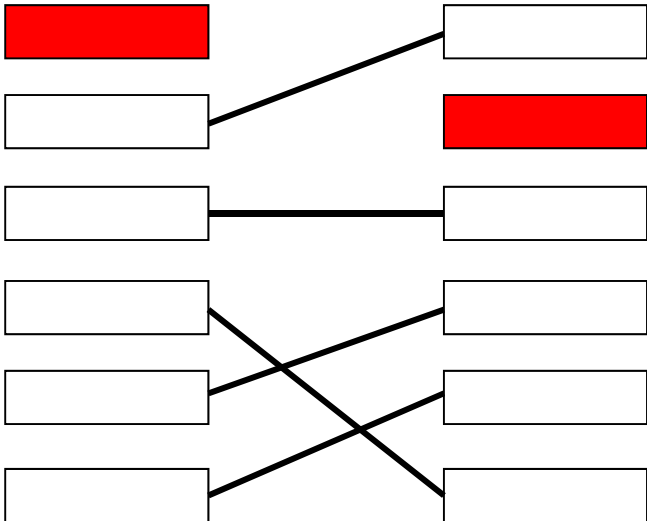
Question	Answer	Marks
7	1.3(3...3) ;	<b>3</b>
	<b>Total:</b>	<b>3</b>

Question	Answer	Marks
8(a)	64 ; 49 49 ;	2
8(b)	indium ;	1
8(c)	in same group as aluminium ; has 3 electrons in outer shell ;	2
	<b>Total:</b>	<b>5</b>

Question	Answer	Marks
9	<u>anther</u> ; carpel / stigma ; <u>cotyledon</u> ; <u>radical</u> ; <u>shoot</u> ;	5
	<b>Total:</b>	<b>5</b>

Question	Answer	Marks
10(a)	energy outputs = 100% ; energy output = energy input ;	2
10(b)	chemical to heat (during burning) ; heat to kinetic (in the turbines) ; kinetic to electrical ;	3
	<b>Total:</b>	<b>5</b>

Question	Answer	Marks
11(a)(i)	hydrogen ;	1
11(a)(ii)	1–3 ; orange ;	2
11(b)(i)	any <b>two</b> from <ul style="list-style-type: none"><li>• zinc hydroxide ;</li><li>• zinc carbonate ;</li><li>• zinc oxide ;</li></ul>	2
11(b)(ii)	(too) low in the reactivity series ;	1
	<b>Total:</b>	<b>6</b>

Question	Answer	Marks
12(a)		5
12(b)(i)	villi are responsible for absorption ; (Q) has more villi (per cm <sup>2</sup> ) than the other three students ;	2
12(b)(ii)	any <b>one</b> from <ul style="list-style-type: none"> <li>• absorbed substances are removed by the blood ;</li> <li>• concentration gradient maintained ;</li> </ul>	1
	<b>Total:</b>	<b>8</b>



Question	Answer	Marks
13(a)(i)	$V = IR$ ; $12 = 0.08 \times R$ or $R = 12/0.08$ ; 150 ;	3
13(a)(ii)	$E = ItV$ or $0.08 \times 30 \times 12$ ; 28.8 ;	2
13(b)(i)	$(0.48 + 0.16 + 0.24 =) 0.88$ ;	1
13(b)(ii)	any <b>one</b> from it is a parallel circuit ; different resistance (in parallel) ; bigger voltage across each component ;	1
	<b>Total:</b>	<b>7</b>

Question	Answer	Marks
14(a)	<b>A</b> = steam ; <b>B</b> = polymerisation ;	2
14(b)	addition / gain of hydrogen ;	1
14(c)	bromine ;	1
14(d)(i)	$  \begin{array}{ccccccc}  & \text{H} & & \text{H} & & & \\  &   & &   & & & \\  \text{H} & - \text{C} & - & \text{C} & - \text{O} & - & \text{H} ; \\  &   & &   & & & \\  & \text{H} & & \text{H} & & &   \end{array}  $	1

Question	Answer	Marks
14(d)(ii)	any <b>one</b> from <ul style="list-style-type: none"> <li>• solvent ;</li> <li>• fuel ;</li> <li>• antiseptic wipes ;</li> </ul>	1
	<b>Total:</b>	<b>6</b>

Question	Answer	Marks
15(a)	<b>A</b> = sperm duct ; <b>B</b> = <u>penis</u> ; <b>C</b> = <u>urethra</u> ; <b>D</b> = testis ;	4
15(b)	<i>prostate gland:</i> produces liquid (for sperm to swim in) / mucus / alkaline liquid ; <i>scrotum:</i> protects testis / keeps testes cool ;	2
15(c)	accept cross on sperm duct in any position ;	1
	<b>Total:</b>	<b>7</b>

Question	Answer	Marks
16(a)	one-quarter wavelength correctly labelled anywhere on Fig. 6.2 ;	1
16(b)(i)	1.2 (m) ;	1
16(b)(ii)	$v = f \lambda$ <b>or</b> $330 = f \times 1.2$ ; $f = 275$ ;	2
	<b>Total:</b>	<b>4</b>

Question	Answer	Marks
17(a)	potassium nitrate ;	1
17(b)	calcium carbonate ;	1
17(c)	oxygen ;	1
17(d)	nitrogen dioxide ;	1
17(e)	nitrogen ;	1
	<b>Total:</b>	<b>5</b>

Question	Answer	Marks
18(a)	any <b>three</b> from <ul style="list-style-type: none"> <li>• alternating current ;</li> <li>• (causes) changing magnetic field (in primary) ;</li> <li>• core connects magnetic field to secondary coil ;</li> <li>• magnetic field cuts/induces e.m.f. in secondary coil ;</li> </ul>	3
18(b)	$V = IR$ or $V = 100 \times (1 / 1\,000)$ ; 0.1 ;	2
	<b>Total:</b>	<b>5</b>