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**COMBINED SCIENCE**

**5129/22**

Paper 2 Theory

**October/November 2016**

MARK SCHEME

Maximum Mark: 100

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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.

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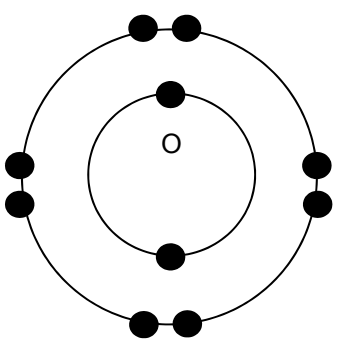
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<b>Question</b>	<b>Answer</b>	<b>Mark</b>
1(a)	5.91	<b>1</b>
1(b)	d = m/v <b>or</b> 24/2.5 9.6	<b>2</b>

<b>Question</b>	<b>Answer</b>	<b>Mark</b>
2(a)(i)	<b>C</b> = pancreas <b>D</b> = small intestine	<b>2</b>
2(a)(ii)	<i>acid</i> <b>B</b> <i>bile</i> <b>A</b>	<b>2</b>
2(b)	any <b>two</b> from <ul style="list-style-type: none"> <li>• enzyme / biological catalyst</li> <li>• acts on / breaks down starch</li> <li>• converts it to maltose / glucose</li> </ul>	<b>2</b>
2(c)	any <b>two</b> from <ul style="list-style-type: none"> <li>• emulsifies fats</li> <li>• produces large surface area</li> <li>• for enzyme activity / speeds up fat digestion</li> </ul>	<b>2</b>

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<b>Question</b>	<b>Answer</b>	<b>Mark</b>
3(a)	0.043	1
3(b)(i)	0 to 10	1
3(b)(ii)	$F = ma$ or $0.043 \times 0.4$ 0.0172	2
3(b)(iii)	$15 \times 4$ 60	2

<b>Question</b>	<b>Answer</b>	<b>Mark</b>
4(a)(i)	85	1
4(a)(ii)	170    32 4.25	3
4(b)(i)		1
4(b)(ii)	$O^{2-}$	1
4(c)	acetylene	1

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<b>Question</b>	<b>Answer</b>	<b>Mark</b>
5	<u>toxic</u> <u>aerobic respiration</u> <u>liver</u> <u>kidneys</u> <u>amino acids</u>	<b>5</b>

<b>Question</b>	<b>Answer</b>	<b>Mark</b>
6(a)	<b>A</b> = copper carbonate <b>B</b> = sulfuric acid <b>C</b> = water <b>D</b> = magnesium	<b>4</b>
6(b)	filtration	<b>1</b>
6(c)	limewater goes milky / cloudy / white precipitate	<b>2</b>

<b>Question</b>	<b>Answer</b>	<b>Mark</b>
7(a)	transfer of energy In the same direction as the vibration	<b>2</b>
7(b)	$v = f\lambda$ <b>or</b> $6 \times 0.9$ $= 5.4$	<b>2</b>

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<b>Question</b>	<b>Answer</b>	<b>Mark</b>
8(a)	$RI = \sin i / \sin r$ $\sin 30 / \sin 19$ or $0.5 / 0.326$ (= 1.54)	<b>2</b>
8(b)	line labelled W to the right of the refracted ray for glass and inside the line where the ray passes straight through	<b>1</b>

<b>Question</b>	<b>Answer</b>	<b>Mark</b>
9	<p>The diagram shows a matching exercise. On the left, there are five empty rectangular boxes. On the right, there are five empty rectangular boxes. Lines connect the boxes as follows: the top-left box connects to the second box from the top on the right; the second-left box connects to the top box on the right; the third-left box connects to the third box from the top on the right; the fourth-left box connects to the bottom box on the right; and the fifth-left box connects to the fourth box from the top on the right. The top and bottom boxes on the right are shaded light brown.</p>	<b>5</b>

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<b>Question</b>	<b>Answer</b>	<b>Mark</b>															
10(a)	<table border="1"> <tr> <td></td> <td>metal</td> <td>non-metal</td> </tr> <tr> <td>melting point</td> <td>high</td> <td>low</td> </tr> <tr> <td>malleability</td> <td>yes / malleable</td> <td>no / brittle</td> </tr> <tr> <td>electrical conductivity</td> <td>yes / conducts</td> <td>no / insulator</td> </tr> <tr> <td>type of oxide</td> <td>basic / alkaline</td> <td>acidic</td> </tr> </table>		metal	non-metal	melting point	high	low	malleability	yes / malleable	no / brittle	electrical conductivity	yes / conducts	no / insulator	type of oxide	basic / alkaline	acidic	<b>4</b>
	metal	non-metal															
melting point	high	low															
malleability	yes / malleable	no / brittle															
electrical conductivity	yes / conducts	no / insulator															
type of oxide	basic / alkaline	acidic															
10(b)	strength / low density resistance to corrosion	<b>2</b>															

<b>Question</b>	<b>Answer</b>	<b>Mark</b>
11(a)(i)	0.5	<b>1</b>
11(a)(ii)	0.25	<b>1</b>
11(b)	any <b>two</b> from <ul style="list-style-type: none"> <li>• <u>more</u> turns (on electromagnet)</li> <li>• <u>decrease</u> resistance (in circuit)</li> <li>• <u>increase</u> current</li> <li>• <u>increase</u> voltage</li> </ul>	<b>2</b>

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<b>Question</b>	<b>Answer</b>	<b>Mark</b>
12(a)	sun	<b>1</b>
12(b)	tree small bird / beetle / hawk moth / caterpillar	<b>3</b>
12(c)	any <b>three</b> from <ul style="list-style-type: none"> <li>• energy is lost (at each trophic level)</li> <li>• as heat / during movement / in urine or faeces</li> <li>• only small proportion of energy available for next (trophic) level</li> <li>• insufficient energy available from top consumers to support a higher trophic level</li> </ul>	<b>3</b>

<b>Question</b>	<b>Answer</b>	<b>Mark</b>
13(a)	molecule / compound containing carbon and hydrogen <u>only</u>	<b>2</b>
13(b)(i)	8      5      6	<b>1</b>
13(b)(ii)	limited supply of oxygen	<b>1</b>
13(c)(i)	contains <u>carbon to carbon double bond</u>	<b>1</b>
13(c)(ii)	addition ethane	<b>1</b>

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<b>Question</b>	<b>Answer</b>	<b>Mark</b>
14	by the same / positive charge placed at <b>P</b>  (like charges) repelled	<b>2</b>

<b>Question</b>	<b>Answer</b>	<b>Mark</b>
15(a)	stomata are on underside of leaves  stomata on <b>L</b> are blocked / covered by the grease  water vapour cannot escape from <b>L</b>	<b>3</b>
15(b)	no stomata on upper surface  stomata are not blocked / covered in both <b>N</b> and <b>M</b>	<b>2</b>

<b>Question</b>	<b>Answer</b>	<b>Mark</b>
16	alkali one electron hydroxide <b>and</b> hydrogen / H <sub>2</sub> more	<b>4</b>



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<b>Question</b>	<b>Answer</b>	<b>Mark</b>
17(a)	light kinetic	<b>2</b>
17(b)(i)	no change	<b>1</b>
17(b)(ii)	move apart	<b>1</b>
17(c)	V = IR <b>or</b> I = V/R <b>or</b> I = 1.5/3 0.5 A	<b>3</b>

<b>Question</b>	<b>Answer</b>	<b>Mark</b>
18	<i>contains seeds</i> <b>C</b> <i>produces pollen</i> <b>B</b> <i>protects flower</i> <b>D</b>	<b>3</b>

<b>Question</b>	<b>Answer</b>	<b>Mark</b>
19(a)(i)	hydroxide	<b>1</b>
19(a)(ii)	8 – 10	<b>1</b>
19(b)	nitric acid	<b>1</b>
19(c)	any <b>one</b> from <ul style="list-style-type: none"> <li>• phosphorus</li> <li>• potassium</li> </ul>	<b>1</b>

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<b>Question</b>	<b>Answer</b>	<b>Mark</b>
20(a)	alpha, beta and gamma alpha	<b>2</b>
20(b)	${}^4_2\text{He}$	<b>2</b>