



**General Certificate of Secondary Education**

**Applied Science (Double Award)  
4861**

**APSC/2F Science for the Needs of Society**

**Mark Scheme**

*2008 examination – January series*

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**Foundation / 2F**

<b>question</b>	<b>answers</b>	<b>extra information</b>	<b>marks</b>
<b>1(a)(i)</b>	fruit / vegetables		1
<b>1(a)(ii)</b>	fat / sugar		1
<b>1(b)(i)</b>	<ul style="list-style-type: none"> <li>• trachea</li> <li>• rib</li> <li>• lung</li> <li>• diaphragm</li> </ul>	three or four labels correct for <b>3</b> marks, two correct for <b>2</b> marks, one correct for <b>1</b> mark.	3
<b>1(b)(ii)</b>	<ul style="list-style-type: none"> <li>• contract</li> <li>• up</li> <li>• flat</li> <li>• increases</li> </ul>		1 1 1 1
<b>1(b)(iii)</b>	<ul style="list-style-type: none"> <li>• measure / see / observe / record before exercise</li> <li>• measurement / record in set time period</li> <li>• measure/ record after exercise</li> </ul>	max <b>2</b> marks for pulse measurement	1 1 1
<b>Total</b>			<b>12</b>

<b>question</b>	<b>answers</b>	<b>extra information</b>	<b>marks</b>
<b>2(a)</b>	low melting point dull poor conductor of electricity low density	three correct for <b>2</b> marks, two correct for <b>1</b> mark	<b>2</b>
<b>2(b)(i)</b>	sulfur/S	allow carbon / C / (diamond)	<b>1</b>
<b>2(b)(ii)</b>	carbon / C		<b>1</b>
<b>2(b)(iii)</b>	lead / Pb or copper / Cu		<b>1</b>
<b>2(b)(iv)</b>	aluminium / Al		<b>1</b>
<b>2(c)(i)</b>	protons		<b>1</b>
<b>2(c)(ii)</b>	proton		<b>1</b>
<b>2(c)(iii)</b>	ions		<b>1</b>
<b>Total</b>			<b>9</b>

question	answers	extra information	marks
3(a)(i)	<ul style="list-style-type: none"> <li>all four points plotted accurately (plus or minus one small square)</li> </ul>	no plot needed at the origin, if line goes through	1
	<ul style="list-style-type: none"> <li>an attempt to draw a line of best fit</li> </ul>		1
3(a)(ii)	the greater the speed the greater the thinking distance	owtte ignore any reference to time	1
3(a)(iii)	8.9 - 9.3 or correct value from candidate's graph		1
3(a)(iv)	thinking distance = 13.6 m	give <b>1</b> mark for use of formula	1
	46.0 – 13.6		1
	= 32.4 m		1
3(b)	<p>any <b>two</b> from:</p> <ul style="list-style-type: none"> <li>speed of vehicle</li> <li>road (condition)</li> <li>weather (conditions)</li> <li>(condition of vehicles) brakes</li> <li>(condition of vehicles) tyres</li> <li>vehicle load / size / mass</li> </ul>	<b>not</b> reference to thinking distance     <b>not</b> wheels	2

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<b>question</b>	<b>answers</b>	<b>extra information</b>	<b>marks</b>
<b>3(c)</b>	any <b>two</b> from: <ul style="list-style-type: none"><li>• lose concentration/might fall asleep</li><li>• increases reaction time when tired</li><li>• increases thinking distance when tired</li><li>• increased stopping distance when tired</li><li>• causes accidents / crashes</li></ul>	ignore breaking distance     <b>not</b> just kill people	<b>2</b>
<b>Total</b>			<b>11</b>

question	answers	extra information	marks
4(a)	gene cell nucleus chromosome	three or four correct for <b>3</b> marks, two correct for <b>2</b> marks, one correct for <b>1</b> mark	3
4(b)(i)	<ul style="list-style-type: none"> <li>• BB Bb Bb bb</li> <li>• bb = blue</li> <li>• BB = brown</li> <li>• Bb = brown</li> </ul>	genotype must be in correct order in correct place  phenotype must be correctly linked	1 1 1 1
4(b)(ii)	$\frac{1}{4}$		1
4(c)(i)	faulty gene		1
4(c)(ii)	measles / mumps / rubella / flu / tuberculosis / TB / tumour / cancer / obesity / Parkinsons' / meningitis / MRSA /Aids / HIV etc		1
<b>Total</b>			<b>10</b>

question	answers	extra information	marks
5(a)	emulsion suspension foam aerosol	three or four correct for <b>3</b> marks, two correct for <b>2</b> marks, one correct for <b>1</b> mark	3
5(b)(i)	water		1
5(b)(ii)	carbon dioxide		1
5(b)(iii)	sugar		1
5(c)(i)	<b>one</b> from eg:  <ul style="list-style-type: none"> <li>• plastic does not decay / rot / disintegrate / non-biodegradable /</li> <li>• eyesore when dropped as litter, etc</li> <li>• made from non renewable source</li> <li>• fuels burnt in manufacture</li> </ul>	ignore erode / corrode	1
5(c)(ii)	recycling / provide more bins / incineration  use an alternative / glass / metal cans / biodegradable polymer	<b>not</b> just 'do not use plastic'	1
5(c)(iii)	<ul style="list-style-type: none"> <li>• aluminium / steel</li> <li>• flexible / malleable / strong / easy to recycle</li> </ul>	second mark must be linked  allow lightweight / does not rust for aluminium  do <b>not</b> allow tin	1  1
<b>Total</b>			<b>10</b>



question	answers	extra information	marks
6(a)(i)	contains carbon & hydrogen		1
	only		1
6(a)(ii)	(crude) oil		1
6(a)(iii)	(fractional) distillation	allow fractionation	1
6(a)(iv)	size of molecules / boiling point / volatility / viscosity / ease of lighting / flammability / amount of pollution	ignore cost ignore energy output	1
6(b)(i)	water	ignore H <sub>2</sub> O <b>not</b> ice and water	1
6(b)(ii)	carbon dioxide	ignore CO <sub>2</sub>	1
6(c)(i)	carbon monoxide	ignore carbon oxide or CO / C / smoke	1
	carbon / soot		1
6(c)(ii)	<b>one</b> from:  <ul style="list-style-type: none"> <li>• non-renewable / finite resource / will run out</li> <li>• produces CO<sub>2</sub> / global warming / greenhouse effect etc</li> </ul>	<b>not</b> ozone  ignore acid rain	1
6(d)	hydrogen / gasohol / ethanol /  alcohol / vegetable oil / biodiesel / biofuel	must be a fuel for motor vehicles	1
<b>Total</b>			<b>11</b>

question	answers	extra information	marks
7(a)(i)	from the soil / earth / ground / compost / through the roots	ignore water / sunlight	1
7(a)(ii)	magnesium	allow iron, calcium, sulfur, sulphate, manganese, boron, copper, zinc, molybdenum	1
7(a)(iii)	avoid loss of leaves or water / prevent evaporation	ignore soil	1
7(b)(i)	1307		1
7(b)(ii)	<b>two</b> from: <ul style="list-style-type: none"> <li>• no fertilizer /A / lowest yield</li> <li>• use of fertiliser/ B increases yield</li> <li>• nitrogen-rich fertiliser / C increases yield even more</li> </ul>		2
7(b)(iii)	<b>one</b> from: <ul style="list-style-type: none"> <li>• used to make protein</li> <li>• needed for (cell) growth</li> <li>• shortage of nitrate in the soil</li> </ul>	ignore healthier	1

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<b>question</b>	<b>answers</b>	<b>extra information</b>	<b>marks</b>
7(c)	use the minimum amount of nitrate to give maximum yield	<b>not</b> 'use less nitrate'	1
	<b>or</b> <b>two</b> from:		1
	<ul style="list-style-type: none"><li>• organic farming</li><li>• crop rotation / organic fertilizer / manure</li><li>• valid explanation of chosen method</li></ul>		2
<b>Total</b>			<b>9</b>

question	answers	extra information	marks
8(a)	walls / buildings / roads / statues / paving / tiles / flags / glass / cement / mortar / concrete	<b>not</b> bricks	1
8(b)	<ul style="list-style-type: none"> <li>calcium oxide</li> <li>calcium hydroxide</li> </ul>		1 1
8(c)(i)	<ul style="list-style-type: none"> <li>C</li> <li>O<sub>2</sub></li> <li>CO<sub>2</sub></li> </ul>	all three formulae correct for <b>2</b> marks, two correct for <b>1</b> mark 1 correct = 0 symbols <b>must</b> be correct	2
8(c)(ii)	<ul style="list-style-type: none"> <li>combustion / exothermic reaction provides heat</li> <li>it / decomposition / endothermic reaction needs heat</li> </ul>		1 1
8(d)	any <b>two</b> from: <ul style="list-style-type: none"> <li>eyesore / destroy area of natural beauty / damage environment / damage habitat</li> <li>noise (from blasting / lorries)</li> <li>dust (from heavy lorries)</li> <li>using the Earth's natural resources too quickly</li> </ul>	ignore air pollution and danger	2
<b>Total</b>			<b>9</b>

question	answers	extra information	marks
9(a)(i)	more energy / electricity / power supplied to bulb (for same output)	allow wastes energy / gives out more heat	1
9(a)(ii)	$(18/60) \times 100$  = 30%	allow <b>1</b> mark for $18/60 = 0.3$	1  1
9(b)(i)	more expensive (to buy) / do not always fit into lamps / less attractive / cannot be 'dimmed' / contain Hg / difficult to dispose of / dull when first switched on		1
9(b)(ii)	<b>Data:</b> any attempt to use data from the table  <b>Calculation:</b> sensible use of data in calculation  <b>Explanation:</b> must refer to result of calculation	<b>must</b> quote data eg low energy bulb lasts 6 years  • $1.95/6 = 0.33$ per year  eg cost of low energy bulb is lower per year	1   1   1

question	answers	extra information	marks
9(c)	any <b>two</b> sensible methods, eg: <ul style="list-style-type: none"> <li>• lower temperature setting on washing machine</li> <li>• switch off lights when they are not needed</li> <li>• turn down (electrical) heating / thermostat</li> <li>• don't overfill the kettle</li> <li>• use solar panels to heat water</li> <li>• don't leave appliances on standby</li> <li>• insulation</li> <li>• turn off / reduce use of appliance</li> </ul>	do <b>not</b> allow gas central heating	2
<b>Total</b>			<b>9</b>
<b>Overall mark = 90</b>			