

Biology Paper 1 Solutions		
1(a)	<p>The diagram shows a prokaryotic cell with a capsule on the outside, followed by a cell wall and a cell membrane. Inside, there is a large, circular, blue chromosome (nucleoid), two smaller orange circular plasmids, and several flagella extending from one end. The cytoplasm is the internal fluid.</p>	[4]
1(b)	Prokaryotic	[1]
1(c)	Pathogens	[1]
1(d)	Viruses are much larger than bacteria.	[1]
2(a)	$6\text{CO}_2 + 6\text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$	[2]
2(b)	Chlorophyll	[1]
2(c)	Temperature	[1]
	Carbon dioxide concentration	[1] <i>accept CO₂ levels</i>
	Light intensity	[1]
3	<p>Relevant points for sexual reproduction:</p> <ul style="list-style-type: none"> sexual reproduction involves specialised sex cells called gametes which are produced in flowers there are male and female gametes female gamete is an egg cell contained within an ovule male gamete is contained within a pollen grain sexual reproduction involves mixing of genes from two 'parents' during fertilisation fertilisation produces a zygote which develops into an embryo plant within a seed offspring produced from sexual reproduction will be genetically different from parents <p>Relevant points for asexual reproduction:</p> <ul style="list-style-type: none"> no specialised gametes are produced and no fertilisation cells from one part of the plant divide to form a structure which breaks away from the parent plant to form a new organism offspring produced from asexual reproduction are genetically identical to the parent organism 	<p>[6] 5-6 marks: <i>discussion of at least 3 relevant points for sexual reproduction with direct comparison to asexual reproduction. Correct identification of cause genetic variation in sexual reproduction. Answers must include key terms 'fertilisation', gametes and zygote for 6 marks.</i></p> <p>3-4 marks: <i>discussion of at least 2 relevant points for sexual reproduction with direct comparison to asexual reproduction. Correct identification of cause genetic variation in sexual reproduction for 4 marks</i></p> <p>1-2 marks: <i>discussion of at least 1 relevant points for sexual reproduction with direct comparison to asexual reproduction.</i></p> <p>0 marks: <i>no relevant points discussed.</i></p>

Turn over ►

4(a)(i)	biotic	[1]
(ii)	abiotic	[1]
(iii)	abiotic	[1]
4(b)(i)	Producer	[1]
(ii)	Bacteria and / or fungi	[1] <i>accept microorganisms</i>
	Recycle nutrients and minerals	[1] <i>accept named examples</i>
5(a)	Any two from: <ul style="list-style-type: none"> • use a larger quadrat • place more quadrats • randomly place the quadrats in the field 	[2] <i>accept sensible alternate answers</i>
5(b)(i)	$120 \times 40 \times 4$	[1]
	= 19 200	[1] <i>accept 20 000 (2 s.f.)</i>
5(b)(ii)	Overestimate	[1]
	(There are likely to be) less clovers in the areas that have been churned up	[1] <i>accept alternate wording</i>
6	Any three from: <ul style="list-style-type: none"> • heat resistance • larger volume of food • higher salt resistance • better balance of nutrients • longer shelf life • higher resistance to herbicides / weed killers • greater disease resistance • faster rate of growth 	[3] <i>ignore 'better taste'</i> <i>ignore 'cheaper / less expensive'</i>

Turn over ►

Chemistry Paper 1 Solutions											
1(a)	<table border="1"> <thead> <tr> <th></th> <th>Element X</th> <th>Ion X⁺</th> </tr> </thead> <tbody> <tr> <td>Atomic number</td> <td>3</td> <td>3</td> </tr> <tr> <td>Number of electrons</td> <td>3</td> <td>2</td> </tr> </tbody> </table>		Element X	Ion X ⁺	Atomic number	3	3	Number of electrons	3	2	[2] -1 mark per mistake
	Element X	Ion X ⁺									
Atomic number	3	3									
Number of electrons	3	2									
1(b)	Sodium	[1]									
1(c)	Same number of electrons in outer shell	[1] accept alternate wording									
2(a)	Weighted mean mass of an atom	[1] accept average mass of isotopes / average mass of naturally occurring atoms									
	Relative to carbon-12	[1] must indicate relativity for second mark									
2(b)	$\left(\frac{7.5}{100}\right) \times 6 + \left(\frac{92.5}{100}\right) \times 7$	[1] accept equivalent method e.g. $0.075 \times 6 + 0.925 \times 7$									
	= 6.93 (2 dp)	[1]									
3(a)	Sodium sulphate + water	[1] accept 'sodium sulfate'									
3(b)	e.g. pH = 2	[1] accept any value less than 5									
3(c)	Ionic bonding	[1]									
3(d)	Yellow	[1]									
4(a)	refinery gases (top fraction)	[1]									
	gasoline	[1]									
	bitumen (bottom fraction)	[1]									
4(b)	contains hydrogen and carbon atoms only	[1]									
4(c)	$2C_4H_{10} + 13O_2 \rightarrow 8CO_2 + 10H_2O$	[2] -1 mark per mistake accept multiples e.g. $1 + 6.5 \rightarrow 4 + 5$									
4(d)	$n \begin{array}{cc} H & H \\ & \\ C & = & C \\ & \\ H & H \end{array} \longrightarrow \left(\begin{array}{cc} H & H \\ & \\ -C & - & C- \\ & \\ H & H \end{array} \right)_n$	[1]									

Turn over ►

4(e)	<p>For landfill:</p> <p>Any one advantage from:</p> <ul style="list-style-type: none"> • no greenhouse gases • no toxic gases • cheap <p>Any one disadvantage from:</p> <ul style="list-style-type: none"> • ugly • smelly • noisy • large land usage • waste takes many years to degrade • pollution of nearby environments 	[2] <i>ignore additional advantages / disadvantages</i>
	<p>For incineration:</p> <p>Any one advantage:</p> <ul style="list-style-type: none"> • requires little space • can produce useful heat energy • can be used to generate electricity <p>Any one disadvantage from:</p> <ul style="list-style-type: none"> • expensive to build / maintain • releases toxic gases • waste products must be disposed of 	[2] <i>ignore additional advantages / disadvantages</i>
5(a)	<p>any one from:</p> <ul style="list-style-type: none"> • wear eye protection • avoid contact with skin • wear gloves • minimise transfers / movement of acid 	[1] <i>accept any sensible suggestion to mitigate hazards</i>
5(b)	Allows CO ₂ to escape and prevents acid from splashing out	[1]
5(c)	best fit line	[1]
	rate = 0.004 g/s	[1] accept ± 0.0002 g/s
5(d)	Increased number of particles per unit volume	[1] <i>accept 'more particles in same space'</i>
	Increased chance of particles reacting	[1] <i>accept alternate wording</i>
5(e)(i)	faster rate of reaction	[1]
	increased surface area	[1]
(ii)	Slower rate of reaction	[1]
	Particles have less kinetic energy	[1]

Turn over ►

Physics Paper 1 Solutions		
1(a)	$(F =) 6000 \times 0.5$	[1]
	$= 3000$	[1]
	Newtons (N)	[1]
1(b)	acceleration = $\frac{\text{change in velocity}}{\text{time taken}}$ $t = \frac{v - u}{a}$	[1]
	$(t =) \frac{25-0}{0.5}$	[1]
	$= 50$ (seconds)	[1]
2(a)(i)	Resistor(s)	[1]
(ii)	Cell	[1] <i>do not accept battery</i>
2(b)(i)	$(V =) 0.2 \times 50$	[1]
	$= 10$ (V)	[1]
(ii)	$(V =) 0.2 \times 30$	[1]
	$= 6$ (V)	[1]
(iii)	$(V =) 16$ (V)	[1]
3(a)(i)	Amplitude	[1]
(ii)	Wavelength	[1]
3(b)	$v = f \times \lambda$ $f = \frac{v}{\lambda}$	[1]
	$f = \frac{18}{1.5}$	[1]
	$= 12$	[1]
	Hertz (Hz)	[1]
4(a)	time taken for the activity or count rate or number of nuclei or number of atoms or number of radioactive particles to decrease to half	[1]
4(b)	9 ± 0.5 (days)	[1]

Turn over ►

5(a)	Place bar magnet between 2 books and place a sheet of card/paper over it	[1]
	Sprinkle iron filings on the paper above the magnet and tap the paper gently	[1]
	The iron filings will move to show the magnetic field pattern.	[1] <i>owtte</i>
5(b)	Shown by how close the magnetic field lines (iron filing lines) are together	[1] <i>owtte</i>
6(a)	Work done = force \times distance moved (in the direction of the force)	[1]
6(b)	(W =) 600×25	[1]
	= 15000	[1]
	Joules (J)	[1]
6(c)	(P =) $\frac{15000}{30}$	[1]
	= 500 (W)	[1]
6(d)	$500 \div 0.8$	[1] <i>allow ecf from their part (c)</i>
	= 625 (W)	[1]

END