



GCSE

## Science B

General Certificate of Secondary Education

Unit **B621/02**: Unit 1 Modules B1, C1, P1 (Higher Tier)

## Mark Scheme for June 2011

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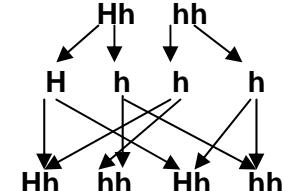
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The **Abbreviations, annotations and conventions** used in the detailed Mark Scheme are:

/	=	alternative and acceptable answers for the same marking point
(1)	=	separates marking points
<b>not</b>	=	answers which are not worthy of credit
<b>reject</b>	=	answers which are not worthy of credit
<b>ignore</b>	=	statements which are irrelevant
<b>allow</b>	=	answers that can be accepted
( )	=	words which are not essential to gain credit
<u>  </u>	=	underlined words must be present in answer to score a mark
<b>ecf</b>	=	error carried forward
<b>AW</b>	=	alternative wording
<b>ora</b>	=	or reverse argument

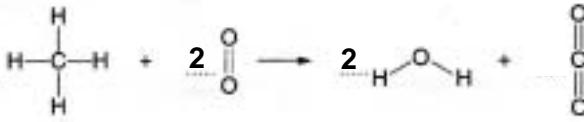
Question			Expected Answers	Marks	Additional Guidance
1	a	i	kwashiorkor (1)	1	
		ii	30 (g)	1	<b>allow</b> <u>0.03 kg</u> <b>NOT</b> 30 kg
		iii	contain (all) essential amino acids / contain amino acids that cannot be made by body (1)	1	<b>ignore</b> references to proteins
	b		reference to mosquitoes (1)  correct reference to parasite / plasmodium / protozoa (1)  reference to (feeding on) blood (1)	3	<b>allow</b> phonetic spellings <b>ignore</b> references to vector unless qualified  <b>NOT</b> bacteria or virus <b>allow</b> pathogen  <b>allow</b> sucking blood / transfer through the blood <b>ignore</b> reference to merely biting
			<b>Total</b>	<b>6</b>	

Question		Expected Answers	Marks	Additional Guidance
2	a	i sound / gun (1)	1	allow noise
		ii ear (1)	1	ignore hearing
		iii legs / muscles (1)	1	ignore response e.g. running
	b	i insufficient oxygen (getting to muscles) / AW (1)	1	allow oxygen debt ignore no oxygen ignore to get more oxygen ignore get burst of energy allow need more energy than can get from aerobic respiration allow blood supply can not increase enough
		ii pain / fatigue (1)	1	allow cramp / stiffness / tightness / soreness / ache / stitch
	c	i (blood vessels near skin surface become wider) so more blood flows near skin surface (1)	1	not vessels move closer to surface allow greater rate of blood flow ignore speed of blood / rush of blood
		ii more heat lost by radiation / increased radiation (1)	1	allow increased conduction / increased convection / increased evaporation  allow increased surface area of blood vessels / arterioles ignore surface area of arteries and veins
		iii so <b>enzymes</b> can work (efficiently) / so <b>enzymes</b> are not denatured (1)	1	allow optimum temperature for <b>enzymes</b> (to work) allow if too hot the <b>enzymes</b> cannot work
		<b>Total</b>	<b>8</b>	

Question			Expected Answers	Marks	Additional Guidance								
3	a	i	50% / 0.5 / half / $\frac{1}{2}$ / 1 in 2 / 2 in 4 / 1:1 (3) <b>but</b> if answer incorrect gametes correctly identified H or h (1) genotypes of children correctly identified Hh or hh (1)	3	<p><b>not</b> 1:2 / 1 in 1</p> <table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td>H</td><td>h</td></tr> <tr><td>h</td><td>Hh</td><td>hh</td></tr> <tr><td>h</td><td>Hh</td><td>hh</td></tr> </table> 	H	h	h	Hh	hh	h	Hh	hh
H	h												
h	Hh	hh											
h	Hh	hh											
		ii	doesn't want to find out (if result is positive) / valid consequence of finding out result is positive, e.g. effect on lifestyle, may lose job, may not get life insurance, increased insurance premiums, may not get a partner, consequence for children (1)	1	<b>allow</b> the idea that he has considered his own risk / may not want to pass on to offspring								
	b	i	huntingtin / protein no longer made <b>or</b> incorrect / faulty version of huntingtin / protein made (1)	1	<b>allow</b> higher level answers: protein will have extra amino acids <b>allow</b> different protein made <b>ignore</b> mutation								
		ii	T / thymine (1)	1	<b>allow</b> U / uracil								
			<b>Total</b>	6									

Question		Expected Answers	Marks	Additional Guidance
4	a	<p><b>any two from:</b></p> <p>improve the taste (1)  improve the flavour (1)  (high temperature) kills microbes / kills bacteria /  kills named bacteria e.g. salmonella / kills virus (1)</p> <p>easier to digest (1)</p> <p>denatures the protein (1)</p>	2	<p><b>ignore</b> taste / flavour unqualified  <b>allow</b> change taste / tastes better  <b>allow</b> change flavour  <b>ignore</b> kills germs  <b>allow</b> to avoid getting salmonella / food poisoning  <b>ignore</b> named symptoms of food poisoning e.g vomiting / tummy upset  <b>ignore</b> it is safer    <b>allow</b> aids digestion  <b>ignore</b> easier to eat / to make it edible    <b>ignore</b> denatures food  <b>ignore</b> improves or changes appearance</p>
	b	<p><b>any two from:</b></p> <p>cell (wall) breaks down (1)  starch granules burst open (1)  so digestive enzymes can digest more easily (1)</p>	2	<p><b>ignore</b> cells denature  <b>allow</b> releases starch  <b>ignore</b> simply easier to digest</p>
		<b>Total</b>	4	

Question		Expected Answers	Marks	Additional Guidance
5	a	high pressure (1) catalyst (1)	2	<b>allow</b> any quoted value above atmospheric pressure <b>ignore</b> references to temperature
	b	unsightly / eyesore / smelly / cause litter / attract vermin (1)  plastics are non-biodegradable / do not rot / do not decompose / do not decay / not attacked by bacteria / do not break down (1)  waste (valuable) land AW / fill up quickly / destroy habitats (1)  wastes a valuable resource (1)	1	<b>allow</b> idea of makes a mess (limit of acceptability)  <b>allow</b> takes a long time to rot / does not break down easily / degrade easily <b>ignore</b> do not disintegrate / do not deteriorate <b>allow</b> need to get rid of methane  <b>allow</b> uses up too much land / running out of space <b>ignore</b> unqualified just takes up land / just fills up  <b>ignore</b> pollution / gives off dangerous gases <b>ignore</b> references to harming animals
	c	(polymer) <b>D</b> (it can be melted and) moulded into shape / is stiff / holds its shape / will not melt with hot or boiling water or in use (1)	1	<b>no mark unless D</b> <b>mark is for explanation</b> <b>allow</b> it is easily coloured (so can be made in a range of colours) <b>allow</b> melting point is above 100°C <b>ignore</b> high melting point one incorrect answer in the list scores 0
	d	cross-links are strong (between chains and prevents movement of chains past each other) (1)	1	<b>allow</b> strong intermolecular bonds  <b>ignore</b> strong intermolecular forces between molecules  <b>ignore</b> polymer has strong bonds – must have idea of bonds <b>between</b> polymer molecules
		<b>Total</b>	5	

Question		Expected Answers	Marks	Additional Guidance
6	a	$C_3H_8$ (1)	1	<p><b>not</b> <math>C^3H^8</math> / <math>C3H8</math>  <b>allow</b> <math>H_8C_3</math>  If no answer in table mark answer written by question</p>
	b	<p>large(r) or long(er) molecules have high(er) boiling point (than smaller molecules) / ora (1)</p> <p>large(r) molecules have large(r) or more intermolecular forces / larger or more forces between molecules / ora (1)</p>	2	<p><b>allow</b> they = molecules  <b>allow</b> bonds for 'forces'  <b>ignore</b> particles</p> <p><b>allow</b> stronger intermolecular forces results in a higher boiling point (1)</p> <p><b>not</b> intramolecular forces or forces within molecules  <b>ignore</b> reference to energy/ heat</p>
	c i	(with a yellow flame) incomplete combustion takes place / with a blue flame complete combustion takes place (1)	1	<p>assume answer refers to yellow flame unless otherwise stated  <b>allow</b> incomplete/complete burning but  <b>ignore</b> incomplete/complete reaction  <b>allow</b> blue flame uses lots of oxygen ora</p>
	ii	<p>22 680(J) scores (2)</p> <p><b>but</b>  energy released = <math>100 \times 4.2 \times 54</math>  <b>or</b>  temperature change = 54 (1)</p>	2	<p><b>look for correct answer first</b>, 22 680(J) on own scores (2) despite any other working out  <b>allow</b> 22.68kJ  unit not needed – <b>ignore</b> incorrect units, unless a <b>con</b>, e.g. 22 680kJ</p>
	d		1	<p><b>both correct for one mark</b></p> <p><b>mark the answer lines first</b>  but if blank allow answer written under question  <b>allow</b> <math>CH_4 + 2O_2 \rightarrow 2H_2O + CO_2</math></p>
		<b>Total</b>	7	

Question			Expected Answers	Marks	Additional Guidance
7	a	i	<b>B</b> (1)	1	
		ii	<b>E</b> (1)	1	
	b	i	(organic) acid(s) (1)	1	<b>allow</b> named organic acid / carboxylic acid e.g. ethanoic acid <b>NOT</b> hydrochloric / sulfuric / nitric / phosphoric acid
		ii	perfumes / solvents (1)	1	<b>allow</b> nail varnish remover / artificial flavourings / plastics
			<b>Total</b>	<b>4</b>	

Question			Expected Answers	Marks	Additional Guidance
8	a		(3) waves per second / number of waves that pass per unit time / AW (1)	1	<b>allow</b> oscillations / vibrations / cycles per second or per unit time <b>allow</b> waves per minute
	b		0.12 (m/s) scores (2) <b>but</b> if answer incorrect then $0.04 \times 3$ (1)	2	<b>allow</b> 12 cm/s (2) but if answer incorrect <b>allow</b> 3 x 4 (1)
			<b>Total</b>	<b>3</b>	

Question		Expected Answers	Marks	Additional Guidance
9	a	total internal reflection (1)	1	<b>allow</b> TIR (1)
	b	on or off / 0 or 1 / high or low (1)  varying value / changing value AW (1)  pulses (1)	3	either order  look for the idea of variation <b>ignore</b> alternating <b>ignore</b> reference to frequency /wavelength / voltage / current on their own  <b>allow</b> short bursts / flashes / bursts / packets / chunks / AW (1) <b>ignore</b> beams / rays / reflections
	c	<b>any two from:</b> more information carried / can be multiplexed (1) noise not recognised / amplified (1) high quality (signal) (1)	2	<b>allow</b> references to more TV channels  <b>allow</b> less interference or no/less noise / better quality picture / less distortion / AW as application of signal quality (1)
<b>Total</b>		<b>6</b>		

Question		Expected Answers	Marks	Additional Guidance	
10	a	<b>any two from:</b>  (dark skin) contains (more) melanin or pigment (1)  (dark skin) absorbs more UV / radiation (1)  less UV / radiation reaches (living) tissues / cells (below surface) (1)	2	<b>allow</b> ora for lighter skin. eg light skin absorbs less UV (1)    <b>allow</b> more melanin which absorbs UV / radiation (2) <b>ignore</b> references to filtering/blocks out the UV radiation	
	b	5 (1)	1		
<b>Total</b>		<b>3</b>			

Question		Expected Answers	Marks	Additional Guidance
11	a	<b>B</b> (and) <b>D</b> (1)	1	<b>both</b> correct answers needed for (1) either order
	b	water (in potato is heated /absorbs microwaves) (1) <b>but</b> water <b>molecules/particles</b> gain KE / vibrate more (2) conduction (to centre) (1)	2	<b>maximum 2 marks</b>  <b>allow</b> description of conduction <b>ignore</b> convection <b>NOT</b> radiation
	c	i breaking <b>intermolecular</b> bonds (1)	1	<b>not</b> breaking intramolecular bonds <b>allow</b> breaking bonds <b>between</b> molecules / particles <b>ignore</b> forces <b>ignore</b> to merely change the state e.g. evaporate / turn to steam  <b>allow</b> gives particles enough (energy) to escape the surface of the water / break free from each other (1)
		ii 2.25 scores (2) <b>but</b> if answer incorrect either $135 = 60 \times ?$ scores (1) <b>or</b> $? = 135 / 60$ scores (1)	2	<b>allow</b> 2.3 (2)
	d	i (IR) heats surface only / (IR) does not penetrate surface / ora – but must specify microwaves (1)	1	<b>ignore</b> dry <b>ignore</b> cooks / cooked for longer
		ii <b>any one from:</b> microwaves penetrate about 1 cm/ further <b>but</b> IR only heat the very outside surface (1)  <b>all</b> microwaves absorbed by food / water / AW ora (1) dish / turntable / (microwave) oven do not absorb microwaves / AW ora (1)	1	<b>but</b> <b>If</b> 1 mark has been awarded in part (i) for (IR) heats surface only / does not penetrate <b>then allow</b> microwaves penetrate (food)  <b>ignore</b> more efficient / less waste
		<b>Total</b>	8	

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