



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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Mark schemes should be read in conjunction with the published question papers and the Report on the Examination.

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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
not	=	answers which are not worthy of credit
reject	=	answers which are not worthy of credit
ignore	=	statements which are irrelevant
allow	=	answers that can be accepted
()	=	words which are not essential to gain credit
—	=	underlined words must be present in answer to score a mark
ecf	=	error carried forward
AW	=	alternative wording
ora	=	or reverse argument

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

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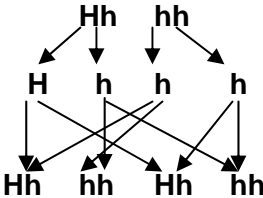
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Question			Expected Answers	Marks	Additional Guidance
2	a	i	sound / gun (1)	1	allow noise
		ii	ear (1)	1	ignore hearing
		iii	legs / muscles (1)	1	ignore response e.g. running
	b	i	insufficient oxygen (getting to muscles) / AW (1)	1	allow oxygen debt 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 enzymes can work (efficiently) / so enzymes are not denatured (1)	1	allow optimum temperature for enzymes (to work) allow if too hot the enzymes cannot work
			Total	8	

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Question			Expected Answers	Marks	Additional Guidance									
3	a	i	50% / 0.5 / half / ½ / 1 in 2 / 2 in 4 / 1:1 (3) but if answer incorrect gametes correctly identified H or h (1) genotypes of children correctly identified Hh or hh (1)	3	not 1:2 / 1 in 1 <table><tr><td></td><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	allow the idea that he has considered his own risk / may not want to pass on to offspring									
	b	i	huntingtin / protein no longer made or incorrect / faulty version of huntingtin / protein made (1)	1	allow higher level answers: protein will have extra amino acids allow different protein made ignore mutation									
		ii	T / thymine (1)	1	allow U / uracil									
			Total	6										

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

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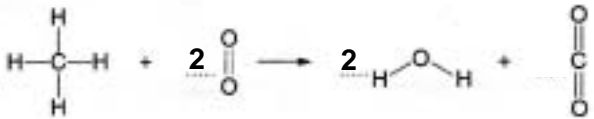
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Question			Expected Answers	Marks	Additional Guidance
5	a		high pressure (1) catalyst (1)	2	allow any quoted value above atmospheric pressure ignore references to temperature
	b		unsightly / eyesore / smelly / cause litter / attract vermin (1) plastics 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	allow idea of makes a mess (limit of acceptability) allow takes a long time to rot / does not break down easily / degrade easily ignore do not disintegrate / do not deteriorate allow need to get rid of methane allow uses up too much land / running out of space ignore unqualified just takes up land / just fills up ignore pollution / gives off dangerous gases ignore references to harming animals
	c		(polymer) D (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	no mark unless D mark is for explanation allow it is easily coloured (so can be made in a range of colours) allow melting point is above 100°C ignore 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	allow strong intermolecular bonds ignore strong intermolecular forces between molecules ignore polymer has strong bonds – must have idea of bonds between polymer molecules
			Total	5	

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

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

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

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Question			Expected Answers	Marks	Additional Guidance
9	a		total internal reflection (1)	1	allow 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 ignore alternating ignore reference to frequency / wavelength / voltage / current on their own allow short bursts / flashes / bursts / packets / chunks / AW (1) ignore beams / rays / reflections
	c		any two from: more information carried / can be multiplexed (1) noise not recognised / amplified (1) high quality (signal) (1)	2	allow references to more TV channels allow less interference or no/less noise / better quality picture / less distortion / AW as application of signal quality (1)
			Total	6	

Question			Expected Answers	Marks	Additional Guidance
10	a		any two from: (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	allow ora for lighter skin. eg light skin absorbs less UV (1) allow more melanin which absorbs UV / radiation (2) ignore references to filtering/blocks out the UV radiation
	b		5 (1)	1	
			Total	3	

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

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