

GCSE 2005
January Series



Mark Scheme

GCSE Applied Science (Double Award)

(3860/2H)

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of candidates' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

Further copies of this Mark Scheme are available to download from the AQA Website:
www.aqa.org.uk

Copyright © 2005 AQA and its licensors. All rights reserved.

COPYRIGHT

AQA retains the copyright on all its publications. However, registered centres for AQA are permitted to copy material from this booklet for their own internal use, with the following important exception: AQA cannot give permission to centres to photocopy any material that is acknowledged to a third party even for internal use within the centre.

Set and published by the Assessment and Qualifications Alliance.

The Assessment and Qualifications Alliance (AQA) is a company limited by guarantee registered in England and Wales 3644723 and a registered charity number 1073334. Registered address AQA, Devas Street, Manchester. M15 6EX.

Dr Michael Cresswell Director General

question	answers	extra information	marks
1(a)	plotting the points	$\pm 1/2$ square all correct 2 marks 4 correct 1 mark	2
	joining the points / curve of best fit 'independent mark'	do not allow zig zag	1
(ii)	6(°C)	consequential from their graph	1
(iii)	any two from: <ul style="list-style-type: none"> • material is wet • water evaporates from material • heat / energy is used to evaporate the water • poor insulation 	or any two from: <ul style="list-style-type: none"> • flask A dry material • traps air / insulator • less heat (energy) loss 	2
(b)	sweat causes cooling		1
	by evaporation		1
	dilation = more heat loss expand / bigger / more blood to surface		1
	constriction = less heat loss smaller / less blood to surface		1
Total			10

question	answers	extra information	marks
2(a)	bicycle = steel / iron / aluminium / carbon / titanium / graphite	ignore metal	1
	wiring = copper or plastic / pvc / polymer / rubber	ignore metal	1
	saucepan = polymer / bakelite / plastic / wood / rubber	ignore metal	1
(b)(i)(ii) (iii)	<p>Rules:</p> <ul style="list-style-type: none"> • table blank can't score any marks in remainder of question • only give marks if chosen material is suitable (can allow metal here) • to score properties mark – properties must apply to material • must use properties from the list but also allow corrosion in the right context • the point must be qualified eg high density not just density <p>allow strong = high tensile strength / won't break</p>		6
Total			9

question	answers	extra information	marks
3(a)	dilute / weaker solution / low concentration	or high water content	1
	strong / concentrated solution	or low water content	1
	semi / partially permeable membrane		1
(b)(i)	comment about chip changing size	or stays the same (length) in $120 \text{ g dm}^{-3} = 2$ marks	1
	correctly linked to concentration		1
(ii)	any four from: <ul style="list-style-type: none"> • (chips getting bigger) water moves in(to cell) • concentration higher in cell • (chips getting smaller) water moves out (of cell) • concentration higher outside cell • (size stays the same) no movement of water • concentration same inside and outside cell 		4
(iii)	any three from: <ul style="list-style-type: none"> • cut to equal size or measure to equal cross section • put each piece into different solutions • leave for same amount of time for each chip • remeasure 	ignore the time given do not accept record result	3
Total			12

question	answers	extra information	marks
4(a)(i)	does not contain carbon or not obtained from living things		1
(ii)	nitrogen		1
	hydrogen		1
(b)(i)	<-196 (°C) to >-273 (°C)		1
(ii)	(fractional) distillation	do not allow evaporation	1
(c)(i)	3		1
(ii)	takes in heat / energy (from surroundings)	or temperature of surroundings decreases	1
(iii)	energy required to break bonds		1
	energy given out when bonds are formed		1
	energy required is greater than energy given out	or more bonds broken than formed	1
(d)(i)	sulphuric	allow phonetic spelling	1
(ii)	evaporate (water from) the solution		1
	by heating / leaving (overnight) / use of Bunsen / boiling		1

question	answers	extra information	marks
(iii)	improve crop yield / grow quicker / provide nitrogen / phosphorus / potassium / minerals	allow correct comparison with organic fertiliser do not allow cheaper or nutrients	1
Total			14

question	answers	extra information	marks
5(a)(i)	2622		1
(ii)	2622×7	allow ecf	1
	= 18354 (p) or (£)183.54	do not allow £183 or £184	1
(b)(i)	$\frac{18}{6}$	ignore units	1
	= 3		1
(ii)	3 kilowatts = 3000 watts	allow ecf	1
	$\frac{3000}{240}$		1
	= 12.5	ignore units ans 0 .0125 = 2 marks	1
Total			8

question	answers	extra information	marks
6(a)(i)	label to diaphragm		1
	label to ribs or intercostal muscles		1
(ii)	any four from: <ul style="list-style-type: none"> • diaphragm / intercostal / muscles relax • ribs / thorax lower / move inwards • diaphragm raises / domes • more pressure (on lungs) • volume (of thorax) decreases • air is pushed out 	accept diaphragm relaxes accept applied to lungs	4
(b)(i)	50 minutes		1
(ii)	increases during exercise	or decreases after exercise	1
	stays high after exercise	or lowers slowly	1
(iii)	any three from: <ul style="list-style-type: none"> • more respiration • more energy needed • more oxygen needed • anaerobic respiration • oxygen debt / lactic acid (levels rise) 		3
Total			12

question	answers	extra information	marks
7(a)(i)	6 26 125		1 1 1
(ii)	electrons labelled on outside of diagram 6 electrons protons labelled correctly neutrons labelled correctly	if protons or neutrons not labelled Can gain 1 mark for nucleus labelled	1 1 1 1
(b)(i)	heat water to generate steam turns turbines turns / powers electrical generator		1 1 1 1
(ii)	less global warming / less greenhouse gases / only need a small amount (of nuclear fuel) / less acid rain	not last longer	1
(iii)	any two from: <ul style="list-style-type: none"> • (harmful) radiation / radioactive / pollution qualified • problems of disposal • cost qualified • problems of accidents – not just explosions 		2

question	answers	extra information	marks
(iv)	any two : <ul style="list-style-type: none">• use forceps / wash hands after handling radioactive sources in the laboratory or decontamination• use protective clothing• store under water• lead / concrete / secure containers• badges monitor exposure• limit time of exposure• bury underground• (hazard) warning signs or clear labelling• site plant away from population		2
Total			16

question	answers	extra information	marks
8(a)(i)	metal is better heat conductor or more efficient		1
(ii)	new coolant absorbs less heat or less efficient		1
(iii)	More heat transferred or more efficient		1
(b)	waste heat energy can be captured and recycled / reused or temperature controlled	allow = energy isn't wasted	1 1
(c)(i)	% efficiency = energy output / energy input × 100 = (450/1500) × 100 = 30(%)	on it's own implies 1 st mark ans 0.3 = 2 marks	1 1 1
(ii)	loss of heat / energy		1
Total			9
Overall marks = 90			