



**General Certificate of Secondary Education
June 2010**

Applied Science (Double Award) APSC/2H

Science for the Needs of Society

Unit 2

Mark Scheme

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 © 2010 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.

MARK SCHEME

Information to Examiners

1. General

The mark scheme for each question shows:

- the marks available for each part of the question
- the total marks available for the question
- the typical answer or answers which are expected
- extra information to help the Examiner make his or her judgement and help to delineate what is acceptable or not worthy of credit or, in discursive answers, to give an overview of the area in which a mark or marks may be awarded.

The extra information is aligned to the appropriate answer in the left-hand part of the mark scheme and should only be applied to that item in the mark scheme.

At the beginning of a part of a question a reminder may be given, for example: where consequential marking needs to be considered in a calculation; or the answer may be on the diagram or at a different place on the script.

In general the right hand side of the mark scheme is there to provide those extra details which confuse the main part of the mark scheme yet may be helpful in ensuring that marking is straightforward and consistent.

2. Emboldening

- 2.1** In a list of acceptable answers where more than one mark is available 'any **two** from' is used, with the number of marks emboldened. Each of the following lines is a potential mark.
- 2.2** A bold **and** is used to indicate that both parts of the answer are required to award the mark.
- 2.3** Alternative answers acceptable for a mark are indicated by the use of **or**. (Different terms in the mark scheme are shown by a / ; eg allow smooth / free movement.)

3. Marking points

3.1 Marking of lists

This applies to questions requiring a set number of responses, but for which candidates have provided extra responses. The general principle to be followed in such a situation is that 'right + wrong = wrong'.

Each error/contradiction negates each correct response. So, if the number of error/contradictions equals or exceeds the number of marks available for the question, no marks can be awarded.

However, responses considered to be neutral (indicated as * in example 1) are not penalised.

Example 1: What is the pH of an acidic solution? (1 mark)

Candidate	Response	Marks awarded
1	4,8	0
2	green, 5	0
3	red*, 5	1
4	red*, 8	0

Example 2: Name two planets in the solar system. (2 marks)

Candidate	Response	Marks awarded
1	Pluto, Mars, Moon	1
2	Pluto, Sun, Mars, Moon	0

3.2 Use of chemical symbols / formulae

If a candidate writes a chemical symbol / formula instead of a required chemical name, full credit can be given if the symbol / formula is correct and if, in the context of the question, such action is appropriate.

3.3 Marking procedure for calculations

Full marks can be given for a correct numerical answer, as shown in the column 'answers', without any working shown.

However if the answer is incorrect, mark(s) can be gained by correct substitution / working and this is shown in the 'extra information' column;

3.4 Interpretation of 'it'

Answers using the word 'it' should be given credit only if it is clear that the 'it' refers to the correct subject.

3.5 Errors carried forward

Any error in the answers to a structured question should be penalised once only.

Papers should be constructed in such a way that the number of times errors can be carried forward are kept to a minimum. Allowances for errors carried forward are most likely to be restricted to calculation questions and should be shown by the abbreviation e.c.f. in the marking scheme.

3.6 Phonetic spelling

The phonetic spelling of correct scientific terminology should be credited **unless** there is a possible confusion with another technical term.

3.7 Brackets

(.....) are used to indicate information which is not essential for the mark to be awarded but is included to help the examiner identify the sense of the answer required.

APSC/2H

Question 1

Question	Answers	Extra information	Mark
1(a)(i)	6500	accept any answer between 6400 and 6600	1
1(a)(ii)	decreased	allow goes down / reduces etc	1
1(b)	mumps	answers can be in either order	1
	rubella (German measles)	allow phonetic spelling	1
1(c)	may choose to not have vaccine or may forget one of the vaccines if they have to have them separately	accept might catch measles before having vaccine accept injection / jab for vaccine	1
1(d)(i)	white blood cell	answers to (i) and (ii) may be other way round	1
	any one from: <ul style="list-style-type: none"> • (makes) antibodies • (makes) antitoxins • engulfs / eats / fights / kills / digests / attacks pathogens / microorganisms / bacteria / germs / infection / viruses or phagocytosis	if incorrect component chosen, no marks if <u>no</u> component award mark for correct statement allow destroy ignore disease	1
1(d)(ii)	platelets	if incorrect component chosen, no marks	1
	form barrier / scab or clot blood or prevent microorganisms / pathogens entering (through cut)	if <u>no</u> component award mark for correct statement allow germs / infections / viruses	1
Total			9

APSC/2H

Question 2

Question	Answers	Extra information	Mark
2(a)	gold	accept platinum	1
2(b)	any two from: <ul style="list-style-type: none"> • destruction of landscape / habitat / wildlife / environment or eyesore • (increased) traffic / machinery • (increased) noise • (increased chance of) water pollution • (more) dust / air pollution 	ignore bad for environment or harms environment or pollution as too vague ignore smoke	2
2(c)(i)	carbon monoxide	accept CO allow carbon oxide / OC do not allow carbon dioxide	1
	lead	accept Pb	1
2(c)(ii)	solder or flashing on roofs or car batteries or radioactive / x-ray shielding or (diving / fishing) weights	accept decorative use (eg in windows) allow roofing ignore pipes / roof tiles / paint / toys / planters / bullets do not accept pencils	1
2(c)(iii)	iron / zinc / tin / copper / silver / nickel	accept Fe / Zn / Sn / Cu / Ag / Ni	1

APSC/2H**Question 2**

Question	Answers	Extra information	Mark
2(d)(i)	sodium calcium magnesium copper	must be in the correct order	1
2(d)(ii)	any two from: <ul style="list-style-type: none">• (good electrical) conductor• ductile• flexible• high melting point	accept can be drawn into wires (owtte) ignore malleable ignore density	2
Total			10

APSC/2H

Question 3

Question	Answers	Extra information	Mark
3(a)(i)	microwaves		1
3(a)(ii)	might put people off buying / using a phone		1
3(a)(iii)	any one from: <ul style="list-style-type: none"> • toaster • remote (control) or games controller • heat (lamp) • grill • telescopes • heat-seeking equipment • detecting heat abnormalities 	do not accept bluetooth do not accept walkie talkies ignore phones ignore burning	1
3(a)(iv)	hertz / Hz	accept Hertz or s^{-1} or 1/s do not accept hz	1
3(a)(v)	visible / light / ultraviolet / UV / X-rays / gamma	accept gamma symbol	1
3(b)(i)	any two from: <ul style="list-style-type: none"> • wavelength longer / stretched • frequency decreased • (the light is) red-shifted 	ignore Doppler effect allow light stretched	2

APSC/2H**Question 3**

Question	Answers	Extra information	Mark
3(b)(ii)	expanding		1
Total			8

APSC/2H

Question 4

Question	Answers	Extra information	Mark
4(a)(i)	genetic causes		1
4(a)(ii)	genetic and environmental causes		1
4(b)(i)	to carry oxygen	need idea of transporting oxygen ignore carbon dioxide / oxygenated blood	1
4(b)(ii)	carry less oxygen which is needed for energy / respiration	accept O / O ₂ ignore air answer must refer to decreased amount, reference to 'not the right amount' is insufficient ignore reference to using up energy do not accept <u>no</u> respiration	1 1
4(b)(iii)	diagram or text that shows: both parents heterozygous (Nn x Nn) gametes correctly identified (N, n) the possible combinations (NN, Nn, nn) given the genotype causing sickle-cell anaemia identified (nn)	accept other upper and lower case letters without key or symbols with a key allow shown as gametes in punnett square for this mark parents do not have to be correct may be the only offspring shown or circled / highlighted / described	1 1 1 1
4(c)(i)	nucleus	ignore chromosome / gene / DNA	1

APSC/2H**Question 4**

Question	Answers	Extra information	Mark
4(c)(ii)	some people do not agree with using embryos for research	must refer to embryo accept reference to against religious beliefs	1
Total			11

APSC/2H

Question 5

Question	Answers	Extra information	Mark
5(a)	Na		1
	Cl		1
5(b)	add water	must be an idea of the correct sequence first two points can be in either order third and fourth points must be in correct order	1
	dissolve / crush / stir / mix		1
	filter	ignore sieve	1
	evaporate / boil off water	reference to heating alone is insufficient	1
5(c)	less friction or roads more slippery or less grip		1
	tyres skid or slip / slide or takes longer or is harder to stop	ignore reference simply to slowing down	1
5(d)(i)	ionic	do not accept covalent / metallic	1
5(d)(ii)	strong bonds or strong forces of attraction	ignore reference to type of bond (covalent / ionic)	1
Total			10

APSC/2H

Question 6

Question	Answers	Extra information	Mark
6(a)(i)	the distance travelled between the driver noticing the need to stop and applying a foot to the brake	do not accept reference to time	1
6(a)(ii)	distance is greater in a lorry	accept reference to time as long as idea of greater / longer is conveyed (eg it takes longer to stop)	1
	lorry has more mass or lorry has more kinetic / movement energy or lorry has more momentum	accept converse for car	1
6(b)	12	both correct for 1 mark	1
	21	must be in correct order	
6(c)	distance = speed x time		1
	= $60 \times 1/3$		1
	= 20	correct answer alone = 3 marks accept answers obtained from rounding $1/3$ as decimal (range of 18–20) allow 60×20 for 1 mark	1
6(d)	for: prevents drink driving or reduced number of deaths from drink driving	accept answers that refer to reduction of accidents / deaths or lowering of drink driving	1
	against: person might not have intended to drive	owtte	1
Total			9

APSC/2H

Question 7

Question	Answers	Extra information	Mark
7(a)(i)	any one from: <ul style="list-style-type: none"> increases yield or crops grow larger easier to plant / harvest / look after reduced labour costs or increased profits 	ignore reference to speed of production or time	1
7(a)(ii)	less diversity or organisms leave or fewer wild plants or destruction of habitat or destroys food sources	ignore reference to trees cut down ignore reference to organisms being killed do not accept reference to global warming because question is about local environment	1
7(a)(iii)	species die out because of less food or habitats destroyed or less pollinating insects	accept habitat or food source destruction only if not mentioned in 7(a)(ii)	1
7(b)(i)	the idea of replacing / keeping the nutrients / minerals taken out of soil by the plants the same plants will take out the same nutrient	ignore any references to increasing yield	1 1
7(b)(ii)	eutrophication or breaks down soil structure	accept algal bloom or reference to increased plant growth in rivers / lakes / water supply ignore kills fish	1

APSC/2H

Question 7

Question	Answers	Extra information	Mark
7(c)	<p>any two from:</p> <ul style="list-style-type: none"> • manure / compost replaces minerals / nutrients • weeding (by hand) kills weeds or competition for crops • introduce natural predator kill pests 	<p>1 mark for method, one for correctly linked way it helps</p> <p>accept acts as a natural fertiliser or fertilises the plants</p> <p>ignore fences / netting / greenhouse / crop rotation</p> <p>accept named predator</p>	<p>max 4</p> <p>1 1</p> <p>1 1</p> <p>1 1</p>
7(d)	<p>any two from:</p> <ul style="list-style-type: none"> • carbon dioxide • temperature • light 	<p>accept reference to water or sunlight</p> <p>ignore references to minerals / nutrients</p>	<p>2</p>
Total			12

APSC/2H

Question 8

Question	Answers	Extra information	Mark
8(a)	any two from: <ul style="list-style-type: none"> • does not rot or is water resistant • flexible or does not break easily or lasts longer or hard wearing • no splinters • can be moulded into shape 	ignore references to strength / sturdiness	2
8(b)(i)	oil	accept crude oil	1
8(b)(ii)	fractional distillation	accept fractionation for 2 marks	1 1
8(c)(i)	polyimide does not melt	if incorrect polymer chosen, no marks accept high melting point list principle applies for reason ignore answers not taken from table	1 1
8(c)(ii)	nylon light	if incorrect polymer chosen, no marks accept low density list principle applies for reason ignore answers not taken from table	1 1

APSC/2H**Question 8**

Question	Answers	Extra information	Mark
8(d)	not (as) biodegradable or toxic manufacturing process or oil is a finite resource	ignore reference to strength of material or breaking / ripping ignore references to density ignore references to cost	1
Total			10

APSC/2H

Question 9

Question	Answers	Extra information	Mark
9(a)	biofuel / gasohol		1
9(b)(i)	2		1
9(b)(ii)	(aerobic) respiration uses oxygen as a reactant or fermentation does not use oxygen as a reactant	allow references to anaerobic respiration must be a comparison, and comparison must be correct for mark	1
	(aerobic) respiration produces water or lactic acid / fermentation does not produce water		1
9(c)(i)	$\frac{15 \times 3}{100}$ or $\frac{15 \times 3000}{100}$ or 0.15×3		1
	or 0.15×3000		
	= 0.45 or 450		1
	3 – (their) 0.45 or 3000 – (their) 450	ecf	1
2.55 kJ or 2550 J	ecf if 2.55 seen in their working allow 2.5 or 2.6 for 3 marks	1	
	$\frac{85 \times 3}{100}$ or 0.85×3 or $\frac{85 \times 3000}{100}$ or 0.85×3000 or 2.55 (J) or 2550 (kJ) = 3 marks		

APSC/2H

Question 9

Question	Answers	Extra information	Mark
9(c)(ii)	heat / sound	accept dissipated or into the air / atmosphere / environment do not accept pollution / evaporation	1
9(d)	any two from: <ul style="list-style-type: none"> • carbon monoxide (is a toxic gas) • hydrocarbons or volatile compounds or VHCs or makes smog • nitrogen oxides or acid rain • carbon / smoke / soot 	ignore reference to carbon dioxide or greenhouse effect ignore pollution as too vague	2
Total			11
Overall mark = 90			