



**General Certificate of Secondary Education
June 2010**

Applied Science (Double Award) APSC/2F

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.

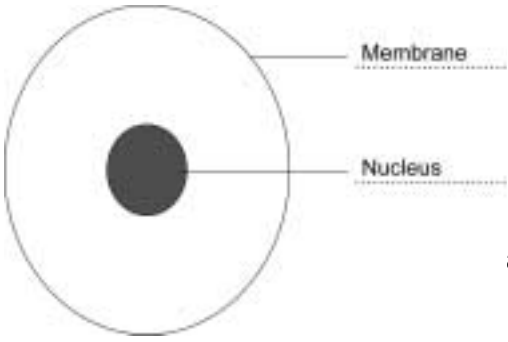
APSC/2F

Question 1

Question	Answers	Extra information	Mark
1(a)(i)	sodium and <u>chlorine</u>	do not accept chloride	1
1(a)(ii)	compound		1
1(b)	solution		1
1(c)	C A B D	accept correct words	1
1(d)(i)	reduces		1
1(d)(ii)	skid		1
1(d)(iii)	melt		1
1(e)(i)	disinfectant		1
1(e)(ii)	kills / destroys bacteria / microbes / microorganisms or sterilises	allow germs ignore bugs ignore cleans / got rid of / remove / fight	1
Total			9

APSC/2F

Question 2

Question	Answers	Extra information	Mark
2(a)		<p>allow phonetic spelling</p>	<p>1</p> <p>1</p>
2(b)	<p>any two from:</p> <ul style="list-style-type: none"> • correct (reference to) length • correct (reference to) dendrites • correct (reference to) nucleus • correct (reference to) fatty layer • correct (reference to) shape 	<p>ignore size / role / function</p> <p>allow branches / root</p>	2
2(c)	<p>The red traffic light changing is the stimulus</p> <p>The eye sees the traffic light change</p> <p>The foot pressing on the brake is the response</p>		<p>1</p> <p>1</p> <p>1</p>
2(d)	<p>ear – sound / noise</p> <p>tongue – taste</p> <p>nose – smell / scent / aroma</p>		<p>1</p> <p>1</p> <p>1</p>
2(e)	hormone		1
Total			11

APSC/2F

Question 3

Question	Answers	Extra information	Mark
3(a)	any two from: <ul style="list-style-type: none"> • speed • weather (conditions) • wear of car • tyres • brakes • road (surface) • friction / grip • mass 	ignore factors affecting thinking / reaction distance allow once only unless qualified	2
3(b)(i)	14 36		1 1
3(b)(ii)	(stopping distance) increases	accept further / longer / higher etc ignore reference to time	1
3(b)(iii)	18		1
3(c)	60×3 180	correct answer alone for 2 marks	1 1
3(d)(i)	(distance) increases	allow gets bigger / goes up etc ignore reference to time	1

Question 3 continues on the next page

APSC/2F**Question 3 continued**

Question	Answers	Extra information	Mark
3(d)(ii)	decreased / reduced / went down	accept went from 25 to 3	1
3(d)(iii)	they might intend to drive the car later or they might already have driven the car		1
3(d)(iv)	any one from: <ul style="list-style-type: none"> • they might get fined etc when they have no intention of driving • they may intend to get someone else to drive the car 	allow might have car keys attached to house keys	1
3(d)(v)	breathalyser test	allow breath test ignore reference to other tests	1
Total			13

APSC/2F

Question 4

Question	Answers	Extra information	Mark
4(a)(i)	Number of species decreases		1
4(a)(ii)	increase yield / more grown	ignore references to money / easier / competition	1
4(b)(i)	cotton / dyes / medicines / wood / paper / vegetable oil / bioethanol / flowers / perfumes	ignore clothing / starch unless qualified ignore food	1
4(b)(ii)	yeast		1
4(c)(i)	fertiliser		1
4(c)(ii)	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Mineral</p> <div style="border: 1px solid black; padding: 5px; width: 100px; margin: 10px auto;">Nitrates</div> <div style="border: 1px solid black; padding: 5px; width: 100px; margin: 10px auto;">Magnesium</div> </div> <div style="text-align: center;"> <p>Used to make</p> <div style="border: 1px solid black; padding: 5px; width: 100px; margin: 10px auto;">Chlorophyll</div> <div style="border: 1px solid black; padding: 5px; width: 100px; margin: 10px auto;">Starch</div> <div style="border: 1px solid black; padding: 5px; width: 100px; margin: 10px auto;">Proteins</div> <div style="border: 1px solid black; padding: 5px; width: 100px; margin: 10px auto;">Sugars</div> </div> </div>	<p>1 mark for each correct line</p> <p>do not allow the mark if more than one line from a mineral</p>	2
4(c)(iii)	<p>carbon dioxide / CO₂</p> <p>oxygen / O₂</p>	<p>must be in correct order</p> <p>allow O₂ C</p> <p>do not allow O</p>	<p>1</p> <p>1</p>

Question 4 continues on the next page

APSC/2F**Question 4 continued**

Question	Answers	Extra information	Mark
4(c)(iv)	manure / compost	accept legumes / crop rotation / beans allow organic fertiliser ignore natural fertiliser	1
Total			10

APSC/2F

Question 5

Question	Answers	Extra information	Mark
5(a)	low density		1
	resistant to chemicals		1
5(b)(i)	plants are a renewable resource	allow not using oil or oil in short supply ignore reference to greenhouse gases or better for the environment	1
5(b)(ii)	cosmetics / bottles / comb / pipes / window frames / baths / sink / toilet seat / shower / sealant	accept any sensible answer ignore window / toilet / wall filler / taps	1
5(c)(i)	waterproof or more hard wearing or keeps food fresher	ignore reusable / strength / cost	1
5(c)(ii)	shatterproof / less weight / lower density	allow more chance of cutting ignore safer unless qualified ignore strength / cost / reusable / recyclable	1
5(c)(iii)	easier to mass produce or no splinters or no need to paint or no screws or less weight	ignore flexible / smooth ignore safer unless qualified ignore reference to manufacture ignore decay / rot / durability	1

Question 5 continues on the next page

APSC/2F

Question 5 continued

Question	Answers	Extra information	Mark
5(d)(i)	metal	allow any relevant named metal eg copper, brass, aluminium, stainless steel ignore steel / iron	1
5(d)(ii)	hard wearing or conducts heat or high melting point or does not burn or does not rust	ignore malleable / boiling point / reactivity / lightweight	1
5(d)(iii)	insulator / does not conduct (heat)	allow heat resistant	1
Total			10

APSC/2F

Question 6

Question	Answers	Extra information	Mark
6(a)(i)	25% of 40 or $40 \div 4$		1
	10	correct answer alone for 2 marks	1
6(a)(ii)	less air pollution or conserving resources or less damage to the environment	allow ethanol renewable ignore cost ignore reference to carbon dioxide / global warming / fumes / energy	1
6(b)	any two from: <ul style="list-style-type: none"> • global warming / greenhouse effect / climate change • flooding or drought or strong winds / hurricanes • acid rain 	allow ice caps melting or sea level rising	2
6(c)(i)	water / H ₂ O	accept hydrogen oxide or OH ₂	1
6(c)(ii)	O ₂		1
6(c)(iii)	38	with or without working if answer incorrect $1140 \div 3000 \times 100$ or $0.38 = 2$ marks $1140 \div 3000 = 1$ mark allow 27 or 27.5 or 28 for 1 mark	3
Total			10

APSC/2F

Question 7

Question	Answers	Extra information	Mark
7(a)(i)	6500	accept any answer between 6400 and 6600	1
7(a)(ii)	decreased	allow goes down / reduces etc	1
7(b)	mumps	answers can be in either order	1
	rubella (German measles)	allow phonetic spelling	1
7(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
7(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
7(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/2F

Question 8

Question	Answers	Extra information	Mark
8(a)	gold	accept platinum	1
8(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
8(c)(i)	carbon monoxide	accept CO allow carbon oxide / OC do not allow carbon dioxide	1
	lead	accept Pb	1
8(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
8(c)(iii)	iron / zinc / tin / copper / silver / nickel	accept Fe / Zn / Sn / Cu / Ag / Ni	1

Question 8 continues on the next page

APSC/2F**Question 8 continued**

Question	Answers	Extra information	Mark
8(d)(i)	sodium calcium magnesium copper	must be in the correct order	1
8(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/2F

Question 9

Question	Answers	Extra information	Mark
9(a)(i)	microwaves		1
9(a)(ii)	might put people off buying / using a phone		1
9(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
9(a)(iv)	hertz / Hz	accept Hertz or s^{-1} or 1/s do not accept hz	1
9(a)(v)	visible / light / ultraviolet / UV / X-rays / gamma	accept gamma symbol	1
9(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

Question 9 continues on the next page

APSC/2F**Question 9 continued**

Question	Answers	Extra information	Mark
9(b)(ii)	expanding		1
Total			8
			Overall mark = 90