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General Certificate of Secondary Education
June 2013

Additional Science AS1FP

(Specification 4409)

Unit 5: Additional Science 1 (Foundation Tier)

Final

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 events which all examiners participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the students' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for standardisation each examiner analyses a number of students' scripts: alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, examiners encounter unusual answers which have not been raised 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 students' 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.

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Quality of Written Communication and levels marking

In Question 13(b) candidates are required to produce extended written material in English, and will be assessed on the quality of their written communication as well as the standard of the scientific response.

Candidates will be required to:

- use good English
- organise information clearly
- use specialist vocabulary where appropriate.

The following general criteria should be used to assign marks to a level:

Level 1: basic

- Knowledge of basic information
- Simple understanding
- The answer is poorly organised, with almost no specialist terms and their use, demonstrating a general lack of understanding of their meaning, little or no detail
- The spelling, punctuation and grammar are very weak.

Level 2: clear

- Knowledge of accurate information
- Clear understanding
- The answer has some structure and organisation, use of specialist terms has been attempted but not always accurately, some detail is given
- There is reasonable accuracy in spelling, punctuation and grammar, although there may still be some errors.

Level 3: detailed

- Knowledge of accurate information appropriately contextualised
- Detailed understanding, supported by relevant evidence and examples
- Answer is coherent and in an organised, logical sequence, containing a wide range of appropriate or relevant specialist terms used accurately.
- The answer shows almost faultless spelling, punctuation and grammar.

Question 1

question	answers	extra information	mark
1(a)(i)	**A**		1
1(a)(ii)	**B** and **E**	either order, **one** mark each	2
1(a)(iii)	**F**		1
1(a)(iv)	**D**		1
1(b)(i)	higher in the small intestine than in the blood		1
1(b)(ii)	by diffusion		1
Total			**7**

Question 2

question	answers	extra information	mark
2(a)	(lots of) respiration **or** provide / release energy (respiration / energy) for movement / swimming	allow 'produce / make energy' allow any sensible reference to energy ignore fertilisation	1 1
2(b)	any **one** from: • control what enters / exits (cell) • retain cytoplasm / cell parts / named	allow prevents entry of bacteria ignore protect (unqualified) do **not** allow support / strengthen	1
2(c)(i)	0.05	award **2** marks for correct answer irrespective of working award **1** mark for 50 / 1000 with incorrect answer or no answer provided no subsequent working allow max **1** mark if unit is changed	2
2(c)(ii)	smaller than	allow ecf from (c)(i)	1
Total			**6**

Question 3

question	answers	extra information	mark
3(a)(i)	any **four** from: • random • description of how randomness is achieved • *idea of* several times / more than once • count plants (of each type) within quadrat(s) • calculate mean per quadrat / m^2 • multiply by proportion of total area sampled • repeat in other area	 e.g. 'throw' allow a method of doing this allow a method of doing this e.g. do in walked on and not walked on area	4
3(a)(ii)	may not be evenly distributed	accept haven't counted every plant **or** haven't sampled whole field allow may miscount the plants	1
3(b)(i)	any **two** from • walked on has more plantain • walked on has less dandelion • walked on has less / no yarrow	allow converse allow ' walked on has less of the others', if first bullet point given if no other mark given, allow for **1** mark number of any one species or total number in both areas ignore reference to daisy numbers	2

Question 3 continued on the next page

Question 3 continued

3(b)(ii)	any **one** from: • walking destroys (some) yarrow / dandelion • plantain can't compete with other plants **or** when other plants not there plantains can survive **or** plantain can survive being walked on	accept a reason why named plants might / might not survive, e.g. soil compacted by walking damages roots of yarrow accept other factors that might affect distribution, e.g. light / water / nutrients / (specific) herbivores	1
Total			**8**

Question 4

question	answers	extra information	mark
4(a)(i)	giant structure		1
4(a)(ii)	(because the atoms are in) layers	allow particles or ions for atoms allow rows for layers	1
	(that) can slide over each other	ignore molecules	1
4(b)(i)	silver	allow Ag	1
4(b)(ii)		ignore values unless qualified	
	silver is (more) expensive		1
	(aluminium) is not (as) good a conductor	ignore reference to heat conduction do **not** accept 'not a conductor'	1
Total			**6**

Question 5

question	answers	extra information	mark
5(a)(i)	a compound simple		1 1
5(a)(ii)	CH_4	allow H_4C / C_1H_4 symbols must be upper case do **not** allow CH4 or CH^4 or $C+H_4$ do **not** allow charges e.g. CH_4^+	1
5(a)(iii)	electron(s)		1
5(b)(i)	covalent		1
5(b)(ii)	-161^oC		1
5(c)	(molecules have) no (overall) charge	accept no ions accept no free / delocalised electrons ignore ref to methane being an insulator	1
Total			**7**

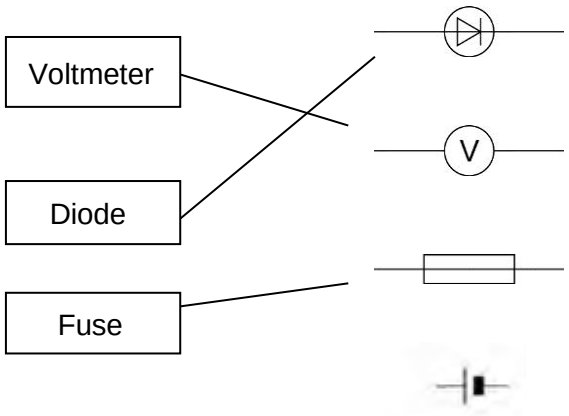
Question 6

question	answers	extra information	mark
6(a)	36.36 (363636)	award **2** marks for correct answer irrespective of working accept 36 / 36.4 allow 36.3 award **1** mark if evidence of $\frac{16}{44} \times 100$ provided no subsequent working allow **1** mark for 0.36 ignore any units	2
6(b)	44g		1
Total			**3**

Question 7

question	answers	extra information	mark
7(a)	tangled		1
7(b)	setting		1
7(c)	catalyst temperature	in either order	1 1
Total			**4**

Question 8

question	answers	extra information	Mark
8(a)			3
8(b)(i)	decreases decreases		1 1
8(b)(ii)	0.6 V point	accept ring around 0.6 and / or 3.6 in the table if no answer on graph	1
8(b)(iii)	error in reading meter	accept error in recording reading / pd / voltage / current / amps / volts accept circuit not connected correctly accept faulty equipment ignore not repeated	1
8(b)(iv)	take more readings (and calculate mean)	accept average for mean accept repeat accept check connections / circuit / equipment	1
8(c)	Resistor diode / LED	accept wire at a constant temperature or variable resistor	1 1
Total			**10**

Question 9

question	answers	extra information	Mark
9(a)	zero		1
9(b)	12 m/s^2	award **2** marks for correct answer irrespective of working allow **1** mark for $\frac{6\ 000\ 000}{500\ 000}$ provided no subsequent working if no circle accept correct unit on answer line	2 1
9(c)	increases		1
9(d)	750	award **2** marks for correct answer irrespective of working allow **1** mark for 15 000 x 0.05 provided no subsequent working	2
9(e)	any **two** from • damage (during the connection) • the whole space station could move • failure to dock	accept collision / crash	2
9(f)	**yes answers** scientific research may find answers to unknown questions new discoveries / technology **no answers** reference to world economy in decline could spend the money on more important issues	no mark for yes or no allow suitable examples of more important issues	1
Total			**10**

Question 10

question	answers	extra information	mark
10(a)	any **one** from: • (same) sized beads / amount of *Chlorella* (in each bead) • (same) number of beads (in each beaker) • (same) temperature • (same) power of light bulbs • (same) carbon dioxide (concentration)	do **not** accept (same) light intensity / distance between lamp and beaker allow (same) wavelength(s) / type of bulb allow (same) volume / amount of (pond) water ignore (same) type of (pond) water ignore size / type of beaker	1
10(b)	oxygen		1
10(c)(i)	light (intensity) increases (between A and B) (so) photosynthesis faster (therefore) more oxygen / gas produced **or** oxygen / gas is produced more quickly	allow light limiting allow more photosynthesis accept ecf named gas from (b)	1 1 1
10(c)(ii)	any **one** from: • limited by / not enough carbon dioxide • limited by temperature / too cold / not warm enough	allow there is another limiting factor ignore light no longer limiting ignore references to water	1

Question 10 continues on the next page . . .

Question 10 continued

10(d)(i)	*Advantage* any **one** from: • does not depend on seasonality • less time to grow • easy to transport • easy to grow • does not need soil • does not go mouldy • self-reproducing / does not need replanting *Disadvantage* any **one** from: • reference to taste / flavour • need to process Chlorella to make them like 'food' • lack of (named) vitamins / minerals / nutrients / energy • reference to allergies	ignore references to cost allow grows faster allow does not need to be stored allow constant supply allow a lot needed allow idea of monotonous	 1 1
10(d)(ii)	any **one** from: • produce oxygen • use up / remove carbon dioxide	do **not** allow (direct / indirect) reference to food allow reference to use in research	1
Total			**9**

Question 11

question	answers	extra information	mark
11(a)(i)	any **two** from • spots / colours are at different levels • spots have different colours / shades • B / red food colouring has more than 1 spot / colour **or** B / red food colouring contains a different spot	 allow spots / colours are in different places ignore spots have different sizes / shape accept B / red food colouring has 3 spots	2
11(a)(ii)	(because it contains) Allura Red	allow reference to possible harm or specific examples of harm (e.g. allergies)	1
11(b)	any **two** from: • (more) accurate • (more) sensitive • fast(er) • small(er) sample size	ignore reference to cost / precision / reliability accept detects small(er) amounts	2
Total			**5**

Question 12

question	answers	extra information	mark
12(a)	(protons) 27 27		1
	(neutrons) 32 33		1
	(mass number) 59 60	allow ecf from sum of proton + neutron numbers for both mass numbers	1
12(b)	logo used to inform customers (that ^{60}Co has been used)	allow so people who can't read can tell **or** easier than reading the label ignore references to harm / danger and allergies ignore idea of food being radioactive	1
	idea of so can make their own choice		1
Total			**5**

Question 13

question	answers	extra information	Mark
13(a)(i)	(thinking distance is the) distance the car travels during the (driver's) reaction time **or** distance travelled between seeing a hazard and applying the brakes	ignore references to time / how long the car travels for ignore distance travelled whilst thinking	1
	(braking distance is the) distance the car travels during the braking force **or** distance travelled between applying the brakes and stopping	allow distance travelled whilst braking	1
13(a)(ii)	(thinking distance) 20		1
	(braking distance) 90	allow correct answer to 110 – the thinking distance given (eg if thinking distance given as 30, allow braking distance of 80)	1

Question 13 continues on the next page

question	answers	extra information	mark
13(b)			6

Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should also refer to the information on page 3 and apply a best fit approach to the marking.

0 marks	Level 1 (1-2 marks)	Level 2 (3-4 marks)	Level 3 (5-6 marks)
No relevant information.	At least one factor that affects stopping distance **or** one factor with its effect on stopping distance **or** one factor with an attempt at an explanation.	Factors with their effects on stopping distance **or** factors and at least one attempt at an explanation **or** one factor, its effect on stopping distance **and** an attempt at an explanation.	Factors with their effects on stopping distance **and** at least one explanation.

Examples of physics points made in the response:

Factors affecting the thinking / stopping distance:

- *(F)* fatigue, drugs, alcohol, distractions, age
  (Ef) (The thinking distance increases) overall stopping distance increases
  (Ex) each factor increases reaction time

or

- *(F)* speed / velocity of the vehicle
  (Ef) (increasing speed / velocity) increases the stopping distance
  (Ex) the distance travelled during the reaction time increases / thinking distance increases

Factors affecting the braking / stopping distance:

- *(F)* poor road conditions (ice / rain / gravel / mud)
- *(F)* poor condition of vehicle (brake condition / tyres)
  (Ef) (each of these will) increase the stopping distance
  (Ex) the braking force is reduced (less friction / grip) and therefore (the vehicle travels further during braking and) the braking distance increases

or

- *(F)* speed / velocity or mass
  (Ef) (increasing speed / velocity or mass) increases the stopping distance
  (Ex) (the kinetic energy increases and) more work needs to be done to stop the vehicle which increases the braking distance (if the force is constant)
  or
  a higher speed will take longer to stop if the deceleration is constant and therefore a longer braking distance
  or
  a higher speed / mass increases momentum which increases the time taken to stop (if the force is constant) and therefore longer braking distance

extra information

accept converse arguments throughout

allow max **4** marks if reference to time rather than distance

ignore reference to visibility e.g. fog / eye sight

ignore slows down reaction time

do **not** accept explanations of factors linked to incorrect distance

ignore (bad) weather

Total			10

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