OCR
RECOGNISING ACHIEVEMENT

GCSE

# Science A

General Certificate of Secondary Education

Unit **A142/01:** Unit 2: Modules B2, C2, P2 (Foundation Tier)

# Mark Scheme for June 2012

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All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

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**Annotations**

Used in the detailed Mark Scheme:

| **Annotation** | **Meaning** |
|---|---|
| / | alternative and acceptable answers for the same marking point |
| (1) | separates marking points |
| **not/reject** | answers which are not worthy of credit |
| **ignore** | statements which are irrelevant – applies to neutral answers |
| **allow/accept** | answers that can be accepted |
| (words) | words which are not essential to gain credit |
| words | underlined words must be present in answer to score a mark |
| ecf | error carried forward |
| AW/owtte | credit alternative wording/or words to that effect |
| ORA | or reverse argument |

Available in scoris to annotate scripts:

| | |
|---|---|
|  | indicate uncertainty or ambiguity |
| BOD | benefit of doubt |
| CON | contradiction |
|  | incorrect response |
| ECF | error carried forward |
|  | draw attention to particular part of candidate's response |
| NBOD | no benefit of doubt |
| R | reject |
|  | correct response |
| L1 , L2 , L3 | draw attention to particular part of candidate's response |
| ^ | information omitted |

**Subject-specific Marking Instructions**

a. Accept any clear, unambiguous response (including mis-spellings of scientific terms if they are *phonetically* correct, but always check the guidance column for exclusions).

b. Crossed out answers should be considered only if no other response has been made. When marking crossed out responses, accept correct answers which are clear and unambiguous.

*eg for a one-mark question where ticks in the third <u>and</u> fourth boxes are required for the mark:*

*This would be worth 1 mark.*

*This would be worth 0 marks.*

*This would be worth 1 mark.*

c. The list principle:
If a list of responses greater than the number requested is given, work through the list from the beginning. Award one mark for each correct response, ignore any neutral response, and deduct one mark for any incorrect response, eg one which has an error of science. If the number of incorrect responses is equal to or greater than the number of correct responses, no marks are awarded. A neutral response is correct but irrelevant to the question.

d. Marking method for tick-box questions:

If there is a set of boxes, some of which should be ticked and others left empty, then judge the entire set of boxes.
If there is at least one tick, ignore crosses and other markings. If there are no ticks, accept clear, unambiguous indications, eg shading or crosses. Credit should be given according to the instructions given in the guidance column for the question. If more boxes are ticked than there are correct answers, then deduct one mark for each additional tick. Candidates cannot score less than zero marks.

*eg if a question requires candidates to identify cities in England:*

| | |
|---|---|
| Edinburgh | |
| Manchester | |
| Paris | |
| Southampton | |

the second and fourth boxes should have ticks (or other clear indication of choice) and the first and third <u>should be blank</u> (or have indication of choice crossed out).

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Edinburgh | | | ✓ | | | ✓ | ✓ | ✓ | ✓ | |
| Manchester | ✓ | × | ✓ | ✓ | ✓ | | | | ✓ | |
| Paris | | | | ✓ | ✓ | | ✓ | ✓ | ✓ | |
| Southampton | ✓ | × | | ✓ | | ✓ | ✓ | | ✓ | |
| **Score:** | **2** | **2** | **1** | **1** | **1** | **1** | **0** | **0** | **0** | **NR** |

e. For answers marked by levels of response:

i. **Read through the whole answer from start to finish**

ii. **Decide the level** that **best fits** the answer – match the quality of the answer to the closest level descriptor

iii. **To determine the mark within the level**, consider the following:

| Descriptor | Award mark |
|---|---|
| A good match to the level descriptor | The higher mark in the level |
| Just matches the level descriptor | The lower mark in the level |

iv. Use the **L1**, **L2**, **L3** annotations in Scoris to show your decision; do not use ticks.

- Quality of Written Communication skills assessed in 6-mark extended writing questions include:
- appropriate use of correct scientific terms
- spelling, punctuation and grammar
- developing a structured, persuasive argument
- selecting and using evidence to support an argument
- considering different sides of a debate in a balanced way
- logical sequencing.

| Question | | | Answer | Mark | Guidance |
|---|---|---|---|---|---|
| 1 | (a) | (i) | Georgia | 1 | |
| | | (ii) | Dave | 1 | |
| | | (iii) | Tanya | 1 | |
| | (b) | | cross-linking ☐<br>decreasing chain length ☐<br>using a plasticizer ✓ | 1 | tick in any other box = 0 |
| | | | **Total** | **4** | |

| Question | | | Answer | Mark | Guidance |
|---|---|---|---|---|---|
| 2 | (a) | (i) | sisal | 1 | ring around any other word = 0<br>**accept** any clear indication of correct response<br>eg underlining |
| | | (ii) | manila | 1 | ring around any other word = 0<br>**accept** any clear indication of correct response |
| | (b) | | *any two from:*<br>rope could break at the minimum/rope is at least that strong (as the minimum); (1)<br>break before the mean value; (1)<br>idea of consequence – safety/could fall; (1) | 2 | |
| | (c) | (i) | *any two from:*<br>check repeatability/validity; (1)<br>look for outliers; (1)<br>good estimate of range/won't get range with only 1 or 2 results; (1) | 2 | **allow** reliability<br>**ignore** fair test, accuracy, average<br>**allow** to get a (good) range |
| | | (ii) | 62 – 79 | 1 | **allow** 79 – 62 |

| Question | | | Answer | Mark | Guidance |
|---|---|---|---|---|---|
| | | (iii) | **(Level 3)**<br>Candidate compares the two ropes correctly, using a property and a **reason**. Figures may be quoted to support argument. Quality of written communication does not impede communication of the science at this level.<br>(5–6 marks)<br><br>**(Level 2)**<br>1 property mentioned and correctly linked to material and correct decision. Reason, if given, may be incorrect or irrelevant. Quality of written communication partly impedes communication of the science at this level<br>(3–4 marks)<br><br>**(Level 1)**<br>Correctly links one of the materials to a property from the table but makes incorrect decision, gives a benefit as a disadvantage (or vice versa) or is not clear whether the property is a benefit or disadvantage. Quality of written communication impedes communication of the science at this level.<br>(1–2 marks)<br><br>**(Level 0)**<br>Insufficient or irrelevant science. Answer not worthy of credit.<br>(0 marks) | 6 | **This question is targeted at grades up to E**<br><br>**Relevant points include:**<br>• properties related to use as a climbing rope<br>• properties used are density, stretch and absorbency<br>• density – lighter to carry<br>• stretch – more comfortable<br>• absorbency – lighter because it does not absorb much water so does not gain mass (if refers to slipping, should suggest that low absorbency means more slipping not less)<br><br>some candidates at this level may use information in a contradictory way<br><br>this would often be shown by giving manila as the chosen rope<br><br>**NB nylon would be correct choice**<br>**ignore** reference to strength |
| | | | **Total** | **13** | |

| Question | | | Answer | Mark | Guidance |
|---|---|---|---|---|---|
| 3 | (a) | | It is the use of particles that are the size of some molecules. ☐<br>☐ ✓<br>☐<br>☐ | 1 | tick in any other box = 0<br>**accept** any clear indication of correct |
| | (b) | | advantage:<br>*any one from:*<br>can alter properties of materials; (1)<br>specific use; (1)<br><br>disadvantage:<br>*any one from:*<br>don't know risks; (1)<br>may be harmful/may not be safe; (1)<br>not been fully investigated; (1) | 2 | or example – make materials stronger<br>**ignore** make it lighter<br><br>eg sunscreens, sports equipment, drug delivery coatings and medicine, antibacterial properties<br>future uses include catalysts, computers and building materials<br><br>candidate must **suggest possible** harm rather than definite<br>specific possible fears including enter the bloodstream |
| | | | **Total** | **3** | |

| Question | | | Answer | Mark | Guidance |
|---|---|---|---|---|---|
| 4 | (a) | (i) | just pulses/on-off/0s & 1s (needs both)<br>OR<br>not continuously changing | 1 | **accept** binary<br>**ignore** reference to waves/wavy or in blocks |
| | | (ii) | same pattern/go up and down at the same time | 1 | |
| | (b) | | 0 1 1 | 1 | |
| | | | **Total** | **3** | |

| Question | | | Answer | Mark | Guidance |
|---|---|---|---|---|---|
| **5** | | | photons (1);<br>increases (1);<br>stays the same (1) | 3 | answers must be in correct order |
| | | | **Total** | **3** | |

| Question | | | Answer | Mark | Guidance |
|---|---|---|---|---|---|
| **6** | (a) | | between ultraviolet and gamma rays<br><br>radio waves \| \| infrared \| \| ultraviolet \| *X-rays* \| gamma rays | 1 | **ignore** other two boxes, but X ray must only appear once in correct box |
| | (b) | | X rays are ionising/high energy (1);<br>can damage cells/cause cancer/can kill cells/produce chemical reactions in cells/mutation/change DNA (1) | 2 | **ignore** causes ionising radiation |
| | | | **Total** | **3** | |

| Question | | | Answer | Mark | Guidance |
|---|---|---|---|---|---|
| 7 | (a) | | 180 | 1 | **ignore** any units |
| | (b) | | either:<br>$\frac{8700-6000}{6000} = \frac{2700}{6000} = 0.45 = 45\%$ (1)<br>comparison with 0.5 or 50% (1)<br><br>or:<br>50% increase in 6000 = 6000 + 3000 = 9000 (1);<br>compared with 8700 (1); | 2 | the 1st mark is a 'method' mark for a valid calculation<br>the 2nd mark is for comparing the answer with a 50% increase<br>comparison can be implied ie statement is correct/incorrect<br><br>**2nd mark depends on correct calculation**<br>**accept** 9000 as minimum correct calculation<br><br>**allow** either conclusion (ie 45% $\neq$ 50% or 45% $\approx$ 50%) |
| | (c) | | *any two from:*<br>carbon dioxide produced (by burning fossil fuels); (1)<br>(is a) greenhouse gas; (1)<br>absorbs infrared/radiation from the Earth; (1)<br>so warms the Earth/causes global warming; (1) | 2 | **ignore** climate change<br>beware contradictory statements such as ozone layer holes causing global warming, 0 marks |
| | | | **Total** | **5** | |

| Question | | | Answer | Mark | Guidance |
|---|---|---|---|---|---|
| 8 | | | **(Level 3)**<br>Consequences and benefits are discussed with scientific detail. Risk reduction may also be included. Quality of written communication does not impede communication of the science at this level.<br>(5–6 marks)<br><br>**(Level 2)**<br>Any two of consequences, risk reduction and benefits are discussed, but with some scientific detail. Quality of written communication partly impedes communication of the science at this level.<br>(3–4 marks)<br><br>**(Level 1)**<br>Writes about a consequence or risk reduction or benefits. Answer may lack scientific detail. Quality of written communication impedes communication of the science at this level.<br>(1–2 marks)<br><br>**(Level 0)**<br>Insufficient or irrelevant science. Answer not worthy of credit.<br>(0 marks) | 6 | **This question is targeted at grades up to C**<br><br>**Indicative points at level 3:**<br>• produces vitamin D<br>• ionising nature of radiation<br>• uncontrolled cell division<br>• change in DNA/mutation<br>• prevents SAD<br>• sun lotions absorb UV<br>• causes cataracts so wear sunglasses<br><br>**Indicative points at level 2:**<br>• causes skin cancer<br>• improves your mood<br>• don't assess the risks carefully/ perception of risk is wrong<br>• use sun lotion frequently<br>• recognise particular risks of certain activities eg bathing, high altitudes<br>• wear a hat/other clothing/sunglasses<br>• delayed outcome<br>• ages the skin/wrinkles<br><br>**Indicative points at level 1:**<br>• outdoor activities are nice<br>• like a sun tan<br>• makes you feel better<br>• gives you sun burn and cancer<br>• people don't think it will happen to them<br>• put on sun lotion |
| | | | **Total** | **6** | |

| Question | | | Answer | Mark | Guidance |
|---|---|---|---|---|---|
| 9 | (a) | | less urine produced (1)<br>less dilute/more concentrated (1) | 2 | answer must indicate which way the urine has changed<br>**ignore** stops urinating<br>**allow** urine darker/stronger smell<br>**ignore** stronger urine<br>**ignore** reference to ADH |
| | (b) | (i) | a correlation | 1 | ring around any other word = 0<br>**accept** any clear indication of correct response<br>eg underlining |
| | | (ii) | *George because:*<br>small sample size/study only used 10 people (1)<br><br>did not include women/did not include a range of ages/did not randomly select people/a biased sample (1) | 2 | if they say Elliott is correct, no marks<br><br>**allow** AW |
| | | | **Total** | **5** | |

| Question | | | Answer | Mark | Guidance |
|---|---|---|---|---|---|
| **10** | (a) | | microorganisms (1)<br>memory cells (1)<br>quickly (1) | 3 | tick in any other box for each line = 0 |
| | (b) | | **(Level 3)**<br>Answer describes a range of reasons why people might be against compulsory vaccination and includes some ethical arguments as well as the practical ones. Quality of written communication does not impede communication of the science at this level<br>(5–6 marks)<br><br>**(Level 2)**<br>Answer describes more than one reason why people might be against compulsory vaccination. This may include some undeveloped ethical arguments as well as practical ones. Quality of written communication partly impedes communication of the science at this level<br>(3–4 marks)<br><br>**(Level 1)**<br>Answer gives a reason why people might be against compulsory vaccination. Answer may be simplistic. Quality of written communication impedes communication of the science at this level.<br>(1–2 marks)<br><br>**(Level 0)**<br>Insufficient or irrelevant science. Answer not worthy of credit.<br>(0 marks) | 6 | **This question is targeted at grades up to C**<br><br>**Indicative Content:**<br>**Ethical Points**:<br>• people should be able to choose whether or not they<br>• are vaccinated<br>• infringement of human rights to make it compulsory<br>• vaccination is against some people's religious beliefs<br><br>**Practical Points**<br>• vaccinations are painful<br>• vaccinations can have side effects<br>• everyone reacts differently to vaccines<br>• difficult to administer/manage<br>• time consuming to vaccinate everyone<br>• expensive to vaccinate everyone<br>• may be limited supply of vaccine<br>• influenza most dangerous to these groups<br>• some people are naturally resistant<br>• idea that if enough people in a population are vaccinated, harder to spread between unvaccinated individuals – herd immunity<br><br>if candidate suggests that the vaccination is used to **treat** influenza, limit to Level 1 |
| | | | **Total** | **9** | |

| Question | | | Answer | Mark | Guidance |
|---|---|---|---|---|---|
| 11 | (a) | (i) | points correctly plotted (1)<br>appropriate correct line of best fit (1) | 2 | **expect** a straight line<br>**allow** a good dot-to-dot line |
| | | (ii) | higher than,<br>more time | 1 | both needed for 1 mark |
| | | (iii) | *Liam is fitter than Ryan because:*<br>*any one from:*<br>Liam's pulse rate returns to resting quicker than Ryan's; (1)<br>Liam's recovery line is steeper; (1) | 1 | **accept** reverse arguments<br>or correct reference to resting value eg after 5 minutes Ryan's had still not returned to 72<br>**accept** 'normal' for 'resting'<br>**accept** Ryan takes longer to slow down/recover |
| | (b) | | *any two from:*<br>reduce smoking; (1)<br>reduce stress; (1)<br>eat a better diet; (1)<br>drink less alcohol; (1) | 2 | **accept** a specific ref to diet, eg eat more fruit and veg, eat less saturated fat, less salt<br>no more than one from each category<br><br>**ignore** reference to junk food<br>**ignore** any ref to exercise |
| | | | **Total** | **6** | |

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