

Additional Applied Science

General Certificate of Secondary Education

Unit **A191/02**: Science in Society (Higher 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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Marking Instructions

For answers marked by levels of response:

- a. **Read through the whole answer from start to finish**
- b. **Decide the level that best fits** the answer – match the quality of the answer to the closest level descriptor
- c. **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 |

- d. 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.

Annotations

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

| Annotation | Meaning |
|------------|---------------------------------------|
| ✓ | correct response |
| × | incorrect response |
| bod | benefit of the doubt |
| nbod | benefit of the doubt not given |
| ECF | error carried forward |
| ^ | information omitted |
| I | ignore |
| R | reject |

| Question | | Answer | Marks | Guidance | |
|----------|-----|--|---|--|---|
| 1 | (a) | any two relevant roles described eg sports psychologist; swimming coach; personal trainer; fitness instructor; physiotherapist; dietician; masseur | 2 | two distinct roles described / named ignore first aider / life guard | |
| | (b) | (i) | (30000 ÷) 458; 65 / 65.5 | 2 | 65.5 without working = 2 marks 65 without working = 1 mark 66 without working = 0 marks |
| | | (ii) | any 2 from; (Mike's fitness number is) average; Because (66) is between 65–79; only just in range / at lower end of range | 2 | ignore yes or no |
| | | | Total | 6 | |

| Question | | Answer | Marks | Guidance |
|----------|-----|--|-------|---|
| 2 | (a) | B before G; G before A; A before F; F before C | 2 | 4 correct = 2 3 correct = 1 |
| | (b) | (ultrasound scan) produces image of fetus to check for physical abnormalities / proper development; check (urine) for pre-eclampsia / (gestational) diabetes (of mother); check (blood pressure) for pre-eclampsia (of mother) | 3 | allow check baby's heart beat allow check for protein / glucose / kidney function allow check mother's blood pressure does not become too high /too low allow maximum of 2 marks for appropriate diagnoses not linked to specific test |

| Question | | Answer | Marks | Guidance |
|--------------|-----|---|-----------|---|
| 2 | (c) | <p>[Level 3] All factors listed. Good explanation of scoring described. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p>[Level 2] All factors listed, i.e. more descriptive but not full explanation. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p>[Level 1] Brief vague account, i.e. not enough information to carry out the procedure. Quality of written communication impedes communication of the science at this level. (1 – 2 marks)</p> <p>[Level 0] Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)</p> | 6 | <p>This question is targeted at grades up to C</p> <p>Indicative scientific points include:</p> <p>Indicative of L3 Explanation of how it is tested.</p> <ul style="list-style-type: none"> • score is totalled • score out of 10 • score indicates health • low number indicates poor health <p>Indicative of L2 Explanation of what is tested.</p> <ul style="list-style-type: none"> • lists some factors and scores 0,1 or 2 indicating health; Appearance Pulse Grimace Activity Respiration <p>Indicative of L1 Explanation of why it is done.</p> <ul style="list-style-type: none"> • applies to new born babies • health check |
| Total | | | 11 | |

| Question | Answer | Marks | Guidance |
|----------|---|-------|---|
| 3 | <p>[Level 3] Use of given data to interpret the growth chart for this baby. Includes description of change. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p>[Level 2] Detailed account of how to use and interpret a growth chart or detailed interpretation of one piece of data about this baby Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p>[Level 1] Brief vague account of how to use and interpret the growth chart. Answers may be simplistic Quality of written communication impedes communication of the science at this level. (1 – 2 marks)</p> <p>[Level 0] Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)</p> | 6 | <p>This question is targeted at grades up to A/A*</p> <p>Indicative scientific points at Level 3 may include:</p> <ul style="list-style-type: none"> • fiftieth percentile initially • no change before 12 weeks • 98th percentile at 28 weeks • 50th percentile is average • 98th percentile is overweight / obese • Baby moves up the percentiles <p>Indicative scientific points at Level 2 may include:</p> <ul style="list-style-type: none"> • identify nearest (percentile) line • repeat for other ages • look for trend over time • used to tell if baby is overweight / underweight • fiftieth percentile initially • fiftieth percentile is normal <p>Indicative scientific points at Level 1 may include:</p> <ul style="list-style-type: none"> • it's used to follow progress of baby • use age and mass to find a point on a graph <p>Use the L1, L2, L3 annotations in Scoris; do not use ticks.</p> |
| | Total | 6 | |

| Question | | Answer | Marks | Guidance |
|--------------|-----|---|----------|---|
| 4 | (a) | $(18 \times 14) = 252;$ m^2 | 2 | $252 m^2$ only = 2 marks |
| | (b) | systematic errors in named equipment / calibration error; random errors from the operator/uneven ground | 2 | |
| | (c) | accuracy is how close a measurement gets to its true value; precision means how well an instrument can measure eg Vernier more precise than ruler | 2 | accept example eg mm is more precise than cm |
| | (d) | errors in both length and width; multiplication (increase error) | 2 | accept errors in measurements |
| Total | | | 8 | |

| Question | Answer | Marks | Guidance |
|----------|--|-------|--|
| 5 (a) | <p>[Level 3] Full explanation of the meaning of both resolving power and depth of field with consequential improvement in comparison of pollen. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p>[Level 2] Description of reasons for choosing an electron microscope with some reference to comparison of pollen. Some use of technical terms Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p>[Level 1] Simplistic description of reasons for choosing an electron microscope. Limited use of technical terms. Quality of written communication impedes communication of the science at this level. (1 – 2 marks)</p> <p>[Level 0] Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)</p> | 6 | <p>This question is targeted at grades up to A/A*</p> <p>Indicative scientific points at Level 3 may include:</p> <ul style="list-style-type: none"> • resolution is the separation of two points • greater resolving power means the ability to separate these two points • idea that depth of field is how much distance is in focus. • the greater the depth of field the more close and distant parts of the image will be in focus • greater resolving power allows greater magnification • reliable / accurate matching <p>Indicative scientific points at Level 2 may include:</p> <ul style="list-style-type: none"> • can see more detail • can see in 3D • greater magnification • better matching / comparison / identification of pollen <p>Indicative scientific points at Level 1 may include:</p> <ul style="list-style-type: none"> • makes pollen look bigger • can zoom in more • see pollen more clearly • easier to study pollen <p>Use the L1, L2, L3 annotations in Scoris; do not use ticks.</p> |

| Question | | Answer | Marks | Guidance |
|--------------|-----|--|----------|---|
| 5 | (b) | idea that living material cannot be viewed; (idea of complexity in producing specimen) takes long time; no colour; kills living material; destroys / changes evidence; expensive equipment; not portable | 2 | description + explanation of 1 disadvantage or 2 descriptions |
| Total | | | 8 | |

| Question | | Answer | Marks | Guidance |
|--------------|-----|--|----------|--|
| 6 | (a) | any three examples of relevant ethical issues eg to help catch criminals; against personal freedom/liberty; misuse of data | 3 | ignore ideas of data collection e.g. expense / difficulty ignore difficulty of matching |
| | (b) | charge; towards and negative OR away and positive; charge; size/mass | 4 | accept size/mass and charge either way round |
| Total | | | 7 | |

| Question | | Answer | Marks | Guidance |
|----------|-----|--|--------------|-------------------------------|
| 7 | (a) | 8; 20; (8 ÷ 20 =) 0.4 | 3 | 0.4 on its own scores 3 marks |
| | (b) | other substance could have same Rf value | 1 | |
| | | | Total | 4 |
| | | | Total | 50 |

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