



## General Certificate of Secondary Education

# Science: Single Award 3463/3F *Specification B*

## Mark Scheme

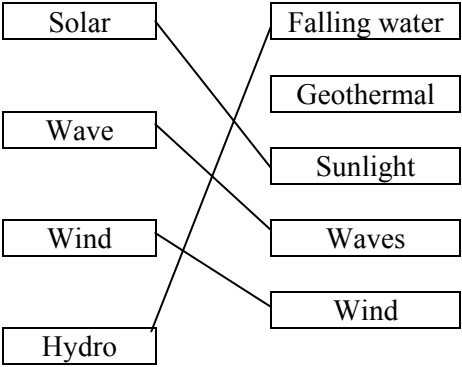
### *2006 examination – June series*

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.

## Single Award (Co-ordinated) Foundation Tier 3463/3F

### 3463/3F Q1

| question | answers  | extra information  | mark |
|----------|--|--|------|
| (a)      | 4 correct lines drawn<br> | <b>1</b> mark for each correct line<br><br>if more than 4 lines are drawn mark incorrect ones first. Mark only 4 lines | 4    |
| (b)      | 4  |  | 1    |
| (c)(i)   | nuclear  |  | 1    |
| (ii)     | (natural) gas  | do <b>not</b> accept natural   | 1    |
| total    |  |  | 7    |

**3463/3F Q2**

| <b>question</b> | <b>answers</b>                                       | <b>extra information</b>  | <b>mark</b> |
|-----------------|--|---|-------------|
| (a)(i)          | ultra violet   |   | 1           |
| (ii)            | kill the cells                                       | accept destroys the cells<br>accept makes cells cancerous<br>accept damage cells<br>accept harms cells<br>accept changes DNA<br>accept cause cells to mutate<br>accept skin cells for cells<br>accept cause cancer<br>do <b>not</b> accept skin for cells<br>do <b>not</b> accept burns the cells | 1           |
| (b)(i)          | the sunbed uses an alternating current (a.c.) supply |   | 1           |
| (ii)            | 10.8   | accept <b>1</b> mark for correct substitution of power in W or kW <u>and</u> time in hours or seconds   | 2           |
| total           |  |   | 5           |

**3463/3F Q3**

| <b>question</b> | <b>answers</b>         | <b>extra information</b>  | <b>mark</b> |
|-----------------|------------------------|---|-------------|
| (a)(i)          | M                      |   | 1           |
| (ii)            | K                      |   | 1           |
| (iii)           | J                      |   | 1           |
| (iv)            | O                      |   | 1           |
| (b)(i)          | billions of years      |   | 1           |
| (ii)            | red giant              | any answer in terms of explosion or supernova is <b>incorrect</b> | 1           |
|                 | contracts / shrinks to | incorrect reference to black hole negates <b>1</b> mark           | 1           |
|                 | white dwarf            |   | 1           |
| total           |                        |   | 8           |

**3463/3F Q4**

| <b>question</b> | <b>answers</b>   | <b>extra information</b>   | <b>mark</b> |
|-----------------|--|--|-------------|
| (a)(i)          | A and C  | <b>both</b> answers must be correct<br><br>in either order   | 1           |
| (ii)            | A and B  | <b>both</b> answers must be correct<br><br>in either order   | 1           |
| (iii)           | same number of protons plus neutrons<br><b>or</b><br>same number of nucleons               | accept number of particles in nucleus<br>the same<br><br>do <b>not</b> accept they add up to 6 unless<br>qualified | 1           |
| (b)(i)          | any <b>two</b> from:<br><br>• boron - 12<br>• carbon - 14<br>• oxygen - 15<br>• lead - 209 | <b>both</b> required<br><br>both name <b>and</b> number must be<br>given   | 1           |
| (ii)            | any <b>two</b> from:<br><br>• boron - 11<br>• carbon - 12<br>• oxygen - 16<br>• lead - 207 | <b>both</b> required<br><br>both name <b>and</b> number must be<br>given   | 1           |
| (c)             | alpha  |  | 1           |
| total           |  |  | 6           |

3463/3F Q5

| question | answers  | extra information   | mark   |
|----------|--|---|--------|
| (a)      | 0.05 (A)   | ignore incorrect units if given<br>accept 'the same' / 'the same as K' / 'the same as the other ammeter'<br>do <b>not</b> accept 'same as the other meter'  | 1      |
| (b)(i)   | any <b>two</b> from: <ul style="list-style-type: none"> <li>two cells are joined + to +</li> <li>some of the cells potential difference is across the diode / ammeters / wires <b>or</b> the pd of the cells is shared by all components</li> <li>the other components have a resistance</li> <li>cells not fully charged <b>or</b> cells partially run down</li> <li>cells have an internal resistance</li> </ul> | answers in terms of current gain no marks<br>accept one cell in the wrong way<br>accept two cells are joined back-to-back<br>accept two cells are joined – to –<br>accept battery for cell<br>do <b>not</b> accept answers in terms of all the cells or in terms of energy only<br>accept voltage for pd<br>do <b>not</b> accept using up pd<br>accept a named component / components / wire has a resistance<br>do <b>not</b> accept voltage of cells is less than 1.5 unless explained<br>do <b>not</b> accept cells are not as powerful unless explained | 2      |
| (ii)     | the diode has a (very) <u>high</u> resistance (in the reverse direction)<br>a diode only conducts / allows current to flow in one direction  | accept little / no current flows<br>do <b>not</b> accept blocks / cuts flow   | 1<br>1 |

Continued

## 3463/3F Q5

| question | answers   | extra information  | mark |
|----------|---|--|------|
| (c)      | <b>QoWC</b> for the use of the word resistance  | annotate Q✓ Q✗<br>accept resistant   | 1    |
|          | accept increase / change / decrease throughout question but a contradiction loses <b>one</b> mark with change as neutral<br>as the pd / current increases / changes | accept voltage for pd<br>must be correctly linked to at least one of the following points accept | 1    |
|          | the temperature of the filament increases / changes   | lamp / bulb for filament<br>accept filament becomes hotter                                       | 1    |
|          | increasing / changing the <b>resistance</b> of the lamp   | accept for <b>1</b> mark only the filament lamp does not obey Ohm's law                          | 1    |
| total    |   |  | 9    |

3463/3F Q6

| question | answers  | extra information  | mark |
|----------|--|--|------|
| (a)      | 0.5  |  | 1    |
|          | hertz  | accept Hz but <b>not</b> HZ / hz / hZ<br><br>accept (waves) per second <b>or</b> / sec <b>or</b> / s <b>or</b> s <sup>-1</sup> <b>or</b> sec <sup>-1</sup> | 1    |
| (b)      | any <b>one</b> from: <ul style="list-style-type: none"> <li>• any named part of the electromagnetic spectrum</li> <li>• S – waves / secondary waves</li> <li>• wave on a rope</li> </ul> | do <b>not</b> accept seismic waves / earthquake<br><br>do <b>not</b> accept slinky unless clearly described  | 1    |
| (c)      | transverse – disturbance / vibration is perpendicular to the direction of energy transfer / wave travel  | accept a correctly labelled diagram  | 1    |
|          | longitudinal – disturbance / vibration is parallel to the direction of energy transfer / wave travel   | accept a correctly labelled diagram<br><br>part explanation of the difference between transverse <b>and</b> longitudinal gains <b>1</b> mark               | 1    |
| (d)(i)   | TIR shown  | needs to stay inside water jet<br><br>ignore number of reflections <b>or</b> arrow heads<br><br>lines straight by eye                                      | 1    |
| (ii)     | bigger than  | any indication of correct answer   | 1    |
| total    |  |  | 7    |



## 3463/3F Q7

| question | answers  | extra information  | mark       |
|----------|--|--|------------|
| (a)      | W<br>has only two states<br><b>or</b><br>is either on or off   | accept discrete values only<br><br>do <b>not</b> credit answer purely in terms of shape  | 1<br><br>1 |
| (b)      | any <b>one</b> from:<br><br>• higher quality<br><br><br><br><br><br><br><br><br>• increased carrying capacity<br><br><br>• errors can be rectified | accept clearer<br><br>do <b>not</b> accept easier to read<br><br>ignore faster<br><br>accept <u>less</u> distortion <b>or</b> <u>less</u> weakening of signal strength<br><br>do <b>not</b> accept no distortion / weakening on its own<br><br>accept more information can be sent <b>or</b> more channels | 1          |
| total    |  |  | 3          |