



**2012 Physics**

**Intermediate 1**

**Finalised Marking Instructions**

© Scottish Qualifications Authority 2012

The information in this publication may be reproduced to support SQA qualifications only on a non-commercial basis. If it is to be used for any other purposes written permission must be obtained from the External Print Team, Centre Services, Dalkeith.

Where the publication includes materials from sources other than SQA (secondary copyright), this material should only be reproduced for the purposes of examination or assessment. If it needs to be reproduced for any other purpose it is the centre's responsibility to obtain the necessary copyright clearance. SQA's External Print Team, Centre Services, at Dalkeith may be able to direct you to the secondary sources.

These Marking Instructions have been prepared by Examination Teams for use by SQA Appointed Markers when marking External Course Assessments. This publication must not be reproduced for commercial or trade purposes.

## Physics – Marking Issues

The current in a resistor is 1.5 amperes when the potential difference across it is 7.5 volts. Calculate the resistance of the resistor.

|     | <b>Answers</b>   | <b>Mark + Comment</b>              | <b>Issue</b> |
|-----|--|------------------------------------|--------------|
| 1.  | $V=IR$<br>$7.5=1.5R$<br>$R=5.0 \Omega$                       | (½)<br>(½)<br>(1)                  | Ideal answer |
| 2.  | 5.0 Ω  | (2) Correct answer                 | GMI 1        |
| 3.  | 5.0  | (1½) Unit missing                  | GMI 2 (a)    |
| 4.  | 4.0 Ω  | (0) No evidence/wrong answer       | GMI 1        |
| 5.  | _____ Ω  | (0) No final answer                | GMI 1        |
| 6.  | $R = \frac{V}{I} = \frac{7.5}{1.5} = 4.0 \Omega$             | (1½) Arithmetic error              | GMI 7        |
| 7.  | $R = \frac{V}{I} = 4.0 \Omega$                               | (½) Formula only                   | GMI 4 and 1  |
| 8.  | $R = \frac{V}{I} = \text{_____} \Omega$                      | (½) Formula only                   | GMI 4 and 1  |
| 9.  | $R = \frac{V}{I} = \frac{7.5}{1.5} = \text{_____} \Omega$    | (1) Formula + subs/No final answer | GMI 4 and 1  |
| 10. | $R = \frac{V}{I} = \frac{7.5}{1.5} = 4.0$                    | (1) Formula + substitution         | GMI 2 (a) an |
| 11. | $R = \frac{V}{I} = \frac{1.5}{7.5} = 5.0 \Omega$             | (½) Formula but wrong substitution | GMI 5        |
| 12. | $R = \frac{V}{I} = \frac{7.5}{1.5} = 5.0 \Omega$             | (½) Formula but wrong substitution | GMI 5        |
| 13. | $R = \frac{I}{V} = \frac{7.5}{1.5} = 5.0 \Omega$             | (0) Wrong formula                  | GMI 5        |
| 14. | $V = IR \quad 7.5 = 1.5 \times R \quad R = 0.2 \Omega$       | (1½) Arithmetic error              | GMI 7        |
| 15. | $V = IR$<br>$R = \frac{I}{V} = \frac{1.5}{7.5} = 0.2 \Omega$ | (½) Formula only                   | GMI 20       |

**Int 1 Marking Scheme 2012**

|    |          |
|----|----------|
| 1  | <b>B</b> |
| 2  | <b>C</b> |
| 3  | <b>D</b> |
| 4  | <b>D</b> |
| 5  | <b>C</b> |
| 6  | <b>E</b> |
| 7  | <b>E</b> |
| 8  | <b>C</b> |
| 9  | <b>B</b> |
| 10 | <b>B</b> |
| 11 | <b>D</b> |
| 12 | <b>B</b> |
| 13 | <b>E</b> |
| 14 | <b>C</b> |
| 15 | <b>E</b> |
| 16 | <b>E</b> |
| 17 | <b>B</b> |
| 18 | <b>E</b> |
| 19 | <b>D</b> |
| 20 | <b>C</b> |

| Sample Answer and Mark Allocation |     |   | Notes   | Inner Margin | Outer Margin |
|-----------------------------------|-----|---|---|--------------|--------------|
| 21.                               | (a) | Radio 1<br>Higher 1   |   | 2            | <b>6</b>     |
|                                   | (b) | (i) At least two rays reflected to meet at the aerial   | 1 or 0<br>Waves do not need to continue to the reflector<br>Any rays passing through/going outwards is WP – 0 marks | 1            |              |
|                                   |     | (ii) More energy/waves/signal is received by the aerial/receiver<br><br>Reflects/focus signal back to one point | Not bounces<br><br>Not concentrates waves to the middle.  | 1            |              |
|                                   | (c) | (i) X – aerial                    1<br>Y – (loud)speaker            1   |   | 2            |              |

| Sample Answer and Mark Allocation |  | Notes  | Inner Margin | Outer Margin |
|-----------------------------------|--|--|--------------|--------------|
| 22.                               | (a) Any suitable<br><br>eg wireless<br>can move around when using portable<br>can be used outside (or a specific location) | Not because it is mobile<br>Not can be used wherever you are   | 1            | <b>6</b>     |
|                                   | (b) (i) diagram completed to show total internal reflection – no more than 4 reflections<br><br>i must approximately = r   | Ray cannot leave fibre at the edge.<br><br>Ray does not need to emerge but should go to the end of the fibre at least. | 1            |              |
|                                   | (ii) Slower signal speed<br>OR cables harder to join together<br>takes signal longer<br>more difficult to repair           |  | 1            |              |
|                                   | (c) Optical fibre  | Answer circled/underlined is OK  | 1            |              |
|                                   | (d) Speed = distance / time<br>= 9 / 0.025<br>= 360 metres per second  | standard 2 marks<br><br>not mps<br><br>no secs in physics  | 2            |              |

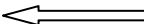
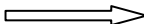
| Sample Answer and Mark Allocation   | Notes   | Inner Margin | Outer Margin |
|---|---|--------------|--------------|
| 23. (a) parallel  |   | 1            | 7            |
| (b) Ignition switch AND S1  | 1 or 0  | 1            |              |
| (c) (i) Current = power / voltage<br>= 21/12<br>= 1.75 amperes  | standard 2 marks<br>accept amps<br>accept 1.8 amperes but not 1.7 | 2            |              |
| (ii) (Total sidelight) = 1.6 (amperes) ½<br>(Total headlight) = 3.5 (amperes) ½<br>(Total current) = 5.1 amperes 1<br><br>1 <sup>st</sup> two lines are independent of each other.<br>However the 2 <sup>nd</sup> line must agree with c (i). | OR<br>1 side + 1 head = 2.55 (1)<br>2 × 2.55 = 5.1 amperes (1)    | 2            |              |
| (iii) 10 amperes<br><br>must be consistent with c (ii)  |   | 1            |              |

| Sample Answer and Mark Allocation                    | Notes  | Inner Margin | Outer Margin |
|--|--|--------------|--------------|
| 24. (a) Diagram completed to show the rays diverging | Ignore anything inside lens                          | 1            | <b>3</b>     |
| (b) (i) Long sight<br>Far sight<br>Hyperopia         | Sighted is OK<br><br>Do not accept 'long' on its own | 1            |              |
| (ii) Convex OR converging                            | There is no carry forward from part (i)              | 1            |              |

| Sample Answer and Mark Allocation |     |      |  | Notes  | Inner Margin | Outer Margin |
|-----------------------------------|-----|------|--|--|--------------|--------------|
| 25.                               | (a) | (i)  | Infra red/IR/thermal   | Not microwave  | 1            | <b>8</b>     |
|                                   |     | (ii) | Thermistor   | Answer circled/underlined is OK  | 1            |              |
|                                   | (b) | (i)  | Photographic film/plate<br>Geiger counter/tube/scintillation counter                             | Not photographic paper<br>Not 'film' on its own<br>Not 'x ray machine'<br>Not aerial | 1            |              |
|                                   |     | (ii) | X-rays can damage living tissue<br>Cause (skin) cancer<br>Can burn the skin<br>Kill/damage cells | Not damage the body<br>Not damage bones  | 1            |              |
|                                   | (c) | (i)  | It can pass/ be detected out of the body   |  | 1            |              |
|                                   |     | (ii) | (A) Technetium (99)  | Not 6 hours  | 1            |              |
|                                   |     |      | (B) long enough to make measurements but does not remain active for a long time                  | Justification of why <b>each</b> of the others cannot be used is OK                  | 1            |              |
|                                   | (d) |      | 200 000 (hertz)  | Answer circled/underlined is OK  | 1            |              |

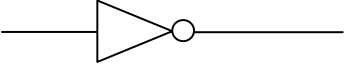


| Sample Answer and Mark Allocation |     |       |   | Notes   | Inner Margin | Outer Margin |
|-----------------------------------|-----|-------|---|---|--------------|--------------|
| 26.                               | (a) | (i)   | light travels faster than sound   | 1 or 0  | 1            | <b>8</b>     |
|                                   |     | (ii)  | measure the distance with the trundle wheel 1<br>Measure the time <u>between</u> seeing the balloon burst and hearing the bang with the timer 1<br>Speed = distance / time 1<br><br>$v = d/t$ OR $s = D/t$ are OK | Independent marks   | 3            |              |
|                                   |     | (iii) | Reaction time<br>It takes time to press the timer   | Watch for two reasons given – one right, one wrong – cancel each other out – 0 marks                              | 1            |              |
|                                   | (b) | (i)   | It must vibrate<br>It must be hit   |   | 1            |              |
|                                   |     | (ii)  | (A) It is quieter<br>Sound level decreases<br>Lower volume<br>Lower amplitude/<br>energy<br>Vibrations are weaker   | Not lower height  | 1            |              |
|                                   |     |       | (B) The amplitude is less   | If part A is lower amplitude cannot accept again for B – look for explanations to do with the height of the trace | 1            |              |

| Sample Answer and Mark Allocation  | Notes  | Inner Margin | Outer Margin |
|--|--|--------------|--------------|
| 27. (a) Weight = mass $\times$ 10<br>= 10 500 $\times$ 10<br>= 105 000 newtons   | Standard 2 marks   | 2            | <b>8</b>     |
| (b) Friction            Engine force<br>(air/wind) resistance<br>Drag                    Thrust<br><br><div style="display: flex; justify-content: space-around; align-items: center;"> <span></span> <span></span> </div> | Push/pull is wrong<br><br>Numbers are wrong<br><br>Marks are independent | 2            |              |
| (c) (i) It slows it down<br>Stops it<br>Decelerate<br>Accelerate   | Slows it down at a steady speed – wrong<br><br>Not brakes                | 1            |              |
| (ii) It increases the friction/air resistance/drag on the car<br>Makes it less aerodynamic<br>Produces an unbalanced force   |  | 1            |              |
| (d) Average speed = distance / time<br>= 1710 / 5<br>= 342 metres per second   | Standard 2 marks<br><br>Not mps<br><br>340 m/s is correct                | 2            |              |

| Sample Answer and Mark Allocation |     |  | Notes                                       | Inner Margin | Outer Margin |
|-----------------------------------|-----|--|---|--------------|--------------|
| 28.                               | (a) | 20 (metres per second)<br>The higher/bigger speed<br><br>The second one  | Ignore mps since units not required         | 1            | <b>6</b>     |
|                                   | (b) | (i) Unbalanced   |   | 1            |              |
|                                   |     | (ii) The speed changes<br><br>If the forces were balanced the speed would not change<br><br>The shape of the car has changed | Not the car stops                           | 1            |              |
|                                   | (c) | (i) Old  |   | 1            |              |
|                                   |     | (ii) Old   |   | 1            |              |
|                                   |     | (iii) Streamlining<br>Decrease the mass<br>More aerodynamic/lower to ground<br>Use a lighter material/make the car lighter   | Not 'smaller'<br>Not a spoiler<br>Not tyres | 1            |              |

| Sample Answer and Mark Allocation   | Notes  | Inner Margin | Outer Margin |
|---|--|--------------|--------------|
| 29. (a) Loudspeaker   | Writing the answer in the box is OK  | 1            | <b>4</b>     |
| (b) Gain = output voltage / input voltage<br>= $4/0.01$<br>= 400              | Standard 2 marks<br><br>Deduct ½ for unit if given                             | 2            |              |
| (c) It increases/gets bigger/higher pitch/higher<br><br>More waves per second | Watch for 'louder' – this is a wrong answer<br><br>Not 'more waves' on its own | 1            |              |

| Sample Answer and Mark Allocation  | Notes   | Inner Margin | Outer Margin |   |   |   |          |          |   |   |          |          |   |   |          |          |   |   |          |          |  |   |  |
|--|---|--------------|--------------|---|---|---|----------|----------|---|---|----------|----------|---|---|----------|----------|---|---|----------|----------|--|---|--|
| 30. (a)   | Must have the circle/connecting wires<br><br>Symbol drawn is the only acceptable answer | 1            | <b>4</b>     |   |   |   |          |          |   |   |          |          |   |   |          |          |   |   |          |          |  |   |  |
| (b) AND  | Correct symbol for AND gate is correct answer   | 1            |              |   |   |   |          |          |   |   |          |          |   |   |          |          |   |   |          |          |  |   |  |
| (c) <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>A</th> <th>B</th> <th>C</th> <th>D</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td><b>1</b></td> <td><b>0</b></td> </tr> <tr> <td>0</td> <td>1</td> <td><b>1</b></td> <td><b>1</b></td> </tr> <tr> <td>1</td> <td>0</td> <td><b>0</b></td> <td><b>0</b></td> </tr> <tr> <td>1</td> <td>1</td> <td><b>0</b></td> <td><b>0</b></td> </tr> </tbody> </table> | A   | B            | C            | D | 0 | 0 | <b>1</b> | <b>0</b> | 0 | 1 | <b>1</b> | <b>1</b> | 1 | 0 | <b>0</b> | <b>0</b> | 1 | 1 | <b>0</b> | <b>0</b> | 1 for each column<br><br>Vertical 'dotted line' between columns C and D.<br><br>If (b) is 'OR' then allow a carry forward for column D only (1,1,0,1) OR allow the correct answer (can be obtained from the stem). | 2 |  |
| A  | B   | C            | D            |   |   |   |          |          |   |   |          |          |   |   |          |          |   |   |          |          |  |   |  |
| 0  | 0   | <b>1</b>     | <b>0</b>     |   |   |   |          |          |   |   |          |          |   |   |          |          |   |   |          |          |  |   |  |
| 0  | 1   | <b>1</b>     | <b>1</b>     |   |   |   |          |          |   |   |          |          |   |   |          |          |   |   |          |          |  |   |  |
| 1  | 0   | <b>0</b>     | <b>0</b>     |   |   |   |          |          |   |   |          |          |   |   |          |          |   |   |          |          |  |   |  |
| 1  | 1   | <b>0</b>     | <b>0</b>     |   |   |   |          |          |   |   |          |          |   |   |          |          |   |   |          |          |  |   |  |

[END OF MARKING INSTRUCTIONS]