



**2012 Physics**

**Intermediate 2**

**Finalised Marking Instructions**

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## 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.	$V = IR$ $7.5 = 1.5R$ $R = 5.0 \Omega$	(½) (½) (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) and 7
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.	$V = IR$ $7.5 = 1.5 \times R$ $R = 0.2 \Omega$	(1½) Arithmetic error	GMI 7
15.	$V = IR$ $R = \frac{I}{V} = \frac{1.5}{7.5} = 0.2\Omega$	(½) Formula only	GMI 20

## 2012 Physics Intermediate 2

### Marking scheme

#### Section A

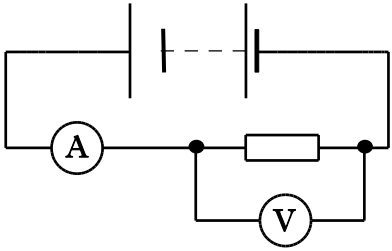
- |       |       |
|-------|-------|
| 1. D  | 11. D |
| 2. A  | 12. A |
| 3. D  | 13. B |
| 4. B  | 14. D |
| 5. C  | 15. D |
| 6. A  | 16. E |
| 7. C  | 17. C |
| 8. B  | 18. C |
| 9. C  | 19. E |
| 10. A | 20. E |

2012 Physics Intermediate 2			
Sample Answer and Mark Allocation			Marks
21.	(a)	(i) $d = vt$  8,300×100×60  = 49,800,000m	(½)  (½)  (1)
		(ii) (As orbit is circular) <u>direction changes</u> / or <u>unbalanced force</u> exists so <u>velocity changes</u> .	(1)  (1)
	(b)	$d = vt$  800×1000 = 300,000,000 t $t = 0.0027$ s	(½)  (½)  (1)
	(c)	(i) The weight of 1 kg OR Weight per unit mass OR Earth's pull per kg.  (ii) 7.8 N/kg  (iii) $W = mg$  = 84×7.8  = 660N	(1)  (1)  (½)  (½)  (1)

Sample Answer and Mark Allocation	Notes	Marks
<p>22. (a) Car continues at a <u>constant speed</u> during this time. (1)            AB represents driver's reaction time OR the forces are (1)            balanced (or equivalent).</p>	<p>Must describe constant speed to get second mark</p>	<p><b>2</b></p>
<p>(b) <math>E = \frac{1}{2}mv^2</math> (½)  <math>= 0.5 \times 700 \times 30^2</math> (½)  <math>= 315,000\text{J}</math> (1)</p>	<p>If 30 without squaring symbol is used – stop marking.            320 000 J OK</p>	<p><b>2</b></p>
<p>(c) 315,000J (1)</p>	<p>Answer must be consistent with (b)</p>	<p><b>1</b></p>

Sample Answer and Mark Allocation	Notes	Marks
<p>(d) <math>a = \frac{v - u}{t}</math> (½)</p> <p><math>= (0 - 30) / 2.5</math> (½)</p> <p>(-)12 (m/s<sup>2</sup>) (½)</p> <p>.....</p> <p><math>F = ma</math> (½)</p> <p><math>= 700 \times 12</math> (½)</p> <p><math>= 8400\text{N}</math></p> <p>OR</p> <p><math>d = \text{area under graph}</math> (½)</p> <p><math>= 0.5 \times 2.5 \times 30</math> (½)</p> <p><math>= 37.5 \text{ (m)}</math> (½)</p> <p>.....</p> <p><math>E_w = Fd</math> (½)</p> <p><math>315,000 = F \times 37.5</math> (½)</p> <p><math>F = 8400\text{N}</math></p>	<p><math>= (30 - 0) / 2.5</math> If used = minus ( ½ )</p> <p>OR</p> <p>If F = 8400 N not stated minus ½</p> <p>a.u.g. or implied</p> <p>OR</p> <p>If F = 8400 N not stated minus ½</p>	<p style="text-align: center;"><b>2</b></p>
		<b>Total 7</b>

Sample Answer and Mark Allocation	Notes	Marks
<p>23. (a) (i) <math>E_p = mgh</math> (½)  <math>= 0.50 \times 10 \times 19.3</math> (½)  <math>= 96.5 \text{ J}</math> (1)</p> <p>(ii) <math>E_H = cm\Delta T</math> (½)  <math>96.5 = 386 \times 0.50 \times \Delta T</math> (½)  <math>\Delta T = 0.5^\circ \text{C}</math> (1)</p> <p>(iii) Less than. (1)  Some heat is lost to surroundings/ or equivalent. (1)</p>	<p>Accept <math>g = 9.8 ; 9.81</math>; s.f. accept 2 more or 1 less</p> <p>97 J OK</p> <p><math>E_H</math> must be consistent with (i). If any other value of 'c' used, only (½) for formula.</p> <p>If 'less than' is on its own = 0 marks.  'Less than' plus wrong explanation = 1 mark. 'Heat loss to' must be qualified.  Qualified sound loss OK eg on hitting the ground</p>	<p>2</p> <p>2</p> <p>2</p>
<p>(b) <math>E_h = ml</math> (½)  <math>= 0.50 \times (2.05 \times 10^5)</math> (1)  (½) (1)  <math>= 102500 \text{ J}</math> (1)</p>	<p>If wrong value from same table for latent heat of fusion used = minus 1. Any other value used = ( ½ ) for formula.</p> <p>100 000 J, 103 000 J OK</p>	<p>3</p>
		<p><b>Total 9</b></p>

Sample Answer and Mark Allocation	Notes	Marks
<p>24. (a)</p> 	<p>(1/2) mark each symbol (2)  (1/2) for position of each meter (voltmeter across battery = OK) (1)  One cell drawn - unacceptable  6V label not needed</p>	<b>3</b>
<p>(b) <math>V = IR</math> (1/2)</p> <p><math>5.7 = 0.60 \times R</math> (1/2)</p> <p><math>R = 9.5 \Omega</math> (1)</p>	<p>10 <math>\Omega</math> OK</p>	<b>2</b>
<p>(c) <math>P = VI</math> (1/2)</p> <p><math>P = 5.7 \times 0.60</math> (1/2)</p> <p><math>P = 3.42 \text{ W}</math> (1)</p> <p>This is greater than the 3W or labelled power rating (so it overheats). (1)</p>	<p><math>P = \frac{V^2}{R}</math> or <math>P = I^2R</math> OK</p> <p>Values must be consistent with (b).</p>	<b>3</b>

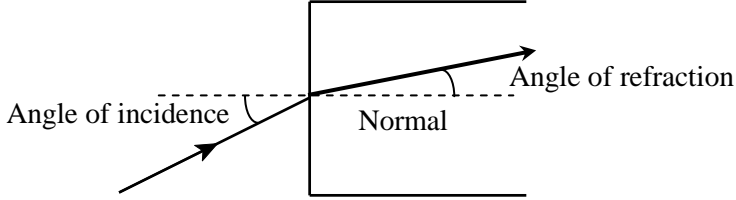


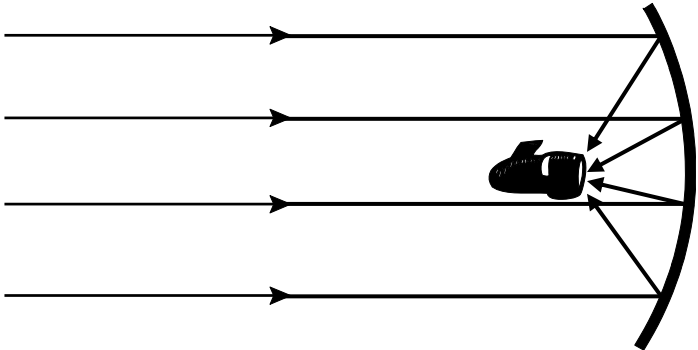
Sample Answer and Mark Allocation	Notes	Marks
<p>(d) No ( ½ )</p> <p>In parallel the voltage is still the same/6V across each resistor (1)</p> <p>So power is the same (½)</p>	<p>NO on its own = ( ½ )</p> <p>(OR correct calculations)</p>	<p>2</p>
		<p><b>Total 10</b></p>

Sample Answer and Mark Allocation	Notes	Marks
<p>25. (a) MOSFET (1)</p>	<p>Transistor on its own = 0 Correct spelling required</p>	<p><b>1</b></p>
<p>(b) (Voltage) falls/decreases (1)</p>	<p>Or equivalent Arrows not allowed</p>	<p><b>1</b></p>
<p>(c) (i) <math>12 - 2.4 = 9.6\text{ V}</math> (1)</p> <p>(ii) <math>\frac{V_1}{V_2} = \frac{R_1}{R_2}</math> (½)</p> <p><math>\frac{9.6}{2.4} = \frac{5600}{R_2}</math> (½)</p> <p><math>R_2 = 1400\Omega</math> (1)</p>	<p>Substitution for <math>V_1</math> must be consistent with (i) or the correct value. (½) for equation <u>once</u></p> <p><math>I = \frac{V}{R_V}</math></p> <p><math>I = \frac{9.6}{5600}</math> (½)</p> <p>(<math>I = 0.001714</math>)</p> <hr/> <p><math>R_T = \frac{V}{I}</math></p> <p><math>R_T = \frac{2.4}{0.001714}</math></p> <p>If incorrect substitution in either equation, <u>stop marking</u>.</p> <p><math>R_T = 1400\Omega</math> (1)</p>	<p><b>1</b></p> <p><b>2</b></p>

Sample Answer and Mark Allocation	Notes	Marks
(d) (Lamp) stays on (Temperature falls) $R_T$ rises $V_T$ rises $V_T > 2.4 \text{ V}$ or switching voltage	(½) only if explanation attempted even if there is wrong physics  Arrows not acceptable  (½)  (½)	2
		<b>Total 7</b>

Sample Answer and Mark Allocation	Notes	Marks
<p>26. (a) (i) Speed of sound (much) less than speed of light (or similar) (1)</p> <p>(ii) <math>d = \bar{v}t</math> (½)</p> <p><math>176 = \bar{v} \times 0.5</math> (½)</p> <p><math>\bar{v} = 352 \text{ m/s}</math> (1)</p>	<p>s.f. 350, 400 OK</p>	<p>1</p> <p>2</p>
<p>(b) The current creates a magnetic field around the coil (1)</p> <p>The steel contact is attracted by the (magnetised) coil/core (1)</p>	<p>OR The <u>contact is attracted</u> to the <u>magnetic coil</u>. (1) (1)</p>	<p>2</p>
<p>(c) <math>V_R = 9 - 6 = 3 \text{ V}</math> (1)</p> <p>..... <math>V = IR</math> (½)</p> <p><math>3 = 800 \times 10^{-3} \times R</math> (½)</p> <p><math>R = 3.75 \Omega</math> (1)</p>	<p>Subtraction of 6 from 9 must be attempted. No subtraction – max (½) for formula.</p> <p>s.f. 4, 3.8 OK</p>	<p>3</p>
<p>(d) <math>v = f\lambda</math> (½)</p> <p><math>340 = 850 \times \lambda</math> (½)</p> <p><math>\lambda = 0.4 \text{ m}</math> (1)</p>	<p>No other value for speed allowed.</p>	<p>2</p>
		<p><b>Total 10</b></p>

Sample Answer and Mark Allocation	Notes	Marks
27. (a) Greater (1)	Accept bigger, larger, longer but not higher	1
(b) 	(½) for each correct label (1½) The normal must be drawn correctly (PJ) to allow marks to be given for labelling marks. Accept <i>i</i> , <i>r</i> and <i>N</i> (½) for correct change of direction  Arrows not required.	2
(c) Total internal reflection	Accept TIR	1
		<b>Total 4</b>

Sample Answer and Mark Allocation	Notes	Marks
<p>28. (a) </p>	<p>Correct reflection of straight rays (1) Arrows essential and minimum of 3 rays required.</p> <p>Arriving at (labelled) microphone at focus (1)</p>	2
<p>(b) More energy OR power OR amplitude is received (at the microphone.)</p>	<p>(1) Do not accept there are more signals, stronger /amplified signal, concentrated sound or more waves at the microphone. Focusing the sound waves OK</p>	1
<p>(c) <math>V_{gain} = \frac{V_o}{V_i}</math></p> <p><math>V_{gain} = \frac{3}{0.024}</math></p> <p><math>V_{gain} = 125</math></p>	<p>(1/2) If 24 used answer 0.125 treat as arithmetical error (1½ max)</p> <p>(1/2) If unit given (-1/2)</p> <p>(1)</p>	2
<p>(d) (i) Short sight</p> <p>(ii) Diverging/concave or diagram OK</p>	<p>(1)</p> <p>(1) If long sight answered in (i) then accept convex/converging lens for (ii). (max 1 mark)</p>	1  1

Sample Answer and Mark Allocation	Notes	Marks
(e) $P = \frac{1}{f}$ (1/2) $10 = \frac{1}{f}$ (1/2) $f = 0.1 \text{ m (10cm)}$ (1)		<b>2</b>
		<b>Total 9</b>

Sample Answer and Mark Allocation	Notes	Marks
<p><b>29.</b> (a) Any two correct count rate values from the graph, i.e. second = half of the first. (1)</p> <p>Half-life = 2 hours (1)</p>		<b>2</b>
<p>(b) Any two valid answers. (1) for each</p>	Weapons, atmosphere, rocks etc must be qualified in terms of radioactivity. PJ	<b>2</b>
<p>(c) A type of <u>electromagnetic</u> radiation / wave/ ray. (1)</p>	Don't accept EM	<b>1</b>
		<b>Total 5</b>



Sample Answer and Mark Allocation	Notes	Marks
<p><b>30.</b> (a) (i) <math>D = E / m</math> (½)</p> <p><math>= 0.000006 / 0.50</math> (½)</p> <p><math>= 0.000012 \text{Gy}</math> (1)</p> <p>(ii) <math>H = D w_R</math> (½)</p> <p><math>= 0.000012 \times 20</math> (½)</p> <p><math>= 0.00024 \text{Sv}</math> (1)</p> <p>(iii) <math>A = N / t</math> (½)</p> <p><math>= 24,000 / (5 \times 60)</math> (½)</p> <p><math>= 80 \text{Bq}</math> (1)</p>	<p>Wrong conversion of a unit (- ½ )</p> <p><math>1.2 \times 10^{-5}</math> or <math>12 \mu\text{Gy}</math></p> <p>D must be consistent with (i) or correct value used</p> <p><math>2.4 \times 10^{-4}</math> ; <math>240 \mu\text{Sv}</math> or <math>0.24 \text{mSv}</math></p>	<p><b>2</b></p> <p><b>2</b></p> <p><b>2</b></p>
<p>(b) (i) The moderator <u>slows neutrons</u>. (1)</p> <p>(ii) The containment vessel prevents/reduces release of radiations OR radioactive gases OR radioactive substances etc. (1)</p>	<p>Do not accept the release of radioactivity.</p>	<p><b>2</b></p>
<p>(c) Fission or Chain reaction. (1)</p>	<p>Do not accept fussion. Fision OK.</p>	<p><b>1</b></p>
		<p><b>Total 10</b></p>

[END OF MARKING INSTRUCTIONS]