2013 Physics

Intermediate 1

Finalised Marking Instructions

Part One: General Marking Principles for Physics Intermediate 1

This information is provided to help you understand the general principles you must apply when marking candidate responses to questions in this Paper. These principles must be read in conjunction with the specific Marking Instructions for each question.

(a) Marks for each candidate response must always be assigned in line with these general marking principles and the specific Marking Instructions for the relevant question.

(b) Marking should always be positive ie, marks should be awarded for what is correct and not deducted for errors or omissions.

GENERAL MARKING ADVICE: Physics Intermediate 1

The marking schemes are written to assist in determining the "minimal acceptable answer" rather than listing every possible correct and incorrect answer. The following notes are offered to support Markers in making judgements on candidates' evidence, and apply to marking both end of unit assessments and course assessments.

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.

	Answers	**Mark + Comment**	**Issue**
1.	$V=IR$ $7{\cdot}5=1{\cdot}5R$ $R=5{\cdot}0\ \Omega$	(½) (½) (1)	Ideal answer
2.	$5{\cdot}0\ \Omega$	(2) Correct answer	GMI 1
3.	$5{\cdot}0$	(1½) Unit missing	GMI 2 (a)
4.	$4{\cdot}0\ \Omega$	(0) No evidence/wrong answer	GMI 1
5.	_____ Ω	(0) No final answer	GMI 1
6.	$R=\frac{V}{I}=\frac{7{\cdot}5}{1{\cdot}5}=4{\cdot}0\ \Omega$	(1½) Arithmetic error	GMI 7
7.	$R=\frac{V}{I}=4{\cdot}0\ \Omega$	(½) Formula only	GMI 4 and 1
8.	$R=\frac{V}{I}=$_____ Ω	(½) Formula only	GMI 4 and 1
9.	$R=\frac{V}{I}=\frac{7{\cdot}5}{1{\cdot}5}=$_____ Ω	(1) Formula + subs/No final answer	GMI 4 and 1
10.	$R=\frac{V}{I}=\frac{7{\cdot}5}{1{\cdot}5}=4{\cdot}0$	(1) Formula + substitution	GMI 2 (a) and 7
11.	$R=\frac{V}{I}=\frac{1{\cdot}5}{7{\cdot}5}=5{\cdot}0\ \Omega$	(½) Formula but wrong substitution	GMI 5
12.	$R=\frac{V}{I}=\frac{75}{1{\cdot}5}=5{\cdot}0\ \Omega$	(½) Formula but wrong substitution	GMI 5
13.	$R=\frac{I}{V}=\frac{7{\cdot}5}{1{\cdot}5}=5{\cdot}0\ \Omega$	(0) Wrong formula	GMI 5
14.	$V=IR\quad 7{\cdot}5=1{\cdot}5\times R\quad R=0{\cdot}2\ \Omega$	(1½) Arithmetic error	GMI 7
15.	$V=IR$ $R=\frac{I}{V}=\frac{1{\cdot}5}{7{\cdot}5}=0{\cdot}2\ \Omega$	(½) Formula only	GMI 20

Part Two: Marking Instructions for each Question

Section A

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

Sample Answer and Mark Allocation			Notes	Inner Margin	Outer Margin
21.	(a)	The number of waves/**cycles** produced in one second.	**Not 'signals'** **Amount of waves per second is OK**	1	3
	(b) (i)	Higher	**Any clear indication of choice**	1●	
	(b) (ii)	Moray (Firth Radio) **accept Murray (MFR) etc.** **Must be name not frequency.**	**If more than one answer apply +/- rule.**	1+	

Sample Answer and Mark Allocation	Notes	Inner Margin	Outer Margin
22. (a) 36 000 (kilometres)	**Watch for 360 000 –0 mark** **Incorrect unit -½**	1•	4
(b) graph drawn correctly	½ mark for line of best fit. **e.g. line forced through origin does not gain this ½ mark.** -½ for each point drawn incorrectly. **Watch for only one point plotted correctly (½ max for line)** **Watch for a graph does not cover the full range of points. No mark for line (max 1 mark)** **Line does not need to extend beyond the range of the points.** **Points only max 1 ½.** **Line must be straight.** **If candidates have a point wrong and then join the dots (max 1 mark)** **If candidates plot a point incorrectly and then draw a best fit straight line max 1 ½.**	2+	
(c) 19.5 hours	Accept 19 to 20 hours **Accept answer that agrees with an incorrect graph. Apply same tolerance +/- ½ hour.** **If they have no graph but have a correct answer award the mark.** **Missing unit – ½**	1+	

Sample Answer and Mark Allocation	Notes	Inner Margin	Outer Margin
23. (a) X –rays		1	6
(b) Resistance = voltage/current = 220/4·0 = 55 ohms	standard 2 marks	2●	
(c) (i) 0·03 x 5000 = 150 (microsieverts)	1 mark for multiplication. 1 mark for answer **Wrong substitution is 0 marks.**	2+	
(c) (ii) Protects them from the harmful x-rays/**radiation**	**Effected by radiation 0 marks.** **Harmed by radiation 1 mark.** **Blocks radiation/x-rays 1 mark.** **Stops radiation/x rays 1 mark.** **Prevents radiation poisoning 0 marks.** **Type of radiation consistent with (a).**	1●	

Sample Answer and Mark Allocation	Notes	Inner Margin	Outer Margin
24. (a) Current = power/voltage = 1725/230 = 7·5 amperes	Standard 2 marks **Accept amps/a/A** **If round off to 8 A -½ for sig figs**	2●	5
(b) Yellow and Green Brown Blue	3 correct (1 mark). 2 correct (½ mark) **Do not accept old colour system.**	1	
(c) (i) 3 (amperes)		1+	
(c) (ii) 13 (amperes)		1+	

Sample Answer and Mark Allocation	**Notes**	Inner Margin	Outer Margin
25. (a) E		1	3
(b) (i) Z		+1	
(b) (ii) highest <u>current</u>, (smallest resistance)	**Not higher amps/amperes** **If they say highest resistance gives smallest current 1 mark BUT must make full statement.**	+1	

Sample Answer and Mark Allocation	Notes	Inner Margin	Outer Margin
26. (a) a <u>high frequency</u> sound beyond the range of human hearing	Accept "(sound with a) frequency <u>greater</u> than 20 000 Hz" **Noise is acceptable instead of sound.** **Sounds that humans can't hear 0 marks** **Outwith human hearing 0 marks.** **dB instead of Hz 0 marks.** **Sound level 0 marks.** **1 OR 0**	1	4
(b) (i) 0·6 seconds	**No unit - ½** **No secs in physics** **If they show calculation but wrong answer 0 marks in this case.**	1●	
(b) (ii) $\text{speed} = \frac{\text{distance}}{\text{time}}$ $\text{speed} = \frac{900}{0{\cdot}6}$ speed = 1500 metres per second	Standard 2 marks **Time must agree with (b) (i) or be 0.6 seconds otherwise max ½** **mps -½** **If the double the distance instead of halving the time 2 marks**	2	

<table>
<tr><th colspan="2">Sample Answer and Mark Allocation</th><th>Notes</th><th>Inner Margin</th><th>Outer Margin</th></tr>
<tr><td>27. (a)</td><td>people/bodies give off IR radiation (heat)</td><td>Heat signals is OK

Heat signature is OK

Must indicate that IR/heat is emitted by humans

‘people are hot’ 0 marks</td><td>1</td><td>5</td></tr>
<tr><td>(b) (i)</td><td>converging (convex)</td><td></td><td>1</td><td></td></tr>
<tr><td>(b) (ii)</td><td>converging rays (½ mark) ,

tending to a focus point (½ mark)</td><td>Ignore rays inside lens</td><td>1</td><td></td></tr>
<tr><td>(c)</td><td><table><tr><th>Type of Radiation</th></tr><tr><td>X-Rays</td></tr><tr><td>Gamma rays</td></tr><tr><td>Infrared</td></tr><tr><td>Ultraviolet</td></tr></table></td><td>3 correct (2 marks), 2 correct (1 mark), 1 correct (½ mark)

Must use terms from the list – heat is not acceptable for infra red BUT IR and UV are acceptable as abbreviations.</td><td>2 ●</td><td></td></tr>
</table>

Sample Answer and Mark Allocation			Notes	Inner Margin	Outer Margin
28. (a)	Output signal should have a greater <u>amplitude</u> **(1 mark)** and same <u>frequency</u> **(1 mark)**		**Independent marks** **Inverted signal is OK** **Square waves max 1 mark (for frequency)** **e.g. just redraw original pattern = 1** **Does not need to be centred on axis.**	2+	5
(b)	**They absorb sound <u>energy</u>.** **OR** **Stop <u>vibrations</u> going into the ear**		"reduces sound level to below 80 db to protect hearing" **Blocks loud sounds 0 marks** **Sound waves are reflected 0 marks** **Sound cancelling 0 marks** **Dampen noise 0 marks** **Dampening sound 1 mark**	1+	
(c)	energy vibrates hertz decibels	(½) (½) (½) (½)	**Must use terms from the list**	2	

Sample Answer and Mark Allocation	**Notes**	Inner Margin	Outer Margin
29. (a) Gain = output voltage / input voltage = 5/0·02 = 250	Standard 2 marks **If unit is given deduct ½ mark.**	2 ●	4
(b) Tuner Amplifier	**receiver is incorrect 0 marks**	2	

Sample Answer and Mark Allocation	Notes	Inner Margin	Outer Margin
30. (a) $\text{average speed} = \frac{\text{distance}}{\text{time}}$ $\text{average speed} = \frac{750}{60}$ average speed = 12·5 metres per second	Standard 2 marks **Not mps** **Rounded to 13 m/s is OK.**	2	4
(b) The forces are balanced	**'The forces are equal' on its own 0 marks.** **The forces are equal but opposite 1 mark.**	1	
(c) **The friction force decreases.** **OR** **There is an unbalanced force.** **OR** **The forces are no longer balanced.** **OR** **There is more friction on the water than in the air.**	**Some friction in the water but <u>none</u> in the air – 0 marks** **No friction between the surfer and the water – 1 mark** **No water resistance 1 mark** **Less force <u>against</u> them 1 mark**	1+	

Sample Answer and Mark Allocation		Notes	Inner Margin	Outer Margin
31.	Metre stick/measuring tape	**Ignore anything already given e.g. tennis ball.** **Ignore anything irrelevant e.g. ladder, stopwatch.**	1●	3
	(Height from which tennis ball is dropped) rebound height	**How <u>high</u> the ball travels/bounces 1 mark** **Where the ball bounces to – 0 marks**	1●	
	The tennis ball is always dropped from the same height **OR** **The method of release is the same e.g. always dropped rather than thrown downwards, the speed of release is always the same etc.** **OR** **Ensure the thickness of the surface is the same each time.**	**Look for one factor/variable that could affect the experiment.** **Answers must be in the correct box.**	1●	

Sample Answer and Mark Allocation		Notes	Inner Margin	Outer Margin
32. (a)	Newton(s)/N/n Earth	½ mark each **Must be from list**	1	5
(b)	weight = 10 x mass weight = 10 x 0·5 weight = 5 newtons	Standard 2 marks **Watch for unit errors**	2	
(c)	acting up the hill/against the motion of the ball/in the opposite direction to the ball	**Not 'up' on its own** **To the left 0 marks** **Backwards is OK** **An arrow showing direction is OK.** **Against the ball 0 marks** **Against the direction of the ball 1 mark.**	1+	
(d)	Less (than)		1+	

Sample Answer and Mark Allocation			Notes	Inner Margin	Outer Margin
33.	(a)	Input Output		1	5
	(b) (i)	thermistor	Must be from list Circuit symbols are OK	1●	
	(b) (ii)	buzzer	Must be from list Circuit symbols are OK	1●	
	(b) (iii)	switch	**If give two answers 0 marks.** Circuit symbols are OK	1+	
	(c)	electrical (energy) to light (energy)	**1 or 0** **Electric is OK** **Electricity 0 marks**	1	

<table>
<tr><th>Sample Answer and Mark Allocation</th><th>Notes</th><th>Inner Margin</th><th>Outer Margin</th></tr>
<tr><td>34. (a) (i) AND</td><td></td><td>1</td><td>4</td></tr>
<tr><td>(a) (ii) (electric) motor</td><td></td><td>1●</td><td></td></tr>
<tr><td>(b)
<table>
<tr><th>Input A</th><th>Input B</th><th>Output Z</th></tr>
<tr><td>0</td><td>0</td><td>0</td></tr>
<tr><td>0</td><td>1</td><td>0</td></tr>
<tr><td>1</td><td>0</td><td>0</td></tr>
<tr><td>1</td><td>1</td><td>1</td></tr>
</table></td><td>1 or 0.

Or Consistent with (a) (i)

High = 1 = on
Low = 0 = off</td><td>1●</td><td></td></tr>
<tr><td>(c) Both inputs must be “high” for the output to be “high” (so when the master switch is off only one input is “high”)</td><td>High = 1 = on</td><td>1+</td><td></td></tr>
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[END OF MARKING INSTRUCTIONS]