



Mark Scheme (Results)

Summer 2025

Pearson Edexcel International GCSE
In Physics (4WSD6) Unit 6PR

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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

Question number	Answer	Notes	Marks
1 (a) (i)	$n = \frac{\sin i}{\sin r}$	accept correct rearrangements	1
(ii)	substitution; rearrangement; evaluation of $\sin r$; evaluation of r ; e.g. $1.6 = \sin 13 / \sin r$; $\sin r = \sin 13 / 1.6$ $\sin r = 0.14059...$ $r = 8.1$ (degrees)	accept 8.082...	4
(b)	moving from high {refractive index / n } to low {refractive index / n }; at an angle (of incidence) greater than critical angle;	accept (optical) density for refractive index accept moving from low speed to high speed	2
(c)	ray of light is reflected back into fibre / does not leave fibre; further reflections occur (to keep the ray in the fibre)	accept idea of reflection, e.g. bounces	2

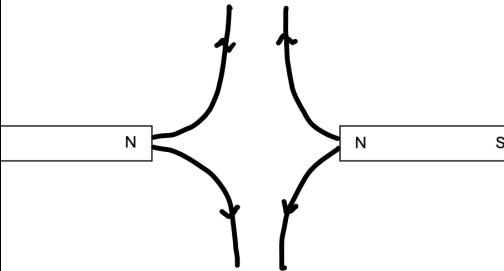
Total for question 1: 9 marks

Question number	Answer	Notes	Marks
2 (a)	any two from: (a method of) transferring energy; (by means of) oscillations / vibrations; without transferring matter;		2
(b)	infrared / IR; x-ray;	this order only	2
(c) (i)	radiation absorbed by water (molecules) causing molecules to vibrate more / gain KE / causing temperature of molecules to increase;	accept particles	2
(c) (ii)	idea of shielding;		1

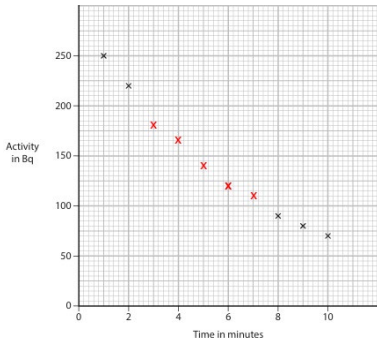
Total for question 2: 7 marks

Question number	Answer	Notes	Marks
3 (a) (i)	D - a planet it is not object A because it has an almost circular orbit it is not objects B or C as they do not orbit stars		1
(ii)	A - a comet it is not object D because it has an highly elliptical orbit it is not objects B or C as they do not orbit stars		1
(iii)	B - gravitational it is not A, C or D because they are the incorrect forces		1
(b) (i)	substitution; rearrangement; evaluation; answer in standard form; e.g. $6.87 = 2 \times \pi \times 414\,000\,000 \div T$ $T = 2 \times \pi \times 414\,000\,000 \div 6.87$ $T = 379\,000\,000$ $T = 3.79 \times 10^8 \text{ (s)}$	accept 378637367.9	4
(ii)	10^8 or 8	allow ecf from (b)(i)	1

Total for question 3: 8 marks

Question number	Answer	Notes	Marks
4 (a)	idea of remaining a magnet (when an external field is removed); OR idea of difficult to magnetise/demagnetise;	ignore examples, e.g. steel	1
(b)	MP1: method to show shape; MP2: use of (plotting) compass to show direction; MP3: further detail;	e.g. use of (plotting) compass OR iron filings / dust / shavings e.g. move (plotting) compass / use multiple (plotting) compasses in different places / plot multiple lines / sprinkle iron filings AND tap card “compass” or “iron filings” stated with no method scores a maximum of one mark	3
(c)	one correct line; four correct lines AND none touching / crossing; all directions shown on field lines correct (from N); e.g. 	allow small gap where field line joins magnet ignore field lines inside the magnet ignore field lines that start outside the pole region only one arrow required for the mark reject contradictory arrows ignore arrows inside the magnet	3
(d)	(the field) lines are parallel (to each other); (field) lines are evenly spaced;	accept a labelled diagram for both marks straight, equidistant lines score 2 marks.	2

Total for question 4: 9 marks

Question number	Answer	Notes	Marks										
5 (a)	time (taken); for the {activity of / mass of (undecayed) nuclei in / number of (undecayed) nuclei in} a sample to decrease by half;	do not accept “half the time” ignore atoms, particles	2										
(b) (i)	5 points correctly plotted;	+ / - half a small square  <table data-bbox="828 938 1241 1225"><tr><td>3</td><td>180</td></tr><tr><td>4</td><td>165</td></tr><tr><td>5</td><td>140</td></tr><tr><td>6</td><td>120</td></tr><tr><td>7</td><td>110</td></tr></table>	3	180	4	165	5	140	6	120	7	110	1
3	180												
4	165												
5	140												
6	120												
7	110												
(b) (ii)	smooth curve of best fit;		1										
(b) (iii)	evidence of looking for halving pattern; conclusion;	can be from table or graph e.g. a line drawn horizontally at 125 meeting the data line OR halving from 220 to 110 (takes 5 minutes) half-life consistent with graph/table	2										

(b)	(iv)	student's conclusion relating to trend is correct; attempt to calculate product of time and activity for one value; attempt to calculate product of time and activity for two or more values; (time x activity) not constant;	DOP Sample data: <table><tr><th>Time</th><th>Activity</th><th>Time x Activity</th></tr><tr><td>1</td><td>250</td><td>250</td></tr><tr><td>2</td><td>220</td><td>440</td></tr><tr><td>3</td><td>180</td><td>540</td></tr><tr><td>4</td><td>165</td><td>660</td></tr><tr><td>5</td><td>140</td><td>700</td></tr><tr><td>6</td><td>120</td><td>720</td></tr><tr><td>7</td><td>110</td><td>770</td></tr><tr><td>8</td><td>90</td><td>720</td></tr><tr><td>9</td><td>80</td><td>720</td></tr><tr><td>10</td><td>70</td><td>700</td></tr></table>	Time	Activity	Time x Activity	1	250	250	2	220	440	3	180	540	4	165	660	5	140	700	6	120	720	7	110	770	8	90	720	9	80	720	10	70	700	4
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7	110	770																																			
8	90	720																																			
9	80	720																																			
10	70	700																																			

Total for question 5: 10 marks

Question number	Answer	Notes	Marks
6 (a)	(molecules have) more frequent collisions (with the walls); more force; force per unit area gives the pressure;	accept particles / atoms for molecules throughout formula alone is insufficient	3
(b)	calculation of increase; use of ratio; evaluation; e.g. 1.25x $\frac{35}{1.25}$ 28 (cm ³) alternative method: calculation of pV; calculation of new pressure; evaluation; e.g. 103 × 35 OR 3605 103 × 1.25 OR 128.75 $\left(\frac{3605}{128.75} = \right) 28 \text{ (cm}^3\text{)}$		3
(c)	kinetic energy (of the molecules) increases; velocity / speed (of the molecules) increases;		2

Total for question 6: 8 marks

Question number	Answer	Notes	Marks
7 (a) (i)	correct nucleon number of Zr; correct proton number of Zr; beta particle with correct values; e.g. $({}_{39}^{90}\text{Y} \rightarrow) {}_{40}^{90}\text{Zr} + {}_{-1}^0\text{B}$	allow one mark if proton and nucleon numbers are interchanged accept use of B, B^-, e, e^- reject B^+, e^+	3
(ii)	idea of exposed to ionising radiation; idea of does not contaminate;		2
(b)	identification of radiation source; (radioactive isotopes within the source) produce <u>ionising</u> radiation (which can be detected);	ignore radioactive waste examples of sources: rocks radon gas food medical equipment cosmic rays	2
(c)	identification of risk; method of reducing risk;	e.g. radioactive waste gives off (named) ionising radiation; store in containers made of lead / concrete which radiation cannot penetrate; radioactive waste can have a long half-life; waste must be securely stored for a long period of time; radioactive waste could contaminate the environment; waste can be vitrified into glass / stored underground / stored in areas with low geological activity / in areas away from groundwater do not accept risks relating to the operation of power stations, e.g. meltdown, particles escaping from the reactor etc.	2

Total for question 7: 9 marks

