



Mark Scheme (Results)

Summer 2026

Pearson Edexcel International GCSE in Physics

4PH1/1P

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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)	<p>first stage = nebula; main sequence before red giant/white dwarf;</p> <p>red giant before white dwarf;</p> <p>fourth stage = white dwarf;</p> <p>e.g.</p> <table border="1"> <thead> <tr> <th>First stage</th><th>Second stage</th><th>Third stage</th><th>Fourth stage</th></tr> </thead> <tbody> <tr> <td>nebula</td><td>main sequence</td><td>red giant</td><td>white dwarf</td></tr> </tbody> </table>	First stage	Second stage	Third stage	Fourth stage	nebula	main sequence	red giant	white dwarf	<p>can be given as any stages as long as main sequence is before red giant/white dwarf</p> <p>can be given as any stages as long as red giant is before white dwarf</p>	4
First stage	Second stage	Third stage	Fourth stage								
nebula	main sequence	red giant	white dwarf								
(b) (i)	<p>reference to combining nuclei however expressed;</p> <p>reference to loss in mass;</p>	<p>allow hydrogen (ions) / protons for nuclei</p> <p>allow two nuclei fuse together (to form larger nucleus)</p> <p>ignore releases energy</p>	2								
(ii)	<p>any two from:</p> <p>MP1. nuclei are (all) positive AND repel each other;</p> <p>MP2. low temperature means low speed/KE;</p> <p>MP3. low pressure means that nuclei aren't close enough together (to fuse);</p>	<p>allow protons, particles, atoms, ions for nuclei</p> <p>allow nuclei have same charge so repel</p> <p>allow RA</p> <p>allow RA</p> <p>allow idea that low pressure decreases number of collisions</p>	2								

Total for Question 1 = 8 marks

Question number	Answer	Notes	Marks
2 (a) (i)	substitution OR rearrangement into given formula; correct evaluation; e.g. $9\,300\,000 = h \times 65 \times 8.9$ OR $h = P / \rho \times g$ ($h = 9\,300\,000 / 65 \times 8.9 =$) $16\,000$ (m)	condone $14\,307.69\dots$ (m) for 1 mark for using $g=10$ N/kg allow $16\,100$, $16\,076\dots$ (m)	2
(ii)	any one from: <ul style="list-style-type: none"> density is constant; g is constant; temperature is constant; 	ignore pressure is constant condone gravity is constant	1
(b) (i)	conversion of either temperature into kelvin; substitution into given formula; rearrangement of given formula; evaluation; e.g. $453\text{ }^{\circ}\text{C}$ is 726 K and $482\text{ }^{\circ}\text{C}$ is 755 K $9.3 \div 726 = P_2 \div 755$ $P_2 = 755 \times 9.3 \div 726$ $P_2 = 9.7$ (million Pa)	mark independently i.e. 726 or 755 seen allow ECF from incorrect or no unit conversion 9.9 , 9.90 , $9.89\dots$ (million Pa) scores 3 marks allow $9.67\dots$ (million Pa)	4
(ii)	any two from: number of particles is constant (in a given volume); reference to constant volume; density is constant;	allow constant mass (of gas)	2
(c)	statement of correct formula; rearrangement to give v^2 or v as the subject; evaluation; e.g. $KE = \frac{1}{2} \times m \times v^2$ $v^2 = (2 \times 6.1 \times 10^{-21}) \div 7.3 \times 10^{-26}$ $v (= \sqrt{167\,123}) = 410$ (m/s)	correct formula can be assumed by evidence of correct substitution answer of $167\,123$ scores 2 marks (not taking square root) allow 409 , $408.8\dots$ (m/s)	3

Total for Question 2 = 12 marks

Question number	Answer	Notes	Marks
3 (a) (i)	A (comet); <i>B is incorrect because galaxies do not orbit the Sun</i> <i>C is incorrect because the Sun has no binary partner star</i> <i>D is incorrect because the universe does not orbit the Sun</i>		1
(ii)	straight arrow drawn pointing towards S such that its line of action passes through both X and S;	judge straight by eye arrow does not need to start at X or finish at the Sun	1
(b)	conversion of time into seconds; substitution into given formula; evaluation; e.g. time = $28 \times 24 \times 60 \times 60 = 2\,419\,200$ (s) orbital speed = $2 \times \pi \times 390\,000 \div 2\,419\,200$ (orbital speed =) 1.0 (km/s)	mark independently i.e. $28 \times 24 \times 60 \times 60$ or 2 419 200 seen allow ECF from incorrect / no unit conversion 87 515... (km/s) scores 2 marks allow 1, 1.01... (km/s)	3
(c)	different mass/density/diameter/radius;	condone size for radius condone 'moon is smaller' / RA ignore if incorrect comparison given e.g. 'Earth has less mass than the Moon'	1

Total for Question 3 = 6 marks

Question number	Answer	Notes	Marks																				
4 (a)	<p>MP1. measure the extension / length (of the wire);</p> <p>MP2. detail for how extension is determined;</p> <p>MP3. increase applied force / load / mass added;</p> <p>MP4. description of how to protect eyes/feet/skin;</p> <p>PLUS</p> <p>any one from:</p> <p>MP5. description of method to reduce parallax error;</p> <p>MP6. idea of placing masses on gently instead of dropping;</p> <p>MP7. measurement of mass with a balance OR measurement of force with newton-meter;</p> <p>MP8. description of a (potentially) more accurate way of measuring extension i.e. (vernier) calipers;</p>	<p>ignore</p> <ul style="list-style-type: none"> • repeats • calculation of mean • control variables • Hooke's law <p>allow 'calculate how much it has increased (in length) for every added load'</p> <p>'how much the marker moves for each load added'</p> <p>e.g. calculate difference between original length and new length</p> <p>ignore 'be careful', 'protective clothing', protection aimed to prevent damage to floor or load</p> <p>allow view ruler perpendicularly / bird's eye view etc.</p> <p>ignore eye level</p> <p>ignore 'weigh each load'</p>	5																				
(b)	<p>'independent' column has a tick in last row only;</p> <p>'dependent' column has a tick in first row only;</p> <p>'control' column has ticks in the middle two rows only;</p> <p>e.g.</p> <table border="1"> <thead> <tr> <th>Name of variable</th><th>Independent</th><th>Dependent</th><th>Control</th></tr> </thead> <tbody> <tr> <td>extension</td><td></td><td>✓</td><td></td></tr> <tr> <td>material of wire</td><td></td><td></td><td>✓</td></tr> <tr> <td>temperature</td><td></td><td></td><td>✓</td></tr> <tr> <td>applied force</td><td>✓</td><td></td><td></td></tr> </tbody> </table>	Name of variable	Independent	Dependent	Control	extension		✓		material of wire			✓	temperature			✓	applied force	✓			<p>reject if ticks given in any other rows</p> <p>reject if ticks given in any other rows</p> <p>reject if ticks given in any other rows</p>	3
Name of variable	Independent	Dependent	Control																				
extension		✓																					
material of wire			✓																				
temperature			✓																				
applied force	✓																						

(c) (i)	<p>as force increases extension increases;</p> <p>(directly) proportional / obeys Hooke's law before X;</p> <p>(non-linear with) increasing gradient after X / eq;</p>	<p>allow 'elastic limit', 'limit of proportionality' for X allow linear (relationship) before X</p> <p>also scores MP1</p> <p>allow 'gets steeper' for increasing gradient</p>	3
(ii)	<p>idea that elastic limit not reached;</p> <p>(so) wire will return to its original <u>length</u>;</p>	<p>allow idea that wire still behaves elastically ignore size/shape/form for length</p>	2

Total for Question 4 = 13 marks

Question number	Answer	Notes	Marks
5 (a)	idea that street lamps work independently of each other however expressed;	allow lamps still work if one lamp breaks etc. allow idea that all lamps get the same (high) voltage	1
(b)	straight ray lines drawn between any point on the street lamp to any point on the person's head via the puddle; any indication that the direction of the ray is from the lamp to the eye e.g. arrow; angle of incidence = angle of reflection;	allow dashed line judge straight by eye judge by eye allow if angles marked as equal on diagram	3
(c) (i)	any angle in the range 22-24 (degrees);		1
(ii)	statement of correct formula; substitution; evaluation; final answer rounded to 3s.f.; e.g. $n = \sin(i) \div \sin(r)$ $n = \sin(54.0) \div \sin(23.0)$ $n = 2.0705...$ $n = 2.07$	accept correct substitution into given formula allow ECF from (i) mark independently allow 1.9890 - 2.1596 allow 1.99 - 2.16	4
(iii)	light leaves block; light bends correctly away from the normal (by eye);	ignore reflected ray ray does not need to be parallel to original ray	2
(d)	any two from: light has undergone total internal reflection/TIR; angle of incidence is greater than critical angle; glass is more (optically) dense than air / glass has a refractive index greater than {air / 1} / speed of light in glass lower than in air;		2

Total for Question 5 = 13 marks

Question number	Answer	Notes	Marks
6 (a)	B (infrared); <i>A is incorrect because gamma rays would penetrate all the way through the food</i> <i>C is incorrect because UV does not cook food</i> <i>D is incorrect because radio waves do not cook food</i>		1
(b) (i)	any one from: <ul style="list-style-type: none"> • same speed (in a vacuum) / travel at the speed of light; • can travel through a vacuum; • (all) transverse waves; • (all) undergo reflection/refraction/transfer energy; 		1
(ii)	conversion of wavelength to 0.12 m; substitution OR rearrangement; evaluation; e.g. $12\text{ cm} = 0.12\text{ m}$ $3.0 \times 10^8 = \text{frequency} \times 0.12$ OR $f = v \div \lambda$ $\text{frequency} (= 3.0 \times 10^8 \div 0.12) = 2.5 \times 10^9\text{ (Hz)}$	allow ECF from incorrect / no unit conversion $2.5 \times 10^7\text{ (Hz)}$ scores 2 marks	3
(c)	reference to conduction; idea that inside (of food) gains <u>energy</u> ;	allow description of conduction e.g. particles passing on vibrations allow <u>energy</u> is transferred through food	2

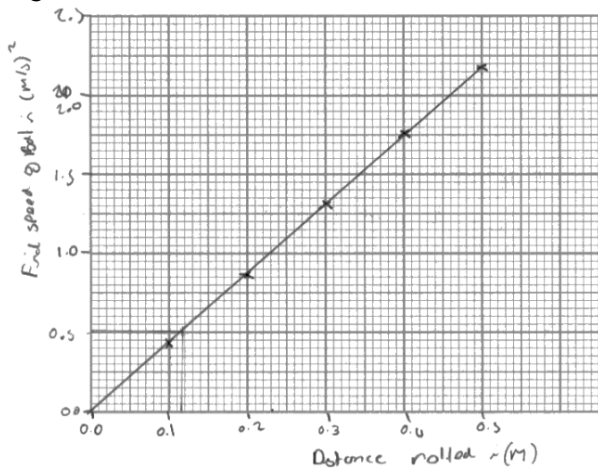
Total for Question 6 = 7 marks

Question number	Answer	Notes	Marks
7 (a)	X = 1; Y = 0; Z = -1;		3
(b)	uranium splits / uranium undergoes fission; neutron(s) released; (these) neutron(s) go on to cause further fissions / eq;	allow nucleus for uranium condone uranium breaks up ignore atoms	3
(c) (i)	(average) time; for {(radio)activity / count rate / number of nuclei / number of atoms / mass of isotope } to halve;	condone “how long it takes” reject “half the time” allow half the nuclei/atoms to decay ignore unqualified reference to mass halving ignore substance halving	2
(ii)	calculation of 6.25% of 72 = 4.5 (MBq); evidence of a total of 4 half-lives; candidate’s number of half-lives multiplied by half-life; correct final answer; e.g. 6.25% of 72 is 4.5 (MBq) 72 → 36 → 18 → 9 → 4.5 (gives 4 half-lives) time = 4 × 15.7 (time =) 63 (million years)	also scores MP1 allow ECF from incorrect number of half-lives used for this mark only no ECF for this mark allow 62.8 (million years)	4

Total for Question 7 = 12 marks

Question number	Answer	Notes	Marks
8 (a) (i)	idea that d.c. is in one direction AND a.c. changes direction (continuously) however expressed;	allow both/different directions for a.c. condone d.c. goes one way and a.c. goes both ways	1
(ii)	any three from: idea that current/coil/wire has a magnetic field; idea that interaction between magnetic fields produces a force (on the coil); direction of the force changes (due to a.c.); (so the) cone/air vibrates;	allow current/coil/wire becomes an electromagnet allow overlaps for interaction ignore cutting for interaction allow interaction between current and magnetic field produces a force allow coil/tube vibrates	3
(b)	cone {vibrates / oscillates}; coil/wire cuts (magnetic) field (lines); inducing a voltage; (which in turn) induces an (alternating) current;	allow coil/tube for cone ignore interacts with field allow alternatives to inducing e.g. causing, producing etc. allow alternatives to inducing e.g. causing, producing etc. ignore causes a reading on ammeter	4

Total for Question 8 = 8 marks

Question number	Answer	Notes	Marks														
9 (a) (i)	substitution into given formula; correct evaluation to more than 1s.f.; e.g. final speed = $0.048 \div 0.028$ final speed = 1.714... (m/s)	condone reverse calculation for full marks e.g. using $v = 2$ (m/s) to calculate distance or time to more than 2s.f.	2														
(ii)	substitution into given formula; rearrangement; evaluation; e.g. $1.714^2 = 0^2 + 2 \times a \times 0.63$ $a = 2.94 \div 1.26$ (a =) 2.3 (m/s ²)	ECF for use of v from (i) ignore any minus sign included in answer use of 2 (m/s) for v gives $a = 3.2$ (m/s ²) for full marks allow 2.33... (m/s ²)	3														
(b) (i)	suitable linear scales constructed such that data takes up over half of the grid in both directions; axes labelled and unit included in distance axis; all points plotted correctly to within $\frac{1}{2}$ small square; e.g. 	accept distance on x-axis or y-axis ignore unit on speed-squared axis must include point at origin <table><tr><th>Distance rolled along ramp in m</th><th>(Final speed of ball)² in (m/s)²</th></tr><tr><td>0.00</td><td>0.00</td></tr><tr><td>0.10</td><td>0.44</td></tr><tr><td>0.20</td><td>0.86</td></tr><tr><td>0.30</td><td>1.31</td></tr><tr><td>0.40</td><td>1.75</td></tr><tr><td>0.50</td><td>2.19</td></tr></table>	Distance rolled along ramp in m	(Final speed of ball) ² in (m/s) ²	0.00	0.00	0.10	0.44	0.20	0.86	0.30	1.31	0.40	1.75	0.50	2.19	3
Distance rolled along ramp in m	(Final speed of ball) ² in (m/s) ²																
0.00	0.00																
0.10	0.44																
0.20	0.86																
0.30	1.31																
0.40	1.75																
0.50	2.19																
(ii)	best fit straight line added;	ECF plotting points should be evenly distributed about the line	1														
(iii)	gradient of best fit line from (ii) evaluated as a decimal;	allow ECF from line drawn in (ii) allow 4.3 - 4.5 for graph with distance on x-axis allow 0.22 - 0.23 for graph with final speed ² on x-axis	1														

(iv)	<p>EITHER:</p> <p>method of reducing friction/air resistance; statement that friction/air resistance should be reduced;</p> <p>OR</p> <p>method of releasing ball from rest; statement that ball should be released from rest;</p> <p>OR</p> <p>method to ensure ball rolls in a straight line; statement that ball should roll in a straight line;</p>	<p>ignore reference to repeating and/or averaging allow use a smoother ramp/ball</p> <p>allow idea that ball is not pushed</p> <p>allow idea of using guide rails along sides of ramp</p>	2
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Total for Question 9 = 12 marks

Question number	Answer	Notes	Marks
10 (a) (i)	light dependent resistor;	allow LDR ignore light dependent resistance	1
	(ii) correct symbol for voltmeter; drawn in parallel with fixed resistor;		2

(b) (i)	<p>conversion of current from mA to A; calculation of circuit resistance (413 ohms);</p> <p>idea that resistors in series add up;</p> <p>correct evaluation of resistance (by subtracting resistance of X);</p> <p>e.g. 15 mA = 0.015 A circuit resistance (= $6.2 \div 0.015$) = 413 (Ω) 413 = R + 220 R (413 - 220) = 190 (Ω)</p> <p>OR</p> <p>conversion of current from mA to A; calculation of voltage across X (by use of $V=IR$); subtraction of voltage across X from supply (to give voltage across resistor); correct evaluation of resistance (by division of voltage across resistor by current);</p> <p>e.g. 15 mA = 0.015 A voltage across LDR (= 0.015×220) = 3.3 (V) voltage across R (= $6.2 - 3.3$) = 2.9 (V) resistance of R (= $2.9 \div 0.015$) = 190 (Ω)</p>	<p>allow ECF for this mark from incorrect / no conversion of mA to A allow ECF for this mark from incorrect / no conversion of mA to A</p> <p>answer of 413.3... (Ω) scores 2 marks answer of 4.13... (Ω) to any other POT scores 1 mark</p> <p>allow 193, 193.3...(Ω)</p> <p>allow ECF for this mark from incorrect / no conversion of mA to A allow ECF for this mark from incorrect / no conversion of mA to A</p> <p>allow 193, 193.3...(Ω)</p>	4
(ii)	<p>a resistor/path in parallel (will increase current);</p> <p>extra resistor placed in parallel with both X and fixed resistor; extra resistor/path has the same resistance as the original circuit resistance; resistance of circuit is given by $6.2 \div 15$ (mA); value of extra resistance is 413 (Ω);</p>	<p>allow if seen in circuit diagram or described ignore if drawn in parallel with ammeter allow if seen in circuit diagram or described</p> <p>also scores MP3 and MP4 allow ECF from incorrect total resistance if seen in (i)</p> <p>allow for full marks a 14 Ω resistor drawn/described in parallel with component X only</p>	5

Total for Question 10 = 12 marks

Question number	Answer	Notes	Marks
11 (a) (i)	C (52000 J); <i>A is incorrect as it is not equal to the KE of the vehicle</i> <i>B is incorrect as it is not equal to the KE of the vehicle</i> <i>D is incorrect as it is not equal to the KE of the vehicle</i>		1
(ii)	substitution OR rearrangement; evaluation; e.g. $52\,000 = \text{force} \times 36$ OR $\text{force} = \text{work done} \div \text{distance}$ (force = $52\,000 \div 36 =$) 1400 (N)	allow ECF from (i) allow 1440, 1444, 1444.4... (N)	2
(b)	MP1. braking distance will increase; MP2. braking distance will increase by a factor of 4 / will be 144 m; with any two from: MP3. braking distance is area of graph; MP4. double speed means triangle is twice as high; MP5. gradient of line or deceleration is the same; MP6. time (taken to stop) will be twice as long / 16 seconds;	condone incorrect quoted value as long as it is greater than 36 m also scores MP1 methods using KE and work done can still score MP1 and MP2 allow if seen on graph allow if seen on graph allow if seen on graph	4

Total for Question 11 = 7 marks