GradeMax

Pearson

Mark Scheme (Results)

Summer 2026

Pearson Edexcel International GCSE in Physics

4PH1/1PR

GradeMax

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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)	A = Sun; B = planet; C = moon; D = comet;	allow star allow named star allow named planet e.g. Earth allow satellite, named artificial or natural satellite e.g. ISS allow named comet	4
(b)	Sun will become a red giant; AND THEN Sun will become a white dwarf;	reject 'red supergiant' reject 'super red giant' reject any other stages e.g. supernova, neutron star, black hole allow black dwarf /planetary nebula for white dwarf white dwarf without red giant stage scores one mark	2

Total for Question 1 = 6 marks

Question number	Answer	Notes	Marks
2 (a) (i)	central line should not be drawn / does not exist; arrows are pointing in the wrong direction / eq;	allow if seen on diagram allow if seen on diagram allow arrows should point away from north poles ignore any statement about start and finish points of field lines	2
(ii)	(plotting) compass(es);	allow use of (bar) suspended magnet with known poles	1
(b)	**A (plastic rod)**; *B is incorrect because a bar magnet has its own magnetic field* *C is incorrect because a current-carrying conductor has its own magnetic field* *D is incorrect because iron is a magnetic material*		1
(c)	steel is a hard magnetic material / magnetically hard; idea that steel retains its magnetism (for however long) / eq;	ignore hard magnet allow steel is permanently magnetised	2

Total for Question 2 = 6 marks

Question number	Answer	Notes	Marks
3 (a)	idea that current changes direction; continuously / repeatedly / frequently / constantly / eq;	allow current in both directions allow reference to electron direction (of travel) ignore vibrate	2
(b)	conversion from minutes to seconds; substitution into P = E / t; evaluation; e.g. time = 1800 s P = 720 000 / 1800 (P =) 400 (W)	allow 1800 seen allow 30 × 60 seen allow ecf from incorrect/no conversion allow ecf from incorrect/no conversion 24 000 (W), 1 440 000 (W) scores 2 marks 400 (W) to any other power of 10 scores 2 marks 24 000 (W), 1440 000 (W) to any other power of 10 scores 1 mark allow correct unit that matches candidate's answer e.g. 24 kW is equivalent to 24 000 W	3
(c)	any five from: MP1. (thermal) energy is lost to the surroundings; MP2. (lid) reduces the amount of (thermal) energy lost (to surroundings) /eq; MP3. (lid) traps air (between water and lid); MP4. (lid) reduces convection losses (to the surroundings)/eq; MP5. idea that lid acts as insulation; MP6. plastic is a poor (thermal) conductor; MP7. energy transfers by conduction are reduced; MP8. idea that black lid is a good radiator;	accept heat for thermal energy throughout ignore traps heat allow '(lid) reduces evaporation' allow plastic is a (good thermal) insulator allow air is a poor conductor allow air is a (good) insulator	5

Total for Question 3 = 10 marks

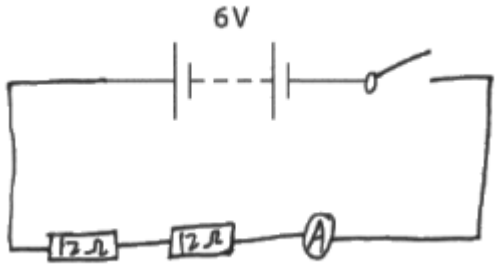
Question number	Answer	Notes	Marks
4 (a) (i)	labelled arrow drawn between distance axis up to a crest or down to a trough;		1
(ii)	labelled arrow drawn between two adjacent crests or two adjacent troughs;	allow equivalent arrow drawn between any two adjacent positions at the same point in the wave cycle	1
(b) (i)	$1(.0) \times 10^{10}$;	allow 10 000 000 000 allow 10^{10} by itself ignore Hz or hertz	1
(ii)	substitution into $v = f \times \lambda$;	allow re-arrangement and substitution in either order substitution into an incorrect or incorrectly re-arranged equation scores no further marks	4
	rearrangement; evaluation of wavelength; evaluation of distance; e.g. $3(.0) \times 10^{8} = 1(.0) \times 10^{10} \times \lambda$ $\lambda = 3(.0) \times 10^{8} / 1(.0) \times 10^{10}$ $\lambda = 0.03(0)$ (m) (distance = 15 × 0.03 =) 0.45 (m)	0.45 (m) to any other power of 10 scores 3 marks allow 0.4 (m) or 0.5 (m) for 4 marks 0.4 or 0.5 to any other power of 10 scores 3 marks	
(iii)	waves are reflected (by metal sheet);		2

	reference to or drawing on diagram showing initial waves reflecting at sheet correctly towards receiver;	judge by eye allow reference to or drawing on diagram to indicate ‘straight down (the page)’. law of reflection or i=r. reject contradiction between diagram and text e.g. diagram shows reflection, text discusses refraction	

Total for Question 4 = 9 marks

Question number	Answer	Notes	Marks
5 (a)	**A (negatively charged electrons)**; *B is incorrect because protons are positively charged* *C is incorrect because electrons are negatively charged* *D is incorrect because protons cannot flow in solid metallic conductors*		1
(b)	**D (rate of flow of charge)**; *A is incorrect because this is the definition of voltage* *B is incorrect because this is the ratio of energy and resistance* *C is incorrect because this is the definition of power*		1

(c) (i)	independent variable = number of resistors;
	
	dependent variable = current;
	
	control variable = voltage of battery / resistance of each resistor/ temperature (of circuit or of resistors);
		ignore resistance
		
		ignore switch, same components etc.
			3

(ii)	idea that it prevents overheating (of the circuit or or the wires or the battery);	allow idea that resistance might change if circuit is left on ignore idea of switching on and off	1
(iii)	all four components in a complete circuit with battery; correct circuit symbol used for two resistors in series with each other; correct circuit symbol used for ammeter in series;  	circuit must include two resistors, switch and ammeter condone incorrect symbols sufficiently labelled ignore extra components	3
(iv)	idea that as number of resistors increases, the current decreases; idea that the decrease in current gets smaller as the number of resistors increases	ignore negative correlation	2

		allow “inversely proportional” for 2 marks	
(v)	any three from: MP1. bar chart is (more) suitable for discrete variables; MP2. line graph is (more) suitable for continuous data; MP3. idea that number of resistors is not continuous; MP4. idea that number of resistors is equivalent to resistance which is continuous/eq;	allow discrete, not continuous and categoric as equivalent ideas ignore “quantitative” and “qualitative” discussion	3

Total for Question 5 = 14 marks

Question number	Answer	Notes	Marks
6 (a)	**C (in stars)**; *A is incorrect because this is not a natural process* *B is incorrect because fusion does not take place in plants* *D is incorrect because fusion does not take place in the human body*		1
(b)	reference to combining **nuclei** however expressed; (resulting in) a loss of mass/eq; releasing energy;	allow hydrogen or protons for nuclei reject atoms, molecules for nuclei allow recognisable mis-spellings for nuclei e.g. nucleuses condone 'heat' for 'energy'	3
(c)	any three from: MP1. high temperature; MP2. nuclei need to move at high speeds or with high KE / eq; MP3. high pressure; MP4. nuclei need to be close together / eq; MP5. reference to electrostatic repulsion (of protons)	allow particles for nuclei condone atoms for nuclei allow high density	3

Total for Question 6 = 7 marks

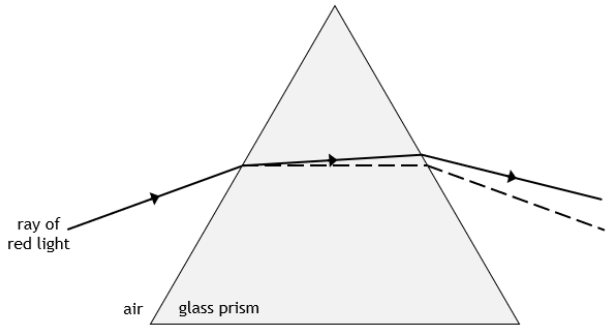
Question number	Answer	Notes	Marks
7 (a) (i)		NB only allow marks from one of the three alternate routes	2
	idea of pouring water into a measuring cylinder;		
	idea of reading measuring cylinder at eye level / no parallax error / measure to the bottom of the meniscus;	allow idea of making sure all of the water gets to the measuring cylinder e.g. idea of not spilling or no water left in tray	
	OR		
	measure difference of mass between water+tray and tray alone (with a balance);	condone weight for mass for this marking point	
	divide mass by density to give volume;	reject weight for mass for this marking point	
	OR		
	measuring dimensions of body of water; calculating (geometrically) the volume from those dimensions;		
(ii)	any one from: • bucket may not have been completely full /eq; • some water may have splashed out /eq; • more water displaced due to object pushing the balloon underwater /eq; • idea of parallax error; • idea of not reading to the bottom of the meniscus; • idea of water remaining on outside of bucket (when removed) • idea that some water may remain in the tray	ignore idea of balloon having thickness ignore idea that balloon is not completely submerged allow idea of balloon decreasing in volume under water compared with being in air	1
(b)	measure mass of burst balloon;		2

	subtract mass of burst balloon from mass of inflated balloon;	accept 'find the difference' or 'find the decrease' for 'subtract' allow 'weight' for 'mass' for this mark only	
(c)	substitution into $\rho = m/V$; evaluation; evaluation given to 3 s.f.; unit; e.g. density = 5.42 / 4350 (density =) 0.0012459… (density =) 0.00125 g/cm^3	 POT – 1 treat incorrect conversions as POT errors award mark for any value expressed to 3 s.f. expect either g/cm^3 or kg/m^3 allow 1.25 kg/m^3 for full marks allow 1.25×10^{-6} kg/cm^3 for full marks	4
(d)	any two from: MP1. repeating the (whole) experiment again; MP2. determine density using a different method; MP3. compare result with another student who did the experiment; MP4. compare result to literature/online value;	 unsupported "take repeats" is insufficient accept idea of using different (volume) balloon	2

Total for Question 7 = 11 marks

Question number	Answer	Notes	Marks
8 (a)	(at absolute zero) the particles in the gas stop moving; (at absolute zero) the (average) kinetic energy is zero; absolute zero is −273 °C;	 allow (line on graph intersects the temperature axis) between −270 °C and −280 °C	3
(b)	any FOUR from: correct reference to $p_1V_1=p_2V_2$; pressure decreases; pressure is halved; idea that particles hit the walls (of the container) **less often** / eq; (so) the (overall) force on the container decreases;	 also scores MP2 allow equivalent algebraic expression allow particles now colliding with a greater (surface) area ignore unsupported references to P = F/A	4
(c)	evaluation of new temperature in °C; evaluation of both temperatures in K; substitution into $p_1/T_1 = p_2/T_2$; rearrangement; evaluation; e.g. new temperature = 35 °C T_1 = 373 K, T_2 = 308 K 140 / 373 = p_2 / 308 p_2 = 140 × 308 / 373 (p_2 =) 120 (K)	allow 35 seen anywhere in working rearrangement and substitution in either order 473.2..., 24.39..., 91 score 3 marks 49, 13.1..., 431.2..., 126.86.. score 4 marks allow 116, 115.6…(kPa) for 5 marks	5

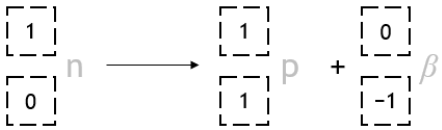
Total for Question 8 = 12 marks

Question number	Answer	Notes	Marks
9 (a) (i)	50 (degrees);	allow 48-52 (degrees)	1
(ii)	substitution into n = sin(i)/sin(r); evaluation to 3 or more s.f.; e.g. refractive index = sin 50 / sin 30 (refractive index =) 1.53…	allow ecf from (i) condone reverse calculation for full marks e.g. using n = 1.5 to calculate i or r to 3 or more sf NB if i is 52, n = 1.57 to 3 sf if i is 48, n = 1.49 to 3sf	2
(iii)	ray drawn refracting with a larger angle of refraction but not greater than the angle of incidence; ray drawn passing back into air such that it diverges from dashed line; e.g.  	ray should be drawn above dashed line and below a continuation of the incident ray reject ray that bends the wrong side of the normal	2
(b) (i)	idea that plotted points would occupy a very small area of the grid;	accept idea that labelling axes too far outside the range(s)	1

		would make the graph too small	
(ii)	data point at 5.3×10^{-7} m circled;	allow any other clear indication	1
(iii)	smooth curve of best fit drawn passing through all data points except anomaly;	allow curve passing through any part of each cross reject points linked by straight lines reject best fit straight line	1

Total for Question 9 = 8 marks

<table>
<tr><th>Question number</th><th>Answer</th><th>Notes</th><th>Marks</th></tr>
<tr><td>10 (a)</td><td>A (high energy electron);
B is incorrect because this is neutron radiation
C is incorrect because this is gamma radiation
D is incorrect because this is alpha radiation</td><td></td><td>1</td></tr>
<tr><td>(b)</td><td>mass and atomic numbers correct for neutron;
mass and atomic numbers correct for proton;

mass and atomic numbers correct for beta particle;
e.g.
</td><td></td><td>3</td></tr>
<tr><td>(c) (i)</td><td>all three rows correct = 2 marks;;

any one row correct = 1 mark;

e.g.
<table>
<tr><th>Statement</th><th>Correct</th><th>Incorrect</th></tr>
<tr><td>the sheet of aluminium is now radioactive</td><td></td><td>✓</td></tr>
<tr><td>the sheet of aluminium has been contaminated by the beta particle</td><td></td><td>✓</td></tr>
<tr><td>the sheet of aluminium has been irradiated by the beta particle</td><td>✓</td><td></td></tr>
</table></td><td>reject row if more than one tick</td><td>2</td></tr>
<tr><td>(ii)</td><td>conversion of mm to m;</td><td></td><td>4</td></tr>
</table>

	substitution into $v^2 = u^2 + 2as$;	ignore POT on speeds until the evaluation allow alternate substitutions of v and u	
	rearrangement with acceleration as subject; evaluation to 2 or more s.f.;	ignore minus sign	
		condone reverse calculation for full marks e.g. using v,u and a to find s to 3 or more sf, using u, a and s to find v to 3 or more sf or using v, a and s to find u to 3 or more sf	
	e.g. $s = 0.60 \times 10^{-3}$ (m) $(2.5 \times 10^7)^2 = (3.2 \times 10^7)^2 + (2 \times a \times 0.60 \times 10^{-3})$ $a = [(2.5 \times 10^7)^2 - (3.2 \times 10^7)^2] / (2 \times 0.60 \times 10^{-3})$ (acceleration =) $(-)3.3 \times 10^{17}$ (m/s^2)	allow $(-)3.325 \times 10^{17}$ (m/s^2)	
(iii)		allow alternative method of using F = ma and W = Fd to calculate the work done on the aluminium sheet	3
	evaluation of initial KE of beta particle; evaluation of final KE of beta particle; (subtraction of KE values to give) evaluation;	ignore minus sign allow ecf from KE values for this mark if values for KE seen and then calculating difference in KE	
	e.g. $KE_{initial}$ = (½ × $9.1 \times 10^{-31} \times (3.2 \times 10^7)^2$ =) 4.7×10^{-16} (J) KE_{final} = (½ × $9.1 \times 10^{-31} \times (2.5 \times 10^7)^2$ =) 2.8×10^{-16} (J) (decrease in KE =) 1.8×10^{-16} (J)	allow 4.6×10^{-16}, 4.6592×10^{-16} (J) allow 2.84375×10^{-16} (J) allow answers that round to 1.8×10^{-16} (J) and 1.9×10^{-16} (J) ignore minus sign on final answer Use of (difference in velocity)^2 scores 1 mark max	

Total for Question 10 = 13 marks

Question number	Answer	Notes	Marks
11 (a) (i)	substitution OR rearrangement; evaluation; e.g. 850 = mass × 10 OR m = W / *g* (mass = 850/10 =) 85 (kg)	allow use of *g* = 9.8, 9.81 N/kg allow 87, 86.7…, 86.6 (kg)	2
(ii)	evaluation of resultant force; substitution into OR rearrangement of F = m × a; evaluation of acceleration; e.g. resultant force = 850 − 250 = 600 (N) 600 = 85 × acceleration OR a = F / m (acceleration = 600/85 =) 7.1 (m/s^2)	allow 600 (N) seen anywhere in working allow ecf from (i) allow use of 250 (N) for F allow ecf for resultant force allow 6.9-7.1 (m/s^2) for 3 marks allow 2.9,2.87.., 2.94.., etc (m/s^2) for 2 marks allow correct answer without any working for 3 marks	3
(b) (i)	any four from: MP1. idea that acceleration is linked to gradient; MP2. idea that (initially) parachute provides (large) upwards force; MP3. deceleration decreases (over time period of the graph); MP4. air resistance decreases as speed decreases; MP5. forces of air resistance and weight (eventually) become equal; MP6. deceleration or gradient (eventually) becomes zero;	accept acceleration for deceleration throughout accept air resistance (AR) or drag is bigger than the weight /eq accept AR or drag for upwards force accept there is a resultant upward force /eq accept resultant is zero accept AR and weight are equal accept balanced forces / eq ignore terminal velocity	4
(ii)	distance = area under line;	seen explicitly or implied by working	5

	suitable method used; distance in the range = 60-100 (m); distance in the range = 65-80 (m); distance in the range = 70-75 (m);	allow • use of trapeziums • rectangles and triangles • counting squares estimation scores 3 marks total scores 4 marks total scores 5 marks total answers in answer column to any other power of 10 scores 1 mark fewer ignore attempts at suvat/equations of motion for uniform acceleration	

Total for Question 11 = 14 marks