Mark Scheme (Results)

Summer 2025

Pearson Edexcel International GCSE
In Physics (4PH1) Paper 1PR

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications are awarded by Pearson, the UK's largest awarding body. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at www.edexcel.com or www.btec.co.uk. Alternatively, you can get in touch with us using the details on our contact us page at www.edexcel.com/contactus.

Pearson: helping people progress, everywhere

Pearson aspires to be the world's leading learning company. Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk

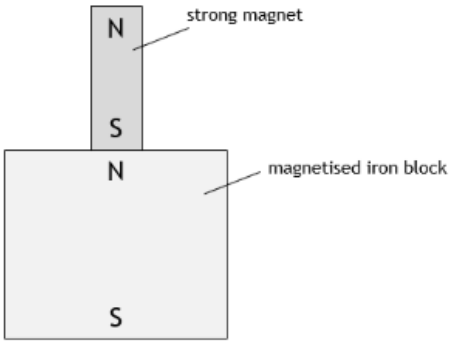
Summer 2025
Question Paper Log Number P75827A
Publications Code 4PH1_1PR_2506_MS
All the material in this publication is copyright
© Pearson Education Ltd 2025

General Marking Guidance

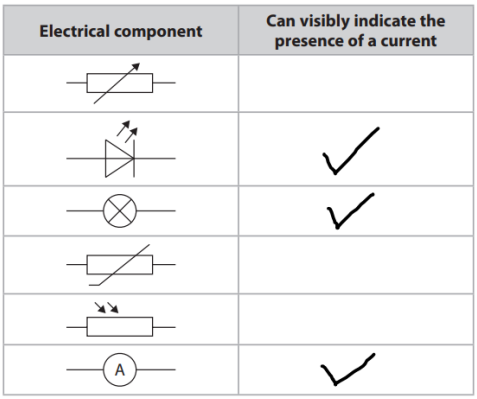
- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should 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)	0 (kN);		1
(b) (i)	(stopping distance = 7 + 20 =) 27 (m);		1
(ii)	any two from: MP1. speed of truck; MP2. mass or weight of truck; MP3. condition of brakes/eq; MP4. condition of tyres/eq; MP5. condition of road/eq; MP6. braking uphill / downhill; MP7. how hard the brake pedal is pressed;	allow wet/icy roads eq. reference to factors that affect thinking distance, e.g. alcohol, tiredness etc. limits score 1 mark max	2
(iii)	**D (the truck is travelling at a lower speed);** A is incorrect because this would affect the braking distance B is incorrect because this would affect the braking distance C is incorrect because this would increase the thinking distance		1

Total for Question 1 = 5 marks

Question number	Answer	Notes	Marks
2 (a)	opposite poles labels; horizontal straight lines drawn joining poles; minimum 3 lines drawn equally spaced; arrows drawn on lines consistent with labelling of poles;	ignore orientation ignore lines drawn outside the region between the poles judge 'straight' by eye i.e. from N to S	4
(b) (i)	north (pole)/N drawn at the top and south (pole)/S drawn at the bottom; e.g.  	condone away from top and bottom provided 'N' is above 'S'	1
(ii)	(will not work because) iron will lose its magnetism; (because) iron is a (magnetically) soft material;	allow iron cannot be permanently magnetised	2

Total for Question 2 = 7 marks

Question number	Answer	Notes	Marks
3 (a)	one mark for each correct tick;;;  	ignore names of components if more than 3 ticks then -1 for each incorrect tick	3
(b) (i)	(NTC) thermistor;		1
(ii)	80 (Ω);	allow 75-85 (Ω)	1
(iii)	substitution;	allow ecf from (ii)	3
	rearrangement;	allow in either order	
	evaluation;		
	e.g. 9.0 = current × 80 (current =) 9.0 / 80 (current =) 0.11 (A)	allow any value that would round to either 0.11 (A) or 0.12 (A)	

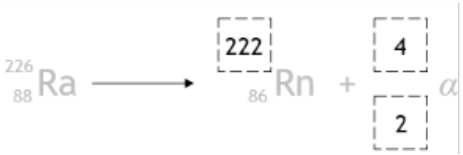
(iv)	any four from:		4
	MP1. resistance of component X is 160 (Ω);	allow resistance doubles ignore resistance increases unless qualified e.g. accept reference to increase of thermistor's resistance because of reduction in temperature	
	MP2. idea that two components in series have more resistance;	accept idea that resistors in series add up	
	MP3. idea that two components in series have **double** the resistance;	also scores MP2	
	MP4. resistance of **circuit** increases;		
	MP5. resistance of **circuit** is 320 (Ω);	also scores MP4 accept circuit resistance is four times that previously	

Total for Question 3 = 12 marks

Question number	Answer	Notes	Marks
4 (a) (i)	any three from:		3
	MP1. (all bars same) length;	condone 'size' for 'length'	
	MP2. (all bars same) width;		
	MP3. (all bars same) thickness;		
	MP4. (all bars can be) placed in same water;	accept ‘same initial temperature (for all bars)’	
	MP5. (all bars will be same) depth in water;		
(ii)	any four from:		5
	MP1. support apparatus in (clamp)stand;	may be shown in diagram	
	MP2. place apparatus into hot water and start stopclock;	condone (stop)watch or timer for stopclock	
	MP3. determine time (from stopclock) for colour change to reach top of strip;	condone reference to wax falling off end	
	MP4. allow apparatus to cool		
	MP5. repeat and calculate mean for each bar;	accept 'average' for 'mean'	
	MP6. other relevant extra practical detail;	e.g. ensure bars are vertical, repeats have same initial temperature, bars are at same depth for repeats	
(b) (i)	linear scale that takes up ≥ 50% of the grid for time axis;	ignore orientation of axes	3

		allow use of false origins	
	labelled axes with units;	allow no units on metal axis	
	all bars plotted correctly within ½ small square;	ignore width of bars accept line for bar ignore plotted 'points'	
(ii)	copper (is most effective at transferring energy by conduction);		2
	(because) time taken (for colour change) is **shortest**;	condone shorter time (than the others)	

Total for Question 4 = 13 marks

Question number	Answer	Notes	Marks
5 (a)	(particle made from) contains protons **and** neutrons; 2 protons and 2 neutrons;	 scores first MP as well ignore electrons ignore reference to helium nucleus	2
(b)	2 for proton number of alpha; 4 for nucleon number of alpha; nucleon numbers balance; e.g. 	 allow ecf from incorrect nucleon number of alpha	3
(c)	any two from: MP1. alpha source is outside body / skin would absorb alpha; MP2. alpha has poor penetrating ability; MP3 idea of alpha (radiation) is absorbed by glass/cloud chamber;	 condone 'highly ionising' allow idea that alpha can't penetrate glass	2

(d)	Any three from: MP1. idea that all tracks are (approximately) same length; MP2. (so) all alpha particles have the same (kinetic) energy; MP3. tracks are short / alpha radiation is short range; MP4. (so) alpha particles are highly ionising or poorly penetrating	allow sensible numerical value ignore ideas of thickness and direction of track	3

Total for Question 5 = 10 marks

Question number	Answer	Notes	Marks
6 (a)	substitution into a = v–u/t; rearrangement; evaluation; e.g. 13 = v (-0) / 5.0 v = 13 × 5.0 (v =) 65 (m/s)	 allow in either order ignore sign -1 for POT error correct answer without working scores all marks	3
(b)	substitution into $v^2 = u^2 + 2as$; rearrangement; evaluation; e.g. $65^2 = (0^2) + 2 \times 13 \times s$ $s = 65^2 / 26$ (s =) 160 (m)	allow ecf from (a) allow use of 's = ½ v t' allow in either order ignore sign -1 for POT error allow 162, 163, 162.5 (m) correct answer without working scores all marks	3

(c)	**for velocity-time graph** straight line drawn; line starts at origin and has positive gradient throughout; **for distance-time graph** line starts at origin and has positive gradient throughout; gradient of line increases over time;		4

Total for Question 6 = 10 marks

Question number	Answer	Notes	Marks
7 (a)	mention of vibrations / oscillations; (vibrations are) at right angles to direction of energy transfer;	accept either noun or verb allow wave travel or wave propagation or wave velocity for energy transfer diagram(s) must be labelled such that direction of vibration and direction of travel are clear ignore unlabelled diagrams	2
(b) (i)	any reflecting ray drawn; angle or reflection approximately equal to angle of incidence;	condone lack of arrowhead reject arrowhead in wrong direction judge by eye	2
(ii)	idea that refractive index of air is less than refractive index of optical fibre; angle of incidence is greater than critical angle; reference to <u>total internal reflection</u>;	allow (optical) density for refractive index accept idea of going from (optically) more dense to (optically) less dense accept 'TIR' (whatever case) for 'total internal reflection'	3
(c)	angle of incidence measured correctly;	allow 48-52 seen anywhere in working	4

		allow clear RA that gives c = 50.28…	
	substitution into sin c = 1/n;	allow sin(90) for '1' or correct substitution into n = sin(i)/sin(r) (i= 50 and r=90)	
	rearrangement;	allow substitution and rearrangement in either order	
	evaluation to 3 or more s.f.;	accept value consistent with candidate's value for angle of incidence i.e. 48 degrees gives 1.345... 52 degrees gives 1.269...	
		arriving at n=0.766 scores 2 marks max	
	e.g. angle of incidence = 50° sin 50 = 1/n n = 1/sin 50 n = 1.305…		
		correct evaluation (e.g.1.305) without working scores 1 mark only	

Total for Question 7 = 11 marks

Question number	Answer	Notes	Marks
8 (a)	Milky Way;		1
(b) (i)	Neptune orbits the Sun; Triton orbits Neptune;		2
(ii)	substitution into $v = 2\pi r/T$;	data for Neptune seen	4
	rearrangement;	allow substitution and rearrangement in either order	
	evaluation of T for Neptune;	accept 5.2×10^9 following correct working for first 3 marks accept $5.23(...) \times 10^9$ without correct working for first three marks	
	setting up ratio of T for Pluto and Neptune that leads to 2:3; e.g. $5.4 \times 10^3 = 2\pi \times 4.5 \times 10^{12} / T$ $T = 2\pi \times 4.5 \times 10^{12} / 5.4 \times 10^3$ $(T =) 5.2 \times 10^9$ (s) ratio = $5.2 \times 10^9 / 7.8 \times 10^9$ (= 2:3)		

Total for Question 8 = 7 marks

Question number	Answer	Notes	Marks
9 (a) (i)	**B (elastic);** A is incorrect because there is no transfer from a chemical store C is incorrect because the gravitational potential store decreases D is incorrect because the spring is stationary in both cases		1
(ii)	any six from: MP1. elastic energy (store) decreases (on way up); MP2. kinetic energy (store) increases (on way up); MP3. gravitational (store) increases (on way up); MP4. idea of process reversing as mass moves downwards; MP5. energy transferred mechanically; MP6. idea of amplitude of oscillations decreasing over time; MP7. (eventually all) energy is transferred to thermal store of spring/surroundings; MP8. (mechanically) by friction between spring and surroundings	allow reference to 'slowing down' to mean 'max speed decreasing' allow reference to reduction in total energy of mass/spring condone heat for thermal alternate energy transfer scheme: MP1 EPE converted to KE (on way up) MP2 EPE converted to GPE (on way up) MP3 KE converted to GPE (after midway point)	6
(b) (i)	**B (it increases the efficiency of the motorcycle);**		1

	A is incorrect because it decreases the energy transferred from fuel each second C is incorrect because it does not affect the speed D is incorrect because it does not affect the braking power		
(ii)	magnet(s) move through coil; idea of coil cutting magnetic field lines;	allow RA condone 'magnet slides through coil' (candidate has realised this is relevant) ignore fields interacting accept reference to changing magnetic flux	3
(iii)	inducing a voltage; bigger or more (frequent) bumps; magnet(s) have bigger amplitude of motion / magnet(s) caused to move more times (per metre of road); (so) induced voltage / voltage generated is larger or for a longer time in total;	accept potential difference, p.d. or EMF for voltage condone 'induces a current' allow RA allow idea of shorter time between bumps allow up and down for bump ignore unqualified 'moves more' (needs idea of a quantity e.g. size, speed) allow coil for magnet allow current for voltage	3

Total for Question 9 = 14 marks

Question number	Answer	Notes	Marks
10 (a) (i)	use of a balance;	ignore scale allow **weighing** scale condone scales	2
	PLUS idea that balance should be zeroed /		
	idea that balance should be level /	allow idea that balance is placed on a flat/level surface	
	idea that there should be no draughts		
(ii)	6.426 circled;		1
(iii)	evidence of correct method of calculating mean;	e.g. adding all five values together and dividing by five = 6.4134	3
	evidence of ignoring anomaly in calculation;	allow ecf from (ii) expect 6.41025	
	answer rounded to 3 decimal places;		
	e.g. mean mass = (6.411 + 6.408 + 6.410 + 6.412) / 4 mean mass = 6.410 (g)		
(iv)	**C (volume = mass ÷ density)**; A is incorrect because this is the incorrect rearrangement B is incorrect because this is the incorrect rearrangement D is incorrect because it has density cubed		1

(b)	any four from: MP1. idea that density will depend on purity of gold; MP2.idea that **calculating** volume will be affected by purity; MP3. reference to mass measurement being four significant figures; MP4. source of error in displacement method described; MP5. idea that small volume of ring will be difficult to measure using displacement method; MP6. calculating volume is likely to be more accurate than measuring for a valid reason e.g. if gold is pure or if there's splashing in a displacement method	 e.g. • possible splashing • ring not fully submerged • meniscus • parallax e.g. due to gradations being not small enough accept RA i.e. if gold is not pure then measurement could be more accurate	4

Total for Question 10 = 11 marks

Question number	Answer	Notes	Marks
11 (a)	conversion of units from g to kg; substitution; evaluation; evaluation given to 3 s.f.; e.g. 159 g = 0.159 kg (KE =) ½ × 159 (×10-3) × 54.82 (KE =) 238.74… (J) (KE =) 239 (J)	allow 0.159 seen anywhere in working ignore units note: take care not to penalise POT error twice here independent mark	4
(b) (i)	substitution; rearrangement; evaluation to 3 or more s.f.; e.g. $54.8 = \Delta f / 2.90 \times 10^{10} \times 3.00 \times 10^{8} / 2$ $\Delta f = 54.8 \times 2.90 \times 10^{10} \times 2 / 3.00 \times 10^{8}$ ($\Delta f =$) $10.59\ldots \times 10^{3}$ (Hz)	 allow in either order allow any value that rounds to 1.06×10^{4} accept non-standard form e.g. 10.6×10^{3} accept answer not in standard form 10594.6… (Hz) award 1 mark max for a successful attempt at calculating the speed that gives a shift of 1.1×10^{4} (Hz) i.e. 56.8... (m/s)	3
(ii)	frequency (of radio waves) decreases; wavelength increases; speed of (radio) waves stays the same;	 condone 'waves stretch'	3

Total for Question 11 = 10 marks

Pearson Education Limited. Registered company number 872828
with its registered office at 80 Strand, London, WC2R 0RL, United Kingdom