》Pearson

Mark Scheme (Results)

November 2025

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)	(i)	**A (Betelgeuse);** *B is incorrect because Sirius A is the hottest* *C is incorrect because Sirius B is hotter than Betelgeuse* *D is incorrect because the Sun is hotter than Betelgeuse*		1
		(ii)	**A (Betelgeuse);** *B is incorrect because its mass is about the same as the Sun* *C is incorrect because Sirius B is the same mass as the Sun and is already a white dwarf* *D is incorrect because the Sun will not become a supernova*		1
		(iii)	any two from: MP1. Sirius B is smaller than the Sun; MP2. Sirius B is more dense than the Sun; MP3. Sirius B contains less hydrogen than the Sun; MP4. fusion doesn't take place in Sirius B but does take place in the Sun; MP5. Sirius B is hotter than the Sun; MP6. Sirius B emits less light than the Sun;	allow RA throughout ignore comments about colour, mass and evolutionary stage allow Sirius B has a higher value of *g* allow Sirius B has smaller brightness / absolute magnitude / luminosity	2
	(b)		conversion of time into seconds; substitution; evaluation; e.g. 50 years = 50 × 365 × 24 × 60 × 60 OR 1.5768×10^9 (s) orbital speed = $2\pi \times 29.7 (\times 10^9) / 1.5768 (\times 10^9)$ (orbital speed =) 118 (km/s)	allow ecf from incorrect or no conversion answer of $3.7... \times 10^9$ scores 2 marks allow 120, 118.2..., 118.3... (km/s)	3

Total for Question 1 = 7 marks

Question number			Answer	Notes	Marks
2	(a)		substitution; evaluation; e.g. (distance =) 14 × 30 (distance =) 420 (m)		2
	(b)	(i)	**B (distance travelled between seeing the obstacle and applying the brakes);** *A is incorrect because this is the braking distance* *C is incorrect because this is the stopping distance* *D is incorrect because this is part of the braking distance*		1
		(ii)	**C (worn tyres on the car);** *A is incorrect because this would decrease the braking distance* *B is incorrect because this increases the thinking distance* *D is incorrect because this would decrease the braking distance*		1
		(iii)	speed (of the car);	allow velocity	1

Total for Question 2 = 5 marks

Question number	Answer	Notes	Marks
3 (a)	any two from: if the current is too high; idea of isolating device; idea of no danger of overheating;	ignore comments relating to electric shock etc. allow current surge allow stops the current, breaks the circuit, cuts the power allow idea that it prevents fires	2
(b)	idea that fuse can't be reset; idea that fuse is slower (to break the circuit);	allow fuse has to be replaced ignore fuse melts/blows allow idea that fuse is less sensitive	2
(c)	any two from: in the event of a fault; current flows in earth wire; trips the circuit breaker;	allow description of a fault e.g. live wire touching metal case (of an appliance), drilling through a cable ignore comments relating to too much current etc. allow charge/electrons for current allow current goes to earth/ground allow idea that it provides low resistance path to earth allow idea that it prevents an electric shock	2

Total for Question 3 = 6 marks

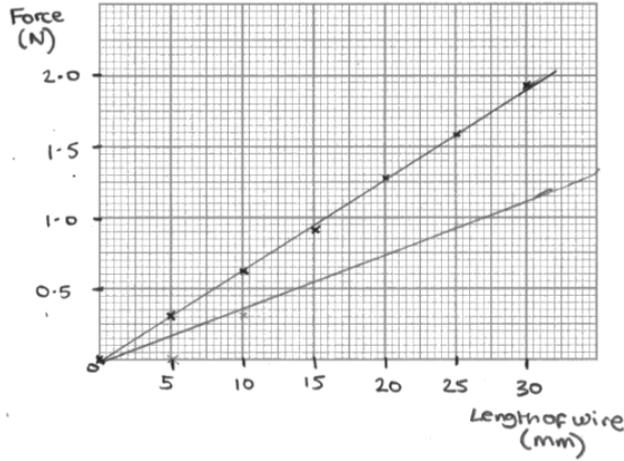| Question number	Answer	Notes	Marks
4 (a)	substitution; evaluation to 3 s.f.; e.g. (work done =) 120 × 3.7 (work done =) 444 (J)		2
(b)	substitution OR rearrangement; evaluation; e.g. 12 = mass × 10 × 0.82 OR mass = GPE / [g x h] (mass =) 1.5 (kg)	allow use of g = 9.8, 9.81 condone symbol for g being used in the substitution rather than the value allow 1.49…(kg) allow 1.46…(kg)	2
(c)	MP1. energy can't be destroyed; with any **one** of: MP2. energy transferred to thermal/heat store; MP3. energy transferred to surroundings; MP4. energy transferred due to friction;	allow statement that energy is conserved allow wasted / lost / dissipated for transferred ignore transferred to GPE, KE allow heat is transferred to surroundings	2

Total for Question 4 = 6 marks

Question number			Answer	Notes	Marks
5	(a)		correct mass number and atomic number for α; mass number for thorium = 234; atomic number for uranium = 92;	expect $^4_2\alpha$ allow ecf from α if equation balances allow ecf from α if equation balances	3
	(b)		 number of neutrons decreases by 1; number of protons increases by 1;	allow neutron becomes a proton (and an electron) for 2 marks allow (atomic) mass <u>number</u> stays the same allow atomic number increases by 1	2
	(c)	(i)	any one from: wearing gloves (whilst handling rock); taking care not to drop rock; storing rock in container (when not being used);	allow other methods of not directly touching rock e.g. use of tongs	1
		(ii)	any one from: minimising exposure time; maximising distance from rock; use of a screen between rock and teacher/students; storing rock in (lead) box (when not being used);	ignore use of protective clothing e.g. mask, goggles, lead apron etc. allow use of tongs	1
		(iii)	ignoring anomaly; mean correctly calculated; evaluation to 2 s.f.; e.g. mean count rate = [54 + 58 + 52 + 55] ÷ 4 mean count rate = 54.75 mean count rate = 55	allow ecf if anomaly included or if 58 is also considered anomalous independent mark 54.8, 54.7, 54.75, 51 score 2 marks 50.8 scores 1 mark	3

Total for Question 5 = 10 marks

Question number			Answer	Notes	Marks
6	(a)	(i)	magnet poles labelled correctly; at least three more straight lines drawn such that they are equally spaced and parallel with existing line; arrows on all field lines between the poles pointing to the right;	N on left and S on right ignore lines drawn outside the rectangular space between the magnets for this mark reject if **any** field lines drawn between poles have contradictory arrows	3

		(ii)	EITHER:
			
			  MP1. use of (plotting) compass;
			  MP2. movement of compass/use of multiple compasses;
			  MP3. idea of joining of dots;
			
			OR
			
			  MP1. use of (sprinkled) iron filings/eq.;
			  MP2. idea of tapping to distribute filings;
			  MP3. use of (plotting) compass to show direction;
				all marking points can be awarded from labelled diagram	3

		(iii)	iron;	condone nickel, cobalt	1
	(b)	(i)	4 rows correct = 3 marks; 2-3 rows correct = 2 marks; any 1 row correct = 1 mark; e.g.	reject row if more than one tick allow other symbols instead of ticks	3
		(ii)	suitably labelled axes with quantity and unit; suitable scale;	ignore orientation of axes reject multiples of 0.3 plotted points must occupy at least 50% of the grid on both scales	3

Variable	Independent	Dependent	Control
current			✓
length of wire in field	✓		
force on wire		✓	
magnetic field strength			✓

| data plotted correctly to nearest ½ square; | | |

Length of wire in field in mm	Force in N
0	0.00
5	0.32
10	0.64
15	0.92
20	1.28
25	1.58
30	1.92

e.g.

(iii)	adequate straight line of best fit;	reject dot-to-dot lines	1
(iv)	straight line drawn; line starts at same point (0,0.00) and has smaller gradient if length plotted on x-axis;	ECF if line same shape as drawn in (iii) allow larger gradient if force plotted on x-axis	2

Total for Question 6 = 16 marks

Question number			Answer	Notes	Marks
7	(a)		correct symbol; symbol in parallel with resistor R;	must be a V inside a circle e.g. ⓥ allow an incorrect symbol for the voltmeter for this mark, but must be identifiable/labelled as a voltmeter	2
	(b)	(i)	voltage = current × resistance;	allow standard symbols and rearrangements e.g. I = V ÷ R condone lower case symbols ignore c, C for current	1
		(ii)	substitution; rearrangement; evaluation in milliamps; e.g. 1.9 = current × 800 OR I = V ÷ R current = 1.9 ÷ 800 current = 2.4 (mA)	mark independently answer of 0.002375, 0.00238, 0.00237, 0.0024 scores 2 marks allow 2.375, 2.38 (mA) condone 2.37 (mA)	3
	(c)		MP1. resistance (of LDR / circuit) decreases (with increased brightness); MP2. current increases; MP3. voltage of **fixed resistor** increases; MP4. battery/total voltage remains constant (so voltage across LDR decreases); OR MP1. resistance of LDR decreases (with increased brightness); MP2. LDR resistance is a smaller proportion/fraction of total resistance; MP3. voltage from battery is split/shared between LDR and resistor; MP4. (so) voltage (across LDR) is <u>proportional</u> to resistance (so voltage across LDR decreases);	 allow R, resistor R for fixed resistor allow circuit voltage for total voltage ignore quotation of V=I×R	4
	(d)		any two from: MP1. current increases; MP2. increase in number of paths/branches; MP3. resistance (of parallel combination) is lower;		2

Total for Question 7 = 12 marks

Question number	Answer	Notes	Marks
8 (a)	reference to using a displacement method; measuring cylinder used (to measure volume of water); repeating and average; further experimental detail relating to accuracy; e.g. • lack of splashing • reading measuring cylinder at eye level • placing measuring cylinder on flat surface • ensure pot is **fully** submerged • ensure eureka can/bowl is (completely) full prior to submerging pot • no trapped air in pot	ignore filling pot with water allow graduated cylinder for measuring cylinder ignore beaker allow repeating to identify anomalous results	4
(b)	(top pan) balance;	allow mass balance, electronic balance, digital balance, **weighing** scale ignore (electronic/digital) scale(s)	1
(c)	evaluation of mass of liquid; substitution into formula; rearrangement; evaluation; e.g. mass of liquid = 6.8 – 1.2 = 5.6 (kg) 920 = 5.6 ÷ volume volume = 5.6 ÷ 920 (volume =) 0.0061 (m^3)	allow ecf from incorrect mass –1 for POT error allow 0.006, 0.00608... (m^3)	4

Total for Question 8 = 9 marks

Question number		Answer	Notes	Marks
9	(a)	**D (gradient of the line);** *A is incorrect because this gives the distance travelled* *B is incorrect because axes are a feature of all graphs not connected with acceleration* *C is incorrect because not all graphs have curves*		1
	(b)	**B (Q);** *A (P) is incorrect as the car is still increasing in velocity* *C (R) is incorrect as the car has been decelerating for some time* *D (S) is incorrect as the car has stopped moving*		1

	(c)	any two from:
		  MP1. air resistance increases (with increasing speed);
		  MP2. resultant force decreases;
		  MP3. acceleration decreases;
		
		  MP4. gradient decreases;
			allow drag/friction for air resistance
			
			allow velocity increases at decreasing rate
			ignore accelerates at decreasing rate
			condone slope decreases
				2

	(d)	idea that distance = area (under line); attempt at calculating area of correct triangle; correct evaluation; e.g. distance = area distance = 0.5 × 90 × 4.0 (distance =) 180 (m)	allow statement that distance = **average** speed × time condone misreading speed for this mark e.g. using speed = 85, 88 must be 180 (m) no ECF from use of speed = 85, 88 allow alternative valid methods e.g. using $v^2 = u^2 + 2as$ with calculated acceleration	3

Total for Question 9 = 7 marks

Question number			Answer	Notes	Marks
10	(a)		any two from: idea that waves transfer energy; by vibrations / oscillations; idea that waves don't transfer mass/matter;	allow waves transfer information	2
	(b)		ray of light drawn reflecting from mirror at the point of the incident ray; angle of reflection correct;	ray does not need an arrow condone ray reflecting to left of incident ray reject refracting ray reflected ray should pass through the word "mirror" in sentence above if extrapolated	2
	(c)	(i)	critical angle = 49(°);	allow 48-50(°)	1
		(ii)	substitution; rearrangement; evaluation; e.g. $\sin 49 = 1/n$ $n = 1/\sin 49$ $(n =) 1.3$	allow ecf from (i) allow answers in the range 1.30 to 1.35	3
		(iii)	higher refractive index means lower critical angle; angle of incidence will be greater than critical angle; blue light will undergo total internal reflection;	allow blue light has lower critical angle allow TIR for total internal reflection allow if seen on diagram	3

Total for Question 10 = 11 marks

Question number	Answer	Notes	Marks
11	any five from: MP1. idea that **air** is heated (by candle under tube B); MP2. (heated) **air** expands; MP3. density of (heated) **air** decreases; MP4. **hot air** rises through tube B; MP5. idea that **cool air** is drawn in (through tube A to replace air that has left box); MP6. idea that the process repeats;	allow any marking point if seen on **labelled** diagram allow **air** particles move faster / gain KE ignore smoke is heated allow **air** particles move further apart ignore particles expand ignore particle density decreases ignore smoke moving through tube A	5

Total for Question 11 = 5 marks

Question number			Answer	Notes	Marks
12	(a)	(i)	idea that (particles) move in different/unpredictable **directions**; idea that (particles) move at different/unpredictable **speeds**;	allow particles move in all/any directions ignore random directions allow particles have different velocities, <u>kinetic</u> energies ignore random speeds	2
		(ii)	idea that a force is produced (on the walls); pressure is force on an area;	ignore pushing on walls allow p = F/A	2
		(iii)	MP1. pressure decreases; with any two from: MP2. (average) speed of particles does not change; MP3. particles travel greater distance / time between collisions increases; MP4. particles collide less **frequently** (with walls of container); MP5. decrease in (average) force (of particles on walls) / increase in area (for collisions);	 allow kinetic energy for speed allow statement of Boyle's law e.g. $p_1V_1 = p_2V_2$ allow pressure is inversely proportional to volume	3
	(b)	(i)	substitution; rearrangement; evaluation; e.g. 1850 = height × 820 × 10 height = 1850 / 8200 (height =) 0.23 (m)	allow use of g = 9.8, 9.81 condone symbol for g being used in the substitution rather than the value allow 0.229…, 0.230… 0.22 (m) scores 2 mark only allow evaluations that round to 0.23 (m) condone 0.225 (m)	3
		(ii)	any two from: mercury is denser (than oil); height difference for mercury will be small(er); idea that a (very) large pressure difference could cause a very/too large height difference (if mercury not used as the liquid);	 allow (very) large pressure difference could cause manometer to overflow	2
	(c)		conversion of initial temperature into kelvin; substitution;	allow ECF from incorrectly or non converted temperature	4

| | rearrangement;
correct evaluation in ˚C; | ignore 37.1 (˚C)

award 2 marks for not converting temperature units **when supported by working**
= 17(.17...) (˚C) | |
| | e.g.
16 ˚C = 289 K
232 / 289 = 249 / T_2
T_2 = 249 × 289 / 232
(T_2 = 310 K =) 37 (˚C) | allow 37.2, 37.1767... (˚C) | |

Total for Question 12 = 16 marks