



Mark Scheme (Results)

Summer 2022

Pearson Edexcel International GCSE

In Physics (4PH1) Paper 1PR

| Question number | Answer | Notes | Marks |
|-----------------|--|--|-------|
| 1 (a) | D - a star; A and C cannot be correct because satellites orbit planets B cannot be correct because comets orbit stars | | 1 |
| (b) | D - universe; A cannot be correct because there are billions of galaxies in the Universe B and C cannot be correct because there are billions of stars and their solar systems in each galaxy | | 1 |
| (c) | B - moon; A cannot be correct as there are billions of stars and their solar systems in each galaxy C cannot be correct because moons orbit planets and those planets orbit stars D cannot be correct because a solar system includes stars planets and moons | | 1 |
| (d) | Earth has a larger mass than the Moon; | accept reverse argument allow Earth has a larger density condone referring to Moon as a planet condone idea of different mass ignore reference to size | 1 |

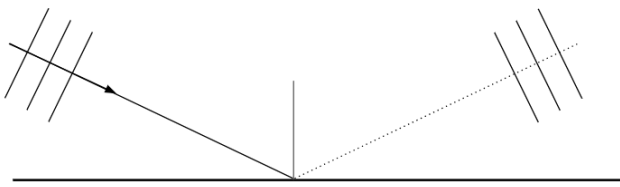
(Total for Question 1 = 4 marks)

| Question number | Answer | Notes | Marks |
|-----------------|--|--|-------|
| 4 (a) | zero/0 (N); | | 1 |
| (b) (i) | pressure = depth × density × gravitational field strength; | allow use of standard symbols e.g. $p = h \times \rho \times g$ allow 'd' for 'h' reject 'gravity' for 'g' in formula | 1 |
| (ii) | substitution; evaluation; e.g. pressure = depth × density × gravitational field strength pressure = $0.041 \times 1000 \times 10$ pressure = 410 (Pa) | -1 POT error allow use of 9.8(1) for 'g' giving 401.8... | 2 |
| (iii) | pressure = force ÷ area; | allow use of standard symbols e.g. $P = F \div A$ | 1 |
| (iv) | substitution or re-arrangement; evaluation; e.g. pressure = force ÷ area $400 = \text{force} \div 0.0017$ force = $400 \times 0.0017 = 0.68$ (N) | substitution and rearrangement in either order allow correctly rounded values e.g. 0.697 allow use of candidate's unrounded value even if not approx 400 | 2 |
| (v) | upwards force greater than weight of cube; resultant force upwards; | allow idea of ice being less dense than water for 1 mark. | 2 |

(Total for Question 4 = 9 marks)

| Question number | Answer | Notes | Marks |
|-----------------|--|---|-------|
| 10 (a) (i) | any THREE from: trolley changes direction; induction depends on direction of relative motion; idea that voltage has changed direction (as sign of voltmeter reading depends on direction of voltage); idea that at ends of motion, voltage is zero; | condone current for voltage ignore idea induction depending on speed | 3 |
| (ii) | speed may change/ magnetic field may not be uniform; | accept idea that magnetic field may change allow idea of entering or leaving field | 1 |
| (b) (i) | substitution; re-arrangement; evaluation; correct answer: 1.8×10^{-4} (A) e.g. charge = current \times time $1.4 \times 10^{-4} = \text{current} \times 0.78$ current = $(1.4 \times 10^{-4}) \div 0.78 = 1.79 \times 10^{-4}$ (A) | substitution and rearrangement in either order -1 POT error | 3 |
| (ii) | substitution; re-arrangement; evaluation; correct answer: 1.6×10^{-2} (V) e.g. energy = charge \times voltage $2.3 \times 10^{-6} = 1.4 \times 10^{-4} \times \text{voltage}$ voltage = $(2.3 \times 10^{-6}) \div (1.4 \times 10^{-4}) = 1.64 \times 10^{-2}$ (V) | allow use of standard symbols e.g. $E = Q \times V$ allow v, V for voltage reject C, c for charge substitution and rearrangement in either order -1 POT error | 3 |

(Total for Question 10 = 10 marks)

| Question number | Answer | Notes | Marks |
|-----------------|---|---|-------|
| 11 (a) (i) | line drawn at 90 degrees to side of boat at point where direction of travel touches boat; | ignore normal inside boat | 1 |
| (ii) | 66 (degrees); | accept in range 64-68 degrees | 1 |
| (iii) | three wavefronts parallel and constant wavelength; to the right of the normal and above boat surface; correct angle of reflection; | by eye; condone different wavelength to incident wavefronts by eye; | 3 |
| |  | allow 'reflected ray' if no other mark awarded | |
| (b) (i) | transverse (waves/particles) vibrate at right angles to the direction of travel of the wave; longitudinal (waves/particles) vibrate along line of direction of travel of the wave; | allow 'vibrations/oscillates at...' allow 'perpendicular to' for 'at right angles' allow 'energy transfer' for 'travel' allow '(anti-)parallel to' for 'along' | 2 |
| (ii) | wavelength or distance between wavefronts smaller; speed of waves is constant; reference to wave equation $v = f\lambda$; | if no other marks awarded, 1 mark for reference to Doppler effect | 3 |

(Total for Question 11 = 10 marks)

| Question number | Answer | Notes | Marks |
|-----------------|---|--|-------|
| 12 (a) | <p>use of $u=0$ (m/s);</p> <p>correct substitution into '$v^2 = u^2 + 2aS$';</p> <p>correct evaluation of v^2;</p> <p>correct evaluation of v;</p> <p>correct answer = 160 (m/s)</p> <p>e.g. $v^2 = u^2 + 2aS$ $v^2 = 0^2 + (2 \times 10 \times 1300)$ $v^2 = 26000$ $v = 161.245... \text{ (m/s)}$</p> | <p>accept loss of GPE = gain in KE</p> <p>reject use of $v=0$ for this MP</p> <p>$v^2 = 26000$</p> <p>accept 25506, 25480</p> <p>reject $v^2 = 2600$ if no $a=10$ seen.</p> <p>ignore sign</p> <p>accept 159.7059..., 159.62....</p> | 4 |
| (b) (i) | <p>any THREE from:</p> <p>MP1. reference to weight and air resistance;</p> <p>MP2. air resistance larger than weight (when parachute opens);</p> <p>MP3. reference to '$F = ma$';</p> <p>MP4. acceleration is upwards;</p> <p>MP5. air resistance decreases as parachutist slows down;</p> | <p>ignore 'upthrust'</p> <p>accept drag for AR</p> <p>accept 'resultant or unbalanced force is upwards'</p> <p>allow idea of increased AR</p> <p>ignore 'decelerates' or 'slows down'</p> | 3 |
| (ii) | <p>any THREE from:</p> <p>MP1. GPE reduces as height above ground reduces;</p> <p>MP2. KE reduces as speed reduces;</p> <p>MP3. friction force does mechanical work on parachutist;</p> <p>MP4. thermal store of parachutist increases;</p> <p>MP5. thermal transfer between (warm) parachutist and (cold) air;</p> <p>MP6. thermal transfer happens by conduction or radiation;</p> | <p>accept 'works mechanically'</p> <p>accept 'energy lost to the surroundings'</p> <p>accept idea of conversion to heat energy via friction</p> | 3 |

(Total for Question 12 = 10 marks)

