Pearson

Mark Scheme (Results)

Summer 2026

Pearson Edexcel International Advanced Subsidiary Level In Physics
WPH13/01

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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.

Mark scheme notes

Underlying principle

The mark scheme will clearly indicate the concept that is being rewarded, backed up by examples. **It is not a set of model answers.**

1. Mark scheme format

1.1 You will not see 'wtte' (words to that effect). Alternative correct wording should be credited in every answer unless the MS has specified specific words that must be present. Such words will be indicated by underlining e.g. 'resonance'

1.2 Bold lower case will be used for emphasis e.g. '**and**' when two pieces of information are needed for 1 mark.

1.3 Round brackets ( ) indicate words that are not essential e.g. "(hence) distance is increased".

1.4 Square brackets [ ] indicate advice to examiners or examples e.g. [Do not accept gravity] [ecf].

2. Unit error penalties

2.1 A separate mark is not usually given for a unit but a missing or incorrect unit will normally mean that the final calculation mark will not be awarded.

2.2 This does not apply in 'show that' questions or in any other question where the units to be used have been given, for example in a spreadsheet.

2.3 The mark will not be awarded for the same missing or incorrect unit only once within one clip in epen.

2.4 Occasionally, it may be decided not to insist on a unit e.g the candidate may be calculating the gradient of a graph, resulting in a unit that is not one that should be known and is complex.

2.5 The mark scheme will indicate if no unit error is to be applied by placing brackets around the unit.

3. Significant figures

3.1 Use of too many significant figures in the theory questions will not prevent a mark being awarded if the answer given rounds to the answer in the MS.

3.2 Too few significant figures will mean that the final mark cannot be awarded in 'show that' questions where one more significant figure than the value in the question is needed for the candidate to demonstrate the validity of the given answer.

3.3 The use of one significant figure might be inappropriate in the context of the question e.g. reading a value off a graph. If this is the case, there will be a clear indication in the MS.

3.4 The use of $g = 10\ m\ s^{-2}$ or $10\ N\ kg^{-1}$ instead of $9.81\ m\ s^{-2}$ or $9.81\ N\ kg^{-1}$ will be penalised by one mark (but not more than once per clip). Accept $9.8\ m\ s^{-2}$ or $9.8\ N\ kg^{-1}$

3.5 In questions assessing practical skills, a specific number of significant figures will be required e.g. determining a constant from the gradient of a graph or in uncertainty calculations. The MS will clearly identify the number of significant figures required.

4. Calculations

4.1 **use of** the formula means that the candidate demonstrates substitution of physically correct values, although there may be conversion errors e.g. power of 10 error.

4.2 If a 'show that' question is worth 2 marks, then both marks will be available for a reverse working. If the question is worth 3 marks then only 2 marks will be available.

4.3 The mark scheme will show a correctly worked answer for illustration only.

5. Quality of Written Expression

5.1 Questions that asses the ability to show a coherent and logically structured answer are marked with an asterisk.

5.2 Marks are awarded for indicative content and for how the answer is structured.

5.3 Linkage between ideas, and fully-sustained reasoning is expected.

Question Number	Answer		Additional Guidance	Mark
1(a)(i)	**Either** Use a tape measure Ensure tape measure is straight/taut/tight **OR** Use a trundle wheel Ensure path is straight from student A to student B **OR** Use a laser rangefinder Ensure laser is horizontal **OR** Use a rope/string that is straight between student A and student B Measure length of rope/string with metre rule/tape measure	**(1)** **(1)** **(1)** **(1)** **(1)** **(1)** **(1)** **(1)**	Do not accept metre rule to measure D directly	**2**
1(a)(ii)	(Increasing distance) will have the same (absolute) uncertainty Percentage uncertainty = absolute uncertainty/measured value (×100%) (measured value is bigger) so % uncertainty is smaller	**(1)** **(1)**	Ignore references to resolution	**2**

1(b)(i)	**EITHER** There will be variation in the values **(1)** **Or** There is a reaction time **Or** Identify and remove anomalies (So repeat readings) allow a mean to be calculated to reduce (the effect of) random errors **(1)**	Ignore human error Not eliminate	**2**
1(b)(ii)	**EITHER** Record video to identify time when blocks hit **(1)** Analyse video for time when sound is detected **(1)** **OR** Use (2) microphone(s) and C.R.O. **(1)** Measure time between peaks on C.R.O **(1)** **OR** Use of an electronic starter eg two contacts on the pieces of wood to start timer **(1)** Use of an electronic stopper eg a microphone to stop timer **(1)**	Accept oscilloscope for CRO If only 1 microphone needs to be clear that an echo method is used for 2 marks	**2**
	Total for question 1		**8**

Question Number	Answer		Additional Guidance	Mark
2(a)(i)	**EITHER** Rubber/string may snap **and** may hit student's eye	**(1)**		**2**
	Wear goggles **Or** wear safety glasses **Or** wear eye protection	**(1)**	Not glasses alone	
	OR Mass may fall **and** hit foot/feet	**(1)**		
	Ensure feet aren't under the mass **Or** wear (safety) boots/shoes **Or** sand tray on floor	**(1)**	Accept stand away Accept cushion	
2(a)(ii)	Uses uncertainty = (half) the resolution	**(1)**	<u>Example Calculation</u>	**2**
	Percentage uncertainty = 0.023 (%) to 1 or 2 sf	**(1)**	Resolution of digital caliper = 0.01 mm Percentage uncertainty = (0.005 mm / 22.13 mm) x 100 % = 0.023 %	
2(a)(iii)	Check (and correct) for zero error (on the calipers)	**(1)**	Accept calibrate to zero	**4**
	To reduce systematic error	**(1)**	Accept eliminate	
	MP2 dependent on MP1			
	Ensure caliper is close to/touching marks **Or** measure from centre of marks **Or** measure parallel to string/rubber band	**(1)**		
	To reduce random error	**(1)**	Accept to reduce/eliminate parallax error by placing caliper close Do not accept eliminate random errors	
	MP4 dependent on MP3			

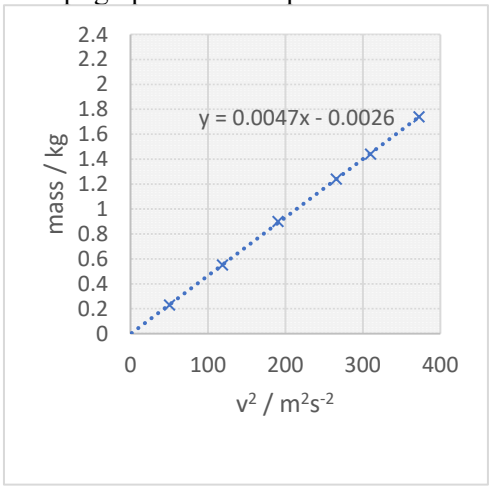
2(b)(i)	Attempts to calculate the mean using all 5 values **(1)** Mean x = 22.4 mm given to 1 d.p. **(1)**	Example Calculation Mean x = (22.1 mm + 22.5 mm + 22.3 mm + 22.4 mm + 22.6 mm) / 5 Mean x = 22.38 mm	**2**
2(b)(ii)	Calculates half range for uncertainty **Or** Calculates furthest from the mean **(1)** Percentage uncertainty in x = 1.1 (%) to 1 to 3sf **(1)** (1.3(%) if max difference method used) Allow ecf for range and mean from 2(b)(i) for both marks	Example calculation Range of repeats = 22.6 mm-22.1 mm = 0.5 mm Uncertainty in x = 0.5 mm / 2 = 0.25 mm Percentage uncertainty in x = (0.25 mm / 22.4 mm) × 100 % = 1.12 %	**2**
2(c)	Use of area under graph **(1)** Energy for single square = 0.01 (J) **(1)** Energy stored = 0.18 J to 0.20 J **(1)**	Accept use of $\frac{1}{2}$Fx Example of calculation 18-20 squares = 0.18 J to 0.20 J	**3**
	Total for question 2		**15**

Question Number	Answer	Additional Guidance	Mark
3(a)	To give minimum current **(1)** Reduces chance of short circuit **(1)** **Or** Protects the ammeter	 Allow reduces chance of overheating Ignore voltmeter	**2**
3(b)(i)	**Max three from** Inconsistent d.p. for current **(1)** The current at 0.74 V does not follow the trend **(1)** Insufficient readings (to draw a graph) **(1)** No evidence of repeats **(1)**	 Allow sf Do not accept anomaly	**3**

3(b)(ii)	**EITHER** Use of 5% to determine lower limit of student's value of e.m.f. Use of $\varepsilon = 0.30 - C$ ε = 1.04 (V) which is outside range (of 1.07 V to 1.19V) so not zinc **Or** C = −0.77 (V) which is less than −0.74 (V) so not zinc **OR** Use of $\varepsilon = 0.30 - C$ Calculates percentage difference for value of e.m.f Percentage difference = 8.7 (%) which is greater than 5 (%) so not zinc	**(1)** **(1)** **(1)** **(1)** **(1)** **(1)**	Example calculation Range for students e.m.f = 1.13V ±5% = 1.07V to 1.19V $\varepsilon = 0.30 - -0.74 = 1.04$V ε = 1.04V which is outside range of 1.07 V to 1.19V so not zinc Example calculation $\varepsilon = 0.30 - -0.74 = 1.04\,\text{V}$ $\frac{1.13\,\text{V} - 1.04\,\text{V}}{1.04\,\text{V}} = 8.7\,\%$ 8.7 % which is greater than 5% so not zinc	**3**
	Total for question 3			**8**

Question Number	Answer	Additional Guidance	Mark
4(a)	Measure distance with a metre rule **and** time with a stopwatch **Or** Measure distance with a metre rule **and** time with light gates. **Or** Measure distance with a metre rule **and** use frame rate (of video) **(1)** Calculate v using v=d/t (for each set) **(1)** Idea of measuring (distance and time) between at least 2 relevant pairs of points **(1)** If velocities are equal the parachute is at terminal velocity **(1)** MP4 dependent on MP3 **Or** If times for equal distances are equal, parachute is at terminal velocity	Accept measuring tape for metre rule Accept time(from video) for frame rate(of video)	**4**
4(b)(i)	Compares to y = mx (+ c) **and** identifies gradient = $\frac{C\rho A}{2g}$ **(1)** Rearranges equation to $C = \frac{\text{gradient} \times 2g}{\rho A}$ **(1)**		**2**

4(b)(ii)	Correct values of v^2 **(1)** ..rounded to 3 s.f. **(1)** | ***m* / kg**	***v* / ms^{-1}**	**(v^2 / m^{2}s^{-2})** | |---|---|---| | 0.23 | 7.1 | 50(.4) | | 0.55 | 10.9 | 119 | | 0.90 | 13.8 | 190 | | 1.24 | 16.3 | 266 | | 1.44 | 17.6 | 310 | | 1.74 | 19.3 | 372 |	Accept first row to 2 s.f.	**2**

4(b)(iii)	Labels axes with quantities and units Sensible scales Plotting Line of best fit	**(1)** **(1)** **(2)** **(1)**	Do not accept reversed axes or titles as quantity (unit). Accept v^2 / $(ms^{-1})^2$ on x-axis Axes must cover at least half grid, value of 2cm square in 1, 2 or 5 only Plots within 1 mm Straight, plots on both sides of line, no rotation Accept graph in landscape  	
4(b)(iv)	Use large triangle (to calculate gradient)(4.7 x 10^{-3} $kgm^{-2}s^2$) Uses gradient = $\frac{C\rho A}{2g}$ Value for C = 1.08 to 3 s.f. with no unit	**(1)** **(1)** **(1)**	Min 160 on denominator or triangle shown on graph Data points from table must lie on line <u>Example of calculation</u> $C = \frac{4.7 \times 10^{-3}\text{kgm}^{-2}\text{s}^2 \times 2 \times 9.81\text{kgms}^{-1}}{1.21\text{kgm}^{-3} \times 0.0704m^2} = 1.0825$ Range 1.06 to 1.10	**3**

4(c)	**EITHER** Factors other than *A* (and *v*)in the equation would be constant **(1)** (When A increases) $v(^2)$ must decrease **(1)** **Or** A $\propto 1/v^2$ *v* decreases by a factor of $\sqrt{2}$ **(1)** **OR** Drag would be greater (with larger area) at a given velocity **(1)** (Accelerates for) less time until drag equals weight **(1)** (When A increases) $v(^2)$ must decrease **(1)**	Accept equation in words	**3**
	Total for question 4		**19**