



Mark Scheme (Results)

January 2026

Pearson Edexcel International Advanced Subsidiary level
In Physics
Practical Skills in Physics I
WPH13/01A

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

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.

Using the Mark Scheme

Examiners should look for qualities to reward rather than faults to penalise. This does NOT mean giving credit for incorrect or inadequate answers, but it does mean allowing candidates to be rewarded for answers showing correct application of principles and knowledge. Examiners should therefore read carefully and consider every response: even if it is not what is expected it may be worthy of credit.

The mark scheme gives examiners:

- an idea of the types of response expected
- how individual marks are to be awarded
- the total mark for each question
- examples of responses that should NOT receive credit.

/ means that the responses are alternatives and either answer should receive full credit.

() means that a phrase/word is not essential for the award of the mark, but helps the examiner to get the sense of the expected answer.

Phrases/words underlined indicate that the meaning of the phrase or the actual word is essential to the answer.

ecf/TE/cq (error carried forward) means that a wrong answer given in an earlier part of a question is used correctly in answer to a later part of the same question.

Candidates must make their meaning clear to the examiner to gain the mark. Make sure that the answer makes sense. Do not give credit for correct words/phrases which are put together in a meaningless manner. Answers must be in the correct context.

Graphs

A mark given for axes requires both axes to be labelled with quantities and units, and drawn the correct way round. Sometimes a separate mark will be given for units or for each axis if the units are complex. This will be indicated on the mark scheme.

A mark given for choosing a scale requires that the chosen scale allows all points to be plotted, spreads plotted points over more than half of each axis of the available space and is not an awkward scale e.g., multiples of 3, 7 etc.

For WPH13 there are two marks available for plotting data points. Points should be plotted to within 1 mm.

- If all are within 1 mm, award 2 marks.
- If one point is 1+ mm out, award 1 mark.
- If two or more points are 1+ mm out, award 0 marks.

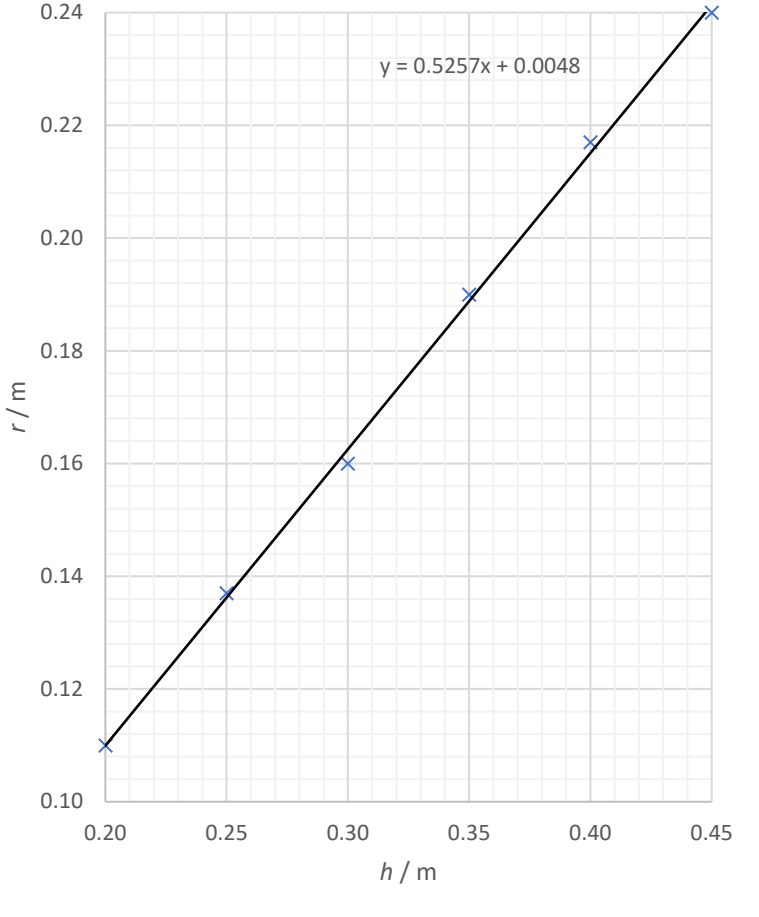
For a line mark there must be a thin continuous line which is the best-fit line for the candidate's results.

Question Number	Answer	Additional Guidance	Mark
1(a)(i)	<p>The burn pattern shows a standing wave with nodes and antinodes Or greatest energy transfer at antinode positions Or nodes areas of least intensity/amplitude so no burning occurs Or antinodes areas of max intensity/amplitude so burning occurs (1)</p> <p>wavelength = 2 x distance between adjacent nodes/antinodes Or distance between adjacent nodes/antinodes = ½ wavelength (1)</p>		2
1(a)(ii)	<p>Use of $v = f\lambda$ (1) Speed = 2.9×10^8 (m s⁻¹) (1) Value rounded to 2 s.f. and correct unit (1)</p>	<p>Do not accept use of $v = s/t$</p> <p><u>Example Calculation</u> $v = f\lambda$ $v = 2450 \times 10^6 \text{ Hz} \times 0.12 \text{ m}$ $v = 2.9 \times 10^8 \text{ m s}^{-1}$</p>	3
1(b)(i)	1 mm (1)		1
1(b)(ii)	<p>The student has to make two judgements (at either end of the ruler) Or it is difficult to judge the position of the centre of a burn (1)</p> <p>The uncertainty is greater (than half the resolution) and the student is wrong (1)</p>	MP2 dependent on MP1 being awarded	2
Total for question 1			8

Question Number	Answer	Additional Guidance	Mark
2(a)	Curved line of best fit (1)		1
2(b)(i)	Minimum p.d. read from their line on the graph (1)		1
2(b)(ii)	Use of $W = VQ$ with $Q = 1.6 \times 10^{-19} \text{ C}$ (1) $W = 2.5 \times 10^{-19}$ to $3.0 \times 10^{-19} \text{ (J)}$ (1)	<u>Example of calculation</u> $W = VQ$ $W = 1.8 \text{ V} \times 1.6 \times 10^{-19} \text{ C}$ $W = 2.9 \times 10^{-19} \text{ J}$	2
2(c)	Use of $c = f\lambda$ with $\lambda = 625 \text{ nm}$ (1) Use of $E = hf$ with $E = 3.1 \times 10^{-19} \text{ J}$ (1) $h = 6.5 \times 10^{-34} \text{ J s}$ (1)	Use of $E = hc/\lambda$ with $\lambda = 625 \text{ nm}$ scores both MP1 and MP2 (1) <u>Example of calculation</u> $c = f\lambda$ $3.0 \times 10^8 \text{ m s}^{-1} = f \times 625 \times 10^{-9} \text{ m}$ $f = 4.8 \times 10^{14} \text{ Hz}$ $E = hf$ $3.1 \times 10^{-19} \text{ J} = h \times 4.8 \times 10^{14} \text{ Hz}$ $h = 6.5 \times 10^{-34} \text{ J s}$	3
2(d)	There would be an uncertainty in wavelength/frequency (1) Or there would be a range of wavelengths/frequencies (1) Or the LED emits multiple wavelengths/frequencies (1) If wavelength was longer, the calculated Planck constant would be larger (1) Or if the frequency was lower, the calculated Planck constant would be larger (1) There would be an uncertainty in the calculated Planck constant (1) Or there would be a range of possible values of the Planck constant (1)	MP2 - Accept converse arguments for shorter wavelength or higher frequency	3
2(e)	Take measurements for additional p.d.s between 1.5 and 2.0V (1) Or take measurements for smaller increments in p.d. (1) This would allow for a more accurate line of best fit to be drawn (1) Or to more accurately identify the p.d. where the line touches the x -axis (1)	Accept use of a datalogger for MP1 MP2 must refer to the graph line	2
Total for question 2			12

Question Number	Answer	Additional Guidance	Mark
3(a)(i)	<p>Mark 3(a)(i) and (ii) holistically to ensure approach used in 3(a)(i) matches the approach used in 3(a)(ii)</p> <p>Measures length of top and bottom edges, and calculates mean (Accept inclusion of additional measurements taken horizontally)</p> <p>Length of card = 0.065 m</p>	<p><u>Example of calculation</u> Length of top edge = 6.6 cm Length of bottom edge = 6.4 cm Mean length = $(6.6 \text{ cm} + 6.4 \text{ cm})/2 = 6.5 \text{ cm}$</p> <p>If neither mark point has been awarded, allow 1 mark for a single length measurement (e.g. top edge, bottom edge, across the middle)</p>	2
3(a)(ii)	<p>EITHER Use of half the range of values if multiple length values measured Or use of max distance from the mean if multiple length values measured</p> <p>% uncertainty = 1.5% (accept 2%)</p> <p>OR Use of half ruler resolution if a single length value is measured/shown in 3(a)(i)</p> <p>% uncertainty = 0.8%</p>	<p>Allow e.c.f. from 3(a)(i) for both approaches.</p> <p><u>Example of calculation</u> Half range = 0.1 cm % uncertainty = $(0.1 \text{ cm} / 6.5 \text{ cm}) \times 100\%$ % uncertainty = 1.5%</p> <p>Accept uncertainty = resolution for MP1, giving an answer of 1.5% or 1.6% for MP2 for this approach.</p> <p><u>Example of calculation</u> Half resolution = 0.05 cm % uncertainty = $(0.05 \text{ cm} / 6.4 \text{ cm}) \times 100\%$ % uncertainty = 0.78%</p>	2

Question Number	Answer	Additional Guidance	Mark
3(b)(i)	Use of $v = s/t$ $v = 0.512 \text{ (m s}^{-1}\text{) to 3 s.f.}$ Use of $p = mv$ $p = 0.140 \text{ (kg m s}^{-1}\text{) to 3 s.f.}$	(1) <u>Example of calculation</u> (1) $v = s/t = 0.105 \text{ m} / 0.205 \text{ s} = 0.512 \text{ m s}^{-1}$ (1) $p = mv = 0.274 \text{ kg} \times 0.512 \text{ m s}^{-1} = 0.140 \text{ kg m s}^{-1}$ (1)	4
3(b)(ii)	Calculates percentage difference between the total momentum before and after The (percentage) difference is small so momentum is conserved Or a conclusion consistent with a comparison of student's values	(1) <u>Example of calculation</u> Percentage difference $= \frac{0.143 \text{ kg m s}^{-1} - 0.140 \text{ kg m s}^{-1}}{0.143 \text{ kg m s}^{-1}} \times 100\%$ Percentage difference = 2.1%	2
3(c)	Different force could be applied each time Or the force could be applied for a different time The time/velocity/momentum/acceleration for the moving glider is likely to be the different for each repeat Increasing uncertainty (in momentum)	(1) (1) (1) MP3 dependent on MP1 or MP2 being awarded	3
3(d)	Light gates and data logger eliminate (human) reaction time Or using the stopwatch would include a (human) reaction time Which would reduce the effect of <u>random</u> error (in the time) Or reducing the uncertainty (in time)	(1) (1)	2
Total for question 3			15

Question Number	Answer	Additional Guidance	Mark														
4(a)(i)	<p>Max 2 from Inconsistent d.p. in r (1)</p> <p>No repeat readings at the same h (1)</p> <p>Values (of h) should be to the nearest mm Or values (of h) should be rounded to 3 d.p. (1)</p>	<p>“No repeats” is insufficient – question states “He then repeated the experiment...”</p>	2														
4(a)(ii)	<p>Labels axes with r / m on the y-axis and h / m on the x-axis (1)</p> <p>Sensible scales (1)</p> <p>Plotting (2)</p> <p>Line of best fit (1)</p> <table border="1" data-bbox="311 775 622 1072"> <thead> <tr> <th>h / m</th> <th>r / m</th> </tr> </thead> <tbody> <tr> <td>0.20</td> <td>0.11</td> </tr> <tr> <td>0.25</td> <td>0.137</td> </tr> <tr> <td>0.30</td> <td>0.16</td> </tr> <tr> <td>0.35</td> <td>0.19</td> </tr> <tr> <td>0.40</td> <td>0.217</td> </tr> <tr> <td>0.45</td> <td>0.24</td> </tr> </tbody> </table>	h / m	r / m	0.20	0.11	0.25	0.137	0.30	0.16	0.35	0.19	0.40	0.217	0.45	0.24		5
h / m	r / m																
0.20	0.11																
0.25	0.137																
0.30	0.16																
0.35	0.19																
0.40	0.217																
0.45	0.24																

Question Number	Answer	Additional Guidance	Mark
4(b)(i)	$mgh = \frac{1}{2}mv^2$	(1) Do not accept use of $v^2 = u^2 + 2as$, as $a \neq g$ and $s \neq h$	2
	Algebra steps shown leading to $u = \sqrt{2gh}$	(1)	
4(b)(ii)	See $v = \sqrt{2gr}$	(1) Accept $v^2 = 2gr$	3
	Shows that $e = \frac{\sqrt{r}}{\sqrt{h}}$	(1) Accept substitution of $u = \sqrt{2gh}$ and $v = \sqrt{2gr}$ into $e = v/u$ for MP2, and re-arrangement into $y = mx$ format and identifying the gradient as e^2 for MP3	
	Gradient = $\frac{\Delta r}{\Delta h}$ therefore gradient = e^2	(1)	
4(c)	Calculates gradient using large triangle	(1) Allow use of $e^2 = \frac{r}{h}$ if graph shows line passing through the origin	3
	Gradient value between 0.51 and 0.56 Or e value between 0.71 and 0.75	(1) <u>Example of Calculation</u> $e^2 = (0.22 - 0.12) / (0.41 - 0.22)$ $e^2 = 0.53$	
	Correct choice of metal for value of e calculated	(1) $e = 0.73$ so stainless steel	
Total for question 4			15