Pearson

Mark Scheme (Results)

January 2026

Pearson Edexcel International Advanced Subsidiary level In Physics
WPH12/01

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

January 2026
Question Paper Log Number P79144A
Publication Code WPH12_01_2601_MS

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. '<u>resonance</u>'

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	Mark
1	**The only correct answer is A** (diode) B is not correct because current would increase at a decreasing rate C is not correct because this would be a straight line through the origin D is not correct because this would be an exponential curve	1
2	**The only correct answer is C** $(5 \times 10^{-3} \times 480)$ A is not correct because this is current divided by time B is not correct because this is current divided by time D is not correct because time is not in seconds	1
3	**The only correct answer is A** (9.8 eV) B is not correct because this would be a transition between the ground state and n = 1 C is not correct because this would be a transition between the ground state and n = 2 D is not correct because this would be a transition between the ground state and n = 3	1
4	**The only correct answer is B** (stays the same increase) A is not correct because voltmeter reading stays the same and ammeter reading increases C is not correct because ammeter reading increases D is not correct because voltmeter reading stays the same	1
5	**The only correct answer is C** $\left(\frac{\pi}{2}\text{ radians}\right)$ A is not correct because phase difference $= \frac{2\pi}{\lambda} \times$ path difference B is not correct because phase difference $= \frac{2\pi}{\lambda} \times$ path difference D is not correct because phase difference $= \frac{2\pi}{\lambda} \times$ path difference	1
6	**The only correct answer is B** $\left(\sqrt{\frac{20 \times 2.5}{0.005}}\right)$ A is not correct because this does not include mass C is not correct because this is tension *x* mass per unit length D is not correct because has no length included	1
7	**The only correct answer is D** $\left(f \propto \frac{1}{\lambda}\right)$ A is not correct because $f \propto \frac{1}{\lambda}$ B is not correct because $f \propto \frac{1}{\lambda}$ C is not correct because $f \propto \frac{1}{\lambda}$	1

8	**The only correct answer is B** $\left(V \times \frac{x}{l}\right)$ A is not correct because this is an incorrect ratio of length C is not correct because this incorrect ratio of length D is not correct because incorrect ratio of length	**1**
9	**The only correct answer is A** $\left(\theta > \sin^{-1}\left(\frac{1.40}{1.75}\right)\right)$ B is not correct because $\theta > \sin^{-1}\left(\frac{1.40}{1.75}\right)$ C is not correct because $\theta > \sin^{-1}\left(\frac{1.40}{1.75}\right)$ D is not correct because $\theta > \sin^{-1}\left(\frac{1.40}{1.75}\right)$	**1**
10	**The only correct answer is D** (pressure is minimum displacement is zero) A is not correct because displacement at a compression is zero and pressure at a rarefaction is minimum B is not correct because displacement at a compression is zero and pressure at a rarefaction is minimum C is not correct because displacement at a compression is zero and pressure at a rarefaction is minimum	**1**

Question Number	Answer	Additional Guidance	Mark
11	Use of $I = nqvA$ **(1)** $v = 3.2 \times 10^{-4}\ \text{m s}^{-1}$ **(1)**	<u>Example of calculation</u> $v = \dfrac{1.25\ \text{A}}{9.0 \times 10^{28}\ \text{m}^{-3} \times 1.6 \times 10^{-19}\ \text{C} \times 2.7 \times 10^{-7}\ \text{m}^2}$ $v = 3.22 \times 10^{-4}\ \text{m s}^{-1}$	**2**
	Total for question 11		**2**

Question Number	Answer	Additional Guidance	Mark
12	The (amplitude of) lattice vibrations increase **(1)** There is an increase in the frequency of collisions of electrons with the lattice **(1)** So the resistance increases **(1)** (MP3 dependent on MP2 or MP1)	Allow atoms / ions for lattice	**3**
	Total for question 12		**3**

Question Number	Answer		Additional Guidance	Mark
13	e.m.f. = 1.5 (V)	**(1)**		
	Reads two pairs of corresponding values of V and I	**(1)**	Intercept can be read as one of the pairs	
	Internal resistance = 0.50 Ω	**(1)**	<u>Example of calculation</u> Gradient $= \frac{1.20 - 0.00}{3.00 - 0.60} = -0.50$ r = 0.50 Ω	**3**
	Total for question 13			**3**

Question Number	Answer		Additional Guidance	Mark
14(a)	Use of $V = \frac{W}{Q}$ $W = 7.68 \times 10^{-16}$ (J) Answer to at least 3 s.f.	**(1)** **(1)**	Example of calculation $W = 4800\ \text{V} \times 1.6 \times 10^{-19}\ \text{C} = 7.68 \times 10^{-16}\ \text{J}$	**2**
14(b)	Use of $E_k = \frac{1}{2}mv^2$ ecf from (a) Use of $\lambda = \frac{h}{mv}$ $\lambda = 1.8 \times 10^{-11}$ m	**(1)** **(1)** **(1)**	Allow use of $E_k = \frac{p^2}{2m}$ Example of calculation $v = \sqrt{\frac{2 \times 7.68 \times 10^{-16}\ \text{J}}{9.11 \times 10^{-31}\ \text{kg}}} = 4.11 \times 10^{7}\ \text{m s}^{-1}$ $\lambda = \frac{6.63 \times 10^{-34}\ \text{J s}}{9.11 \times 10^{-31}\ \text{kg} \times 4.11 \times 10^{7}\ \text{m s}^{-1}} = 1.77 \times 10^{-11}\ \text{m}$	**3**
	Total for question 14			**5**

Question Number	Answer		Additional Guidance	Mark
15(a)(i)	Calculate cross-sectional area Use of $R = \frac{\rho l}{A}$ $R = 4.9\ (\Omega)$	**(1)** **(1)** **(1)**	Example of calculation $A = 1.64 \times 10^{-3}\ \text{m} \times 2 \times 10^{-4}\ \text{m} = 3.3 \times 10^{-7}\ \text{m}^2$ $R = \frac{1.70 \times 10^{-6}\ \Omega\ \text{m} \times 0.95\ \text{m}}{3.3 \times 10^{-7}\ \text{m}^2} = 4.92\ \Omega$	3
15(a)(ii)	Use of $\frac{1}{R_{\text{tot}}} = \frac{1}{R_1} + \frac{1}{R_2}$ $R = 0.45\ \Omega$ (ecf from 15(a)(i))	**(1)** **(1)**	Example of calculation $\frac{1}{R_{\text{tot}}} = 11 \times \left(\frac{1}{5\ \Omega}\right)$ $R_{\text{tot}} = \frac{5\ \Omega}{11} = 0.45\ \Omega$	2
15(a)(iii)	Use of $R = \frac{V}{I}$ $I = 26.7$ A (ecf from 15(a)(ii)) Show that value gives 26.4 A	**(1)** **(1)**	Example of calculation $I = \frac{12\ \text{V}}{0.45\ \Omega} = 26.67$ A	2
15(b)	Resistance of wire in series would be greater **Or** p.d. from power supply shared across each strip So power dissipated would be lower (MP2 dependent on MP1)	**(1)** **(1)**		2
	Total for question 15			**9**

Question Number	Answer		Additional Guidance	Mark
16(a)	**EITHER** Use of ratio of resistances Use of corresponding ratio of p.d.s Minimum voltmeter reading = 1.8 V **OR** Use of $R = \frac{V}{I}$ to determine circuit current Use of $R = \frac{V}{I}$ to determine pd across 6.8 kΩ resistor Minimum voltmeter reading = 1. 8V	**(1)** **(1)** **(1)** **(1)** **(1)** **(1)**	Example of calculation $\frac{V}{3.0\text{ V}} = \frac{6.8\text{ k}\Omega}{6.8\text{ k}\Omega + 4.7\text{ k}\Omega}\ W$ $V = 3.0\text{ V} \times \frac{6.8\text{ k}\Omega}{11.5\text{ k}\Omega} = 1.77\text{ V}$ Allow 1 mark for any use of $R = \frac{V}{I}$ for MP1	3
16(b)	Use of $P = \frac{V^2}{R}$ $P = 7.8 \times 10^{-4}$ W ecf from (a)	**(1)** **(1)**	Allow use of $P = VI$ or $P = I^2R$ Example of calculation $P = \frac{(3.0)^2}{(6.8 + 4.7) \times 10^3\ \Omega} = 7.83 \times 10^{-4}$ W	2
16(c)	Use of $I = \frac{\Delta Q}{\Delta t}$ **and** of $V = \frac{W}{Q}$ E = 680 J	**(1)** **(1)**	Example of calculation $Q = 2.5\text{ A} \times (1.5 \times 60)\text{s} = 225\ \text{C}$ $E = 225\ C \times 3.0\ V = 675$ J	2
	Total for question 16			**7**

Question Number	Answer		Additional Guidance	Mark
17(a)	Calculates θ (using tan) Use of $n\lambda = d\sin\theta$ Calculates number of lines per mm $= \frac{1}{d \times 1000}$ d = 300 lines per mm	**(1)** **(1)** **(1)** **(1)**	Example of calculation $\tan\theta = \frac{0.78\text{ m}}{4\text{ m}}$, therefore $\theta = 11.03°$ $d = \frac{1 \times \lambda}{\sin\theta} = \frac{635 \times 10^{-9}\text{ m}}{\sin 11.03} = 3.32 \times 10^{-6}\text{ m}$ number of lines per mm $= \frac{1}{3.32 \times 10^{-6}\text{ m} \times 1000}$ $= 301$	**4**
17(b)	The path difference between waves (from adjacent slits) is one wavelength So the waves are in phase So constructive interference occurs	**(1)** **(1)** **(1)**	Allow whole number of wavelengths	**3**
	Total for question 17			**7**

Question Number	Answer	Additional Guidance	Mark
18(a)	Transmitted wave reflects from the metal plate **(1)** (Incident and reflected waves undergo) superposition / interference **(1)** Antinodes formed in regions of constructive interference **(1)** **Or** antinodes formed where waves meet in phase		3
18(b)	Determine the wavelength **(1)** Use of $v = f\lambda$ **(1)** Speed of radio waves = 2.98×10^8 m s^{-1} **(1)**	Example of calculation $\lambda = \frac{4.75 \text{ m}}{2.5} = 1.90 \text{ m}$ $c = 157 \times 10^6 \text{Hz} \times 1.90 \text{ m} = 2.98 \times 10^8 \text{ m s}^{-1}$	3
18(c)	Oscillations are in one plane / one direction **(1)** So radio waves are polarised **(1)**	Accept vibrations Accept aerial acts as a polarising filter	2
	Total for question 18		**8**

<table>
<tr><th>Question Number</th><th>Answer</th><th>Additional Guidance</th><th>Mark</th></tr>
<tr><td>*19</td><td>This question assesses a student’s ability to show a coherent and logically structured answer with linkages and fully-sustained reasoning. Marks are awarded for indicative content and for how the answer is structured and shows lines of reasoning. The following table shows how the marks should be awarded for indicative content.
<table>
<tr><th>IC points</th><th>IC mark</th><th>Max linkage mark</th><th>Max final mark</th></tr>
<tr><td>6</td><td>4</td><td>2</td><td>6</td></tr>
<tr><td>5</td><td>3</td><td>2</td><td>5</td></tr>
<tr><td>4</td><td>3</td><td>1</td><td>4</td></tr>
<tr><td>3</td><td>2</td><td>1</td><td>3</td></tr>
<tr><td>2</td><td>2</td><td>0</td><td>2</td></tr>
<tr><td>1</td><td>1</td><td>0</td><td>1</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>0</td></tr>
</table>

The following table shows how the marks should be awarded for structure and lines of reasoning.
<table>
<tr><th></th><th>Number of marks awarded for structure of answer and sustained line of reasoning</th></tr>
<tr><td>Answer shows a coherent and logical structure with linkages and fully sustained lines of reasoning demonstrated throughout</td><td>2</td></tr>
<tr><td>Answer is partially structured with some linkages and lines of reasoning</td><td>1</td></tr>
<tr><td>Answer has no linkages between points and is unstructured</td><td>0</td></tr>
</table>
Indicative content
IC1 <u>Pulses</u> of ultrasound are used
IC2 Ultrasound is <u>reflected</u> from the crack
IC3 Time taken between pulse being sent and received is measured
IC4 Speed of ultrasound is known
IC5 Speed = distance / time is used to calculate distance to the crack
IC6 Using half time or half distance</td><td>For IC3 accept the time taken for the ultrasound to return is measured</td><td>6</td></tr>
<tr><td></td><td>Total for question 19</td><td></td><td>6</td></tr>
</table>

Question Number	Answer		Additional Guidance	Mark
20(a)(i)	Use of $n = \frac{c}{v}$ with c = 3×10^8 m s^{-1} $v = 1.7 \times 10^8$ m s^{-1}	**(1)** **(1)**	Example of calculation $v = \frac{3 \times 10^8 \text{ m s}^{-1}}{1.75} = 1.71 \times 10^8 \text{ m s}^{-1}$	**2**
20(a)(ii)	Angle of incidence = 34.9° **and** Angle of refraction = 26.0° Use of $n_1 \sin\theta_1 = n_2 \sin\theta_2$ with $n_2 = 1.75$ Concentration = 3.0% (allow range 3.0 to 3.5) Concentration is 3.0% which is closest to 3.2% so it is sample 2 **Or** Comparison of calculated concentration with values in the table and consistent conclusion	**(1)** **(1)** **(1)** **(1)**	If concentration is determined to be 3.2 then accept "it is sample 2" for MP4 Example of calculation $n_1 \times \sin 34.9^\circ = 1.75 \times \sin 26.0^\circ$ $n_1 = 1.341$ Concentration = 3.0% which is closest to 3.2% so it is sample 2	**4**
20(b)	The ray shows the maximum angle of incidence **Or** The angle of incidence is almost 90° So this is the maximum angle of refraction for the glycerol sample	**(1)** **(1)**		**2**
	Total for question 20			**8**

Question Number	Answer	Additional Guidance	Mark
21(a)(i)	Use of $v = f\lambda$ **(1)** Use of $E = hf$ **(1)** $E = 5.23 \times 10^{-19}$ (J) At least 3 sf **(1)**	<u>Example of calculation</u> $f = \frac{3.0 \times 10^{8}\ \text{m s}^{-1}}{380 \times 10^{-9}\ \text{m}} = 7.89 \times 10^{14}$ Hz $E = 6.63 \times 10^{-34}$ J s $\times 7.89 \times 10^{14}$ Hz $= 5.234 \times 10^{-19}$	3
21(a)(ii)	Calculates area of pixel **(1)** Use of $I = \frac{P}{A}$ **(1)** Calculates number of photons incident each second **(1)** percentage of photons that release an electron = 82% **(1)** 82% ≈ 80% so statement is accurate **(1)** **Or** Calculated percentage compared to 80% and consistent conclusion	<u>Example of calculation</u> Area $= \frac{\pi \times (1.2 \times 10^{-5})^2}{4} = 1.13 \times 10^{-10}\ \text{m}^2$ $P = I \times A = 1.1 \times 10^{-6}\ \text{W m}^{-2} \times 1.13 \times 10^{-10}\ \text{m}^2$ $= 1.24 \times 10^{-16}$ W number of photons incident each second $= \frac{1.24 \times 10^{-16}\ \text{J}}{5.23 \times 10^{-19}\ \text{J}} = 238$ percentage of photons that release an electron = $\frac{195}{238} = 82\%$ 82% ≈ 80% so statement is accurate	5

	OR Calculates area of pixel Use of $I = \frac{P}{A}$ Calculates number of photons incident each second Number of photons released = 190 190 ≈ 195 so statement is accurate **Or** Calculated number of photons compared to 195 and consistent conclusion	Example of calculation $\text{Area} = \frac{\pi \times (1.2 \times 10^{-5})^2}{4} = 1.13 \times 10^{-10}\ \text{m}^2$ $P = I \times A = 1.1 \times 10^{-6}\ \text{W m}^{-2} \times 1.13 \times 10^{-10}\ \text{m}^2$ $= 1.24 \times 10^{-16}\ \text{W}$ number of photons incident each second $= \frac{1.24 \times 10^{-16}\ \text{J}}{5.23 \times 10^{-19}\ \text{J}} = 238$ number of photons released = $238 \times \frac{80}{100} = 190$ 190 ≈ 195 so statement is accurate	
	OR Calculates area of pixel Use of $I = \frac{P}{A}$ Energy of 195 emitted photons = 1.02×10^{-16} J percentage of energy released by 195 photons = 82% 82% ≈ 80% so statement is accurate **Or** Calculated percentage compared to 80% and consistent conclusion	Example of calculation $\text{Area} = \frac{\pi \times (1.2 \times 10^{-5})^2}{4} = 1.13 \times 10^{-10}\ \text{m}^2$ $P = I \times A = 1.1 \times 10^{-6}\ \text{W m}^{-2} \times 1.13 \times 10^{-10}\ \text{m}^2$ $= 1.24 \times 10^{-16}\ \text{W}$ Energy of emitted photons = $195 \times 5.23 \times 10^{-19}\ \text{J} = 1.02 \times 10^{-16}\ J$ Percentage energy released $= \frac{1.02 \times 10^{-16}\ \text{J}}{1.24 \times 10^{-16}\ \text{J}}$ $= 82\ \%$ 82% ≈ 80% so statement is accurate	

21(b)	There are a range of frequencies/wavelengths in white light **(1)** Only some frequencies will be higher than the threshold frequency **(1)** Only some photons will have enough energy to release an electron **(1)** **Or** Only some electrons have energy greater than the work function **(1)** Only smaller percentage of photons would release electrons	Accept white light has a range of colours/spectrum	**4**
	Total for question 21		**12**