GradeMax

Pearson

Mark Scheme (Results)

Summer 2026

Pearson Edexcel International Advanced Subsidiary Level In Physics
WPH11/01

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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	Mark
1	**The only correct answer is C** ($\mathrm{N\,m^{-2}}$) A is not correct because this is the unit of density B is not correct because this is the unit of spring stiffness constant D is not correct because this is the unit of viscosity	1
2	**The only correct answer is C** (momentum is changing, kinetic energy is constant) A is not correct because momentum changes because the car changes direction B is not correct because momentum changes because the car changes direction, and kinetic energy is constant D is not correct because kinetic energy is constant	1
3	**The only correct answer is B** (The wire will not return to its original length because it has gone beyond its elastic limit.) A is not correct because an elastically deformed wire would return to its original length when the force is removed. C is not correct because the wire will not return to its original length D is not correct because the wire will not return to its original length	1
4	**The only correct answer is D** (mass of the object and time taken to reach the ground) A is not correct because the equation $v^2 = u^2 + 2as$ can be used B is not correct because the equation $s = ut + \frac{1}{2}at^2$ can be used C is not correct because the equation $v = u + at$ can be used	1
5	**The only correct answer is D** (The person is accelerating downwards) A is not correct because N3: the tension is equal in magnitude to the weight of the person B is not correct because N3: the tension is in the opposite direction to the weight of the person C is not correct because N3: the forces act on different objects	1
6	**The only correct answer is C** ($(t_1 \times \frac{a_{\max}}{2}) + (t_2 - t_1) \times a_{\max}$) A is not correct because this would give an area greater than the area under the graph B is not correct because the area of the rectangle should be $(t_2 - t_1) \times a_{max}$ D is not correct because the area of the triangle should be $\frac{1}{2}(t_1 \times a_{max})$ and the area of the rectangle should be $(t_2 - t_1) \times a_{max}$	1
7	**The only correct answer is D** ($\frac{260 \times 1.8}{\cos 35°}$) A is not correct because the correct trig identity needed is cos. B is not correct because the correct trig identity needed is cos. C is not correct because 1.8m is on the adjacent side, not on the hypotenuse	1

8	**The only correct answer is A** ($\sqrt{(C-A)^2+(D-B)^2}$) B is not correct because this answer should be square rooted C is not correct because the resultant horizontal force is (C-A) and the resultant vertical force is (D-B) D is not correct because the resultant horizontal force is (C-A) and the resultant vertical force is (D-B) and the answer should be square rooted.	**1**
9	**The only correct answer is A** $\left(d=\sqrt{\frac{4m}{\pi l\rho}}\right)$ B is not correct because this would give the radius of the wire C is not correct because this would not give the diameter of the wire D is not correct because this would not give the diameter of the wire	**1**
10	**The only correct answer is D** ($m \times (30+9.81)$) A is not correct because this would give the resultant force on the person B is not correct because this would give the weight of the person C is not correct because the force from the ground would be greater than the weight of the person.	**1**

Question Number	Answer		Additional Guidance	Mark
11	Use of $E_k = \frac{1}{2}mv^2$ speed = 25 m s^{-1}	**(1)** **(1)**	Example calculation $120 \times 10^3\ \text{J} = \frac{1}{2} \times 390\ \text{kg} \times v^2$ $v = \sqrt{\frac{2 \times 120 \times 10^3\ \text{J}}{390\ \text{kg}}} = 24.8\ \text{m s}^{-1}$	**2**
	Total for question 11			

Question Number	Answer		Additional Guidance	Mark
12	Use of $F = k\Delta x$ Use of $E_{el} = \frac{1}{2}F\Delta x$ $E_{el} = 0.29$ J	**(1)** **(1)** **(1)**	Example calculation $\Delta x = \frac{3.8\ \text{N}}{25\ \text{N m}^{-1}} = 0.152\ \text{m}$ $E_{el} = \frac{1}{2} \times 3.8\ \text{N} \times 0.152\ \text{m} = 0.289\ \text{J}$	**3**
	Total for question 12			**3**

Question Number	Answer		Additional Guidance	Mark
13(a)	Momentum is conserved during the collision **Or** total momentum before the collision = total momentum after the collision	**(1)**		
	So the change in momentum of the racket is equal (in magnitude) to the change in momentum of the ball.	**(1)**		
	So (because the mass of the racket is greater than the mass of the ball) the change of velocity of the racket is less than the change in velocity of the ball (dependent on MP1 or MP2)	**(1)**	Ignore the racket has a lower acceleration than the ball Ignore the change speed of the racket is lower than the ball	
	OR			
	the racket exerts a force on the ball and the ball exerts a force on the racket	**(1)**		
	By Newton's third law, the forces are equal (magnitude, and opposite direction)	**(1)**		
	(because the mass of the racket is greater than the mass of the ball) the change of velocity of the racket is less than the change in velocity of the ball (dependent on MP1 or MP2)	**(1)**	Ignore the racket has a lower acceleration than the ball Ignore the change speed of the racket is lower than the ball	**3**

13(b)	Use of $v = u + at$ **(1)** Use of $F = ma$ **(1)** m = 58 g **(1)** Comparison of calculated value with 56 g and 59.4 g, and consistent conclusion **(1)**		Allow use of any valid suvat method to determine a <u>Example calculation</u> $a = \frac{14\ \text{m s}^{-1} + 22\ \text{m s}^{-1}}{0.034\ \text{s}} = 1060\ \text{m s}^{-2}$ $m = \frac{61\ \text{N}}{1060\ \text{m s}^{-2}} = 0.0575\ \text{kg} = 57.5\ \text{g}$ 56 < 57.5 < 59.4 so yes	**4**
	Total for question 13			**7**

Question Number	Answer		Additional Guidance	Mark
14(a)	Use of $\Delta E_{\text{grav}} = mg\Delta h$ Applies principle of conservation of energy $\Delta E_{\text{grav}} = 4.0 \times 10^6$ J **OR** Use of $W = mg$ Use of Work done $= F\Delta s$ using force of motor on bridge. $\Delta E_{\text{grav}} = 4.0 \times 10^6$ J	**(1)** **(1)** **(1)** **(1)** **(1)** **(1)**	<u>Example calculation</u> $\Delta E_{\text{grav}} = 420000 \text{ kg} \times 9.81 \text{ N kg}^{-1} \times 8.5 \text{ m}$ $- 4 \times 93000 \text{ kg} \times 9.81 \text{ N kg}^{-1} \times 8.5 \text{ m}$ $\Delta E_{\text{grav}} = 4.00 \times 10^6$ J	**3**
14(b)	Use of $P = \frac{E}{t}$ Use of efficiency $= \frac{\text{useful power output}}{\text{total power input}}$ **Or** Use of efficiency $= \frac{\text{useful energy output}}{\text{total energy input}}$ useful power output = 28 kW	**(1)** **(1)** **(1)**	<u>Example calculation</u> $P_{\text{input}} = \frac{15 \times 10^6 \text{ J}}{190 \text{ s}} = 78\,900$ W Useful $P_{\text{output}} = 78\,900 \text{ W} \times 0.36$ $= 28\,404$ W	**3**

14(c)	The resultant force would be zero / less **Or** The total change in gravitational potential energy would be zero **Or** The motor only needs to overcome resistive forces **Or** more / all work is done by the counterweights **(1)** So less work would need to be done by the motors **Or** so less energy input would be needed **(1)**	Allow zero work for less work Allow zero energy for less energy Dependent on MP1	**2**
	Total for question 14		**8**

Question Number	Answer		Additional Guidance	Mark
15(a)	draw a tangent at the steepest point of the curve	**(1)**	Allow draw a tangent to the curve at a point between 0.2 s and 1.0 s	**2**
	(maximum) acceleration is the gradient of the tangent	**(1)**	If no other mark scored, allow **1** mark for maximum acceleration is the gradient of the steepest part of the curve. If no other mark scored, allow **1** mark for drawing an appropriate tangent **and** calculating its gradient	
15(b)	Distance moved = 14 (m)	**(1)**	Allow a distance in the range 13.5 m to 14.5 m	**3**
	Uses 3.5 m to determine number of floors moved by elevator	**(1)**		
	Highest floor reached = 10 (answer must be an integer)	**(1)**	<u>Example of calculation</u> Approximate distance = $0.5 \times 1.4 \times 2.6 + 3.4 \times 2.6 + 0.5 \times 2.8 \times 2.6$ $= 14.3$ m Number of floors moved = $\frac{14.3\text{ m}}{3.5} \cong 4$ floors Highest floor reached = 4 + 6 = 10	
	Total for question 15			**5**

Question Number	Answer	Additional Guidance	Mark
16(a)	The point at / through which the weight of the object / beam appears to act **(1)**		**1**
16(b)	Use of $W = mg$ **(1)** Use of moment of force = Fx **(1)** Use of principle of moments **(1)** Weight = 1.3 N **(1)** Comparison of calculated value with weight(s) from table and consistent conclusion **(1)**	<u>Example of calculation</u> 0.25 kg × 9.81 N kg^{-1} = 2.45 N 2.45 N × 81 × 10^{-3} m = W × 0.150 m $W = \frac{0.198 \text{ Nm}}{0.150 \text{ m}} = 1.32 \text{ N}$ 1.32 N ≅ 1.4 N, so beam C was used	**5**
	Total for question 16		**6**

<table>
<tr><th>Question Number</th><th>Answer</th><th>Additional Guidance</th><th>Mark</th></tr>
<tr><td>17(a)</td><td>Laminar flow
Or The absence of turbulent flow (1)</td><td></td><td>1</td></tr>
<tr><td>*17(b)</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></td><td>Indicative content
IC1 The forces acting are weight, upthrust and (viscous) drag

IC2 Weight (of bubble) remains constant

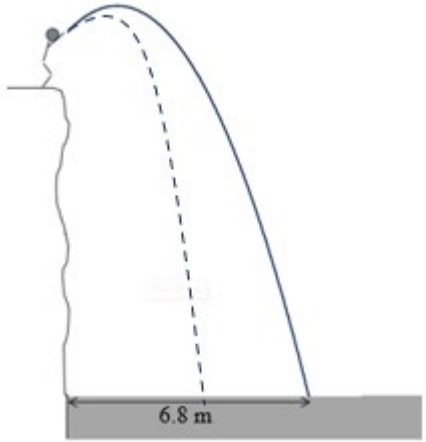
IC3 Upthrust increases because volume / weight of displaced water increases

IC4 (At the same speed) drag increases because radius/volume of bubble increases

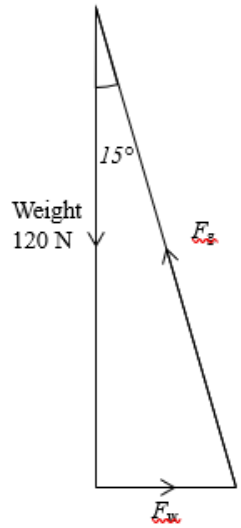
IC5 (At the same speed, for the same increase in volume) upthrust increases more than drag
Or (At the same speed) drag is proportional to radius of bubble and upthrust is proportional to radius cubed

IC6 (So) There is a resultant force (upwards) and speed/velocity of bubble increases Or There is a resultant force (upwards) and the bubble accelerates</td><td>6</td></tr>
<tr><td></td><td>Total for question 17</td><td></td><td>7</td></tr>
</table>

Question Number	Answer	Additional Guidance	Mark
18(a)(i)	Use of appropriate trigonometry **(1)** Horizontal component of initial velocity = 3.49 (m s^{-1}) (to at least 3 sig. figs.) **(1)**	<u>Example of calculation</u> $4.7\ \text{m s}^{-1} \times \cos(42°) = 3.49\ \text{m s}^{-1}$	**2**
18(a)(ii)	Use of $s = ut + \frac{1}{2}at^2$ with $a = 0$ **(1)** Use of appropriate trigonometry to calculate initial vertical velocity **(1)** Use of $s = ut + \frac{1}{2}at^2$ with $a = -9.81$ m s^{-2} and positive initial vertical component of velocity **(1)** $s = (-)13$ m [allow ecf from 12(a)(i)] (show that value gives 12.38 m) **(1)**	Allow use of pythagoras' theorem to calculate initial vertical velocity Allow use of any valid suvat method to determine *s* <u>Example of calculation</u> $t = \frac{6.8\ \text{m}}{3.49\ \text{m s}^{-1}} = 1.95\ \text{s}$ $u_{\text{vertical}} = 4.7\ \text{m s}^{-1} \times \sin(42°) = 3.14\ \text{m s}^{-1}$ $s = 3.14\ \text{m s}^{-1} \times 1.95\ \text{s} + \frac{1}{2} \times (-9.81\ \text{m s}^{-2}) \times (1.95\ \text{s})^2$ $= -12.5\ \text{m}$	**4**

18(a)(iii)	Path moves up to a maximum height lower than line shown Curved path with ball landing in sea between original position and cliff	**(1)** **(1)**	Do not accept a line that curves back towards the cliff. <u>Example diagram</u>  	**2**
18(b)	Drag increases with speed / velocity (At terminal velocity, upthrust plus) drag is equal (in size) to weight of ball (So) resultant force becomes zero (and the ball moves at terminal velocity)	**(1)** **(1)** **(1)**	Allow air resistance for drag throughout Allow weight, (upthrust) and drag cause the stone to be in equilibrium Ignore forces become balanced	**3**
	Total for question 18			**11**

Question Number	Answer		Additional Guidance	Mark
19(a)	There is a larger (cross-sectional) area	**(1)**		**3**
	(each fishing line) has the same breaking stress	**(1)**		
	(So the line will break at) a larger tension / force	**(1)**	Dependent on MP1 or MP2	
19(b)	Calculates cross-sectional area	**(1)**	Example of calculation	**4**
	Use of $\sigma = \frac{F}{A}$	**(1)**	$A = \pi \times (0.34 \times 10^{-3}\ \text{m})^2 = 3.63 \times 10^{-7}\ \text{m}^2$	
	Use of $E = \frac{\sigma}{\varepsilon}$ **and** use of $\varepsilon = \frac{\Delta x}{x}$	**(1)**	$\sigma = \frac{17\ \text{N}}{3.63 \times 10^{-7}\ \text{m}^2} = 4.68 \times 10^{7}\ \text{Pa}$	
	Extension $=$ 0.60 m	**(1)**	$\varepsilon = \frac{4.68 \times 10^{7}\ \text{Pa}}{2.8 \times 10^{9}\ \text{Pa}} = 1.67 \times 10^{-2}$	
			$\Delta x = 1.67 \times 10^{-2} \times 36\ \text{m}$ $= 0.601\ \text{m}$	
19(c)	Represents the elastic strain energy stored in the fishing line	**(1)**	Allow elastic potential energy for elastic strain energy	**3**
	which is work done to stretch the fishing line	**(1)**	Allow $W = F\Delta s$ Allow which is the work done on the fishing line	
	(because) the area is the mean force multiplied by the extension	**(1)**	Allow (because) the area is equal to $\frac{1}{2}F\ \Delta x$	
	Total for question 19			**10**

Question Number	Answer	Additional Guidance	Mark
20(a)	Straight line at least 6 cm long representing weight of ladder, with Label *W*, *mg,* weight or 120 N **(1)** Vector triangle of correct shape drawn with at least two sides labelled and angle between weight and F_g 15° **(1)** All 3 arrows in correct relative directions (dependent on MP2) **(1)** Magnitude of F_g = 124 N (allow answers in the range 120 N to 128N) **(1)**	<u>Example of diagram</u>  	**4**
20(b)	Pythagoras used to determine distance from wall to bottom of ladder. **(1)** Appropriate trigonometry with half distance from wall to bottom of ladder to determine θ **(1)** $\theta = 7.6°$ **(1)**	Allow appropriate use of trigonometry to determine distance from wall to bottom of ladder. <u>Example of calculation</u> $x = \sqrt{(2.07\text{ m})^2 - (2.00\text{ m})^2} = 0.534\text{ m}$ $\frac{x}{2} = 0.267\text{ m}$ $\theta = \tan^{-1}\left(\frac{0.267}{2.00}\right) = 7.60°$	**3**

20(c)	(in equilibrium) the resultant moment is zero **(1)** the anticlockwise moment (about the bottom of the ladder) increases **Or** the moment caused by the weight of the student increases **(1)** (so) the clockwise moment (caused by F_w) increases **(1)** (so) F_w increases (dependent on MP3) **(1)**	Allow total clockwise moment = total anticlockwise moment	**4**
	Total for question 20		**11**