Pearson

Mark Scheme (Results)

Summer 2026

Pearson Edexcel International Advanced Subsidiary Level In Physics
WPH11/01A

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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 $g = 10\ \text{m s}^{-2}$ or $10\ \text{N kg}^{-1}$ instead of $9.81\ \text{m s}^{-2}$ or $9.81\ \text{N kg}^{-1}$ will be penalised by one mark (but not more than once per clip). Accept $9.8\ \text{m s}^{-2}$ or $9.8\ \text{N kg}^{-1}$
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 B** (momentum) A is not correct because mass is a scalar quantity C is not correct because temperature is a scalar quantity D is not correct because time is a scalar quantity	1
2	**The only correct answer is C** ($N\,kg^{-1}$) A is not correct because this is a unit for momentum B is not correct because this the unit for force D is not correct because this is a unit for power	1
3	**The only correct answer is B** (Distance the ball falls and time taken) A is not correct because it would not be possible to determine acceleration due to gravity without further quantities C is not correct because it would not be possible to determine acceleration due to gravity without further quantities D is not correct because it would not be possible to determine acceleration due to gravity without further quantities	1
4	**The only correct answer is B** (0 N) A is not correct because this is their weight C is not correct because this is the distance travelled D is not correct because the magnitude of this number is the magnitude of their velocity	1
5	**The only correct answer is B** ($\frac{5\,N}{4\,m}$) A is not correct because stiffness = force / extension C is not correct because stiffness = force / extension D is not correct because stiffness = force / extension	1
6	**The only correct answer is D** ($0.5 \times 5\,N \times 4\,m$) A is not correct because energy stored is the area under the graph B is not correct because energy stored is the area under the graph C is not correct because energy stored is the area under the graph	1
7	**The only correct answer is C** (17 N) A is not correct because the resultant force is given by Pythagoras B is not correct because the resultant force is given by Pythagoras C is not correct because the resultant force is given by Pythagoras	1
8	**The only correct answer is D** (The falling object should move with laminar flow) A is not correct because the object should be spherical B is not correct because Stokes' law would apply in any fluid C is not correct because the object should be moving slowly	1

9	**The only correct answer is A** (2k) B is not correct because springs in parallel are stiffer than by themselves C is not correct because springs in parallel are stiffer than by themselves D is not correct because the spring constants would add together not multiply	**1**
10	**The only correct answer is C** (4*x*) A is not correct because x $\propto v^2$ B is not correct because x $\propto v^2$ C is not correct because x $\propto v^2$	**1**

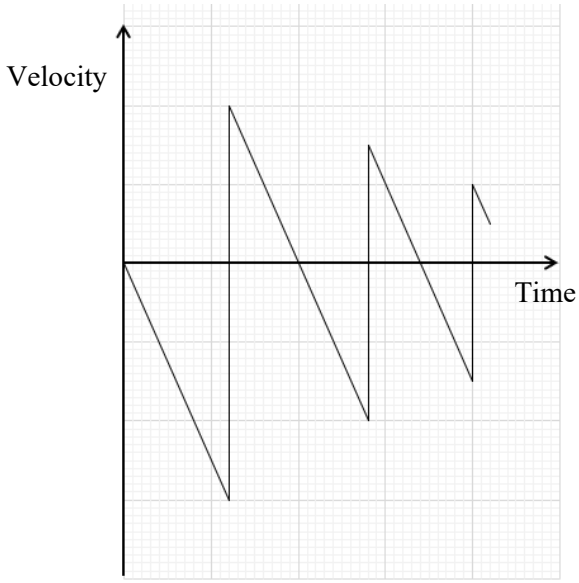
Question Number	Answer	Additional Guidance	Mark
11	velocity is a vector (but speed is a scalar) **Or** velocity has magnitude/speed and direction (but speed does not have direction) **(1)** Direction is changing (so velocity changes) **(1)**		**2**
	Total for question 11		**2**

Question Number	Answer	Additional Guidance	Mark
12	Use of $W = mg$ **(1)** Use of trigonometry to calculate Tension from component **(1)** T =21 N **(1)**	Example of calculation $W = 1.8\,\text{kg} \times 9.81\,\text{m s}^{-2} = 17.66\,\text{N}$ $17.66\,\text{N} = 2 \times T \times \sin(25°)$ $T = \frac{17.66\,\text{N}}{2 \times \sin(25°)} = 20.89\,\text{N}$	**3**
	Total for question 12		**3**

Question Number	Answer	Additional Guidance	Mark
13(a)(i)	maximum mass of carriage(s) and passengers determined **(1)** Use of $\Delta W = F\Delta s$ **Or** Use of $\Delta E_{grav} = mg\Delta h$ **(1)** Maximum work done = 4.1×10^7 (J) (to at least 2 sig. figs.) **(1)**	Example of calculation total mass = 50 × (300+120) kg = 21000 kg work done = 21000 kg × 9.81 m s^{-2} × 200 m work done = 4.12×10^7 J	**3**

13(a)(ii)	Use of $P = E/t$ **(1)** Conserves energy **(1)** Work done against resistive forces = 2.4×10^7 J (ecf from (a)(i)) **Or** Work done against resistive forces = 5.3×10^7 J **(1)**	Example of calculation Total Energy input = 135000 W × 8 × 60 s = 6.48×10^7 J Work done against resistive forces = 6.48×10^7 J − 4.12×10^7 J = 2.36×10^7 J	**3**
13(a)(iii)	Use of efficiency = $\frac{\text{useful energy output}}{\text{total energy input}}$ **Or** Use of efficiency = $\frac{\text{useful power output}}{\text{total power input}}$ **(1)** Efficiency = 0.64 (allow 64%) (ecf from (a)(i) and (a)(ii)) Or (if the carriages are all empty) Efficiency = 0.18 (allow 18%) **Or** (If useful energy output is treated as energy to lift people only up mountain) Efficiency = 0.45 (allow 45 %) **(1)**	Example of calculation efficiency = $\frac{4.12 \times 10^7 \text{ J}}{135 \times 10^3 \text{W} \times 8 \times 60} = \frac{4.12 \times 10^7 \text{ J}}{6.48 \times 10^7 \text{ J}}$ = 0.636	**2**
13(b)	friction decreases **(1)** So work done against friction decreases **(1)**	allow resistive forces for friction throughout Ignore references to air resistance	**2**
	Total for question 13		**10**

Question Number	Answer	Additional Guidance	Mark
14(a)	Energy is dissipated (during the collision / bounce) **Or** the collision (with the ground) is inelastic **(1)** So after the bounce the (maximum) gravitational potential energy is less **Or** after the bounce, less kinetic energy is transferred to gravitational potential energy **(1)**	Allow kinetic energy decreases (during the collision / bounce) Allow energy is transferred to thermal energy (during the collision / bounce) Ignore energy is transferred to the ground Ignore energy is wasted	**2**
14(b)(i)	**EITHER** Use of $v^2 = u^2 + 2as$ **(1)** velocity = (−)6.3 (m s^{-1}) (to at least 2 sig. figs.) **(1)** **OR** Use of $E = mgh$ and $E = 1/2mv^2$ **(1)** velocity = 6.3 (m s^{-1}) (to at least 2 sig. figs.) **(1)**	Example of calculation $v^2 = (0^2) + 2 \times 9.81\ \text{m s}^{-2} \times 2.0\ \text{m} = 39.2\ \text{m}^2\ \text{s}^{-2}$ $v = \sqrt{2 \times 9.81\ m\ s^{-2} \times 2\ m} = (-)6.26\ \text{m s}^{-1}$	**2**

14(b)(ii)	Use of appropriate equation of motion to determine t **(1)** Time = 0.64 (s) (to at least 2 sig. figs.) (e.cf. from 14(b)(i)) **(1)**	Example of calculation $-6.26\ \text{m s}^{-1} = (0) - 9.81\ \text{m s}^{-2} \times t$ $t = \frac{6.26\ \text{m s}^{-1}}{9.81\ \text{m s}^{-2}} = 0.639\ \text{s}$	**2**
14(b)(iii)	y-axis labelled velocity / v **and** x-axis labelled time / t **and** Graph starts with a straight line from the origin **(1)** Three bounces shown with velocity reversed direction to a smaller magnitude **(1)** (at least) 3 bounces shown as vertical lines to reversed velocity **Or** (at least) 3 bounces shown as instantaneous changes to reversed velocity. **(1)** Gradient between bounces is the same throughout (dependent on MP3) **(1)**	Example graph  	**4**
	Total for question 14		**10**

Question Number	Answer	Additional Guidance	Mark
15(a)	Any four from: • Initial gradient is the same for both graphs **(1)** • As the strain increases, the gradient of both graphs decreases **(1)** • As the strain increases the gradient of the toffee graph decreases more than that of the biscuit graph **Or** As the strain increases, For a given stress, the strain of the toffee bar is greater **(1)** • Both have the same/similar breaking stress **(1)** • Biscuit breaks at a lower strain than toffee bar **(1)** • Toffee stress decreases with strain after a certain point (but biscuit stress only increases with strain.) **(1)** • Area under the toffee bar graph (at breaking point) is greater than the area under the biscuit bar graph (at breaking point) **(1)**	Allow at low strain, stress is similar for both bars Allow the Young modulus is similar Allow ultimate tensile stress/strength for breaking stress Allow for the toffee bar, the gradient becomes negative after a certain point / stress / strain	**4**
15(b)	Material returns to original shape/size/length when stress/force/tension removed **(1)**		**1**
15(c)(i)	Use a metre rule **(1)** **Or** Use a vernier scale measure initial length and extended length (with mass added) **(1)** subtract the original length from the extended length **(1)**	Allow use vernier/digital callipers Allow measure initial reading and reading with mass added Do not accept measure the extension Allow calculate the difference between the initial and extended readings	**3**

15(c)(ii)	Corresponding pair of values of force and extension from graph **(1)** Use of $\sigma = \frac{F}{A}$ **and** $\varepsilon = \frac{\Delta x}{x}$ **Or** Calculates gradient **(1)** Use of $E = \frac{\sigma}{\varepsilon}$ **(1)** Young modulus = 4.9×10^4 Pa (allow answers in the range 4.7×10^4 Pa to 5.1×10^4) **(1)**	<u>Example of calculation</u> $\sigma = \frac{4.0\ \text{N}}{1.27 \times 10^{-4}\ \text{m}^2} = 31\,500\ \text{Pa}$ $\varepsilon = \frac{0.10\ \text{m}}{0.155\ \text{m}} = 0.645$ $E = \frac{31\,500\ \text{Pa}}{0.645} = 48\,800\ \text{Pa}$	**4**
	Total for question 15		**12**

Question Number	Answer		Additional Guidance	Mark
16(a)	Use of $p = mv$	**(1)**	Example of calculation	
	Use of conservation of momentum	**(1)**	$p_{white\ initial} = 2m \times 2.1\ \text{m s}^{-1}$	
	Velocity of green ball = 3.0 m s^{-1}	**(1)**	$(2m \times 2.1\ \text{m s}^{-1}) = (2m \times 0.6\ \text{m s}^{-1}) + mv$	**3**
			$v = 2 \times (2.1\ \text{m s}^{-1} - 0.6\ \text{m s}^{-1})$	
			$= 3.0\ \text{m s}^{-1}$	

***16(b)**

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.

IC points	IC mark	Max linkage mark	Max final mark
6	4	2	6
5	3	2	5
4	3	1	4
3	2	1	3
2	2	0	2
1	1	0	1
0	0	0	0

The following table shows how the marks should be awarded for structure and lines of reasoning**.**

	Number of marks awarded for structure of answer and sustained line of reasoning
Answer shows a coherent and logical structure with linkages and fully sustained lines of reasoning demonstrated throughout	2
Answer is partially structured with some linkages and lines of reasoning	1
Answer has no linkages between points and is unstructured	0

Indicative content

IC1 Initially the white ball has momentum

IC2 The white ball applies a force to the green ball and the green ball exerts a force on the white ball.

IC3 By Newton's third law, these forces are equal (in magnitude) and opposite (in direction)

IC4 So there is a resultant force on each ball (for the same time)

IC5 By Newton's first / second law the white ball decelerates and the green ball accelerates

IC6 So the momentum of the white ball decreases and the momentum of the green ball increases (by the same amount)

For IC6 ignore total momentum before = total momentum after collision

For IC6 ignore momentum is conserved

6

Total for question 16 **9**

Question Number	Answer		Additional Guidance	Mark
17(a)(i)	Resultant force = 0 Resultant moment = 0	**(1)** **(1)**		**2**
17(a)(ii)	The point at / through which the weight of the object / cupboard appears to act	**(1)**		**1**
17(b)	Use of $W = mg$ Use of moment of force = Fx Use of principle of moments Force on screw = 430 N **Or** (if moments taken about centre of back of cupboard) Force on screw = 850 N 430 N > 200 N so suggestion is incorrect **Or** comparison of calculated value with 200 N and consistent conclusion	**(1)** **(1)** **(1)** **(1)** **(1)**	Allow a calculation of total clockwise moment caused by weight of cupboard and weight of box **and** a calculation of anticlockwise moment caused by force of screw Example of calculation $W = 50\ \text{kg} \times 9.81\ \text{N kg}^{-1} = 491\ \text{N}$ $F \times 0.75\ \text{m} = 80\ \text{N} \times 0.30\ \text{m} + 491\ \text{N} \times 0.60\ \text{m} = 319\ \text{Nm}$ $F = \frac{319\ \text{Nm}}{0.75\ \text{m}} = 425\ \text{N}$ 425 (N) > 200 (N) so not correct	**5**
	Total for question 17			**8**

Question Number	Answer		Additional Guidance	Mark
18(a)	Use of $v^2 = u^2 + 2as$ vertically using consistent sign convention	**(1)**	Example of calculation	**3**
	Use of appropriate trigonometry to determine u	**(1)**	$0 = (u \times \sin(35°))^2 - 2 \times 9.81\ \text{m s}^{-2} \times 0.4\ \text{m}$	
	$u = 4.9\ (\text{m s}^{-1})$ (to at least 2 sig. Figs.)	**(1)**	$u = \sqrt{\frac{2 \times 9.81\ \text{m s}^{-2} \times 0.4}{(\sin(35°))^2}} = 4.88\ \text{m s}^{-1}$	
18(b)	Use of appropriate equation(s) of motion with $a = (-)9.81\ \text{m s}^{-2}$ and consistent sign convention to determine time taken to reach floor	**(1)**	Example of calculation	**5**
	$t = 0.86\ (s)$ (ecf from 18(a))	**(1)**	$u_{\text{vertical}} = 4.88\ \text{m s}^{-1} \times \sin(35°) = 2.8\ \text{m s}^{-1}$	
	Use of appropriate trigonometry to determine horizontal component of velocity	**(1)**	$-1.2 = 2.8\ \text{m s}^{-1} \times t - \frac{1}{2} \times 9.81\ \text{m s}^{-2} \times t^2$	
	Use of $s = ut + \frac{1}{2}at^2$ with $a = 0$	**(1)**	$t = 0.86\ s$	
	$d = 3.4\ \text{m}$ (ecf from 18(a))	**(1)**	$u_{\text{horizontal}} = 4.88\ \text{m s}^{-1} \times \cos(35°) = 4.00\ \text{m s}^{-1}$	
			$s = 4.00\ \text{m s}^{-1} \times 0.86\ s = 3.44\ \text{m}$	
	Total for question 18			**8**

Question Number	Answer		Additional Guidance	Mark
19a	Use of $\Sigma F = 0$ (i.e. upthrust = weight of iceberg)	**(1)**	<u>Example of calculation</u>	**5**
	Use of $\rho = \frac{m}{V}$	**(1)**	(At equilibrium,) upthrust = weight of iceberg	
	Use of $W = mg$	**(1)**	weight of displaced seawater = weight of iceberg	
	Volume of water displaced is 0.89 × volume of iceberg	**(1)**	$\rho_{\text{seawater}} \times V_{\text{displaed}} \times g = \rho_{\text{ice}} \times V_{\text{ice}} \times g$	
	Comparison of calculated value with 70% and consistent conclusion	**(1)**	$\frac{V_{\text{displaed}}}{V_{\text{ice}}} = \frac{\rho_{\text{ice}}}{\rho_{\text{seawater}}} = \frac{917\ \text{kg m}^{-3}}{1025\ \text{kg m}^{-3}} = 0.89$ 89 % $\neq$ 70% so not true	
19b	Weight of iceberg is constant **Or** Weight of seawater displaced is constant **Or** Upthrust is constant	**(1)**	Allow weight is constant Ignore mass (of iceberg) is constant	**3**
	Weight of iceberg = weight of seawater displaced **Or** Upthrust = weight of seawater displaced **Or** Upthrust $\propto$ volume of seawater displaced	**(1)**		
	There is an increase in the volume (of the iceberg under the surface, because density of seawater decreases) (Dependent on MP2)	**(1)**	Allow the volume of liquid displaced increases	
	Total for question 19			**8**