Pearson

Mark Scheme (Results)

October 2025

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

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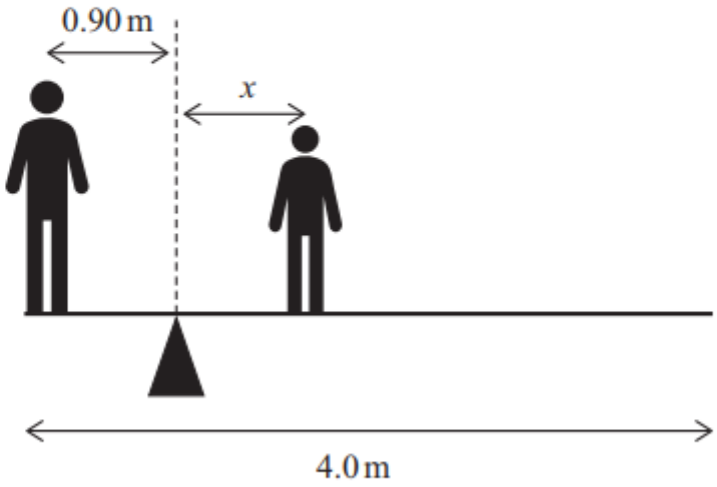
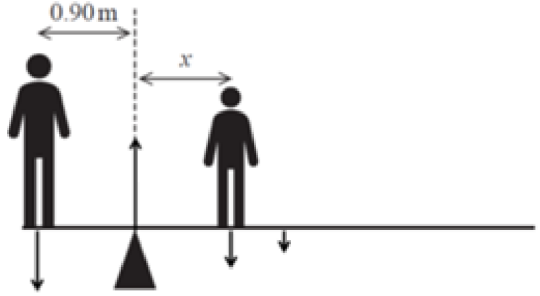
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General Marking Guidance

- 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.

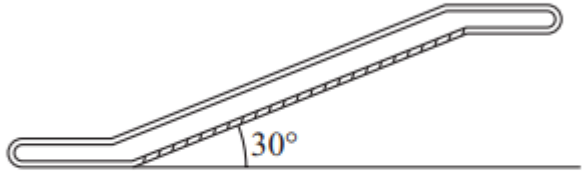
Question Number	Answer	Mark
1	**Which of the following is a vector quantity?**	
1	**The only correct answer is C** (velocity) A is not correct because distance is a scalar quantity B is not correct because speed is a scalar quantity D is not correct because work done is a scalar quantity	**1**
2	**What is the spring constant of the spring?**	
	The only correct answer is D (50 N m^{-1}) A is not correct because $k = \frac{\Delta F}{\Delta x} = \frac{1.5\text{ N}}{0.030\text{ m}} = 50\text{ N m}^{-1}$ B is not correct because $k = \frac{\Delta F}{\Delta x} = \frac{1.5\text{ N}}{0.030\text{ m}} = 50\text{ N m}^{-1}$ C is not correct because $k = \frac{\Delta F}{\Delta x} = \frac{1.5\text{ N}}{0.030\text{ m}} = 50\text{ N m}^{-1}$	**1**
3	**Which of the following SI units can only be used with a scalar quantity?**	
	The only correct answer is B (s) A is not correct because displacement is measured in metres C is not correct because velocity is measured in metres per second D is not correct because acceleration is a vector	**1**
4	**Which row of the table shows a graph with a gradient equal to *g*?**	
	The only correct answer is B (y-axis 2*s*; x-axis t^2) A is not correct because this would give a gradient of *g/2* C is not correct because this would give a gradient of 2/*g* D is not correct because this would give a gradient of 1/*g*	**1**
5	**Which of the following is a correctly drawn, scaled, vector diagram for the resultant *R* of forces P and Q?**	
	The only correct answer is D A is not correct because vector arrows should be added tip-to-tail and R is in the wrong direction B is not correct because R is in the wrong direction C is not correct because vector arrows should be added tip-to-tail and R goes between the wrong two points	**1**
6	**Assuming there is no air resistance acting on the projectile, which of the following is a correct statement?**	
	The only correct answer is C (The initial horizontal velocity is equal to the final horizontal velocity) A is not correct because the horizontal component of velocity remains constant throughout the motion. A constant value does not have a minimum or maximum, so it is not appropriate to describe the horizontal velocity as minimum B is not correct because at maximum height the vertical velocity is 0 D is not correct because the final position is below the initial position	**1**

7	**Which of the following correctly describes the work done W to extend the wire?**	
	The only correct answer is B ($W > 0.5F_1e_1$) A is not correct because the area under the graph is greater than the area of a triangle drawn from the origin to the end of the line C is not correct because work done is a force multiplied by a distance, not divided by a distance D is not correct because work done is a force multiplied by a distance, not divided by a distance	**1**
8	**Which of the following is the acceleration of the ball at its maximum height?**	
	The only correct answer is D (-9.8 m s^{-1}) A is not correct because the ball is in freefall so has acceleration due to gravity B is not correct because the ball is in freefall so has acceleration due to gravity C is not correct because the ball is in freefall so has acceleration due to gravity	**1**
9	**Which of the following statements is not correct for a Newton's 3rd law pair of forces?**	
	The only correct answer is B (the forces act on the same body) A is not correct because in a Newton's third law pair the forces act in opposite directions C is not correct because in a Newton's third law pair the forces are of the same type D is not correct because the forces have the same magnitude	**1**
10	**Which of the following expressions could be used to determine the velocity of the roller coaster car at Q?**	
	The only correct answer is D (90g) A is not correct because by conserving energy, the expression for speed in metres per second should be $\sqrt{2 \times g \times (75 - 30)}$ B is not correct because by conserving energy, the expression for speed in metres per second should be $\sqrt{2 \times g \times (75 - 30)}$ C is not correct because by conserving energy, the expression for speed in metres per second should be $\sqrt{2 \times g \times (75 - 30)}$	**1**

Question Number	Acceptable Answer	Additional Guidance	Mark
11(a)	A uniform plank of length 4.0 m is pivoted 0.90 m from one end. The weight of the plank is 250 N. A person of weight 950 N stands at one end of the plank. A person of weight 650 N stands a distance x from the pivot so that the plank is in equilibrium, as shown.  (a) Add to the diagram in the answer book to show the forces acting on the plank.		
	Three downward arrows to show the forces of the people and the weight of the plank **(1)** Upward arrow to show reaction force at the pivot **(1)**	Example diagram  	**2**

11(b)	**Calculate the distance *x*.**		
	Use of moment = $F\,x$ **(1)** Application of principle of moments **(1)** x = 0.89 m **(1)**	Example calculation $950\ \text{N} \times 0.90\ \text{m} = \left(\frac{4.0\ \text{m}}{2} - 0.90\ \text{m}\right) \times 250 + \text{x} \times 650\ \text{N}$ $x = \frac{(950\ \text{N} \times 0.90\ \text{m}) - (1.10\ \text{m} \times 250\ \text{N})}{650\ \text{N}}$ $x = \frac{855\ \text{Nm} - 275\ \text{Nm}}{650\ \text{N}} = 0.89\ \text{m}$	**3**

(Total for Question 11 = 5 marks)

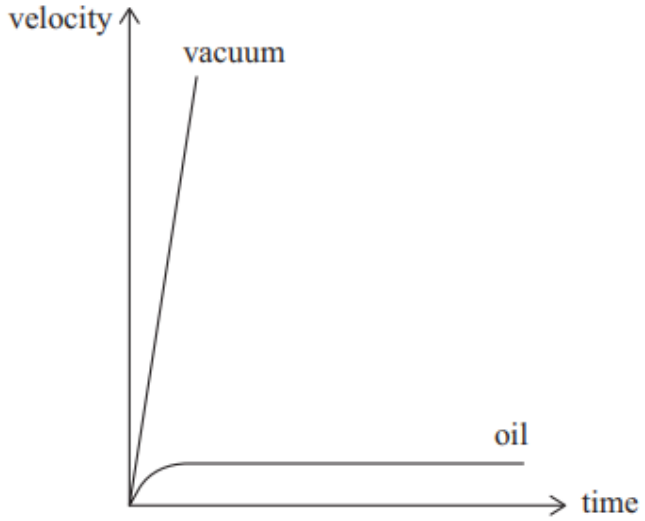
Question Number	Acceptable Answer	Additional Guidance	Mark
12	Moving walkways are often found in airports. One moving walkway carries passengers up an incline of 30°, as shown.   (Source: © ilolab/Shutterstock) (a) A single passenger of mass 72 kg stands on the walkway. The speed of the walkway is 0.51 m s^{-1}. Show that the rate at which the walkway does work on the passenger is about 200 W.		

12(a)	Use of appropriate trigonometry **(1)** Use of $\Delta E_{\text{grav}} = mg\Delta h$ **Or** Use of $W = Fs$ **(1)** P = 180 (W) **(1)**	See $\frac{\Delta h}{t} \times \sin(30°)$ $(= 0.255 \text{ m s}^{-1})$ Or see $mg \times \sin(30°)$ $(= 353 \text{ N})$ <u>Example calculation</u> $mg\frac{\Delta h}{t} = 72\text{kg} \times 9.81 \text{ N kg}^{-1} \times \sin(30°) \times 0.51 \text{ m s}^{-1}$ $P = 180 \text{ W}$	**3**
12(b)	**The walkway system has an efficiency of 78%. Calculate the power input to the system when 15 passengers of average mass 72kg are standing on the walkway.**		
	Calculates useful power output **(1)** Use of efficiency $= \frac{\text{useful power output}}{\text{total power input}}$ **(1)** Power input = 3500 W (= 3800 W if 'show that' value used) **(1)**	ecf from 12(a) <u>Example calculation</u> $P_{\text{useful}} = 15 \times 180 \text{ W} = 2700 \text{ W}$ $\text{efficiency} = 0.78 = \frac{2700 \text{ W}}{P_{\text{input}}}$ $P_{\text{input}} = \frac{2700 \text{ W}}{0.78} = 3460 \text{ W}$	**3**

(Total for Question 12 = 6 marks)

Question Number	Acceptable Answer	Additional Guidance	Mark
13(a)	**Stokes' law can be used to determine the magnitude of the viscous drag for small, spherical objects moving through a fluid. State one other condition that must be met in order for Stokes' law to apply to the moving object.**		
	Low speed **Or** laminar flow **Or** an absence of turbulent flow **(1)**	Ignore small sphere	**1**
13(b)	**A sphere falls through water at a constant speed of 0.50ms –1 . Assess whether Stokes' law can be applied to the falling sphere. You should include calculations in your answer. diameter of sphere = 6.0×10–3 m mass of sphere = 9.1×10–4 kg upthrust on sphere = 1.1×10–3N viscosity of water = 8.9×10–4Pa s.**		
	Use of $W = mg$ **(1)** Use of $U + D = W$ **(1)** Use of $F = 6\pi\eta rv$ **(1)** $F = (-)\ 2.5 \times 10^{-5}$ N **(1)** Comparison of calculated value of drag with calculated value for F and corresponding conclusion **(1)**	Example calculation $W = 9.1 \times 10^{-4}\ \text{kg} \times 9.81\ \text{N kg}^{-1} = 8.93 \times 10^{-3}\text{N}$ $\text{Drag} = 8.93 \times 10^{-3}\ \text{N} - 1.1 \times 10^{-3}\ \text{N} = 7.83 \times 10^{-3}\ \text{N}$ $F = 6\pi \times 8.9 \times 10^{-4}\ \text{Pa s} \times \frac{6.0 \times 10^{-3}\ \text{m}}{2} \times 0.50\ \text{m s}^{-1}$ $F = 2.52 \times 10^{-5}\ \text{N}$ $7.83 \times 10^{-3}\ \text{N} \neq 2.52 \times 10^{-5}\ \text{N}$, so no.	**5**

(Total for Question 13 = 6 marks)

Question Number	Acceptable Answer	Additional Guidance	Mark
*14	A teacher demonstrated the motion of a small sphere falling through a vacuum and through oil. The teacher used a motion sensor and data logger connected to a computer. The computer plotted graphs of velocity against time for the sphere as shown.  Explain the differences between the shapes of the graphs.		

***14**

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 Gradient of graph is equal to acceleration

IC2 In vacuum, drag = 0 (and upthrust = 0)
Or In vacuum, resultant force = weight
Or In vacuum, resultant force is constant
Or In vacuum the only force acting is weight

IC3 so in vacuum acceleration/gradient is constant

IC4 In oil, as speed increases, drag force increases

IC5 Until in oil resultant force becomes zero
Or until weight = drag (+ upthrust)
Or until weight – drag (– upthrust) = 0

IC6 so in oil acceleration/gradient decreases to zero
Or so in oil acceleration/gradient decreases until terminal/constant velocity is reached

6

(Total for Question 14 = 6 marks)

Question Number	Acceptable Answer	Additional Guidance	Mark
15(a)	**A student carried out an experiment to determine the Young modulus of copper. She added a mass m to the free end of a sample of copper in the form of a long thin wire and the corresponding extension Δx was measured. This was repeated for increasing masses. (a) State the meaning of the term Young modulus**		
	the stiffness of the material / metal / copper **Or** (Young modulus =) $\frac{\text{Stress}}{\text{Strain}}$ in the linear region **Or** (Young modulus =) $\frac{Fx}{A\Delta x}$ in the linear region with all terms defined **(1)**		**1**

15(b)(i)

The student repeated the measurement of the diameter of the wire at different positions and orientations of the wire.
She obtained the following results.

Diameter / mm	0.230	0.235	0.230	0.240

(i) Determine the cross-sectional area of the sample of wire used.

Calculates mean diameter **(1)**

Calculates cross sectional area **(1)**

$A = 4.3 \times 10^{-8}$ m^2 ($= 4.3 \times 10^{-2}$ mm^2) **(1)**

Example calculation

Mean diameter

$$= \frac{0.230 \text{ mm} + 0.235 \text{ mm} + 0.230 \text{ mm} + 0.240 \text{ mm}}{4}$$

$$\text{Mean diameter} = 0.234 \times 10^{-3} \text{ m}$$

$$A = \pi \frac{(0.234 \times 10^{-3}\, m)^2}{4} = 4.30 \times 10^{-8} \text{ m}^2$$

3

15(b)(ii)

The student plotted a graph of m against Δx. She measured the gradient and obtained a value of 195kgm –1 . Determine the Young modulus of the copper. length of sample of copper used = 3.50m

Use of $W = mg$ **(1)**

Use of $\sigma = \frac{F}{A}$ **and** Use of $\varepsilon = \frac{\Delta x}{x}$ **and** use of $E = \frac{\sigma}{\varepsilon}$

Or

Calculates gradient × $\frac{\text{length}}{\text{area}}$ **(1)**

Young modulus = 1.6×10^{11} Pa (ecf from (b)(i)) **(1)**

Example calculation

$$\frac{F}{\Delta x} = 195 \text{ kg m}^{-1} \times 9.81 \text{ N kg}^{-1} = 1913 \text{ N m}^{-1}$$

$$E = 1913 \text{ N m}^{-1} \times \frac{3.50 \text{ m}}{4.30 \times 10^{-8} \text{ m}^2} = 1.557 \times 10^{11} \text{ Pa}$$

3

15(b)(iii)	**The experiment was repeated by another student, using a 2.00m length of the copper wire. Suggest how the values obtained for the gradient and hence the Young modulus will differ between the students.**		
	The gradient will be greater (for the shorter wire) **(1)** The Young modulus is the same **(1)**		**2**

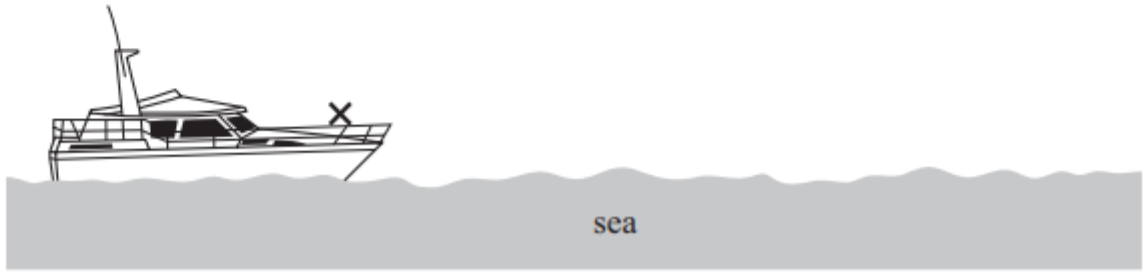
(Total for Question 15 = 9 marks)

Question Number	Acceptable Answer	Additional Guidance	Mark
16(a)	The photograph shows a fireboat used to put out fires on ships at sea. A pump, fixed to the boat, pumps water from the sea. The seawater is projected at high speed out of a pipe connected to the pump.  (Source: © Konrad Zelazowski/age fotostock/Superstock) (a) The mass of seawater pumped each second is 300 kg. The pipe has a radius of 5.0 cm. density of seawater = $1030\,kg\,m^{-3}$. Show that the speed at which the seawater is projected from the pipe is about $37\,m\,s^{-1}$.		

16(a)	Use of $\rho = \frac{m}{V}$ **(1)** Calculates cross sectional area of pipe **(1)** Use of volume in 1 second = cross section area × speed **(1)** Speed = 37.1 (m s^{-1}) (to at least 3 significant figures) **(1)**	Example calculation $V = \frac{300\ \text{kg}}{1030\ \text{kg m}^{-3}} = 0.291\ \text{m}^3$ $A = \pi \times (0.050\ \text{m})^2 = 7.85 \times 10^{-3}\ \text{m}^2$ $v = \frac{0.291\ \text{m}^3\ \text{s}^{-1}}{7.85 \times 10^{-3}\ \text{m}^2} = 37.10\ \text{m s}^{-1}$	**4**
16(b)	**Projecting water from the pipe causes a force to be exerted on the pump. Explain the direction of the force on the pump.**		
	Pump applies a (forward/upward/rightwards) force to the water **(1)** By Newton's third law, water applies an (equal and) opposite/backward/downward/leftward force to the pump **(1)** **OR** Pump applies a (forward/upward/rightwards) force to the pipe **(1)** By Newton's third law, pipe applies an (equal and) opposite/backward/downward/leftward force to the pump **(1)**	MP2 dependent on MP1 MP2 dependent on MP1 If no other marks scored, allow **1** mark for the direction of the water is to the right, so by Newton's third law the force of the water on the pump is to the left	**2**

16(c)	**Initially the pump is turned off and the fireboat moves forwards through the water at a constant speed. The boat's engine provides a constant forward force. When the pump is turned on, water is projected forwards and the fireboat slows to a lower constant speed. Explain why the boat now has a lower constant speed.**		
	When pump is turned on there is a resultant force backwards/leftwards on the boat, (so the speed decreases) **(1)** As speed decreases, drag force decreases **(1)** Until resultant force = zero (when speed becomes constant) **Or** Until drag force + force from pump = forward force from engine (when speed becomes constant) **Or** Resultant force = zero when speed is constant **(1)**		**3**

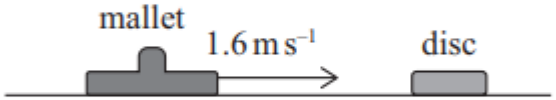
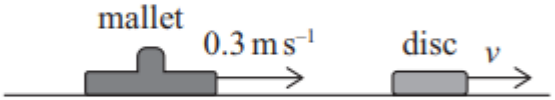
(Total for Question 16 = 9 marks)

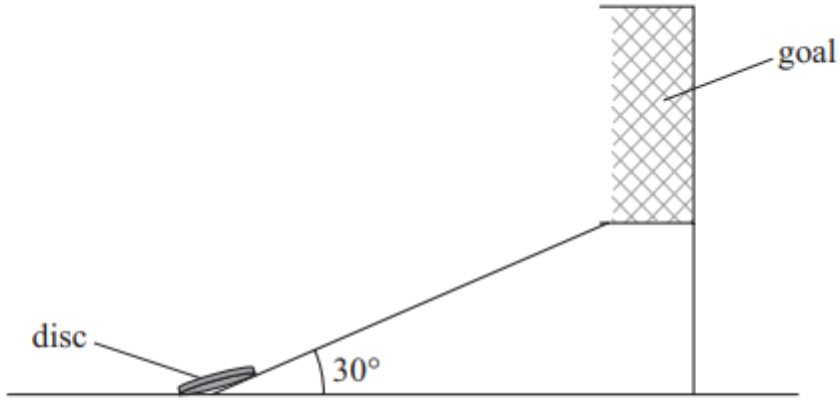
Question Number	Acceptable Answer	Additional Guidance	Mark
17(a)(i)	A distress flare may be launched from a boat, to signal for help. (a) A flare was launched from a stationary boat at an angle of 30° to the horizontal. (i) The flare was launched to the right from the launch position marked ✕ on the boat in the diagram below. Complete the diagram to show the path taken by the flare before it hit the sea. 		
	Initial angle at 30° (with a parabolic shape) (judge by eye) **(1)**	Example diagram 	**1**

17(a)(ii)	**The maximum height of the flare above the launch position was 42m. Show that the flare was launched at a speed of about 60ms –1.**			
	Use of $v^2 = u^2 + 2as$ (with $v = 0$) Use of appropriate trigonometry to determine initial velocity u = 57 (m s^{-1}) (to at least 2 significant figures)	**(1)** **(1)** **(1)**	Allow use of appropriate suvat equations to determine u <u>Example calculation</u> $0^2 = (u_{\text{vertical}})^2 + 2 \times (-9.81\ \text{m s}^{-2}) \times 42\ \text{m}$ $u_{\text{vertical}} = \sqrt{824} = 28.7\ \text{m s}^{-1}$ $u = \frac{28.7\ \text{m s}^{-1}}{\sin(30°)} = 57.4\ \text{m s}^{-1}$	**3**

17(a)(iii)	**The flare was visible from a maximum distance of 8km. A rescue boat was 8.2km from the boat in distress. Determine whether the flare travelled a sufficient distance to be visible from the rescue boat. You should assume that the flare was launched in the direction of the rescue boat.**			
	Use of suitable equation(s) of motion for vertical motion to determine the time of flight (with *a*—9.81) Use of appropriate trigonometry to determine horizontal component of velocity Use of $s = ut + \frac{1}{2}at^2$ for horizontal motion (with $a = 0$) Total horizontal distance travelled = 290 m, which is greater than 200 m so flare can be seen (show that value gives 320 m) (ecf from (a)(ii)) **Or** Horizontal distance to maximum height = 150 m, which is less than 200 m so flare cannot be seen (show that value gives 160 m) (ecf from (a)(ii))	**(1)** **(1)** **(1)** **(1)**	Example calculation $t = \frac{2 \times 57.4\ \text{m s}^{-1} \times \sin(30°)}{9.81\ \text{m s}^{-2}} = \frac{57.4\ \text{m s}^{-1}}{9.81\ \text{m s}^{-2}} = 5.85\ s$ $u_{\text{horizontal}} = 57.4\ \text{m s}^{-1} \times \cos(30°) = 49.7\ \text{m s}^{-1}$ $s = 49.7\ \text{m s}^{-1} \times 5.85\ \text{s} = 291\ \text{m}$ 291 m > 200 m so yes **OR** $t = \frac{57.4\ \text{m s}^{-1} \times \sin(30°)}{9.81\ \text{m s}^{-2}} = \frac{28.7\ \text{m s}^{-1}}{9.81\ \text{m s}^{-2}} = 2.93\ s$ $u_{\text{horizontal}} = 57.4\ \text{m s}^{-1} \times \cos(30°) = 49.7\ \text{m s}^{-1}$ $s = 49.7\ \text{m s}^{-1} \times 2.93\ \text{s} = 146\ \text{m}$ 146 m < 200 m so no	**4**

(Total for Question 17 = 8 marks)

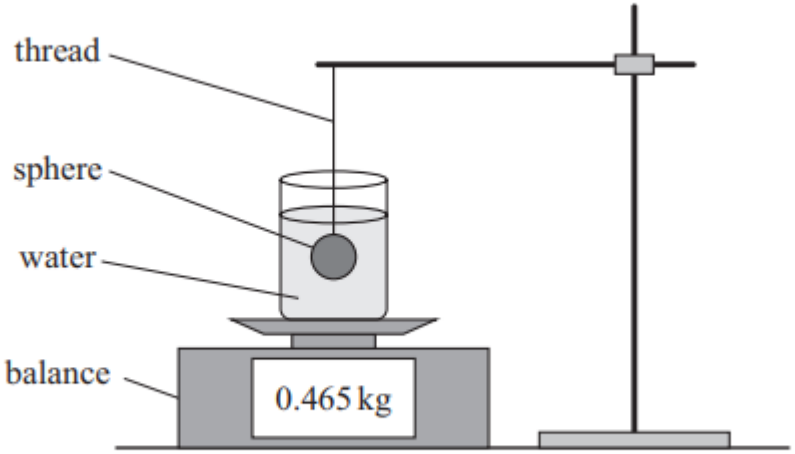
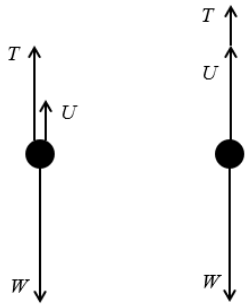
Question Number	Acceptable Answer	Additional Guidance	Mark
18(a)	A game is played where each player must use a 'mallet' to hit a disc across a table into the opponent's goal. One player accidentally lets go of a mallet. The mallet travels at a speed of $1.6\,m\,s^{-1}$ and collides with a stationary disc. After the collision, the mallet continues in the same direction at a lower speed of $0.3\,m\,s^{-1}$. The disc moves in the same direction as the mallet with a velocity v, as shown.  before collision  after collision (a) Calculate a value for v. Assume that frictional forces are negligible. mass of disc = 0.035 kg mass of mallet = 0.17 kg.		
	Use of $p = mv$ **(1)** Use of principle of conservation of momentum **(1)** $v = 6.3$ m s^{-1} **(1)**	<u>Example calculation</u> $0.17\ \text{kg} \times 1.6\ \text{m s}^{-1} = 0.17\ \text{kg} \times 0.30\ \text{m s}^{-1} + 0.035\ \text{kg} \times v$ $v = \dfrac{0.272\ \text{kg m s}^{-1} - 0.051\ \text{kg m s}^{-1}}{0.035\ \text{kg}} = 6.31\ \text{m s}^{-1}$	**3**

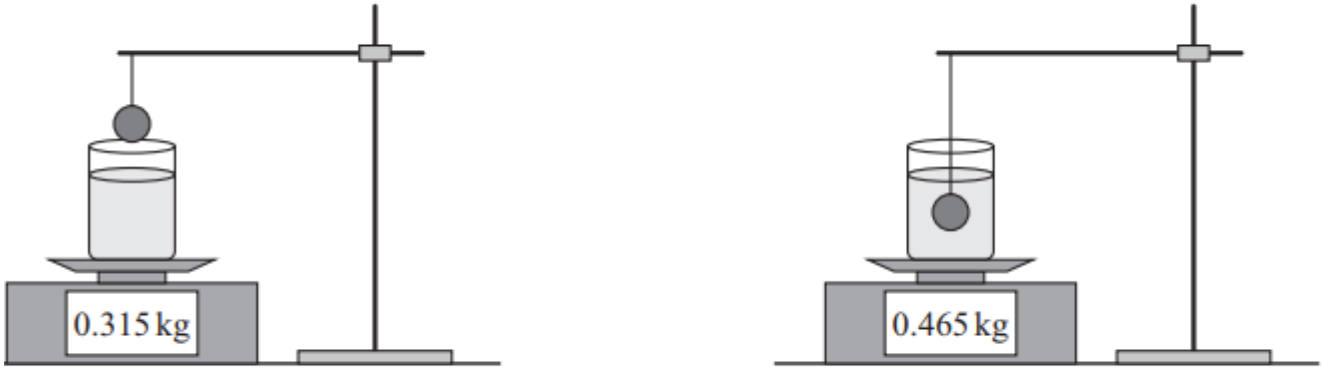
18(b)	To reach the goal, the disc must move up a ramp which is at an angle of 30° to the horizontal.  The velocity of the disc at the bottom of the ramp is $5.0\,m\,s^{-1}$. The disc moves up the ramp and work is done by the disc against the frictional force. The disc moves a distance of 6.5 cm up the ramp before moving back down. Determine the frictional force acting on the disc. mass of disc = 0.035 kg	

18(b)	Use of $E_k = \frac{1}{2}mv^2$	**(1)**		
	Use of appropriate trigonometry to determine vertical height moved by disc **Or** use of appropriate trigonometry to determine component of weight acting along slope	**(1)**	See $0.035\ \text{kg} \times 9.81\ \text{N kg}^{-1} \times \sin(30°)$ **Or** see $\sin(30°) \times 0.065\ \text{m}$	
	Use of $\Delta E_{grav} = mg\Delta h$ **Or** use of $W = Fs$ to determine work done against gravity	**(1)**		
	Use of principle of conservation of energy	**(1)**		
	Use of $W = Fs$	**(1)**		
	$F = 6.6$ N	**(1)**		
	OR			
	Use of $W = mg$	**(1)**		
	Use of appropriate trigonometry to determine component of weight acting along slope	**(1)**	See $0.035\ \text{kg} \times 9.81\ \text{N kg}^{-1} \times \sin(30°)$ **Or** see $0.34 \times \sin(30°)$	
	Use of $v^2 = u^2 + 2as$ to determine acceleration of disc	**(1)**	Allow use of any appropriate suvat method to determine acceleration of disc	
	Use of $\Sigma F = ma$	**(1)**		
	Use of friction = $\Sigma F -$ (component of weight acting along slope)	**(1)**		
	$F = 6.6$ N	**(1)**		**6**

		Example calculation $E_{\mathrm{k}} = \frac{1}{2} \times 0.035\ \mathrm{kg} \times (5.0\ \mathrm{m\ s^{-1}})^2 = 0.438\ \mathrm{J}$ $\Delta E_{\mathrm{grav}} = 0.035\ \mathrm{kg} \times 9.81\ \mathrm{N\ kg^{-1}} \times \sin(30°) \times 0.065\ \mathrm{m}$ $= 0.0112\ \mathrm{J}$ $W = 0.438\ \mathrm{J} - 0.0112\ \mathrm{J} = 0.427\ \mathrm{J}$ $F = \frac{0.427\ \mathrm{J}}{0.065\ \mathrm{m}} = 6.57\ \mathrm{N}$	

(Total for Question 18 = 9 marks)

Question Number	Acceptable Answer	Additional Guidance	Mark
19(a)	A student used the apparatus shown to investigate the forces acting on a uniform, solid sphere placed in water.  (a) Draw a free-body force diagram for the sphere when it is suspended in water as shown in the answer book.		
	Upwards arrow labelled upthrust / U **and** Upwards arrow labelled tension / T / F / F_{thread} **(1)** Downwards arrow labelled Weight / W / mg **(1)** Length of downwards arrow ≈ total length of upwards arrows (dependent on MP1 or MP2) **(1)**	Arrows must start from dot <u>Example diagrams</u>  	**3**

19(b)(i)	As the sphere was lowered into the water, the reading on the balance increased from 315 g to 465 g as shown.  (i) Explain the increase in the reading on the balance. Your answer should include a reference to Newton's third law.		
	The water exerts an upwards force on the sphere **(1)** **Or** the water exerts an upthrust on the sphere by Newton's third law the sphere exerts a downward/opposite force on water (dependent on MP1) **(1)** (so) the <u>force</u> on the balance increases (and the reading increases) **(1)**		**3**

19(b)(ii)	**Determine the mass of the sphere. density of water = 1000kgm –3 density of sphere = 2000 kgm –3**		
	mass of displaced water = 0.150 kg **(1)** Use of $\rho = \frac{m}{V}$ with $\rho = 1000$ kg m^{-3} to determine volume of sphere **(1)** Use of $\rho = \frac{m}{V}$ with $\rho = 2000$ kg m^{-3} to determine mass of sphere **(1)** Mass of sphere = 0.30 kg **(1)**	(credit correct equivalent physics due to the density of the sphere being double the density of the water leading to the answer of 0.30 kg if correct reasoning shown) <u>Example calculation</u> Mass of displaced water = 0.465 kg – 0.315 kg = 0.150 kg Volume of sphere = $\frac{0.150 \text{ kg}}{1000 \text{ kg m}^{-3}} = 1.50 \times 10^{-4}$ m^3 Mass of sphere $2000 \text{ kg m}^{-3} \times 1.5 \times 10^{-4} \text{ m}^3 = 0.300 \text{ kg}$	**4**
19(b)(iii)	**The water was replaced with the same mass of oil and the experiment repeated. The density of the oil is less than the density of water. Explain the change in the reading on the balance when the sphere was suspended in oil.**		
	Upthrust will be less **Or** weight of displaced oil will be less **Or** downwards force of sphere on liquid will be less **(1)** (So) final reading will be less (than 465 g) **Or** (So) the increase/change in reading will be less (than 150 g) **(1)**	MP2 dependent on MP1	**2**

(Total for Question 19 = 12 marks)

TOTAL FOR PAPER = 120 MARKS