Name of the Student:_____
Max. Marks : 18 Marks **Time : 18 Minutes**

Mark Schemes

Q1.

Question Number	Answer	Additional guidance	Mark
(i)	recall (1) $(P =) \frac{E}{t}$ substitution and evaluation (1) (P=) 75 (W)	P = work done ÷ time $P = \frac{45}{0.6}$ award full marks for the correct answer without working	**(2)**

Question Number	Answer	Additional guidance	Mark
(ii)	substitution into $E = \frac{1}{2} \times k \times x^2$ (1) $45 = \frac{1}{2} \times 140 \times x^2$ rearrangement (1) $(x =) \sqrt{\frac{2 \times 45}{140}}$ evaluation (1) 0.8(0) (m)	allow substitution and rearrangement in either order $x^2 = (\frac{E}{0.5k} =) \frac{2 \times 45}{140}$ $x^2 = 0.64(28571)$ accept values that round to 0.80 e.g. 0.80178 award full marks for the correct answer without working	**(3)**

Q2.

Question number	Answer	Additional guidance	Mark
	substitution (1) $2{,}800 = ½ \times 85 \times v^2$ rearrangement (1) $(v^2 =) \frac{2800 \times 2}{85}$ evaluation (1) v = 8.1 (m/s)	allow substitution and rearrangement in either order 66 or 65.88 seen allow values that round to 8.1 e.g 8.1168 award full marks for the correct answer without working	**(3)** **AO2**

Q3.

Question number	Answer	Additional guidance	Mark
(i)	substitution into work done = force x distance (1) 1800 = force x 1.2 rearrangement and evaluation (1) (force =) 1500 (N)	alternative method rearrangement (1) $(\text{force} =) \frac{\text{work (done)}}{\text{d(istance moved)}}$ **or** $(\text{force} =) \frac{1800}{1.2}$ (substitution and) evaluation (1) (force =) 1500 (N) if no other marks scored allow one mark for answer of 500 (N) or 4500 (N) award full marks for correct answer without working.	**(2)** **AO2**

Question number	Answer	Additional guidance	Mark
(ii)	substitution (1) $64 = \frac{1800 \times 100}{\text{total work done}}$ **or** $0.64 = \frac{1800}{\text{total work done}}$ rearrangement and evaluation (1) (work done =) 2800 (J)	alternative method re-arrangement (1) (total work done =) $\frac{\text{work done on barrel} \times 100}{\text{efficiency}}$ **or** (work done=) $\frac{1800 \times 100}{64}$ **or** (work done=) $\frac{1800}{0.64}$ (substitution and) evaluation (1) (work done =) 2800 (J) allow values that round to 2800; e.g. 2812.5 award full marks for correct answer without working.	**(2)** **AO2**

Question number	Answer	Additional guidance	Mark
(iii)	any **one** of additional mass in the system (1) rope stretches (1)	 (bottom) pulley / rope has {mass / weight} ignore references to the mass / weight of barrel tension in rope ignore references to consequences of friction such as air resistance, heat or sound. ignore pulling at an angle ignore references to person	**(1)** **AO1**

Q4.

Question number	Answer	Mark
(a)	C	**(1)**

Question number	Answer	Mark
(b)(i)	change in GPE = mass × gravitational field strength × change in vertical height	**(1)**

Question number	Answer	Additional guidance	Mark
(b) (ii)	transformation (1) $h = \Delta E \div mg$ substitution (1) $h = 39\,000 \div (580 \times 10)$ evaluation (1) 6.7 (m)	accept use of $g = 9.81$ accept 6.72 accept 6.85 (from $g = 9.81$)	(3)