

Name of the Student: _____

Max. Marks : 21 Marks

Time : 21 Minutes

Mark Schemes

Q1.

Question Number	Acceptable Answer	Additional Guidance	Mark
(i)	- Use of $v = u + at$ (1) $a = 0.81 \text{ m s}^{-2}$ (1)	<u>Example of calculation</u> $a = \frac{v - u}{t} = \frac{97 \text{ m s}^{-1}}{120 \text{ s}} = 0.808 \text{ m s}^{-2}$	2
(ii)	- Use of $s = ut + \frac{1}{2}at^2$ Or $v^2 = u^2 + 2as$ Or $s = \left(\frac{v+u}{2}\right)t$ (1) - Use of $v_{av} = \frac{s}{t}$ with $t = 320 \text{ s}$ (1) $v_{av} = 75 \text{ m s}^{-1}$ (1)	Ecf acceleration from (a)(i) <u>Example of calculation</u> $s = ut + \frac{1}{2}at^2 = 0.5 \times 0.808 \text{ m s}^{-2} (120 \text{ s})^2 = 5820 \text{ m}$ $s_2 = 29900 \text{ m} - 5820 \text{ m} = 24080 \text{ m}$ $t = 440 \text{ s} - 120 \text{ s} = 320 \text{ s}$ $v_{av} = \frac{24080 \text{ m}}{320 \text{ s}} = 75.3 \text{ m s}^{-1}$	3

Q2.

Question Number	Acceptable Answer	Additional Guidance	
	- Use of $s = \frac{(u+v)}{2} \cdot t$ (1) - Use of $E_k = \frac{1}{2}mv^2$ (1) - Use of $P = \frac{\Delta W}{\Delta t}$ (1) $P = 110 \text{ W}$ (1)	Example of calculation: $32.5 \text{ m} = \frac{(u+0)}{2} \times 17.5 \text{ s}$ $\therefore u = \frac{32.5 \text{ m} \times 2}{17.5 \text{ s}} = 3.71 \text{ m s}^{-1}$ $P = \frac{\Delta E_k}{\Delta t} = \frac{\frac{1}{2} \times 19.6 \text{ kg} \times (3.7 \text{ m s}^{-1})^2}{1.25 \text{ s}} = 107 \text{ W}$	4

Q3.

Question Number	Answer	Additional Guidance	Mark
	- Tangent drawn at $t = 4.0 \text{ s}$ (1) - Gradient of tangent determined (1) a in the range $1.4 - 1.6 \text{ m s}^{-2}$ (1)	<u>Example of calculation</u> $a = \frac{(35.0 - 25.0) \text{ m s}^{-1}}{(10.0 - 0.0) \text{ s}} = 1.50 \text{ m s}^{-2}$	3

Q4.

Question Number	Answer	Additional Guidance	Mark
	- Use of displacement = area under line (1) 1 square = 20 m (1) Or area divided into regular shapes s in the range 410 – 430 m (1)	<u>Example of calculation</u> Number of squares = 42 $1 \text{ square} = 2 \text{ s} \times 5 \text{ m s}^{-1} = 10 \text{ m}$ $s = 42 \times 10 \text{ m} = 420 \text{ m}$	3

Q5.

Question Number	Answer	Additional Guidance	Mark
	- Use moment = $F x$ (1) $x = 0.49 \text{ m}$ (1)	<u>Example of calculation</u> $6.5 \text{ N} \times (0.75 \text{ m} - x) = 3.5 \text{ N } x$ $4.875 \text{ Nm} - 6.5 x = 3.5 x$ $x = \frac{4.875 \text{ Nm}}{10 \text{ N}} = 0.488 \text{ m}$	2

Q6.

Question Number	Answer	Additional Guidance	Mark
	• Use of $V = IR$ (1) • Use of $P = I^2 R$ (1) • Use of $P = \frac{E}{t}$ (1) • $E = 320 \text{ J}$ ECF from (a) (1) [show that answer gives 323 J] Or • Use of $V = IR$ to find I (1) • Use of $V = IR$ to find terminal pd (1) • Use of $W = VIt$ (1) • $E = 320 \text{ J}$ ECF from (a) (1) [show that answer gives 323 J]	<u>Example of calculation</u> $I = \frac{9 \text{ V}}{(72+2.5) \Omega} = 0.121 \text{ A}$ $P = (0.121 \text{ A})^2 \times 72 \Omega = 1.05 \text{ W}$ $E = 1.05 \text{ W} \times 300 \text{ s} = 316 \text{ J}$	4