Question	Scheme	Mark	Notes
5a	Use of $P = Fv$ $\left(F = \frac{500}{6}\right)$	M1	
	Equation of motion	M1	Dimensionally correct. Required terms and no extras
	$F - 60 = 80a$	A1	Correct unsimplified equation in F
	$a = \frac{7}{24}\left(\text{m s}^{-2}\right)$	A1	0.29 or better (0.291666666..)
		[4]	
5b	Gain in KE = $\frac{1}{2} \times 80 \times 8^2 \text{(J)} \left(= 2560\text{(J)}\right)$ Gain in GPE = $80 \times 9.8 \times 300 \text{ (J)} \left(= 235200\text{(J)}\right)$ Work done against resistance $= 20\,000 \times 60$	B1 B1	Any one correct (seen or implied) A second term correct (seen or implied) (KE gain + GPE gain = 237760 J)
	Use of *suvat* and $F = ma$ is M0A0A0		
	expression for combined work and energy	M1	All terms required and no double counting. Mass replaced with 80. Condone sign errors. Dimensionally correct. Condone error in zeros in $20\,000$
	Total work done $= 40 \times 64 + 80 \times 9.8 \times 300 + 20\,000 \times 60$	A1	Correct unsimplified expression for the work done
	$1440\left(\text{kJ}\right)$ or $1400\left(\text{kJ}\right)$	A1	Accept answers in joules. 3 sf or 2 sf (1437760)
		[5]	
5c	Equation of motion	M1	Dimensionally correct. Required terms and no extras
	$F - 60 - 80g \times \sin\alpha = 0$ $\frac{P}{7} - 60 - 80g \times \frac{1}{20} = 0$	A1 A1	Unsimplified equation in P or F with at most one error Correct unsimplified equation in P
	$P = 694$ or $P = 690$	A1	3sf or 2 sf only
		[4]	
		(13)	