Question	Scheme	Marks	AOs
3(a)	Equation of motion for Q	M1	3.3
	$3g - T = 3a$ or $T - 3g = 3a$	A1	1.1b
		(2)	
(b)	For P: $T = 2a$ or $-T = 2a$ For system: $3g = 5a$ or $-3g = 5a$	B1	1.1b
	Solve for a	M1	3.4
	Acceleration $= \frac{3}{5}g = 5.9\left(\text{m s}^{-2}\right)$ or $5.88\left(\text{m s}^{-2}\right)$	A1	1.1b
		(3)	
(c)	Form an equation in v only e.g. $v^2 = 2\times(\text{their } a)\times 0.4$	M1	3.1b
	Speed = $2.2\left(\text{m s}^{-1}\right)$ or $2.17\left(\text{m s}^{-1}\right)$	A1	1.1b
		(2)	
(d)	Form an equation in K only e.g. $K = \frac{1.2 - 0.4}{\textit{their } 2.2}$	M1	3.1b
	$K = 0.37$ or $K = 0.369$	A1	1.1b
		(2)	
(e)	Acceleration will be less, with a reason.	B1	3.5c
		(1)	
(f)	e.g. Consider the dimensions or shape of the packages or not modelling the packages as particles Consider resistance in the pulley Consider the weight or mass of the pulley Consider the weight or mass or dimensions of the rope Consider elasticity of the rope B0 use a more accurate value for g make the model 3D **N.B. Ignore** mention of resistance or friction from the table and/or air resistance.	B1	3.5c
		(1)	
			Total 11 marks

Notes:

(a)

M1: Equation of motion for Q. Dimensionally correct. All relevant terms and no extras. Condone sign errors.
Must appear in (a)
Consistent inclusion of m : $3mg - T = 3ma$, can score M1A0

A1: Correct equation, must appear in (a).

(b)

B1: Equation of motion for P, consistent with their equation for Q,
or for whole system.
Inclusion of m here is B0.

M1: Obtain equation in a and solve
N.B. If not using a valid attempt at a system equation with mass 5, they must be solving two equations in T and a which are dimensionally correct
i.e. force = mass $\times$ a

A1: Answer to 2 sf or 3 sf only. Must be positive.

(c)

M1: Complete method using *suvat* to form an equation in v or v^2 using their a, even if negative.
N.B. Must have found a value for a.

A1: Answer to 2 sf or 3 sf

(d)

M1: Complete method to form an equation in K only

A1: Answer to 2 sf or 3 sf

(e)

B1: Correct conclusion with a reason. B0 if no reason given.

(f)

B1: Must relate to an aspect of the model. B0 if any incorrect extras included.