Name of the Student:_____
Max. Marks : 20 Marks **Time : 20 Minutes**

Mark Schemes

Q1.

Question Number	Acceptable answers		Additional guidance	Mark
(a)	• V at top/start = 0V **Or** recognition "potential divider" **Or** V increases (by implication) **Or** V at bottom = 1.5V	(1)	**Alternative MS** Constant Current (I) in wire (1) p.d. across section of wire = Ir between A and loop (1) Increases from 0V to 1.5V linearly (1)	3
	• Two sections of wire act as series resistors **Or** $R=\rho l/A$ **Or** comment about R proportional to length **Or** $\frac{V}{1.5}=\frac{R}{R_T}$	(1)		
	• potential difference proportional to length of wire	(1)		

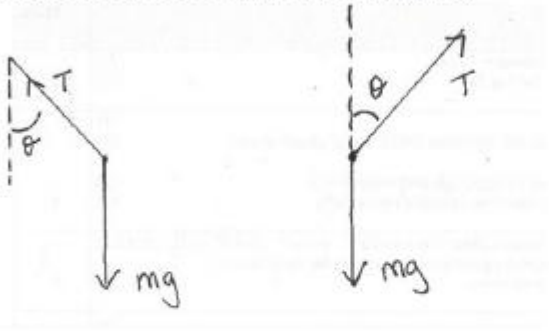
Question Number	Acceptable answers		Additional guidance	Mark
(b)	• Tangent drawn at 1.5 s	(1)	Example of calculation Gradient = $\frac{1.1\text{V}-0.2\text{V}}{1.0\text{s}}=0.9\text{Vs}^{-1}$ As 1.5 V represents 2.00 m $v=0.9\ \text{Vs}^{-1}\times\frac{2.00\text{m}}{1.5\text{V}}=1.2\ \text{ms}^{-1}$	4
	• Scales p.d. to give distance	(1)		
	• Gradient determined using a base of triangle of at least 1.0 s **Or** use of $s=\frac{(u+v)}{2}t$ **and** correct V read from graph	(1) (1)		
	• velocity = 1.0 m s^{-1} – 1.3 m s^{-1}			

Question Number	Acceptable answers		Additional guidance	Mark
(c)	• Use of $v = u + at$	(1)	Example of calculation $1.5\,\text{ms}^{-1} = 1.2\,\text{m s}^{-1} + \text{a} \times 0.5\,\text{s}$ $a = \frac{0.3\,\text{m s}^{-1}}{0.5} = 0.6\,\text{m s}^{-2}$ $0.6\,\text{m s}^{-2} = 9.81\,\text{m s}^{-2} \sin\theta$ $\theta = 3.6°$	4
	• Use of $a = g\sin\theta$	(1)		
	• Calculates a value for a, θ or v (using a SUVAT AND $a = g\sin\theta$)	(1)		
	• Valid comparison of their calculated quantity and the stated quoted uncertainty.	(1)		

Q2.

Question Number	Acceptable Answer		Additional Guidance	Mark
	• Use of $W = QV$	(1)	Example of calculation: $\frac{1}{2}mv^2 = eV$ $\therefore v = \sqrt{\frac{2 \times 1.6 \times 10^{-19}\,\text{C} \times 8.5 \times 10^{3}\,\text{V}}{(34.97 \times 1.66 \times 10^{-27})\,\text{kg}}} = 2.16 \times 10^{5}\,\text{ms}^{-1}$	4
	• Use of $KE = \frac{1}{2}mv^2$	(1)		
	• Use of $1\text{u} = 1.66 \times 10^{-27}$ kg	(1)		
	• $\text{v} = 2.16 \times 10^{5}$ (m s^{-1})	(1)		

Q3.

Question Number	Answer	Mark
	Free body force diagram showing 2 forces only Weight/W/mg **(1)** Tension / T **(1)** (Each additional forces e.g. horizontal component or resultant force, 1 mark penalty) **If θ is angle to the vertical then**: (Resolving vertically): $T\cos\theta = mg$ **(1)** (Resolving horizontally): $T\sin\theta = mv^2/r$ **Or** $T\sin\theta = mr\omega^2$ **(1)** Derives $\tan\theta = v^2/rg$ **and** links to observations **Or** Derives $\tan\theta = r\omega^2/g$ **and** links to observations **(1)** If angle to horizontal is used candidates can score MP3 and 4.[then sin and cos swop over and tan of angle will be reciprocal of above] <u>Examples of free body force diagrams</u>  (full credit for the last 3 marks can be given to candidates who draw a vector triangle and derive $\tan\theta = T_{horzt}/mg$ and then $\tan\theta = r\omega^2/g$ **and** observation)	**5**
	Total for question	**5**