Question Number	Answer	Mark
12a	Arrow upwards along wire labelled tension (accept *T*) (1) Arrow downwards from bob labelled weight (accept *W, mg,* gravitational force, force due to gravity) (1)	**2**
12bi	Resolve vertically $T\cos\theta = mg$ (1) Resolve horizontally $T\sin\theta = m\omega^2 r$ **Or** $T\sin\theta = \frac{mv^2}{r}$ (1) Use radius of circular path = $l \times \sin\theta$ (1) Suitable algebra (1) <u>Example of derivation</u> $T\cos\theta = mg$ $T\sin\theta = m\omega^2 r$ $T\sin\theta = ml\sin\theta\,\omega^2$ $\cos\theta = \frac{g}{l\omega^2}$ $\omega = \sqrt{\frac{g}{l\cos\theta}}$	**4**
12bii	Use of $\omega = \sqrt{\frac{g}{l\cos\theta}}$ (1) Use of $T = \frac{2\pi}{\omega}$ (1) Confirmation of value of T = 5.0 (s) with conclusion **Or** l = 6.4 (m) with conclusion **Or** θ = 13.9 (°) with conclusion **Or** g = 9.81 (N kg^{-1}) with conclusion **Or** calculates ω = 1.26 (s^{-1}) from both equations with conclusion (1) <u>Example of calculation</u> $\omega = \frac{2\pi}{5.0\text{s}} = 1.26\ \text{s}^{-1}$ $\omega = \sqrt{\frac{9.81\ \text{N kg}^{-1}}{6.4\ \text{m} \times \cos 13.9^\circ}}$ $\omega = 1.26\ \text{s}^{-1}$	**3**
	Total for question 12	**9**