

Question Number	Answer	Mark
15a	Difficult to judge/measure the exact position of node Or Ruler is not close to the string (so there might be parallax error) (1)	1
15bi	<p>Calculates gradient by best fit or plotted points from graph (1)</p> <p>Recognises distance between adjacent nodes = $\lambda/2$ Or Recognises that speed of waves on the string = $2 \times$ gradient (1)</p> <p>Use of $v = \sqrt{\frac{T}{\mu}}$ to find T (1)</p> <p>Use of $T = mg$ with $g = 9.81 \text{ Nkg}^{-1}$ (accept $W = mg$) (1)</p> <p>$m = 0.21 \text{ kg}$ (1)</p> <p><u>Example of calculation</u> Gradient = $\frac{2.7 \text{ m}}{0.080 \text{ s}} = 33.75 \text{ ms}^{-1}$ Speed = $2 \times$ gradient = 67.5 ms^{-1} $v = \sqrt{T/\mu}$, $67.5 \text{ ms}^{-1} = \sqrt{\frac{T}{4.5 \times 10^{-4} \text{ kg m}^{-1}}}$ $T = 2.05 \text{ N}$ $m = \frac{W}{g} = \frac{T}{g} = \frac{2.05 \text{ N}}{9.81 \text{ Nkg}^{-1}} = 0.209 \text{ kg}$</p>	5
15bii	<p>Straight line with shallower gradient drawn, starting from origin (1) Line has a gradient of around $0.7 \times$ line drawn (1)</p> <p>(Graph line if continued to the last value for $1/f$ should be between 1.8 and 2.0m for d).</p>	2
Total for question 15		8