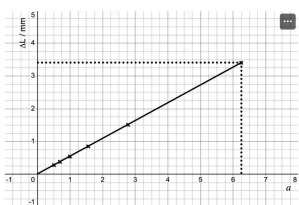


Physics

Higher level

Paper 2

Markscheme

Question	Answer	Note	Marks
1 (a)	Pa ✓	Accept N m ⁻²	1
1 (b)	Mass affects force applied onto wire ✓ Force applied affects change in length [as per formula] ✓		2
1 (c)	1/r ² OR r ⁻² ✓ mm ⁻² ✓		2
1 (d)	 $\Delta L = \frac{FL}{EA}$ $\Delta L = \frac{mgL}{\pi r^2 E}$ $\Delta L = \frac{mgL}{\pi(\Delta a L r^2)} \quad \checkmark$ $E = \frac{(20)(9.81)(1.00)}{\pi(\frac{3.40 \times 10^{-3}}{6.25 \times 10^{-6}})} \quad \checkmark$	<p>Award ✓ for line of best fit, ✓ for triangle drawn</p> <p>Accept range of ΔL as 3.35-3.45</p>	5

	$E \approx 1.15 \times 10^{11} \text{ Pa} \checkmark$		
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Question	Answer	Note	Marks
2 (a)	<p>Any of:</p> <p>Mass destroying the string and potentially damaging the floor</p> <p>Wire is sharp so could cause cuts</p> <p>Loose screws causing damage</p> <p>\checkmark</p>	Accept OWTTE	1
2 (b)	$\text{kg}^{-\frac{1}{2}} \text{m}^{-\frac{1}{2}} \checkmark$		1
2 (c)	<p>46.4 \checkmark</p> <p>$\text{s}^{-1} \text{kg}^{-1} \checkmark$</p>	Accept reasonable range	2
2 (d)	<p>Assumed mass of string was zero \checkmark</p> <p>Therefore, there is still some tension in the string at $m=0$ that allows for vibration \checkmark</p>	Accept OWTTE	2

2 (e)	<p>Uncertainty in mass leads to uncertainty in the horizontal axis (\sqrt{m}), affecting data point positions. ✓</p> <p>Uncertainty in frequency leads to uncertainty in the vertical axis, increasing scatter and uncertainty in the calculated gradient. ✓</p>	Accept OWTTE	2
2 (f)	<p>Increasing tension increases the frequency, which increases the kinetic and potential energy of the string. ✓</p> <p>Higher tension means greater restoring force and faster oscillation, increasing the total energy stored. ✓</p>	Accept OWTTE	2