17a (Two) waves travelling in opposite directions Or wave meeting its reflection Nodes are points of zero/minimum amplitude and antinodes are points of maximum amplitude Nodes linked to destructive interference and antinodes linked to constructive interference (1) 17b Equates $v = f\lambda$ and $v = \sqrt{(T/\mu)}$ Rearranges to give $f^2 = \frac{T}{\mu \lambda^2}$ Or $f^2 = \frac{T}{\mu(2L)^2}$ (1) Replaces T with W in equation (1) Where μ and λ are constants Or where μ and L are constants (1) $f^2 \alpha W$ Or no "c" in "y=mx +c" Or y-intercept is 0 Or in the format $y = mx$ (1) (MP5 is dependent on some correct working leading to an equation) (Award MP4 if stated that $\frac{1}{\mu \lambda^2}$ = constant or equivalent in terms of I) 17c (Connect signal generator to) cathode ray oscilloscope Or record movement of the string with a video camera (Measure time period T and) calculate $f = 1/T$ 17d Use of $v = \sqrt{(T/\mu)}$ Identifies that $\lambda = 2L$ (1) Example of calculation	Question Number	Answer		Mark
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$\mu = 4.3 \times 10^{-4} \text{ kg m}^{-1}$ Example of calculation (1)	17d	Use of $v = \sqrt{(T/\mu)}$	(1)	
$\frac{\mu - 4.3 \times 10^{-6} \text{ kg m}}{\text{Example of calculation}}$		Identifies that $\lambda = 2L$	(1)	
		$\mu = 4.3 \times 10^{-4} \mathrm{kg} \;\mathrm{m}^{-1}$	(1)	3
$659 \text{ Hz} \times (2 \times 0.328 \text{ m}) = \sqrt{(80.0 \text{ N} / \mu)},$		$f\lambda = \sqrt{(T/\mu)},659 \text{ Hz} \times (2 \times 0.328 \text{ m}) = \sqrt{(80.0 \text{ N} / \mu)},$		
$\mu = 4.3 \times 10^{-4} \text{ kg m}^{-1}$ Total for question 17		<u> </u>		13