Question Number	Answer		Mark
3(a)	• Ensure metre rule is vertical • Measure d in multiple places **and** calculate the mean • Measure the time taken for the wave to travel at least 2 lengths of the tray **Or** measure the time taken for the wave to travel the length of the tray, repeat this **and** calculate the mean average time/speed **Or** use a video camera to film the wave to determine the time taken • Calculate v using the average time for the wave to travel 40 cm (accept $v = 0.40$ m/t) **Or** calculate v using total distance the wave travelled in the time measured	**(1)** **(1)** **(1)** **(1)**	**4**
3(b)(i)	**EITHER** • Plot a graph of v^2 on the y-axis against d on the x-axis **Or** compared $v^2 = kd$ with $y = mx$ • The gradient will be k MP2 dependent on MP1 **OR** • Plot a graph of v^2 on the x-axis and d on the y-axis • The gradient will be $1/k$ MP2 dependent on MP1	 **(1)** **(1)** **(1)** **(1)**	**2**
3(b)(ii)	**Max ONE from** • Values of d recorded to inconsistent decimal places (d.p.) • Inconsistent significant figures (s.f.) for k values calculated • No evidence of repeated measurement • Not enough depths tested (to plot a graph) • $k = 9.9$ incorrectly rounded (9.96)	 **(1)** **(1)** **(1)** **(1)** **(1)**	**1**
3(b)(iii)	• Mean value of $k = 9.71$ (m s^{-2}) • Calculates percentage difference from 9.81 m s^{-2} • Percentage difference small so k could be gravitational field strength (Allow correct conclusion from their calculated mean k value) MP3 depends on MP2 For MP2, the denominator must be the published value (9.81 m s^{-2}) <u>Example of calculation</u> Mean $k = (9.36 + 9.9 + 9.88) / 3 = 9.71$ Percentage difference = $[(9.81 – 9.71) / 9.81] \times 100\% = 1\%$, which is small so k could be g.	**(1)** **(1)** **(1)**	**3**
	Total for question 3		**10**