Question Number	Answer	Mark
5(a)(i)	• Number N of divisions between 7.1 and 7.3 (1) • Use of $t = N \times$ time per division (1) • Use of $s = ut$ (1) • u value between 342 and 352 (m s^{-1}) (1) Do not accept use of $v = f\lambda$ for MP3 & MP4 <u>Example of Calculation</u> $t = 7.2 \times 0.5 \times 10^{-3}$ s $= 3.6 \times 10^{-3}$ s u = 1.25 m / 3.6×10^{-3} s = 347 m s^{-1}	**4**
5(a)(ii)	• Use of $s = ut$ to find time between peaks (1) • Use of time per division to calculate maximum time that could be shown on the oscilloscope screen **Or** use of screen width to calculate time per division required to show both peaks on the oscilloscope screen **Or** use of time per division to calculate how many divisions would be required to show both peaks on the oscilloscope screen (1) • Concludes that time displayed on the screen would be too short **Or** identifies the correct setting (50μs) (1) Do not accept use of $v = f\lambda$ for MP1 <u>Example Calculation</u> time between peaks = 1.25 / 4000 = 3.1×10^{-4} s = 310 μs 20 μs × 8 = 160 μs So, time on display is too short to show both peaks	**3**
5(b)	• Peaks would be wider (1) • It would be more difficult to judge the position/time of the peaks, so time between peaks would be less accurate (1)	**2**
5(c)	• Percentage uncertainty of $E = 4\%$ (1) • So, the Young modulus is the more significant source of uncertainty (1) (allow a conclusion consistent with comparison using incorrectly calculated $\%U_E$) <u>Example of Calculation</u> $\%U_E$ = (0.5 GPa / 11.2 GPa) × 100 = 4.46% 4% > 3%	**2**
	Total for question 5	**11**