

Question	Answers / Explanatory notes	Marks available
3. (a) (i)	Accurate results $\pm 0.1$ s [no unit penalty] (1) Repeat readings taken <b>or</b> more than 1 oscillation measured. (1)	2
(ii)	Correct result – smaller than in (a) – to nearest 0.01 s [accept 0.005] – units – 2/3 d.p.	1
(b) (i)	Repeat readings for either (1) Correct values: $b \pm 1$ mm; $d \pm 0.2$ mm (1) [N.B. Only 2 marks here – error on printed paper]	2
(ii)	Calculations correct (1) Correct unit – Pa or $\text{N m}^{-2}$ (1)	2
(iii)	$d$ (1) [accept $T$ ] Smallest value / cubed (1) [difficulty of counting rapid oscillations]	2
(c) (i)	metre rule used (1) rule vertical / use of set square / parallax (1) measurement to nearest mm / 0.5 mm; units; repeats (1)	3
(ii)	Measurements to nearest mm (1) Correct calculation (1)	2
(iii)	All readings shown with units (1) Readings to nearest mm (1)	2
(d)	Correct calculations (1) Correct number of s.f. [2 d.p. max] (1) [If only 1 value found – $1_{\text{max}}$ ]	2
(e)	Correct method (2 <sup>nd</sup> ) (1) Correct reason ( $T^2$ in method 1, but only $h$ in method 2) (1) [Accept: any valid reason]	2
		<b>[20]</b>