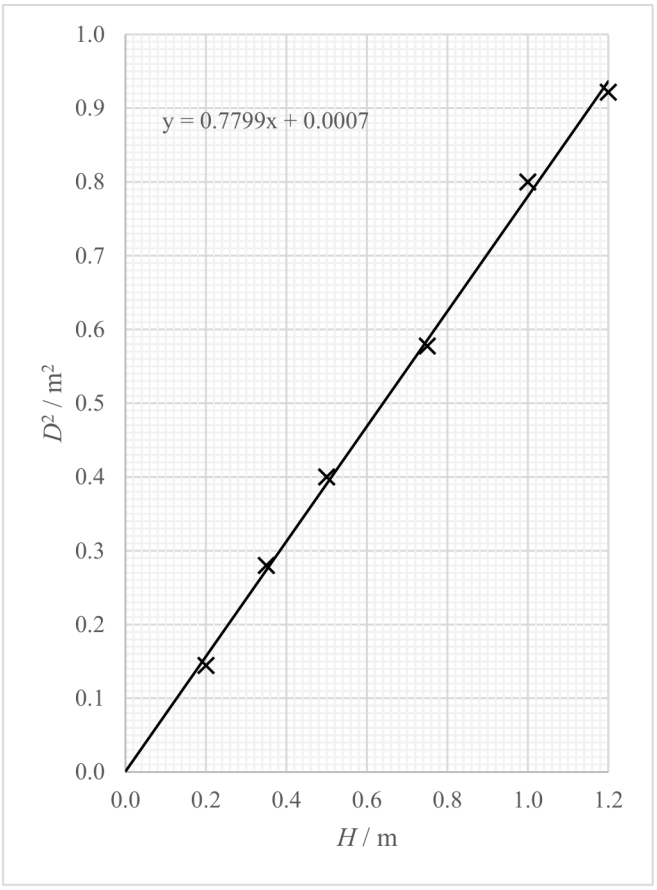
Question Number	Answer		Mark
4(a)	• (Energy is conserved, so) $mg\Delta h = \frac{1}{2}mv^2$ • $v = \sqrt{2g\Delta h}$ **Or** $v^2 \propto \Delta h$ **Or** states that *m* and *g* are constants • Δh is constant so *v* is always the same **Or** Δh is constant so v^2 is always the same If no other marks awarded, accept GPE (decrease) and KE (increase) are the same for 1 mark If suvat equations are used to show $v = \sqrt{2as}$ or $v^2 \propto s$, do not award MP1 or MP2, but MP3 is still available	(1) (1) (1)	**3**
4(b)	• Inconsistent d.p. in *H* • H/D should be measured to nearest mm **Or** H/D should be recorded to 3 d.p. Allow "No repeats shown" for either marking point	(1) (1)	**2**
4(c)(i)	• Correct D^2 values rounded to 2 s.f. • Labels axes with quantities and units • Sensible scales • Plotting • Line of best fit	(1) (1) (1) (2) (1)	**6**



H / m	D^2 / m^2
0.20	0.14
0.35	0.28
0.50	0.40
0.75	0.58
1.00	0.79
1.20	0.92

Question Number	Answer	Mark
4(c)(ii)	• Calculates gradient using large triangle (1) • Use of $gradient = \frac{2v^2}{g}$ (1) • v between 1.92 and 1.98 (m s^{-1}) (1) Example Calculation $gradient = \frac{0.78-0.16}{1.0-0.2} = 0.775$ m $v = \sqrt{\frac{g \times gradient}{2}} = \sqrt{\frac{9.81 \text{ m s}^{-2} \times 0.775 \text{ m}}{2}} = 1.95 \text{ m s}^{-1}$	3
4(c)(iii)	• States actual/percentage difference between the two values **Or** identifies that their value is slower/faster (1) • Comment identifying a potential cause for the difference **Or** comment on the accuracy of the values (1) Examples • The speed given by the graph is slower • Air resistance reduced the size of *D* • The speed given by the graph is only 0.03 m s^{-1} slower than the value she calculated • The difference is only 2%, so the experiment is accurate **Or** the difference is small, so the experiment is accurate • Calculates the percentage difference between 1.98 m s^{-1} and the value from 4(c)(ii) • The percentage difference is small, so the experiment is accurate **Or** the percentage difference is large, so the experiment is not accurate	2
	Total for question 4	16