Question Number	Answer	Mark
16(a)(i)	• Use measurement and scaling factor (1) **(1)** • $h = 3.4 \pm 0.1$ cm **(1)** **OR** • Use of $s = \frac{1}{2}at^2$ with $t = 0.083$ s **(1)** • $h = 3.4$ cm **(1)**	**(2)**
16(a)(ii)	• Use of (average) speed = s/t with s = value from part (a)(i) **(1)** • Use of initial speed = 2 × average speed **(1)** • Speed = 0.82 m s^{-1} ecf from (a)(i) **(1)** **OR** • Use of $E_g = mgh$ with h = value from (a)(i) **(1)** • Use of $½mv^2 = E_g$(initial) **(1)** • Speed = 0.82 m s^{-1} ecf from (a)(i) **(1)** **OR** • Use of $v = u + at$ with v = 0 **(1)** • Use of $a = -g$ **(1)** • Speed = 9.81 × 0.083 = 0.81 m s^{-1} **(1)** **OR** • Use of with $s = ut + ½at^2$ with s = value from part (a)(i) **(1)** • Use of $a = -g$ **(1)** • Speed = 0.82 m s^{-1} ecf from (a)(i) **(1)** <u>Example of calculation</u> $u = s/t - ½at$ $u = 0.034/0.083 + ½ \times 9.81 \times 0.083$ **OR** • Use of $v^2 = u^2 + 2as$ with s = value from (a)(i) and $v = 0$ **(1)** • Use of $a = -g$ **(1)**	

	• Speed = 0.82 m s^{-1} ecf from (a)(i) **(1)** Example of calculation Actual distance travelled by popcorn = 6.2 cm ÷ 1.8 = 3.4 cm (average speed) = $\frac{0.034\ \text{m}}{83 \times 10^{-3}\ \text{s}} = 0.41\ \text{m s}^{-1}$ Initial speed = 2 × average speed = 0.82 m s^{-1}	**(3)**
16(b)	• Use of 14% to determine mass (of water/popcorn). **(1)** **Or** $m_{\text{popcorn}}/m_{\text{water}}$ = 86/14 • Use of $p = mv$ **(1)** • Use of momentum conservation **(1)** • v = (–) 9.2 m s^{-1} **(1)** Example of calculation 0 = (0.0946 g × 1.5 m s^{-1}) + (0.0154 g × v) $v = \frac{-0.0946\ \text{g} \times 1.5\ \text{m s}^{-1}}{0.0154\ \text{g}}$ v = –9.21 m s^{-1}	**(4)**
	Total for question 16	**9**