Question Number	Answer		Mark
16(a)	Flow (around sphere must be) laminar **Or** Flow (around sphere is) not turbulent	**(1)**	**1**
16(b)(i)	Use of upthrust = weight of displaced fluid $U = 5.2 \times 10^{-7}$ (N) Example calculation $U = 5.3 \times 10^{-11}\ m^3 \times 998\ kg\ m^{-3} \times 9.81\ N\ kg^{-1}$ $= 5.19 \times 10^{-7}$ N	**(1)** **(1)**	**2**
16(b)(ii)	Use of $V = \frac{4}{3}\pi r^3$ Use of $F = 6\pi\eta r v$ $F = 1.5 \times 10^{-7}$ N **Or** Required $v = 0.12\ m\ s^{-1}$ **Or** Required $V = 2.4 \times 10^{-9}\ m^3$ **Or** Required $r = 8.3 \times 10^{-4}$ m **and** $r = 2.3 \times 10^{-4}$ m **Or** Required $\eta = 3.4 \times 10^{-3}$ Pa s Valid conclusion by comparison of relevant student values (ecf from (b)(i)) Example calculation $5.3 \times 10^{-11}\ m^3 = \frac{4}{3}\pi r^3$ $r = \sqrt[3]{\frac{3 \times 5.3 \times 10^{-11}\ m^3}{4\pi}} = 2.33 \times 10^{-4}$ m If Stokes' law applies, $F = U$ $F = 6\pi \times 9.5 \times 10^{-4}$ Pa s $\times 2.33 \times 10^{-4}$ m $\times 3.50 \times 10^{-2}\ m\ s^{-1}$ $= 1.46 \times 10^{-7}$ N $\neq 5.19 \times 10^{-7}$ N $\therefore$ Stokes' law does not apply	**(1)** **(1)** **(1)** **(1)**	**4**
	Total for question 16		**7**