

Question Number	Answer	Mark
17(a)	<p>Max 2</p> <p>Object must be a sphere (1)</p> <p>Low speed/velocity (1)</p> <p>Laminar flow (1)</p>	2
17(b)(i)	<p>Use of $F = 6\pi \eta r v$ (1)</p> <p>Subtraction of two forces (1)</p> <p>Resultant force = $7 \times 10^{-6} \text{ N}$ (1)</p> <p><u>Example of calculation</u> drag force = $6\pi \times 7.1 \times 10^{-2} \text{ Pa s} \times 2.25 \times 10^{-3} \text{ m} \times 5.2 \times 10^{-3} \text{ m s}^{-1}$ = $1.6 \times 10^{-5} \text{ N}$ Resultant force = $2.3 \times 10^{-5} \text{ N} - 1.6 \times 10^{-5} \text{ N} = 0.7 \times 10^{-5} \text{ N}$</p>	3
17(b)(ii)	<p>Use of $F = 6\pi \eta r v$ with $F = 2.3 \times 10^{-5} \text{ N}$ (1)</p> <p>$v = 7.6 \times 10^{-3} \text{ m s}^{-1}$ (1)</p> <p><u>Example of calculation</u> $2.30 \times 10^{-5} \text{ N} = 6\pi \times 7.10 \times 10^{-2} \text{ Pa s} \times 2.25 \times 10^{-3} \text{ m} \times v$ $v = 2.30 \times 10^{-5} \text{ N} \div (6\pi \times 7.10 \times 10^{-2} \text{ Pa s} \times 2.25 \times 10^{-3} \text{ m}) = 7.64 \times 10^{-3} \text{ m s}^{-1}$</p>	2
17(c)	<p>Larger diameter gives larger drag force (at given speed) (1)</p> <p>Or</p> <p>Larger diameter gives a lower speed (for the same constant force) (1)</p> <p>Lower temperature so viscosity is greater</p> <p>Greater viscosity gives larger drag force (at given speed)</p> <p>Or</p> <p>Greater viscosity gives lower speed (for the same constant force) (1)</p> <p>Maximum speed will decrease (dependent on MP1 and MP3) (1)</p>	4
	Total for question 17	11