Question Number	Answer		Mark
17(a)(i)	The layers of fluid flow past each other without mixing **Or** Velocity at a fixed point (relative to the drop) remains constant	**(1)**	**1**
17(a)(ii)	Resultant force is zero **Or** Sum of the vertical forces is zero (Accept $W - U = D$ or $W = U + D$ with terms defined)	**(1)**	**1**
17(b)(i)	Use of $\rho = \frac{m}{V}$ Use of $W = mg$ Weight = 3.3×10^{-4} N Example of calculation 1.00×10^{3} kg m^{-3} = $m \div 3.35 \times 10^{-8}$ m^3 $m = 1.00 \times 10^{3}$ kg m$^{-3} \times 3.35 \times 10^{-8}$ m^3 = 3.35×10^{-5} kg $W = m\,g = 3.35 \times 10^{-5}$ m$^3 \times 9.81$ N kg^{-1} = 3.29×10^{-4} N	**(1)** **(1)** **(1)**	**3**
17(b)(ii)	Use of upthrust = weight of fluid displaced Upthrust = 3.1×10^{-4} (N) Example of calculation 0.94×10^{3} kg m^{-3} = $m \div 3.35 \times 10^{-8}$ m^3 $m = 0.94 \times 10^{3}$ kg m$^{-3} \times 3.35 \times 10^{-8}$ m^3 = 3.15×10^{-5} kg $U = m\,g = 3.15 \times 10^{-5}$ m$^3 \times 9.81$ N kg^{-1} = 3.09×10^{-4} N	**(1)** **(1)**	**2**
17(b)(iii)	Uses upthrust and weight to determine the viscous force F Use of $V = 4/3\ \pi\ r^3$ to determine r Use of $F = 6\pi\eta rv$ $v = 4.8 \times 10^{-3}$ m s^{-1} (ecf from (b)(i) and (b)(ii)) Example of calculation $W = U + 6\pi\eta rv \rightarrow W - U = 6\pi\eta rv$ $W - U = (3.29 - 3.09) \times 10^{-4}$ N = 2.0×10^{-5} N $r = \sqrt[3]{(¾ \times 3.35 \times 10^{-8}\ \text{m}^3 \div \pi)} = 2.0 \times 10^{-3}$ m 2.0×10^{-5} N = $6\pi \times 0.11$ Pa s $\times\ 2.0 \times 10^{-3}$ m $\times\ v$ $v = 2.0 \times 10^{-5}$ N $\div$ ($6\pi \times 0.11$ Pa s $\times\ 2.0 \times 10^{-3}$ m) = 4.82×10^{-3} m s^{-1}	**(1)** **(1)** **(1)** **(1)**	**4**
	Total for question 17		**11**