Question Number	NAnswer		Mark
18(a)(i)	Use of $\rho = m / V$ Identifies upthrust is equal to weight of fluid displaced Use of $W = m\,g$ Use of $D = W - U$ 1.8×10^2 (N) Example of calculation $m = 1030\ \text{kg m}^{-3} \times 1.60 \times 10^{-2}\ \text{m}^3 = 16.5\ \text{kg}$ $U = 16.5\ \text{kg} \times 9.81\ \text{N kg}^{-1} = 162\ \text{N}$ $W = 35\ \text{kg} \times 9.81\ \text{N kg}^{-1} = 343\ \text{N}$ $D = W - U = 343\ \text{N} - 162\ \text{N} = 181\ \text{N}$	**(1)** **(1)** **(1)** **(1)** **(1)**	**5**
18(a)(ii)	Use of $D = k\,v^2$ $v = 9.1\ \text{m s}^{-1}$ (allow ecf from (a)(i)) Example of calculation $D = 181\ \text{N} = 2.2\ \text{N s}^2\ \text{m}^{-2} \times v^2$ $v = \sqrt{(181\ \text{N} \div 2.2\ \text{N s}^2\ \text{m}^{-2})} = 9.1\ \text{m s}^{-1}$	**(1)** **(1)**	**2**
18(a)(iii)	Object might not be spherical Flow might not be laminar	**(1)** **(1)**	**2**
18(b)	Drag force increases as velocity increases Until drag force plus weight equals upthrust (Resultant force is then zero) so the object stops accelerating	**(1)** **(1)** **(1)**	**3**
	Total for question 18		**12**