$$\text{Density } \rho = \frac{\text{Mass}}{\text{Volume}}$$

$$= \frac{\text{Mass of the payload } + \text{ Mass of helium}}{\text{Volume}}$$

$$= \frac{m + V\rho_{He}}{V}$$

$$= \frac{400 + 1425 \times 0.18}{1425}$$

$$= 0.46 \text{ kg/m}^3$$

From equations (*ii*) and (*iii*), we can obtain y as:

$$\rho = \rho_0 e^{-y/y_o}$$

$$\log_e \frac{\rho}{\rho_0} = -\frac{y}{y_o}$$

$$\therefore y = -8000 \times \log_e \frac{0.46}{1.25}$$

$$= -8000 \times -1$$

$$= 8000 \text{ m} = 8 \text{ km}$$

Hence, the balloon will rise to a height of 8 km.