

37. (a) The average speed is

$$\bar{v} = \frac{\sum v}{N},$$

where the sum is over the speeds of the particles and N is the number of particles. Thus

$$\bar{v} = \frac{(2.0 + 3.0 + 4.0 + 5.0 + 6.0 + 7.0 + 8.0 + 9.0 + 10.0 + 11.0) \text{ km/s}}{10} = 6.5 \text{ km/s} .$$

(b) The rms speed is given by

$$v_{\text{rms}} = \sqrt{\frac{\sum v^2}{N}} .$$

Now

$$\begin{aligned} \sum v^2 &= (2.0)^2 + (3.0)^2 + (4.0)^2 + (5.0)^2 + (6.0)^2 \\ &\quad + (7.0)^2 + (8.0)^2 + (9.0)^2 + (10.0)^2 + (11.0)^2 = 505 \text{ km}^2/\text{s}^2 \end{aligned}$$

so

$$v_{\text{rms}} = \sqrt{\frac{505 \text{ km}^2/\text{s}^2}{10}} = 7.1 \text{ km/s} .$$