

# Example

- What is the rms speed of a nitrogen ( $\text{N}_2$ ) molecule in this classroom?

$$\langle KE \rangle = \frac{3}{2} k_B T$$

$$\frac{1}{2} m \langle v^2 \rangle = \frac{3}{2} k_B T$$

$$\langle v^2 \rangle = \frac{3 k_B T}{m}$$

$$v = 510 \text{ m/s}$$

$$= 1150 \text{ mph!}$$

$$\langle v^2 \rangle = \frac{3(1.38 \times 10^{-23} \text{ J/K})(273 + 20) \text{ K}}{(28 \text{ u}) \times (1.66 \times 10^{-27} \text{ kg/u})}$$