Solutions

Each answer shows the steps, then the **result**.

2.1

- the collisions of the gas particles with the container walls

2.2

- it also doubles ($\overline{KE} \propto T$)

2.3

$$\overline{KE} = \tfrac{3}{2}k_B T = \tfrac{3}{2}(1.38 \times 10^{-23}\ \text{J K}^{-1})(300\ \text{K})$$

- $\overline{KE} = \mathbf{6.2 \times 10^{-21}}$ J

3.1 B

- average kinetic energy of its particles.

3.2 C

- triples.

3.3

(a)

- $\overline{KE} \propto T$ and T doubles (600 K/300 K = 2), so the ratio is $\mathbf{2 : 1}$

(b)

- higher temperature means faster particles, which hit the walls harder and more often, raising the pressure

3.4

(a)

- $\Delta p = mv - (-mv) = 2mv = 2(6.6 \times 10^{-27})(1200)$
- $\Delta p = \mathbf{1.6 \times 10^{-23}}$ kg m s^{-1}

(b)

- each collision gives the wall a small impulse; a huge number every second adds up to a steady force, and pressure is that perpendicular force per unit area

(c)

- atoms also collide with each other and with any surface placed in the gas, so the same force per area acts throughout it

3.5 A

- more atoms have high speeds; the area under the curve (the number of atoms) stays the same