

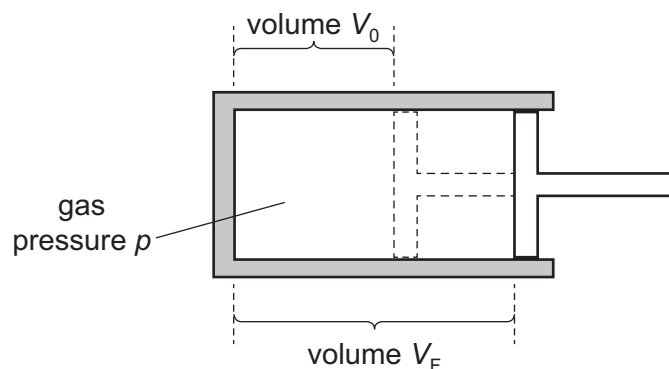
- 16** A ball drops onto a horizontal surface and bounces elastically.

What happens to the kinetic energy of the ball during the very short time that it is in contact with the surface?

- A** Most of the kinetic energy is lost as heat and sound.
- B** The kinetic energy decreases to zero and then returns to its original value.
- C** The kinetic energy remains constant because it is an elastic collision.
- D** The kinetic energy remains constant in magnitude but changes direction.

- 17** Some gas in a cylinder is supplied with thermal energy  $q$ .

The gas does useful work in expanding at constant pressure  $p$  from volume  $V_0$  to volume  $V_F$ , as shown.



Which expression gives the efficiency of this process?

- A**  $\frac{pV_0}{q}$
  - B**  $\frac{V_F}{V_0q}$
  - C**  $\frac{p(V_F - V_0)}{q}$
  - D**  $\frac{(V_F - V_0)}{V_0q}$
- 18** An object of mass  $0.30 \text{ kg}$  is thrown vertically upwards from the ground with an initial velocity of  $8.0 \text{ m s}^{-1}$ . The object reaches a maximum height of  $1.9 \text{ m}$ .
- How much work is done against air resistance as the object rises to its maximum height?
- A**  $4.0 \text{ J}$
  - B**  $5.6 \text{ J}$
  - C**  $9.6 \text{ J}$
  - D**  $15 \text{ J}$
- 19** A water pump raises a mass of  $27 \times 10^3 \text{ kg}$  of water through a vertical distance of  $80 \text{ m}$  in a time of  $1.0 \text{ hour}$ .

What is the average useful output power of the pump?

- A**  $0.60 \text{ kW}$
- B**  $5.9 \text{ kW}$
- C**  $36 \text{ kW}$
- D**  $350 \text{ kW}$