

9. Thermodynamics

Starter Quiz · 课前小测

AP Physics 2

Name: _____ Score: _____

- In kinetic theory, the temperature of a gas is a measure of the particles':
 - ☐ total number
 - ☐ average kinetic energy
 - ☐ colour
 - ☐ total mass
- A gas at 100 kPa, 2 m³ is squeezed to 0.5 m³ at constant temperature. What is the new pressure, in kPa?
_____ kPa
- Left on their own, in which direction does heat flow?
 - ☐ from cold to hot
 - ☐ from hot to cold
 - ☐ in no particular direction
 - ☐ always upward
- A gas absorbs 500 J of heat and does 200 J of work. What is its change in internal energy, in joules?
_____ J
- How much heat warms 2 kg of water by 10 °C? ($c = 4200 \frac{\text{J}}{\text{kg} \cdot ^\circ\text{C}}$.) Answer in J.
_____ J
- Entropy is a measure of a system's:
 - ☐ total mass
 - ☐ disorder
 - ☐ temperature only
 - ☐ electric charge
- What causes the pressure a gas exerts on its container?
 - ☐ particles colliding with the walls
 - ☐ gravity pulling the gas down
 - ☐ the colour of the gas
 - ☐ the walls heating up

- Which is the ideal gas law?

☐ $PV = nRT$

☐ $P = mgh$

☐ $V = IR$

☐ $F = ma$

- Doubling the kelvin temperature of a gas doubles the average kinetic energy of its particles.

☐ True ☐ False

- Temperature in the ideal gas law must be in kelvin.

☐ True ☐ False

1. **average kinetic energy**

Temperature is proportional to the average kinetic energy of the particles.

2. **400 kPa**

$$P_1 V_1 = P_2 V_2 \Rightarrow 200 = 0.5 P_2 \Rightarrow P_2 = 400 \text{ kPa.}$$

3. **from hot to cold**

Heat flows spontaneously from the hotter object to the colder one.

4. **300 J**

$$\Delta U = Q - W = 500 - 200 = 300 \text{ J.}$$

5. **84000 J**

$$Q = mc\Delta T = 2 \times 4200 \times 10 = 84\,000 \text{ J.}$$

6. **disorder**

Entropy measures how spread-out and disordered a system's energy is.

7. **particles colliding with the walls**

Each collision with a wall gives a tiny push; together they make the pressure.

8. **$PV = nRT$**

$PV = nRT$ links pressure, volume, amount and temperature.

9. **True**

On the kelvin scale, average kinetic energy is proportional to temperature.

10. **True**

The law is proportional in kelvin; using °C gives wrong ratios.