1. In kinetic theory, the temperature of a gas is a measure of the particles':

   ☐ average kinetic energy

   ☐ colour

   ☐ total number

   ☐ total mass

2. A gas at 100 kPa, 2 m^3 is squeezed to 0.5 m^3 at constant temperature. What is the new pressure, in kPa?

   _____ kPa

3. Left on their own, in which direction does heat flow?

   ☐ in no particular direction

   ☐ from cold to hot

   ☐ always upward

   ☐ from hot to cold

4. A gas absorbs 500 J of heat and does 200 J of work. What is its change in internal energy, in joules?

   _____ J

5. 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

6. Entropy is a measure of a system's:

   ☐ total mass

   ☐ temperature only

   ☐ electric charge

   ☐ disorder

7. What causes the pressure a gas exerts on its container?

   ☐ the walls heating up

   ☐ gravity pulling the gas down

   ☐ particles colliding with the walls

   ☐ the colour of the gas

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   ☐ $V = IR$

   ☐ $P = mgh$

   ☐ $F = ma$

   ☐ $PV = nRT$

9. Thermal equilibrium means the two objects hold the same amount of internal energy.

   ☐ True ☐ False

10. A gas absorbs 400 J of heat but does no work (rigid container). What is ΔU, in joules?

    _____ J

1. **average kinetic energy**

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

2. **400 kPa**

   $P_1V_1 = P_2V_2 \Rightarrow 200 = 0.5P_2 \Rightarrow P_2 = 400$ kPa.

3. **from hot to cold**

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

4. **300 J**

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

5. **84000 J**

   $Q = mc\Delta T = 2 \times 4200 \times 10 = 84\,000$ 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. **False**

   It means equal temperature, not equal energy – a large cool object can still hold more energy.

10. **400 J**

    With $W = 0$, $\Delta U = Q = 400$ J – all the heat raises the internal energy.

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