IGCSE Physics Name: _____ Score: _____

1. In which state are the particles far apart, fast, and moving in random directions?
   - ☐ gas
   - ☐ solid
   - ☐ liquid
   - ☐ they are the same in all states
2. For the same rise in temperature, which expands the most?
   - ☐ a gas
   - ☐ a liquid
   - ☐ a solid
   - ☐ they all expand by the same amount
3. While ice is melting into water, what happens to the temperature?
   - ☐ it stays the same until all the ice has melted
   - ☐ it rises steadily
   - ☐ it falls steadily
   - ☐ it rises then falls
4. Why are metals such good conductors of thermal energy?
   - ☐ they have free electrons that carry energy quickly
   - ☐ they are shiny
   - ☐ they are heavy
   - ☐ they contain trapped air
5. Temperature is a measure of:
   - ☐ the average kinetic energy of the particles
   - ☐ the total number of particles
   - ☐ the mass of the object
   - ☐ the colour of the object
6. Convert 27 °C to kelvin.

   _____ K

7. How much energy is needed to heat 2.0 kg of water by 10 °C? (Use $c = 4200$ J per kg per °C.)

   _____ J

8. Evaporation can happen below the boiling point.

   ☐ True ☐ False

9. Convection can happen in a solid.

   ☐ True ☐ False

10. A gas has a volume of 200 cm^3 at 100 kPa. It is squeezed to 100 cm^3 at constant temperature. What is the new pressure, in kPa?

    _____ kPa

2. Thermal physics

Answers · 答案

IGCSE Physics

1. **gas**

   Gas particles are far apart and move quickly in random directions, filling the container. Solids only vibrate; liquids slide past each other.

2. **a gas**

   Gases expand the most, then liquids, then solids (whose particles are held most tightly).

3. **it stays the same until all the ice has melted**

   During a change of state the energy goes into breaking the forces between particles, so the temperature stays constant until the change is complete.

4. **they have free electrons that carry energy quickly**

   Metals have free (delocalised) electrons that move through the metal and carry energy rapidly from the hot end to the cold end.

5. **the average kinetic energy of the particles**

   Hotter means the particles move faster, so temperature measures their average kinetic energy.

6. **300 K**

   $T = \theta + 273 = 27 + 273 = 300$ K.

7. **84000 J**

   $\Delta E = mc\,\Delta\theta = 2.0 \times 4200 \times 10 = 84\,000$ J.

8. **True**

   Evaporation happens at the surface at any temperature — the fastest surface particles escape. Boiling happens throughout the liquid at the boiling point.

9. **False**

   Convection needs particles to move from place to place, so it only happens in liquids and gases — not solids.

10. **200 kPa**

    pV is constant: $100 \times 200 = p \times 100$, so $p = 200$ kPa. Halving the volume doubles the pressure.