

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. How much energy is needed to heat 2.0 kg of water by 10 °C? (Use $c = 4200 \text{ J per kg per } ^\circ\text{C}.$)
_____ J

7. Evaporation can happen below the boiling point.

☐ True ☐ False

8. Convection can happen in a solid.

☐ True ☐ False

9. Convert 27 °C to kelvin.

_____ K

10. Adding 8400 J raises the temperature of 0.50 kg of a metal by 40 °C. What is its specific heat capacity, in J per kg per °C?

_____ J/(kg °C)

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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. **84000 J**

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

7. **True**

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

8. **False**

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

9. **300 K**

$$T = \theta + 273 = 27 + 273 = 300 \text{ K.}$$

10. **420 J/(kg °C)**

$$c = \frac{\Delta E}{m \Delta \theta} = \frac{8400}{0.50 \times 40} = \frac{8400}{20} = 420 \text{ J per kg per } ^\circ\text{C.}$$