# GCSE Physics Topic 3 AQA: Changes of state and the particle model
# (particle model of matter)
## Exam Questions/Mock Exam Questions
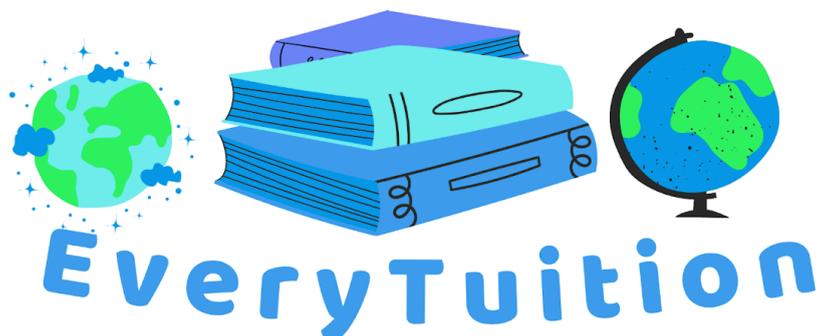
(It would still be recommended to answer the foundation tier questions for triple science and higher tier to ensure you have good understanding).

**Q1.**
 Jack is learning about particle theory.
 State the three states of matter.

_____

_____

_____

[3]

**Q2.**
 Harry heats a solid.

(a) Describe what happens to the particles as the solid melts.

_____

_____

[2]

(b) Name the process by which a solid changes directly into a gas.

_____

[1]

[Total: 3 marks]

**Q3.**
 Ben studies diffusion.
 Explain what is meant by diffusion in gases.

_____

_____

_____

**etrevision.co.uk**

[3]

**Q4.**
 Daniel heats water in a beaker.

(a) State what happens to the temperature of the water during boiling.

_____

[1]

(b) Explain why the temperature does not increase during boiling even though heat is supplied.

_____

_____

[2]

[Total: 3 marks]

**Q5.**
 Oliver investigates density.

(a) State the equation linking density, mass and volume.

_____

[1]

(b) A block has a mass of 120 g and a volume of 60 cm³. Calculate its density.

_____

_____

[2]

[Total: 3 marks]

**Q6.**
Ethan observes gas particles in a container.
Explain how gas particles exert pressure on the walls of a container.

[3]

**Q7.**
Sam is studying specific heat capacity.

(a) State the unit of specific heat capacity.

[1]

(b) A 0.5 kg block of metal is heated and the temperature rises by 20 °C. If the energy supplied is 4200 J, calculate the specific heat capacity.

[3]

[Total: 4 marks]

**Q8.**
Charlie investigates melting and boiling points.

(a) State the melting point of ice.

[1]

(b) State the boiling point of water.

[1]

[Total: 2 marks]

**Q9.**
Noah observes a balloon shrinking when placed in a freezer.
Explain why the balloon shrinks.

_____

_____

_____

[3]

**Q10.**
Jacob studies particles in liquids.

(a) Describe the arrangement of particles in a liquid.

_____

_____

[2]

(b) State one property of liquids that allows them to flow.

_____

[1]

[Total: 3 marks]

**Q11.**
William investigates evaporation.

(a) Explain the difference between evaporation and boiling.

_____

_____

_____

[3]

(b) Give one everyday example of evaporation.


[1]

[Total: 4 marks]


**Q12.**
 Alex measures the mass and volume of an object.
 State how he could calculate the density.

_____

_____

[2]


**Q13.**
 Luke studies particle motion.

(a) Describe how the motion of particles changes when a solid is heated.

_____

_____

[2]

(b) Describe how the motion of particles changes when a gas is cooled.

_____

_____

[2]

[Total: 4 marks]

**Q14.**

James is investigating cooling.

Explain why hot water cools faster in a metal container than in a plastic container.

---

---

---

[3]

**Q15.**

Tom is learning about pressure.

(a) State the equation linking pressure, force and area.

---

[1]

(b) A force of 200 N acts on an area of 0.5 m². Calculate the pressure.

---

---

[2]

[Total: 3 marks]

# Higher Tier

**Q16.**

Jack is investigating density of solids and liquids.

(a) State the equation linking density, mass and volume.

---

[1]

(b) A cube of metal has a mass of 300 g and a volume of 50 cm³. Calculate its density.

---

---

[3]

[Total: 4 marks]

**Q17.**
 Harry heats a liquid in a beaker.

(a) Explain what happens to the particles as the liquid boils.

_____

_____

_____

[3]

(b) Describe how boiling differs from evaporation.

_____

_____

[2]

[Total: 5 marks]

**Q18.**
 Ben investigates a gas in a container.

(a) Explain how increasing temperature affects the pressure of the gas.

_____

_____

_____

[3]

(b) State the relationship between pressure and volume at constant temperature (Boyle's Law).

_____

[1]

[Total: 4 marks]

**Q19.**
 Daniel studies cooling curves.

(a) Explain why the temperature remains constant during melting.

_____

_____

_____

[3]

(b) Suggest a reason why the temperature may not remain perfectly constant in a real experiment.

_____

[1]

[Total: 4 marks]

**Q20.**
 Oliver investigates the specific heat capacity of a metal.

(a) State the unit of specific heat capacity.

_____

[1]

(b) A 2 kg block of metal requires 16 000 J to raise its temperature by 10 °C. Calculate its specific heat capacity.

_____

_____

_____

[3]

[Total: 4 marks]

**Q21.**
Ethan studies particle motion.

(a) Describe the arrangement of particles in a solid.

_____

_____

[2]

(b) Explain how particle motion changes as a solid melts.

_____

_____

_____

[3]

[Total: 5 marks]


**Q22.**
Sam investigates pressure in fluids.

(a) State the equation linking pressure, force and area.

_____

[1]

(b) A force of 500 N is applied to a piston with an area of 0.25 m². Calculate the pressure.

_____

_____

[2]

(c) Explain why pressure in a liquid increases with depth.

_____

_____

[2]

[Total: 5 marks]


**Q23.**
 Charlie studies energy transfer during phase changes.

(a) Define latent heat.

_____

_____

[2]

(b) Explain why energy is supplied during boiling without changing temperature.

_____

_____

_____

[3]

[Total: 5 marks]


**Q24.**
 Noah heats water in a metal beaker.

Explain why water cools faster in a metal beaker than in a plastic beaker.

_____

_____

_____

[3]


**Q25.**
 Jacob investigates gases.

(a) Explain why gas pressure increases when the gas is heated at constant volume.

_____

[3]

(b) Explain what happens to particle spacing and motion during expansion.

_____

_____

[2]

[Total: 5 marks]

**Q26.**
William measures the density of irregular solids.

Describe how he could measure the density using a balance and a measuring cylinder.

_____

_____

_____

_____

[4]

**Q27.**
Alex investigates diffusion in liquids.

(a) Explain why diffusion occurs.

_____

_____

[2]

(b) State two factors that increase the rate of diffusion.

_____

_____

[2]

[Total: 4 marks]


**Q28.**
 Luke studies heating curves.

(a) Explain why energy supplied during melting is used to break bonds rather than raise temperature.

_____

_____

_____

[3]

(b) Sketch a heating curve for water showing melting and boiling points.

_____

_____

[2]

[Total: 5 marks]


**Q29.**
 James investigates evaporation.

(a) Describe what happens to particles with the highest energy during evaporation.

_____

_____

[2]

(b) State one everyday example of evaporation.

_____

[1]

[Total: 3 marks]

**Q30.**
Tom studies the particle model.

(a) Explain why solids are incompressible.

_____

_____

[2]

(b) Explain why gases are easily compressible.

_____

_____

[2]

[Total: 4 marks]

**Q31.**
Jack heats a 0.5 kg block of aluminium by 10 °C. The specific heat capacity is 900 J/kg°C.

Calculate the energy supplied.

_____

_____

_____

[3]

**Q32.**
Harry investigates particle motion in liquids.

(a) Describe the motion of particles in a liquid.

_____

_____

[2]

(b) State one property of liquids that allows them to flow.

_____

[1]

[Total: 3 marks]

**Q33.**
Ben measures gas pressure.

(a) Explain how pressure in a gas is created.

_____

_____

_____

[3]

(b) State one factor that increases gas pressure at constant volume.

_____

[1]

[Total: 4 marks]

**Q34.**
Daniel investigates cooling.

Explain why adding a lid to a container slows the cooling of a liquid.

_____

_____

_____

[3]

**Q35.**
 Oliver studies gas laws.

A gas has a volume of $2.0 \times 10^{-3}$ m³ and a pressure of $1.0 \times 10^{5}$ Pa.

(a) Calculate the force on a piston with area 0.01 m².

_____

_____

[2]

(b) State how pressure changes if volume is halved at constant temperature.

_____

[1]

[Total: 3 marks]

**Q36.**
 Ethan investigates latent heat.

(a) Define specific latent heat of fusion.

_____

_____

[2]

(b) Explain why the temperature remains constant while ice melts.

_____

_____

_____

[3]

[Total: 5 marks]

**Q37.**
 Sam observes a gas in a syringe.

(a) Explain why reducing the volume of the gas increases the pressure.

_____

_____

_____

[3]

(b) State what happens to particle collisions with the syringe walls.

_____

[1]

[Total: 4 marks]

**Q38.**
Charlie heats a liquid in a metal container.

Explain why the liquid heats faster than in a plastic container.

_____

_____

_____

[3]

**Q39.**
Noah investigates thermal energy.

A 1.0 kg block requires 5000 J to raise its temperature by 20 °C.

(a) Calculate its specific heat capacity.

_____

_____

[2]

(b) Explain why more energy is required to heat a larger block of the same material.

_____

[1]

[Total: 3 marks]

**Q40.**
 Jacob observes a heating curve of water.

Explain why the curve has a flat section at the boiling point.

_____

_____

_____

[3]

# Triple Science

**Q41.**
 William investigates density of irregular solids.

Describe a method to measure density using a balance and a measuring cylinder. Include apparatus, measurements, and precautions.

_____

_____

_____

_____

_____

_____

_____

[6]

**Q42.**
Alex investigates the heating of a solid.

(a) Define specific heat capacity.

_____

_____

[2]

(b) Explain why energy supplied to a solid increases its temperature.

_____

_____

_____

[3]

[Total: 5 marks]

**Q43.**
Luke investigates pressure in gases.

(a) Explain why increasing the temperature of a gas increases its pressure at constant volume.

_____

_____

_____

[3]

(b) State the relationship between volume and pressure at constant temperature.

_____

[1]

[Total: 4 marks]

**Q44.**
James observes particle motion.

(a) Explain why solids have fixed shapes.

_____

_____

[2]

(b) Explain why liquids can flow.

_____

_____

[2]

(c) Explain why gases are compressible.

_____

_____

[2]

[Total: 6 marks]

**Q45.**
Tom investigates latent heat.

(a) Define specific latent heat of vaporisation.

_____

_____

[2]

(b) Explain why temperature remains constant during boiling.

_____

_____

_____

[3]

[Total: 5 marks]

## Q46.
Jack studies particle collisions in gases.

Explain how particle collisions cause gas pressure.

_____

_____

_____

[3]

## Q47.
Harry investigates diffusion.

(a) Describe what diffusion is.

_____

_____

[2]

(b) Explain why diffusion occurs faster at higher temperatures.

_____

_____

[2]

[Total: 4 marks]

## Q48.
Ben measures energy transfer in heating.

A 1.2 kg block of material is heated by 15 °C. The specific heat capacity is 900 J/kg°C.

Calculate the energy supplied.

_____

_____

_____

[3]


**Q49.**

Daniel studies cooling.

Explain why placing a lid on a liquid slows its cooling.

_____

_____

_____

[3]


**Q50.**

Oliver investigates a gas.

A gas occupies $4 \times 10^{-3}$ m³ at a pressure of $2 \times 10^5$ Pa.

(a) Calculate the force on an area of 0.01 m².

_____

_____

[2]

(b) State what happens to pressure if volume is halved at constant temperature.

_____

[1]

[Total: 3 marks]

**Q51.**
Ethan observes the heating curve of water.

Explain why energy supplied during melting or boiling does not change temperature.

_____

_____

_____

[3]


**Q52.**
Sam investigates particle spacing.

Explain why gases are easily compressible but solids are not.

_____

_____

_____

[3]


**Q53.**
Charlie investigates thermal energy.

(a) Explain why a metal heats faster than a wooden block when equal energy is supplied.

_____

_____

[2]

(b) Suggest one reason why water is used as a coolant in engines.

_____

[1]

[Total: 3 marks]

**Q54.**

 Noah calculates energy transfer.

A 0.8 kg metal block is heated from 20 °C to 80 °C. Specific heat capacity = 450 J/kg°C.

Calculate the energy transferred.

[3]

**Q55.**

 Jacob studies diffusion in gases.

Explain why diffusion occurs faster at higher temperatures.

[3]