

Name:

Date:

P3 - Test 5  
PARTICLE MODEL OF MATTER  
Advanced

**GCSE**

PHYSICS

AQA - Combined Science

Mark

Grade

---

### Materials

For this paper you must have:

- Ruler
- Pencil and Rubber
- Scientific calculator, which you are expected to use when appropriate

### Instructions

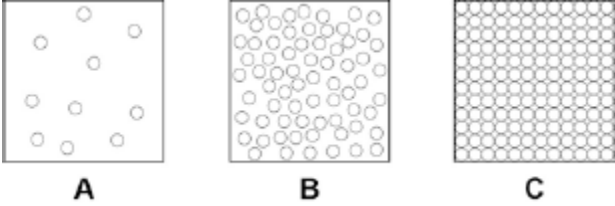
- Answer all questions
- Answer questions in the space provided
- All working must be shown

### Information

- The marks for the questions are shown in brackets

1.

The figure below shows a simple model of the three states of matter.



(a) What is the correct equation to work out the density of a material?

\_\_\_\_\_

(1)

(b) A student explains density to his teacher using the particle model in the figure above. His teacher says there are limitations to the model.

Give **two** limitations of the particle model in the figure above.

1. \_\_\_\_\_

\_\_\_\_\_

2. \_\_\_\_\_

\_\_\_\_\_

(2)

(c) When the gas in a container with a fixed volume is heated, the pressure increases as the temperature increases.

Explain why the pressure increases.

Use the model in the figure above to help you.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(4)

(Total 7 marks)



- (b) At the end of the race, the athlete is covered with a 'space blanket' made from shiny foil to prevent him from cooling too quickly.



© Fuse/Thinkstock

He wraps the space blanket around his body to reduce energy transfer to the surroundings.

How does the space blanket reduce energy transfer to the surroundings?

---

---

---

---

---

---

---

(3)

(Total 7 marks)

3.

The particle model can be used to explain the properties of gases.

- (a) Describe the direction of motion of the particles in a gas.

---

---

(1)

(b) Explain why heating a gas increases the average speed of the gas particles.

---

---

---

---

---

---

---

**(3)**

(c) Water can exist as either a liquid or a gas at 100 °C.

Explain why a mass of gaseous water at 100 °C contains more energy than an equal mass of liquid water at 100 °C.

---

---

---

---

---

---

---

**(2)**

(d) Water vapour is a gas. Gases change state when they cool.

The figure below shows condensation on a cold bathroom mirror.



© Dwight Eschliman/Getty Images

A volume of  $2.5 \times 10^{-5} \text{ m}^3$  of condensation forms on the mirror.

Density of water =  $1000 \text{ kg / m}^3$

Specific latent heat of vaporisation of water =  $2.26 \times 10^6 \text{ J / kg}$ .

Calculate the energy released when the condensation forms.

---

---

---

---

---

---

---

---

Energy released = \_\_\_\_\_ J

(5)

(e) Central heating boilers burn gas and use the energy released to heat water.

Modern condensing central heating boilers take advantage of the energy that is released when water condenses.

Waste water vapour produced when the water is heated in the boiler is used to preheat the cold water entering the boiler.

Give some of the arguments in favour of condensing boilers compared to older non-condensing boilers.

---

---

---

---

---

---

---

---

---

---

**(4)**  
**(Total 15 marks)**