3.1 Changes of State & the Particle Model

Question Paper
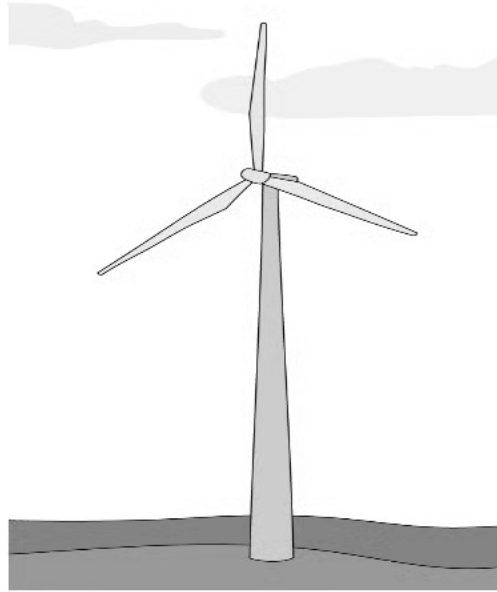
Course	AQA GCSE Physics
Section	3. Particle Model of Matter
Topic	3.1 Changes of State & the Particle Model
Difficulty	Medium

Time allowed: 60

Score: /45

Percentage: /100

Question 1

Figure 1 below shows a wind turbine.

Figure 1

At a particular wind speed, a volume of 1.9×10^4 m³ of air passes the blades each second.

The density of air is 1.2 kg/m³.
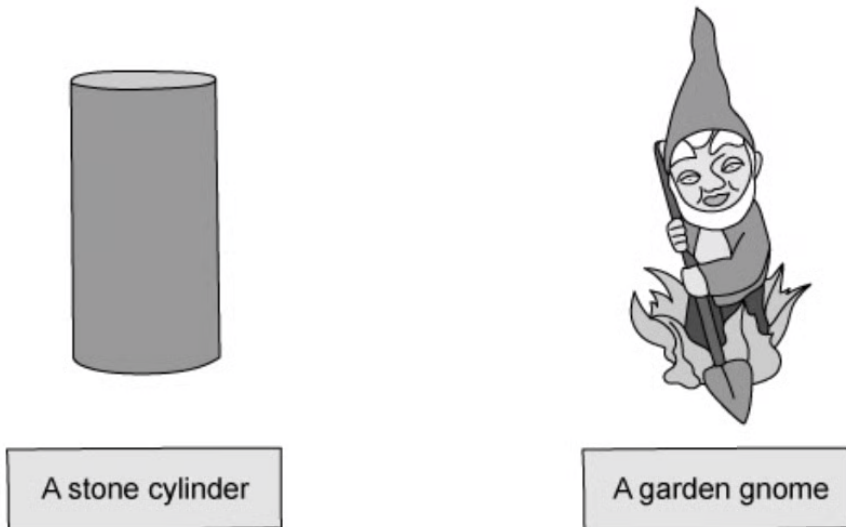
Calculate the mass of air passing the blades per second.

[3 marks]

[3 marks]

Question 2

A student wants to calculate the density of the two objects shown in **Figure 2** below.

Figure 2

A stone cylinder

A garden gnome

Describe how the student could measure the densities of the two objects.
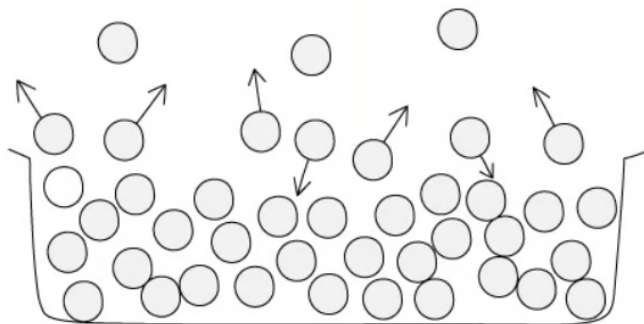
[6 marks]

[6 marks]

Question 3a

Kinetic theory states that all matter is made up of tiny particles, which are always moving.

The liquid shown in **Figure 3** is evaporating.

Figure 3

(a) Using information given in **Figure 2**, state how you know the liquid is evaporating.
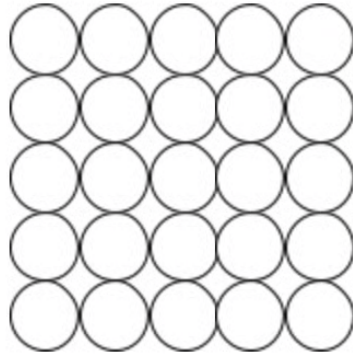
[1 mark]

[1 mark]

Question 3b

(b) **Figure 4** shows the arrangement of particles in a solid.

Figure 4

The volume of one kilogram of solid is much smaller than the volume of one kilogram of gas.

Use the kinetic theory to explain why.

[4 marks]

[4 marks]

Question 4a

A student finds a small rock that she suspects is a meteorite.

Measuring the density of the rock will give one piece of evidence to support her idea.

(a) State the equation that links density (ρ), mass (m) and volume (v).

[1 mark]

[1 mark]

Question 4b

(b) Describe how the student could measure the volume of the piece of rock.

[4 marks]

[4 marks]

Question 4c

(c) The volume of the piece of rock was 120.0 cm^3.

The student measured the mass of the piece of rock as 895 g.
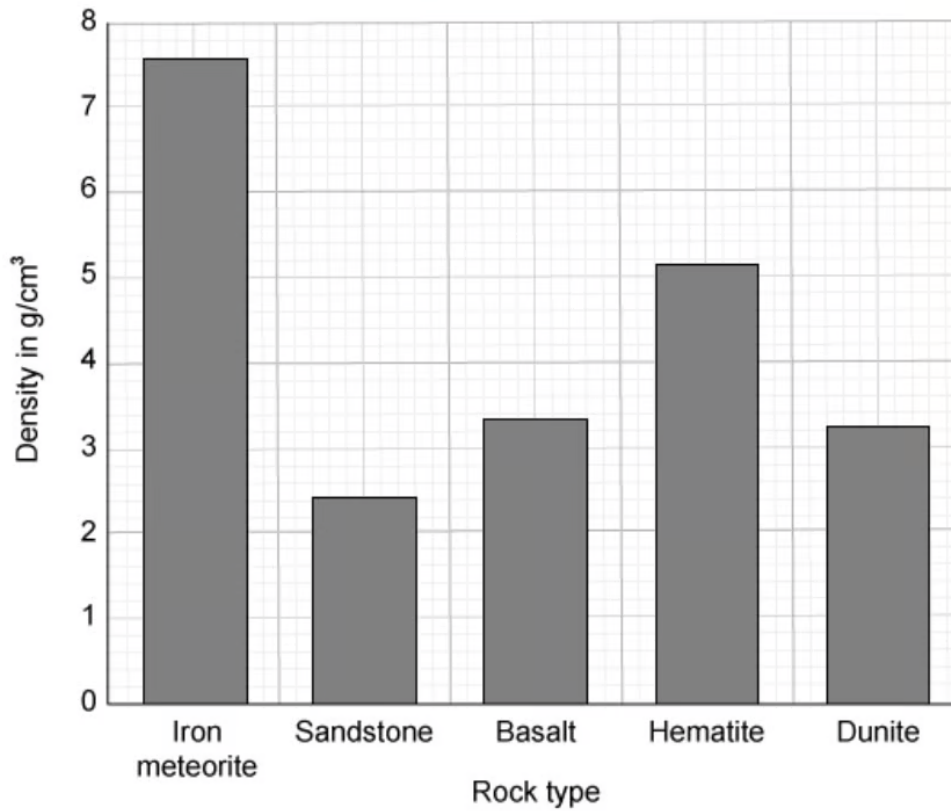
Calculate the density of the rock in g / cm^3.

[2 marks]

[2 marks]

Question 4d

(d) The graph in **Figure 5** below shows the densities of some common types of rock.

Figure 5

Which type of rock most closely matches the rock the student measured?

[1 mark]

[1 mark]

Question 4e

(e) Give one error that the student could have made when measuring the volume of the rock.

[1 mark]

[1 mark]

Question 4f

(f) What effect would the error you described in part **4(e)** have on the value of the volume of the rock that the student measured?
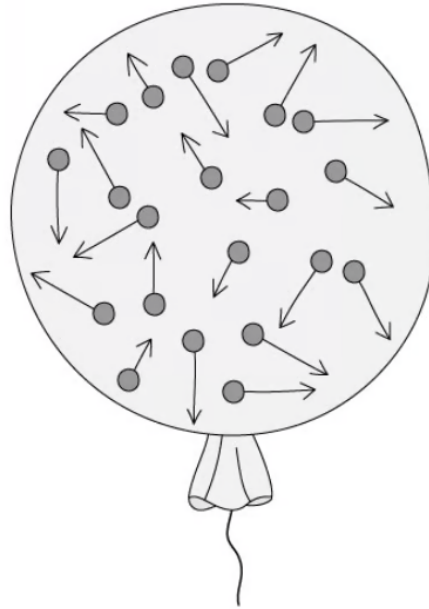
[1 mark]

[1 mark]

SaveMyExams

Question 5a

Figure 6 below shows a party balloon, filled with air.

Figure 6

(a) Describe the motion of the air particles inside the balloon.

[2 marks]

[2 marks]

Question 5b

(b) Explain, in terms of particles, why the air inside the balloon is easy to compress.

[2 marks]

[2 marks]

Question 5c

(c)   State the name given to the sum of the potential and kinetic energy of all the particles of air inside the balloon.

[1 mark]

[1 mark]

Question 5d

(d)   State the equation which links mass, density and volume.

[1 mark]

[1 mark]

Question 5e

(e)   The balloon has a volume of 0.0283 m^3.

The air in the balloon has a mass of 0.0340 kg.

Calculate the density of air.

[3 marks]

[3 marks]

Question 5f

(f)   The balloon is placed into very cold liquid nitrogen, causing the air inside to turn to a liquid.

During this process no air leaves the balloon.

State the name of the physical process which has taken place inside the balloon.

[1 mark]

[1 mark]

Question 5g

(g)   The air inside the balloon is now a liquid.

What is its mass?

[1 mark]

[1 mark]

Question 5h

(h)   Explain, in terms of particles, what has happened to the volume of the balloon.

[2 marks]

[2 marks]

Question 6a

(a) Describe the **arrangement** of the particles in a solid, a liquid and a gas.

[3 marks]

[3 marks]

Question 6b

(b) Describe the **motion** of the particles in a solid, a liquid and a gas

[3 marks]

[3 marks]

Question 6c

(c) During a dry day, a puddle on a road dries up and disappears.

State the name of the process which causes this to happen.

[1 mark]

[1 mark]

Question 6d

(d) Describe **one** change in the weather that would cause the puddle to dry up more quickly.

[1 mark]

[1 mark]