



HOMework BOOKLET

P3

The Particle Model

1) What is density?

2) In each box draw how the particles are arranged in solids, liquids and gases:



solids



liquids



gases

3) Explain each property in terms of how the particles are arranged:

a) Gases and liquids can flow and be poured because...

b) Solids and liquids cannot be squashed (compressed) because...

c) Solids cannot flow because...

d) Gases can be squashed (compressed) because...

4) Phoebe leaves a can of hairspray on the windowsill on a sunny day. Describe what is happening inside the can in terms of the particles:

Challenge: Why are drivers encouraged to check their car tyre pressures before completing a long journey?

Learning Objectives:

- I can define density.
- I can draw the arrangement of particles in solids, liquids and gases.
- I can link the properties of solids, liquids and gases to the arrangement of their particles.
- I can describe the effects of gas pressure.



Density

Density can be calculated using the equation:

$$\text{density (kg/m}^3\text{)} = \frac{\text{mass (kg)}}{\text{volume (m}^3\text{)}}$$

1. Calculate the density of an object with a mass of 2kg and a volume of 0.1m³.

density = _____ kg/m³

2. A mixing bowl has a mass of 0.5kg. A baker adds 0.0002m³ of water to the mixing bowl until the total mass of the bowl and water is 0.7kg.

- a) Calculate the mass of the water.

mass = _____ kg

- b) Calculate the density of the water.

density = _____ kg/m³

3. The baker adds an egg yolk to the mixing bowl. The egg yolk has a density of 1027kg/m³.

- a) What happens to the egg yolk when it is added to the water?

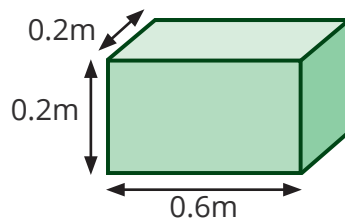
Tick **one** box.

it floats

it sinks

- b) Explain why this happens.

4. A block of oak wood has a mass of 18 480g. The dimensions of the block are shown below.



- a) Calculate the volume of the block.

volume = _____ m³

- b) Calculate the density of the block.

density = _____ kg/m³

5. Tick **one** box to show which is a correct rearrangement of the equation.

mass = $\frac{\text{volume}}{\text{density}}$

mass = $\frac{\text{density}}{\text{volume}}$

mass = density \times volume

6. The density of gold is 19 300kg/m³. The standard volume for a gold bar is 0.00064m³. Calculate the mass of a standard gold bar. Give your answer to 3 significant figures.

mass = _____ kg

Specific Heat Capacity

1. Write the definitions for the following:

a) Heat.....

b) Temperature.....

c) Specific Heat capacity

.....
.....

Write the formula for specific heat capacity, showing the units for each part

.....

2. The specific heat capacity of copper is 390 J/Kg °C. What does this

mean?.....
.....

3. Calculate the energy transferred when 3kg of copper is heated from 20°C to 220°C

.....
.....

4. Calculate the energy needed to heat 2kg of water from 10°C to 90°C. The Specific heat capacity of water is 4200J/Kg°C

.....
.....

5. Here are the specific heat capacity values of four different metals:

metal	specific heat capacity (J/kg°C)
aluminium	910
brass	380
copper	390
iron	460

6. How much energy must be transferred into 1 kg of copper to raise its temperature by 1 °C?

.....

7. Suppose you have 1 kg of each metal. Which one will need the most energy to raise its temperature by 1 °C?

.....

8. The same amount of energy is transferred into 1 kg of each metal. Which one has the largest temperature rise?
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9. How much energy must be transferred into 2 kg of iron to raise its temperature by 5°C?
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10. Complete the table by calculating the missing values

material	energy transfer (J)	Mass (kg)	temperature rise (°C)	specific heat capacity (J/kg°C)
A		4	6	4000
B	6 000	1		2000
C	8 000		4	1000
D		12	24	500
E	2 500	2	5	