Investigating physical properties

Sheet 5

Instructions

In this investigation, you will experiment with water as a solid (ice) and as a liquid; air; and a mixture of gases, to explore some of the properties of the main states of matter.

Background Write definitions for solid, liquid and gas. Draw a diagram or flowchart to show your understanding of the difference between solids, liquids and gases.	
Aim What do you want to find out?	What are some of the differences in the properties of different states of matter?

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Risk assessment	Personal safety
How will you do the experiments safely?	☐ Safety glasses ☐ Gloves ☐ Protective outer clothing ☐ Hair tied back ☐ Closed shoes **Other** ☐ Report all spills and breakages.

What are the risks?	How will you manage them?
Spilling water	
Using the syringe (without the needle)	

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Experiment 1: Investigating a solid	
Materials What will you need?	• 100 mL beaker (or small glass jar) • ice cubes • ruler • plastic forceps, tweezers (or tongs) • white tile (or plate)
Method Remember this should be written in steps using the third person.	1. Place the ice cube on the white tile and measure the length, height and width of the ice cube and record the measurements. 2. Place the ruler on the top of the ice cube and try to compress (squash) it. Record observations. 3. Use tweezers to put the ice cube into the beaker. Draw a diagram of the ice cube in the beaker.
Results and observations	Measurements of the ice cube: Height Length Width Compression observations: Diagram of ice cube in the beaker:

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Analysis of results and observations	Calculate the volume of the ice cube: Volume = length × height × width = = cm^3 Could the ice cube be compressed? Could it's volume be decreased? When the ice cube is moved into the beaker, what, if any, immediate changes do you observe in the shape and/or volume of the ice?

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Experiment 2: Investigating a liquid	
Materials What will you need?	• 50 mL beaker (or small glass jar) • 10 mL graduated measuring cylinder (or measuring cup) • water • syringe (without needle) • rubber stopper (or eraser, cork or reusable adhesive putty) • ruler • white tile (or plate)
Method Remember this should be written in steps using third person.	1. Place 10 mL of water in the measuring cylinder. Draw a diagram of the water in the measuring cylinder. Use the ruler to measure the height of the water. Record this on the diagram. 2. Pour the water from the measuring cylinder into the beaker. Draw a diagram of the water in the beaker. Use the ruler to measure the height of the water. Record this on the diagram. 3. Fill the syringe with 10 mL of water. Draw a diagram of the water in the syringe. Use the ruler to measure the height of the water. Record this on the diagram. 4. Place the rubber stopper on the white tile. Hold the syringe so the nozzle is pressed against the rubber stopper. Try to compress the water in the syringe by gently pressing the plunger down. Record observations.
Results and observations	**Diagrams of water in different containers** **Measuring cylinder** | **Beaker** | **Syringe** Compression observations:

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Analysis of results and observations	Describe what happened to the shape of the water as it was moved from one container to a different container. Does the volume of water change when it is moved to different-shaped containers? Could the water be compressed?

Experiment 3: Investigating a gas	
Materials What will you need?	• balloon • rubber stopper (or eraser, cork or reusable adhesive putty) • syringe (without the needle) • white tile (or disposable plate)
Method Remember this should be written in steps using the third person	1. Half fill a balloon with air and tie a knot in the opening. Draw a diagram of the balloon. 2. Squash the air in the balloon down to one end of the balloon. Draw a diagram of the balloon. 3. Twist the balloon halfway so that the air is in two sections of the balloon. Draw a diagram of the balloon. 4. Fill an empty syringe with air. Place the rubber stopper on the tile and rest the syringe nozzle on it. Try to compress the gas by gently compressing the syringe. Record your observations.
Results and observations	**Diagrams of air in different balloon shapes** Compression observations:

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Analysis of results and observations	Did the amount of gas in the balloon change? Did the volume of the gas in the balloon change? Explain your answer. Describe what happens to the shape of the air as the balloon changes shape. Could the air be compressed?

Experiment 1, 2, 3 Discussion	
Discussion Write your answers in sentence form.	Which state/s of matter changed shape when their container changed shape? Explain why you think this occurred. Which state/s of matter can be easily compressed? Which state/s of matter changed their volume when the volume of the container changed?
Conclusion Sentences relating to the investigation questions.	