

Particle Model Quick Assessment

1) For each property, explain why it is possible in terms of how the particles are arranged:

a. Solids and liquids cannot be compressed (squashed).

b. Liquids and gases can flow.

c. Gases can be compressed.

2) Mercury is a metal but is a liquid at room temperature. Describe the arrangement of the particles of mercury as a liquid, compared to at -38°C when it becomes a solid. **Challenge:** try to refer to 'density' and 'forces' in your answer.

3) Why do scientists use models?

4) We used an analogy (a comparison) for density comparing the idea to packing lots of clothes into a suitcase. Can you think of two other analogies for density?

Learning Objectives:

- I can link the arrangement of particles in each state of matter to their properties.
- I can describe the arrangement of particles in liquids compared to solids.
- I can compare density to everyday situations as an analogy.

Particle Model Quick Assessment Answers

1)

a. Solids and liquids cannot be compressed (squashed) because there are no spaces between the particles, so we say they are very dense/have a high density.

b. Liquids and gases can flow because the particles are free to move/have no fixed point and so can move over one another.

c. Gases can be compressed because the particles have large spaces between them and move around. They will take the shape of any container they are placed in.

2) Mercury, as a liquid, has particles that are free to move and flow. The forces between the particles are relatively strong, and mercury as a liquid has a high density. At -38°C when mercury becomes a solid, the forces between the particles are stronger. The particles are also regularly arranged and are not free to move/they are fixed, but can vibrate on the spot; there are many particles in a small volume, it has a high density.

3) Scientists use models to help describe and explain phenomena that are difficult to observe. For example, atoms are difficult to see with the naked eye. The particle model is a shared concept between scientists across the world and can help to understand what is happening at a smaller level, but it does have its limitations.

4) Student responses may vary, but could include:

- Several people tightly packed on a mode of public transport during rush hour, compared to the middle of the day.
- Several people entering a cinema, as the film begins to start.
- Students going to the canteen at break time/lunchtime and sitting down to eat, compared to other times of the day.

Note: Try to keep student's responses in the same place, so the volume is kept the same. This will be helpful for them to remember that volume is a key factor in density and in this analogy they are only changing 'mass'.

Particle Model Quick Assessment **Teacher Feedback**

Effort: 1 2 3 4 5

You can link the arrangement of particles in some states of matter to their properties.	You can link the arrangement of particles in most states of matter to their properties.	You can link the arrangement of particles in all states of matter to their properties.
You can describe the arrangement of particles in liquids compared to solids.	You can describe the arrangement of particles in liquids compared to solids and refer to forces or density.	You can describe the arrangement of particles in liquids compared to solids and refer to forces and density.
With guidance, you can compare density to one everyday situation as an analogy.	You can independently compare density to everyday situations as an analogy.	You can compare density to everyday situations as an analogy and refer to mass and volume.

Next Steps:

