Subject

Year 8: Particle Model (Physics)

Assessment Opportunities	Literacy/Reading opportunities	CEIAG Links
• Regular low stakes quizzing of AO1- self marked. • In class past paper questions where – self / peer marked • Extended writing is teacher marked with personalised feedback provided. • End of unit assessment self & teacher marked with collective feedback provided.	**Reciprocal reading:** Why do ships float? **Key vocab is highlighted in the SOL**	**Spotlight on careers:** Physicist Other careers: • Mechanical engineer • Aerospace engineer • Biomechanical engineer • Sports scientist • Astronomer

Curriculum vision:

"Our aim is to deliver a curriculum that is inclusive, relevant and progressive for all learners."

KS3 Particle Model (Physics)

Big Picture: Gaining understanding of pressure, density and particle behaviour is fundamental as it provides crucial insight into how the physical world operates. This topic is covered broadly in Key Stage 3 and Key Stage 4 across both Chemistry and Physics. This topic is important as it allows students to understand how pressure varies in different environments, how density can affect buoyancy, and how particles behave in different states of matter and the transition between these.

Lesson sequence	**Learning outcomes / Key knowledge (including NC KS3)** Interleave / review SEND scaffold	**Skills development:** Reading / writing / data / numeracy / graph work	**Spec / book reference**

1. **TBAT:** Explain how pressure changes in liquids.	• Definition of pressure and its units (Pascal, Pa).
	• Describe hydrostatic pressure and the relationship between pressure and depth.
	• Difference between pressure in liquids and gases.
	  ○ States of matter
	  ○ Arrangement of particles
	  ○ Visual aids and demonstrations
	  ○ Use of analogies
	  ○ Sentence starters and word banks
		○ **Explain** how pressure changes with depth in liquids.
		○ **Draw** diagrams illustrating pressure at different depths.
		○ **Predict** the outcome of changing depth on pressure.
			NC pg 10-14 here
			Boost Book 2 Page 111-124

2. **TBAT:** Describe how pressure changes in the atmosphere.	• Definition of atmospheric pressure.
	• Explain the relationship between altitude and atmospheric pressure.
	• How pressure differences affect weather patterns
	• How atmospheric pressure is measured.
	  ○ Visual aids and demonstrations
	  ○ Interactive simulations
	  ○ Sentence starters and word banks
		○ **Describe** how atmospheric pressure changes with altitude.
		○ **Explain** how atmospheric pressure is measured.
		○ **Suggest** why atmospheric pressure decreases with altitude.
			NC pg 10-14 here
			Boost Book 2 Page 111-124

3. **TBAT:** Calculate pressure acting on different objects.	• Use the correct formula to calculate pressure (Pressure = Force/Area) • Use correct units for Force (Newtons, N) • Use correct units for Area (metres^2, m^2) • Convert between units with different prefixes (kilo, milli)	○ **Calculate** pressure using given force and area.	**NC pg 10-14 here**

	○ Forces ○ Balanced and unbalanced forces ○ Worked examples	○ **Justify** calculations using clear working out. ○ **Compare** pressure in different scenarios based on varying forces and areas.	**Boost Book 2 Page 111-124**
4. TBAT: Engage with a scientific article.	• Use a scientific article to investigate why ships are able to float using knowledge about pressure in liquids. • Use an article to answer questions and apply knowledge about pressure in fluids. ○ Reading rulers, tracking as teacher reads ○ Larger text chunked as needed ○ Modelling highlighting and annotation of text	○ **Reciprocal reading:** Why do ships float?	**NC pg 10-14 here** **Boost Book 2 Page 111-124**
5. **TBAT:** Describe and calculate the density of different objects.	• Definition for density of a material. • Use of the appropriate equation to calculate density. • Use appropriate units for density (kg/m^3 or g/cm^3) • How to measure the mass and volume of objects. • Examples of high- and low-density materials ○ States of matter ○ Arrangement of particles ○ Visual aids and demonstrations ○ Use of analogies ○ Sentence starters and word banks	○ **Describe** density and how it is measured. ○ **Calculate** density using mass and volume data. ○ **Compare** densities of different materials.	**NC pg 10-14 here** **Boost Book 3 Page 161-173**
6. **TBAT:** Investigate the density of regular and irregular objects.	• Definition for density of a material. • Use of the appropriate equation to calculate density. • Use appropriate units for density (kg/m^3 or g/cm^3) • How to measure the mass and volume of objects. • Examples of high- and low-density materials • Select appropriate equipment for given investigation.	• **Writing:** Write a set of instructions detailing how to carry out an investigation into the density of regular and irregular objects.	**NC pg 10-14 here** **Boost Book 3**

	○ Lab safety ○ Visual aids and demonstrations ○ Sentence starters and word banks ○ Premade results table and graphical axes		**Page 161-173**
7. **TBAT:** Use the particle model to explain changes in state.	• Describe and explain the particle model of matter. • Describe all changes in state in terms of the particle model and energy transferred. ○ Internal energy store ○ Visual aids and demonstrations ○ Use of analogies ○ Sentence starters and word banks	○ **Explain** how the particle model accounts for changes in state. ○ **Sketch** diagrams of particles in different states of matter. ○ **Evaluate** the energy changes involved in state transitions.	**NC pg 10-14 here** **Boost Book 3 Page 161-173**
8. **TBAT:** Describe how heating and cooling affects the density of materials.	• Describe the effect of temperature on particle motion and spacing. • Relationship between temperature changes and density. • Give real-life examples of thermal expansion and contraction. • Describe how internal energy changes with temperature, ○ Pressure ○ Density calculations and descriptions ○ Visual aids and demonstrations ○ Hands on with equipment ○ Sentence starters and word banks	○ **Describe** how heating and cooling affect density. ○ **Explain** the underlying particle behaviour when materials are heated or cooled. ○ **Suggest** practical applications of thermal expansion and contraction.	**NC pg 10-14 here** **Boost Book 3 Page 161-173**

Vocab	**Links to previous learning / interleaving**	**Assessment & homework**

L3 Vocab Pascal Hydraulic Barometer Atmospheric pressure Anomaly	**L2 Vocab** Pressure Density Altitude Volume Mass Energy Temperature Liquid Solid Gas State Change Expand Contract	**Command words focus** Label Plot Measure Predict Identify Estimate Observe Justify Evaluate Compare construct	**KS2** ○ Contact and non-contact forces ○ Friction ○ Air and water resistance ○ Gravity **Working Scientifically** ○ Asking questions ○ Using scientific apparatus ○ Presenting data ○ Fair tests ○ Predictions and conclusions ○ Variables ○ Accuracy and precision	• Regular low stakes quizzing of AO1 • In class assessment of AO1, AO2, AO3 using past paper questions where appropriate • Written word is assessed with personalised feedback provided. • End of unit assessment marked with collective feedback provided. Homework is set weekly and is outlined in the half-termly homework booklet. Homework includes • online quizzes on Carousel • Learning of content for in-class quizzes • Completion of written questions.
Independent learning BBC Bitesize – Solids, Liquids and Gases BBC Bitesize – Changes of state BBC Bitesize - Pressure **Videos** Particle Model and States of Matter Changing State Pressure in Liquids Pressure in Solids				**Misconceptions / common errors** • Pressure is the same at all depths in a liquid. • Atmospheric pressure is constant regardless of altitude. • Pressure only exists in liquids. • Density and weight are the same. • All objects with the same volume have the same density. • Particles in solids do not move at all. • Heating always causes expansion and cooling always causes contraction. • Particles change size during state transitions. • The density of a material does not change with temperature. • Internal energy is only related to temperature.