

Student Teacher		Observer	
Topic / Unit	Particle Theory	Date	
Class / Key Stage	Year 7 / KS3	Room	

My related targets this week are:

- Instructions - Planning and delivering clear and concise instructions.
- Explanations – chunking retrieval & new knowledge.
- Routines - Implementing calm and orderly exit.

After discussions about my progress, I have identified the following focus for my observer:

- Planning and delivering clear and concise instructions.
- Chunking explanations – particle theory diagrams.

What do I want the students to learn? What are the objectives of this lesson?

Explain differences - solids, liquids & gases in terms of the particle model & by using diagrams.
Objective: 1) Describe properties of solids, liquids & gases; 2) Classify substances as solids, liquids & gases (KS2 retrieval); 3) Describe particle arrangement using particle model diagrams.

What is this lesson building on, and building towards?

Although particle theory is not KS2 content most pupils encountered the particle theory model in KS2.
Building on: Key Stage 2 (Year 4 & 5): Term 'particle' / compared & classified materials - solids, liquids or gases / observed materials change state when heated or cooled / terms evaporation & condensation (water cycle) / separating mixtures by filtering, sieving & evaporating.
No chemistry in Year 6.
Building towards: Key Stage 3: Simple (Dalton) atomic model / conservation of mass changes of state / concept of pure substance / diffusion / separating mixtures by distillation & chromatography.

What might the pupils find difficult, or what misconceptions might they already have?

Misunderstanding: Inaccurate use of changes of state terms / inaccurate drawing of particle diagrams e.g. particles overlap each other & are different sizes.
Misconceptions: Meaning of 'property' / air is a pure substance / there are 'air' particles between particles in a gas / liquids can be compressed / individual particles can change state, expand, compress.

What key / new terminology am I introducing?

Tier 2 language to describe particle arrangement and movement; property / attractive forces, vibrate, fixed position, regular arrangement, random arrangement.

What resources do I need?

Student booklets, MWBs, pens & wipes.
Perfume, bottle water, 250 cm³ measuring cylinder, 250 cm³ beaker, brick, inflated balloon.
Range of materials to classify including some difficult to classify e.g., sand, jelly, talc, tomato sauce.
Bitesize KS3 video preloaded & visualiser with A4 of particle model diagrams.

What health and safety considerations do I need to make?

Routines for bags & coats. Organised movement around room during classification activity.

Lesson Parts

How will the pupils enter the classroom?	
Who is doing what?	What adaptations are needed?
Student booklets, MWB, pens & wipes on benches and 'Do Now' Key Question projected. Greet pupils at door – bag & coat under bench. Refocus pupils slow to settle.	Remind Ken about behaviour expectations. Make sure Helen is sitting in the correct seat. Quiet praise for Wendy & Menna - effort last lesson.

Part 1 Key Learning		Introducing particle theory – Key Question: Why can everyone eventually smell my perfume?	
Who is doing what?		What adaptations are needed?	How do I check understanding?
Spray perfume - front of class; pupils raise hands when smell it. Do Now: pupils answer on post-it.		Frontload instructions: e.g. In silence. Raise your hand when you can smell the perfume.	Target pupils to explain task back.
How will I transition to the next part?			
Clear instruction moving on – pens down and eyes on me. Key question.			

Part 2 Key Learning		Properties of substances Key Question: How can you tell if a substance is a solid, liquid or gas?	
Who is doing what?		What adaptations are needed?	How do I check understanding?
<p>Retrieval KS2 properties states of matter. PPT slide - present properties table – go through properties of solid.</p> <p>Pupils think-pair-share properties of liquids & gases - record on MWB.</p> <p>Review class ideas pf properties for liquids & gases before slow reveal on PPT.</p>		<p>Check understanding of ‘substance’ & ‘property.’ Examples; brick, water bottle, inflated balloon.</p> <p>No note taking as properties table in booklet already.</p> <p>Prepare reteach e.g. liquids take shape of container & always take up same amount of space (demo using beaker & measuring cylinder).</p>	<p>Circulate during think-pair-share and check MWB responses.</p> <p>Select pupils to share - address misconceptions & misunderstanding.</p>
How will I transition to the next phase?			
Warn – 1 minute. Clear instruction moving on – pens down and eyes on me. What we are going to do ...			

Part 3 Key Learning		Classification of substances	
Who is doing what?		What adaptations are needed?	How do I check understanding?
<p>Substances to classify - on benches.</p> <p>On visualiser - explain pupils are to:</p> <ul style="list-style-type: none">• Classify substances – s, l or g.• Record how they decided e.g. water is a liquid because it can flow ... <p>Record in booklet.</p> <p>Explain to pupils how to move around classroom.</p>		<p>Set expectation – do not touch substances in front of you.</p> <p>Model classification process for a couple of substances (not in the activity).</p> <p>Set expectations (quietly & calmly) & monitor engagement (specific pupils).</p>	<p>Target pupils to explain task back.</p> <p>Circulate & observe.</p> <p>Prioritise ‘check in’ with specific pupils once started activity.</p>
How will I transition to the next phase?			
Frontload instructions / warn 3 minutes / warn 1 minute / countdown for end of activity & back to seats.			

Part 4 Key Learning		Particle Theory Model	
		Key Question: Why do solids, liquids & gases have different properties?	
Who is doing what?		What adaptations are needed?	How do I check understanding?
<p>Quick review of classification – pick up on difficult examples.</p> <p>Ask pupils to imagine they can see what substances are made from using a powerful microscope – introduce idea of ‘particle.’</p> <p>KS3 Bitesize video (< 1 min) - particle model diagrams. Pupils observe arrangement & movement of particles – note ideas on MWB.</p> <p>On visualiser - particle model diagrams. Q+A pupil ideas & label each diagram using key terminology. Pupils then label diagrams.</p> <p>Show particle model poems – pupils identify state of matter on MWB.</p>		<p>Advance warning specific pupils if want to answer during Q+A.</p> <p>Emphasise spelling of ‘particle’</p> <p>Pause video after each state – let pupils describe on MWBs.</p> <p>Count down routine for MWB.</p> <p>Address misconceptions – emphasise particles all same size and do not overlap. Highlight model limitation – diagrams do not show particle movement.</p> <p>Count down routine for MWB.</p>	<p>Target responses Q+A</p> <p>MWB responses.</p> <p>Responses Q+A</p> <p>MWB responses.</p>
How will I transition to the next phase?			
Instructions; MWB cleaned. Pass MWBs, pens and wipes to end of row. Key Question.			

Part 5 Key Learning		Applying particle theory	
		Key Question: Why can everyone eventually smell my perfume?	
Who is doing what?		What adaptations are needed?	How do I check understanding?
Pupils return to post-it & improve answer.		Display key terms for arrangement & movement of particles in a gas.	Collect in responses – select range & use as discussion activity at the start of next lesson.
How will I transition to the next phase?			
Pre-prepared PPT slide reminder of exit routines.			

How will the pupils leave the classroom?	
Who is doing what?	What adaptations are needed?
<p>Instructions:</p> <p>Pupils pass booklets to end of bench. One pupil from each row collects post-it notes. Pack up bag, put on coat & stand behind stool.</p> <p>Dismiss row by row.</p>	

Reflections

What feedback did you receive / reflections do you have on this lesson?

Lesson pace dropped because there were lots of transitions throughout the lesson.

Some of my instructions were clear particularly at the start of the lesson, but towards the end I could have been more concise and used countdowns better.

My explanations went well and pupils were focused because I had rehearsed and knew exactly what I needed to say.

Sometimes some pupils were not engaged e.g. because they finished the classification activity quickly and because they already knew all about particle theory and I didn't have any extension activities.

My subject knowledge needs development as I incorrectly talked about 'gas particles.'

What impact did your adaptations have on pupils? How do you know this?

Explaining how the classification activity would work and my expectations of pupil movement around the room meant that pupils were not confused and started the activity quickly.

The end of the classification activity was a bit chaotic as I forgot about my countdown and ended up shouting over pupils talking, instead of waiting for silence.

Explaining the particle model diagrams supported pupils in being able to use the key terminology correctly. Most pupils could correctly identify the state from the diagram and, those I asked could explain their choice using the key terminology correctly.

The post-it note activity gave me good feedback regarding whether pupils could apply their knowledge of particle theory to real-life examples. Displaying the key terminology meant that most pupils included some of the terms in their revised explanation.

What discussion points / questions will you take to your next mentor meeting?

1. How do I limit the number of transitions planned, so less lesson time is wasted?
2. What other strategies can I use to manage transitions?
3. Are there other terms that teachers often use incorrectly when teaching particle theory?