

Physics > Big idea PMA: Matter > Topic PMA1: Heating and cooling

Progression toolkit: Temperature

Learning focus	Temperature is a measure of the average speed at which the particles in a substance or material are moving.				
As students' conceptual understanding progresses they can:					
As students' conceptual understanding progresses they can:	Predict the temperature of different materials that are all in thermal equilibrium with the room. P	Predict the temperature reached by mixing samples of water that are all at the same temperature. P	Describe the arrangement and movement of particles in a substance in the solid and liquid states.	Describe the changes in particles of a substance or material when its temperature is changed.	Explain the changes in volume of solids and liquids when their temperature is changed.
Diagnostic questions	Three balls	More water	Particle model SL	Pie tin particles	A cup of tea
Response activities	Water and sand		Particle diagram of a liquid	Ouch!	
				Expansion model	

Key:

P Prior understanding from earlier stages of learning

B Bridge to later stages of learning

<p>Three balls</p> <p>What do you think about the temperature of each ball?</p> <table border="1"> <thead> <tr> <th>Statements</th> <th>I am sure it's right</th> <th>I think it's right</th> <th>I think it's wrong</th> <th>I am sure it's wrong</th> </tr> </thead> <tbody> <tr> <td>A All three balls have the same temperature</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>B The metal ball has the lowest temperature</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>C The tennis ball has the highest temperature</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Statements	I am sure it's right	I think it's right	I think it's wrong	I am sure it's wrong	A All three balls have the same temperature					B The metal ball has the lowest temperature					C The tennis ball has the highest temperature					<p>More water</p> <p>What will the water feel like when it is mixed?</p> <p>Put a tick (✓) in the box next to the best answer:</p> <p>A hotter <input type="checkbox"/></p> <p>B the same temperature <input type="checkbox"/></p> <p>C colder <input type="checkbox"/></p>	<p>Particle model SL</p> <p>Imagine you could see the particles in this block of lead.</p> <p>Which diagram best matches what you would see?</p> <p>A Particles not moving <input type="checkbox"/></p> <p>B Particles shaking on the spot <input type="checkbox"/></p> <p>C Particles moving freely <input type="checkbox"/></p> <p>D Particles not moving <input type="checkbox"/></p>	<p>Pie tin particles</p> <p>What do you think happens to the particles?</p> <table border="1"> <thead> <tr> <th>Statements</th> <th>I am sure it's right</th> <th>I think it's right</th> <th>I think it's wrong</th> <th>I am sure it's wrong</th> </tr> </thead> <tbody> <tr> <td>A They get heavier</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>B They get bigger</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>C They move more quickly</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>D They push into each other with more force</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>E They change shape</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Statements	I am sure it's right	I think it's right	I think it's wrong	I am sure it's wrong	A They get heavier					B They get bigger					C They move more quickly					D They push into each other with more force					E They change shape					<p>A cup of tea</p> <p>What happens to the liquid in the thermometer when it is put in the hot tea?</p> <p>Put a tick (✓) in the box next to the best answer:</p> <p>A Its temperature goes up and it expands (gets bigger) <input type="checkbox"/></p> <p>B Its temperature goes up <input type="checkbox"/></p> <p>C Its temperature goes up and it contracts (gets smaller) <input type="checkbox"/></p>
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<p>Application - practical</p>	<p>Critique a representation</p>	<p>Talking heads</p>	<p>Critique a representation</p>																																																			