


Key concept (age 11-14)


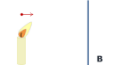
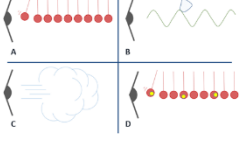

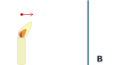
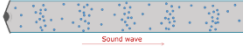



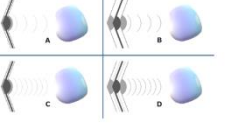



PSL4.2: A wave model of sound

Progression toolkit: A wave model of sound

Learning focus	As a sound wave (longitudinal wave) travels it transfers energy, as particles of the medium through which it travels are successively made to vibrate forwards and backwards along the direction in which the wave travels.				
As students' conceptual understanding progresses they can:					
As students' conceptual understanding progresses they can:	<p>Recognise that as a sound wave travels forward, the medium it travels through does not.</p> <p>P</p>	<p>Describe the movement of each 'particle' of a longitudinal (sound) wave as the wave moves forward.</p> <p>P</p>	<p>Explain how movement of each 'particle' of a longitudinal wave causes a perturbation to move forward.</p>	<p>Compare the speed of sound waves that have a different frequency or loudness to each other and are moving through a common medium.</p>	<p>Compare the energy transferred by sound waves that have a different frequency or loudness to each other and are moving through a common medium.</p>
Diagnostic questions	Moving sound	Flame in a sound wave	Longitudinal wave	Faster sound waves	Sound bubble
Response activities	Model sound wave			School band	Candle in the sound

Key:

P Prior understanding from earlier stages of learning

<p>Moving sound</p> <p>BEST STUDENT WORKSHEET</p> <p>Moving sound</p> <p>A loudspeaker is shown in front of a candle. The flame is tilted because a sound wave moves through the air. The sound wave moves towards the candle.</p>  <p>What happens to the flame in a sound wave? The candle is tilted to the right because...</p>  <p>These pictures try to show how a sound wave moves through the air. Which one is the best model for how a sound wave moves?</p>  <p><small>Developed by the University of York Science Education Group and the Salters' Institute. This document may have been edited. Download the original from www.BestEvidenceScienceTeaching.org. © University of York Science Education Group. Distributed under a Creative Commons Attribution-NonCommercial (CC BY-NC) license.</small></p>	<p>Flame in a sound wave</p> <p>BEST STUDENT WORKSHEET</p> <p>Flame in a sound wave</p> <p>A lit candle is placed in front of a speaker. The speaker makes a sound wave. The sound wave moves towards the candle.</p>  <p>What happens to the flame in a sound wave? The candle is tilted to the right because...</p>  <p>These statements are about the moving air particles in a sound wave. Are each statement, not just one, correct to show what you think?</p> <table border="1"> <thead> <tr> <th></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. Air particles can be pushed forward by other air particles that hit them.</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>B. Air particles vibrate and sound moves forward.</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>C. Air particles can travel backwards off the air particles that hit them.</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>D. Air particles move backwards and forwards over and over again.</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p><small>Developed by the University of York Science Education Group and the Salters' Institute. This document may have been edited. Download the original from www.BestEvidenceScienceTeaching.org. © University of York Science Education Group. Distributed under a Creative Commons Attribution-NonCommercial (CC BY-NC) license.</small></p>		I am sure it's right	I think it's right	I think it's wrong	I am sure it's wrong	A. Air particles can be pushed forward by other air particles that hit them.					B. Air particles vibrate and sound moves forward.					C. Air particles can travel backwards off the air particles that hit them.					D. Air particles move backwards and forwards over and over again.					<p>Longitudinal wave</p> <p>BEST STUDENT WORKSHEET</p> <p>Longitudinal wave</p> <p>The picture shows particles of air in a sound wave. A vibrating object is making the air particles move.</p>  <p>The pictures show particles of air when there is no sound wave.</p>  <p>These statements are about the moving air particles in a sound wave. Are each statement, not just one, correct to show what you think?</p> <table border="1"> <thead> <tr> <th></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. Air particles can be pushed forward by other air particles that hit them.</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>B. Air particles vibrate and sound moves forward.</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>C. Air particles can travel backwards off the air particles that hit them.</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>D. 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The loudspeaker makes a louder sound when it makes a bigger vibration in and out.</p>  <p>1a. Which sound wave moves faster through the air? Put a tick (✓) in the box next to the best answer.</p> <p>A. Wave X moves faster. <input type="checkbox"/></p> <p>B. Wave Y moves faster. <input type="checkbox"/></p> <p>C. Both waves move at the same speed. <input type="checkbox"/></p> <p>1b. What is the best reason for your last answer? Put a tick (✓) in the box next to the best answer.</p> <p>A. Both waves move through the same air. <input type="checkbox"/></p> <p>B. It has more energy. <input type="checkbox"/></p> <p>C. It has more force. <input type="checkbox"/></p> <p>D. Faster air particles need to move. <input type="checkbox"/></p> <p><small>Developed by the University of York Science Education Group and the Salters' Institute. This document may have been edited. Download the original from www.BestEvidenceScienceTeaching.org. © University of York Science Education Group. Distributed under a Creative Commons Attribution-NonCommercial (CC BY-NC) license.</small></p>	<p>Sound bubble</p> <p>BEST STUDENT WORKSHEET</p> <p>Sound bubble</p> <p>A sound bubble is very stretchy.</p>  <p>A sound wave can make the surface of a bubble vibrate. The sound wave transfers energy to the bubble.</p> <p>1a. Which sound wave transfers energy to the bubble most quickly? Put a tick (✓) in the box next to the best answer.</p>  <p>1b. What is the best reason for your last answer? Put a tick (✓) in the box next to the best answer.</p> <p>A. This sound wave contains more energy. <input type="checkbox"/></p> <p>B. This sound wave hits the bubble with most force. <input type="checkbox"/></p> <p>C. This sound wave makes the bubble vibrate the most. <input type="checkbox"/></p> <p>D. This sound wave moves the most air particles. <input type="checkbox"/></p> <p><small>Developed by the University of York Science Education Group and the Salters' Institute. 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<p>Simple multiple choice</p>	<p>Simple multiple choice</p>	<p>Confidence grid</p>	<p>Two-tier multiple choice</p>	<p>Two-tier multiple choice</p>																																																		
<p>Model sound wave</p> <p>BEST STUDENT WORKSHEET</p> <p>Model sound wave</p> <p>A group of students make a model to show how a sound wave moves through the air.</p>  <p>1. What on the ping-pong balls represent? 2. What happens to the ping-pong balls when the loudspeaker vibrates? 3. How is this model similar to how a sound wave moves? 4. How is this model different to how a sound wave moves?</p> <p><small>Developed by the University of York Science Education Group and the Salters' Institute. This document may have been edited. Download the original from www.BestEvidenceScienceTeaching.org. © University of York Science Education Group. Distributed under a Creative Commons Attribution-NonCommercial (CC BY-NC) license.</small></p>	<p>School band</p> <p>BEST STUDENT WORKSHEET</p> <p>School band</p> <p>Some students have formed a band. They played their first concert at the end of last term.</p>  <p>The students in the school choir are talking about the music.</p> <p>Wiktoria: All the different notes reach the back of the choir at the same time.</p> <p>Xavier: You hear the drums just before the other music because they are so loud.</p> <p>Zara: The best sound is closest to the stage, before the different notes mix together.</p> <p>Yaelin: The high notes are the sharpest because they reach you first.</p> <p>To answer: 1. Who is right about this music? 2. What is wrong about the music? 3. What would you say to help their understanding?</p> <p><small>Developed by the University of York Science Education Group and the Salters' Institute. This document may have been edited. Download the original from www.BestEvidenceScienceTeaching.org. © University of York Science Education Group. Distributed under a Creative Commons Attribution-NonCommercial (CC BY-NC) license.</small></p>	<p>Candle in the sound</p> <p>BEST STUDENT WORKSHEET</p> <p>Candle in the sound</p> <p>A lit candle is put in front of a speaker. The speaker makes a sound wave. The sound wave makes the candle flame flicker.</p>  <p>Predict: How will the candle flame move differently if the sound wave is made louder? How will it move differently if the frequency of the sound wave is made higher? Explain: Explain why you think this will happen. Write a demonstration of the investigation. Observe: Describe what happens to the candle flame when the sound wave is made louder, and when the frequency of the sound wave is increased. Explain: Write your predictions and explanations correct? Try to improve your first explanations to explain what happened more clearly.</p> <p><small>Developed by the University of York Science Education Group and the Salters' Institute. This document may have been edited. Download the original from www.BestEvidenceScienceTeaching.org. © University of York Science Education Group. Distributed under a Creative Commons Attribution-NonCommercial (CC BY-NC) license.</small></p>																																																				
<p>Critiquing a representation</p>	<p>Talking heads</p>	<p>Predict, explain, observe, explain</p>																																																				