

Physics > Big idea PSL: Sound, light and waves > Topic PSL1: Sound and light






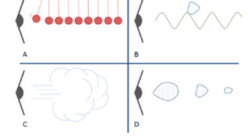
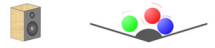
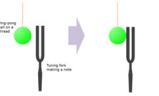
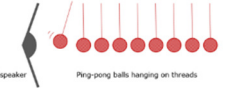
Progression toolkit: Production of sound

Learning focus	Objects and materials can be made to vibrate to produce a sound that becomes louder as the size of vibration increases and higher pitched as the rate of vibration increases.				
As students' conceptual understanding progresses they can:					
As students' conceptual understanding progresses they can:	Identify what vibrates to make sound. P	Describe the effect of larger vibrations on a sound. P	Describe the effect of faster or slower vibrations on a sound.	Explain how sound is produced by objects that do not appear to vibrate.	Explain how vibrations are passed on to the surrounding air.
Diagnostic questions	Sound vibrations	Drum beat		Wood-rock	Into the air
		High or loud?			
Response activities		Speaker vibration		Touching note	Sound model


Key:

P Prior understanding from earlier stages of learning

B Bridge to later stages of learning

<p>Sound vibrations</p> <p>BEST STUDENT WORKSHEET</p> <p>Sound vibrations</p> <p>When something vibrates it can make a sound.</p> <p>A vibration is a shake or a wobble.</p>  <p>1. What vibrates to make a sound? Put each statement in the correct column to show what you think.</p> <table border="1" data-bbox="246 478 504 606"> <thead> <tr> <th>Plays</th> <th>I am sure this is right</th> <th>I think this is right</th> <th>I don't think this is right</th> <th>I am sure this is wrong</th> </tr> </thead> <tbody> <tr> <td>A The guitar strings</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>B The skin on the drum</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>C The metal in the horn</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>D The air in the horn</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 material is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike license. © University of York Science Education Group. Best Evidence Science Teaching is a trademark of the University of York Science Education Group. All rights reserved. 2017. BY-NC-SA</small></p>	Plays	I am sure this is right	I think this is right	I don't think this is right	I am sure this is wrong	A The guitar strings					B The skin on the drum					C The metal in the horn					D The air in the horn					<p>Drum beat</p> <p>BEST STUDENT WORKSHEET</p> <p>Drum beat</p> <p>When a drum is hit it makes a sound.</p>  <p>1. What happens when the drum is hit harder? Put a tick (✓) in the box next to the best answer.</p> <table border="1" data-bbox="660 438 862 502"> <tbody> <tr> <td>A The sound is the same</td> <td><input type="checkbox"/></td> </tr> <tr> <td>B The sound is louder</td> <td><input type="checkbox"/></td> </tr> <tr> <td>C The sound lasts longer</td> <td><input type="checkbox"/></td> </tr> </tbody> </table> <p>2. Why do you think this will happen? Put a tick (✓) in the box next to the best answer.</p> <table border="1" data-bbox="660 526 862 614"> <tbody> <tr> <td>A It is the same drum</td> <td><input type="checkbox"/></td> </tr> <tr> <td>B It is hit with a bigger force</td> <td><input type="checkbox"/></td> </tr> <tr> <td>C The drum vibrates in the same way</td> <td><input type="checkbox"/></td> </tr> <tr> <td>D The drum vibrates with bigger vibrations</td> <td><input type="checkbox"/></td> </tr> </tbody> </table> <p><small>Developed by the University of York Science Education Group and the Salters' Institute. This material is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike license. © University of York Science Education Group. Best Evidence Science Teaching is a trademark of the University of York Science Education Group. All rights reserved. 2017. BY-NC-SA</small></p>	A The sound is the same	<input type="checkbox"/>	B The sound is louder	<input type="checkbox"/>	C The sound lasts longer	<input type="checkbox"/>	A It is the same drum	<input type="checkbox"/>	B It is hit with a bigger force	<input type="checkbox"/>	C The drum vibrates in the same way	<input type="checkbox"/>	D The drum vibrates with bigger vibrations	<input type="checkbox"/>	<p>High or loud?</p> <p>BEST STUDENT WORKSHEET</p> <p>High or loud?</p> <p>To describe a sound you need to use the just right word.</p> <p>To do</p> <p>Fill in the gaps to describe the sounds that are made. You should only use the words <i>high</i> and <i>loud</i>.</p> <p>To answer</p> <p>Playing a guitar Plucking a guitar makes the strings vibrate. Thin strings vibrate very quickly and make _____ notes. Plucking hard on a string makes it vibrate a lot and its note is _____.</p>  <p>Beating a drum When a drum is hit hard its sound is _____. A tight drum vibrates very quickly and has a _____ sound. When a drum has large vibrations it is _____.</p> <p><small>Developed by the University of York Science Education Group and the Salters' Institute. This material is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike license. © University of York Science Education Group. Best Evidence Science Teaching is a trademark of the University of York Science Education Group. All rights reserved. 2017. BY-NC-SA</small></p>	<p>Wood-rock</p> <p>BEST STUDENT WORKSHEET</p> <p>Wood-rock</p> <p>Teasing a rock with a metal rod makes a sound. What is the sound made by the table.</p>  <p>1. Why is the sound made by the table a lot louder than the sound made by the rock? Put each statement, tick (✓) in the box to show what you think.</p> <table border="1" data-bbox="1355 478 1612 598"> <thead> <tr> <th>Plays</th> <th>I am sure this is right</th> <th>I think this is right</th> <th>I don't think this is right</th> <th>I am sure this is wrong</th> </tr> </thead> <tbody> <tr> <td>A The table vibrates much more</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>B The table is a lot bigger</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>C It is the table that gets hit</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>D The rock does not vibrate</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. 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<p>Speaker vibration</p> <p>BEST STUDENT WORKSHEET</p> <p>Speaker vibration</p> <p>A loudspeaker vibrates to make a sound. The ping-pong balls on the speaker jiggle up and down.</p>  <p>Predict</p> <p>What do you think will happen if a louder note is played? What do you think will happen if a higher note is played?</p> <p>_____</p> <p>_____</p> <p>Explain</p> <p>Explain why you think this will happen.</p> <p>_____</p> <p>_____</p> <p>Now watch the demonstration</p> <p>_____</p> <p>Observe</p> <p>Describe what happens.</p> <p>_____</p> <p>_____</p> <p>Explain</p> <p>Were your predictions and explanations correct? If not, can you explain what you observed?</p> <p>_____</p> <p>_____</p> <p><small>Developed by the University of York Science Education Group and the Salters' Institute. This material is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike license. © University of York Science Education Group. Best Evidence Science Teaching is a trademark of the University of York Science Education Group. All rights reserved. 2017. BY-NC-SA</small></p>	<p>Touching note</p> <p>BEST STUDENT WORKSHEET</p> <p>Touching note</p> <p>A tuning fork makes a note when it is struck. What happens when it touches the ping-pong ball?</p>  <p>Predict</p> <p>What do you think will happen when the tuning fork touches the ping-pong ball?</p> <p>_____</p> <p>_____</p> <p>Explain</p> <p>Explain why you think this will happen.</p> <p>_____</p> <p>_____</p> <p>Now watch the demonstration</p> <p>_____</p> <p>Observe</p> <p>Describe what happens.</p> <p>_____</p> <p>_____</p> <p>Explain</p> <p>Were your prediction and explanation correct? If not, can you explain what you observed?</p> <p>_____</p> <p>_____</p> <p><small>Developed by the University of York Science Education Group and the Salters' Institute. This material is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike license. © University of York Science Education Group. Best Evidence Science Teaching is a trademark of the University of York Science Education Group. All rights reserved. 2017. BY-NC-SA</small></p>	<p>Sound model</p> <p>BEST STUDENT WORKSHEET</p> <p>Sound model</p> <p>A group of students make a model to show how we can hear a loudspeaker.</p>  <p>To answer</p> <ol style="list-style-type: none"> What do the ping-pong balls represent? What happens to the ping-pong balls when the loudspeaker vibrates? How is this model similar to what happens when sound moves through the air? How is this model different to what happens when sound moves through the air? <p><small>Developed by the University of York Science Education Group and the Salters' Institute. This material is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike license. © University of York Science Education Group. Best Evidence Science Teaching is a trademark of the University of York Science Education Group. All rights reserved. 2017. BY-NC-SA</small></p>																																																																		
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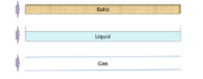

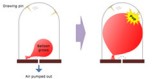


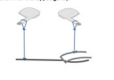

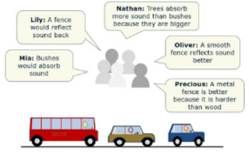
Progression toolkit: Transmission of sound

Learning focus	Sound needs a medium to travel through. It radiates out from a source in straight lines in all directions and when it strikes an object or new material it is transmitted, reflected, scattered or absorbed – or a combination of these.				
As students' conceptual understanding progresses they can:					
Diagnostic questions	Identify which materials sound travels best in.	Describe how particles vibrate to transmit sound.	Explain why sound will not travel through empty space (vacuum).	Explain why sounds become quieter as the distance from the source increases.	Explain why sound is absorbed by soft surfaces and reflected or scattered by hard ones.
Response activities	String ears	Candle sound	Balloon pop!	Long distance sound	Sshhh... curtains
Diagnostic questions	Sound moves	Candle sound	Balloon pop!	Long distance sound	Sshhh... curtains
Response activities	String ears	It's quiet in space			Noisy Road

Key:

P Prior understanding from earlier stages of learning

B Bridge to later stages of learning

<p>Sound moves</p> <p>When something vibrates it can make a sound. Sound can travel through solids, liquids and gases.</p>  <p>Does sound travel best in a solid, a liquid or a gas? Put a tick (✓) in the box next to the best answer.</p> <p>A Solid <input type="checkbox"/></p> <p>B Liquid <input type="checkbox"/></p> <p>C Gas <input type="checkbox"/></p> <p>Why do you think sound travels best in this? Put a tick (✓) in the box next to the best answer.</p> <p>A There is space for sound to move between particles. <input type="checkbox"/></p> <p>B Lots of particles to push the sound along. <input type="checkbox"/></p> <p>C Many particles to vibrate and bump into each other. <input type="checkbox"/></p> <p>D Particles are joined so it is easy to pass on vibrations. <input type="checkbox"/></p>	<p>Candle sound</p> <p>A lit candle is put in front of a speaker. The speaker starts to vibrate a sound.</p>  <p>Predict: What do you think will happen to the flame when the speaker is turned off?</p> <p>Explain: Explain why you think this will happen.</p> <p>Now watch the demonstration.</p> <p>Observe: Describe what happens.</p> <p>Explain: Were your prediction and explanation correct? If not, can you explain what you observed?</p>	<p>Balloon pop!</p> <p>Air is pumped out of the jar and the balloon gets bigger. The drawing pins will pop the balloon.</p>  <p>Predict: What do you think you will hear when the balloon pops?</p> <p>Explain: Explain why you think you will hear this?</p> <p>Now watch (and listen) to the demonstration.</p> <p>Observe: Describe what you hear when the balloon pops.</p> <p>Explain: Were your prediction and explanation correct? If not, can you explain what you observed?</p>	<p>Long distance sound</p> <p>You are sitting towards the stick and it makes noise. Early 'teleg' is louder than the one below.</p>  <p>Which is the best reason for the sound getting louder? Put a tick (✓) in the box next to the best answer.</p> <p>A It is easier for the sound to reach you. <input type="checkbox"/></p> <p>B The sound has less time to fade before it reaches your ears. <input type="checkbox"/></p> <p>C Your ears get used to the sound. <input type="checkbox"/></p> <p>D The sound is less spread out, so more of it gets to your ears. <input type="checkbox"/></p>	<p>Sshhh... curtains</p> <p>Curtains help to make a room quieter by absorbing sound.</p>  <p>Which statements about curtains absorbing sound do you think are right? For each statement, tick (✓) one column to show what you think.</p> <table border="1"> <thead> <tr> <th>Places</th> <th>I am sure this is right</th> <th>I think this is right</th> <th>I think this is wrong</th> <th>I am sure this is wrong</th> </tr> </thead> <tbody> <tr> <td>A Curtains absorb sound that reaches them.</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>B Sound makes particles in curtains vibrate more quickly.</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>C Particles in curtains trap sound.</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>D The folds in curtains help them absorb sound.</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Places	I am sure this is right	I think this is right	I think this is wrong	I am sure this is wrong	A Curtains absorb sound that reaches them.					B Sound makes particles in curtains vibrate more quickly.					C Particles in curtains trap sound.					D The folds in curtains help them absorb sound.				
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<p>String ears</p> <p>The metal clamp makes a sound when it is tapped gently.</p>  <p>Predict: What do you think will happen to the sound if you put your fingers in your ears?</p> <p>Explain: Explain why you think this will happen.</p> <p>Now have a go.</p> <p>Observe: Describe how the sound changes.</p> <p>Explain: Were your prediction and explanation correct? If not, can you explain what you observed?</p>	<p>It's quiet in space</p> <p>Sound cannot be heard through space.</p>  <p>Why can't you hear a sound in space? Put a tick (✓) in the box next to the best answer.</p> <p>A No air particles to make each other vibrate. <input type="checkbox"/></p> <p>B No air particles to push the sound along. <input type="checkbox"/></p> <p>C No air particles to pass the sound along. <input type="checkbox"/></p> <p>D No gas in the space acts for sound to get in. <input type="checkbox"/></p>	<p>Noisy Road</p> <p>The road outside Nathan's school is very noisy. Some students are thinking about how to reduce the noise.</p>  <p>Who can't you hear a sound in space? Put a tick (✓) in the box next to the best answer.</p> <p>A No air particles to make each other vibrate. <input type="checkbox"/></p> <p>B No air particles to push the sound along. <input type="checkbox"/></p> <p>C No air particles to pass the sound along. <input type="checkbox"/></p> <p>D No gas in the space acts for sound to get in. <input type="checkbox"/></p>																											
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