

Physics > Big idea PMA: Matter > Topic PMA2: Floating and sinking

Key concept (age 11-14)

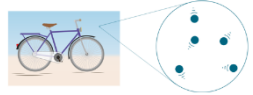
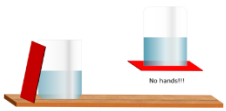





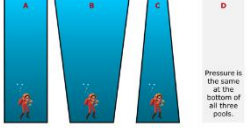


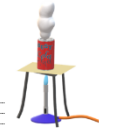

PMA2.2: Pressure in fluids

Progression toolkit: Pressure in fluids

Learning focus	Pressure increases with depth in a fluid, so the force exerted by a fluid is larger on the lower surface of an immersed object than on the upper surface. This results in an upward force on the object.				
As students' conceptual understanding progresses they can:	<div> <div>CONCEPTUAL PROGRESSION</div> <div></div> </div>				
	Describe the movement of particles in fluids on either side of a boundary. P	Explain phenomena that are caused by differences in fluid pressure, on either side of a boundary.	Explain why pressure in a fluid increases with depth.	Explain why pressure at a particular depth is the same throughout a fluid.	Explain how pressure pushes on an object submerged in a fluid.
Diagnostic questions	Inflation	Magic glass	Underwater beach ball Squeezing water	Deep water Underwater cave	Underwater basketball
Response activities		Pressure can	Diving deep		

Key:

P Prior understanding from earlier stages of learning

Inflation	Magic glass	Underwater beach ball	Squeezing water	Deep water																																																												
<p>BEST STUDENT WORKSHEET</p> <p>Inflation</p> <p>This diagram shows how particles in the air are moving.</p>  <p>1. What do you think about the particles of air?</p> <p>For each statement, click (✓) for agree or show what you think.</p> <table border="1"> <thead> <tr> <th></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. There is air between the particles.</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>B. The particles are moving very, very quickly.</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>C. The particles move freely in every direction.</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 this is right	I think this is right	I think this is wrong	I am sure this is wrong	A. There is air between the particles.					B. The particles are moving very, very quickly.					C. The particles move freely in every direction.					<p>BEST STUDENT WORKSHEET</p> <p>Magic glass</p> <p>A piece of card is placed on top of a glass of water. Holding the card in place, the glass is turned over. With luck, the water stays in the glass!</p>  <p>Why do you think the water stays in the glass?</p> <p>For each statement, click (✓) for agree or show what you think.</p> <table border="1"> <thead> <tr> <th></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. 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The air gas inside the water has pushed the water back into the glass.					<p>BEST STUDENT WORKSHEET</p> <p>Underwater beach ball</p> <p>A beach ball is full of air. It's pushed under water.</p>  <p>What happens to the beach ball when it is pushed deeper down?</p>  <p>For each statement, click (✓) for agree or show what you think.</p> <table border="1"> <thead> <tr> <th></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. The pressure on the beach ball gets bigger.</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>B. The ball is squashed harder in all directions.</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>C. The ball is squashed flatter.</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. 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Is this pressure large enough to squash water?</p> <p>Put a tick (✓) in the box next to the best answer.</p> <p>A. Water cannot be squashed. <input type="checkbox"/></p> <p>B. Water is squashed a tiny bit. <input type="checkbox"/></p> <p>C. Water is squashed more than a tiny bit. <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>BEST STUDENT WORKSHEET</p> <p>Deep water</p> <p>The pressure is very big at the bottom of the sea.</p>  <p>These three diving pools each have the same depth of water. At the bottom of which pool is the pressure the biggest?</p>  <p>Pressure is the same at the bottom of all three pools.</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>
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<p>BEST STUDENT WORKSHEET</p> <p>Underwater cave</p> <p>Sometimes there are caves under the sea.</p>  <p>a. What do you think about the pressure in the cave?</p> <p>Put a tick (✓) in the box next to the best answer.</p> <p>A. Pressure is the same as pressure at T. <input type="checkbox"/></p> <p>B. Pressure is bigger at X in the cave sea. <input type="checkbox"/></p> <p>C. Pressure is bigger at T in the cave. <input type="checkbox"/></p> <p>b. What is the best reason for your last answer?</p> <p>Put a tick (✓) in the box next to the best answer.</p> <p>A. Pressure depends on how much water is above that point. <input type="checkbox"/></p> <p>B. Pressure depends on depth. <input type="checkbox"/></p> <p>C. Water is more compressed here. <input type="checkbox"/></p> <p>D. Water has more freedom to move here. <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>BEST STUDENT WORKSHEET</p> <p>Underwater basketball</p> <p>Some rings can be kept under water. The ball is pushed underwater.</p>  <p>How hard does the water press on each of the spots?</p> <p>Put the name of each force in a pressure to show what you think.</p> <table border="1"> <thead> <tr> <th>Spot</th> <th>Pressure</th> </tr> </thead> <tbody> <tr> <td>Top</td> <td>No pressure</td> </tr> <tr> <td>Side</td> <td>Smallest pressure</td> </tr> <tr> <td>Bottom</td> <td>Some pressure (not biggest or smallest)</td> </tr> <tr> <td></td> <td>Biggest pressure</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>	Spot	Pressure	Top	No pressure	Side	Smallest pressure	Bottom	Some pressure (not biggest or smallest)		Biggest pressure	<p>BEST STUDENT WORKSHEET</p> <p>Pressure can</p> <p>A little bit of water is added to a drink can and heated. When the water boils, steam comes out of the top of the can. Particles of air and water leave the can.</p>  <p>Problem</p> <p>The can is turned upside-down and put into cold water. What do you think happens?</p> <p>Explain</p> <p>Explain why you think this will happen.</p> <p>Write a demonstration of the can being put into cold water.</p> <p>Outline</p> <p>Describe what you see.</p> <p>Describe how quickly this happens.</p> <p>Explain</p> <p>Show your prediction and explanation correct? Try to improve your first explanation or explain what happens 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>BEST STUDENT WORKSHEET</p> <p>Diving deep</p> <p>It is not easy to dive to the bottom of a deep sea. Divers wear masks and they can breathe air from a tank.</p>  <p>Some students are discussing what it would be like for a diver at the bottom of the sea.</p> <p>Leo: It would be hard to walk because of the weight of the water.</p> <p>Max: It would feel like she is wearing very tight clothes that squeeze her.</p> <p>Kieran: She needs to wear heavy shoes to hold her down.</p> <p>Nathan: She has a rope because the pressure of the water makes it hard for her to swim up to the surface.</p> <p>To answer</p> <p>1. Who is right about the diver?</p> <p>2. Who is wrong about the diver?</p> <p>What would you say to help them understand?</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>																																																			
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Two-tier multiple choice	Linking ideas	Predict, explain; observe, explain (PEOE)	Talking heads																																																													