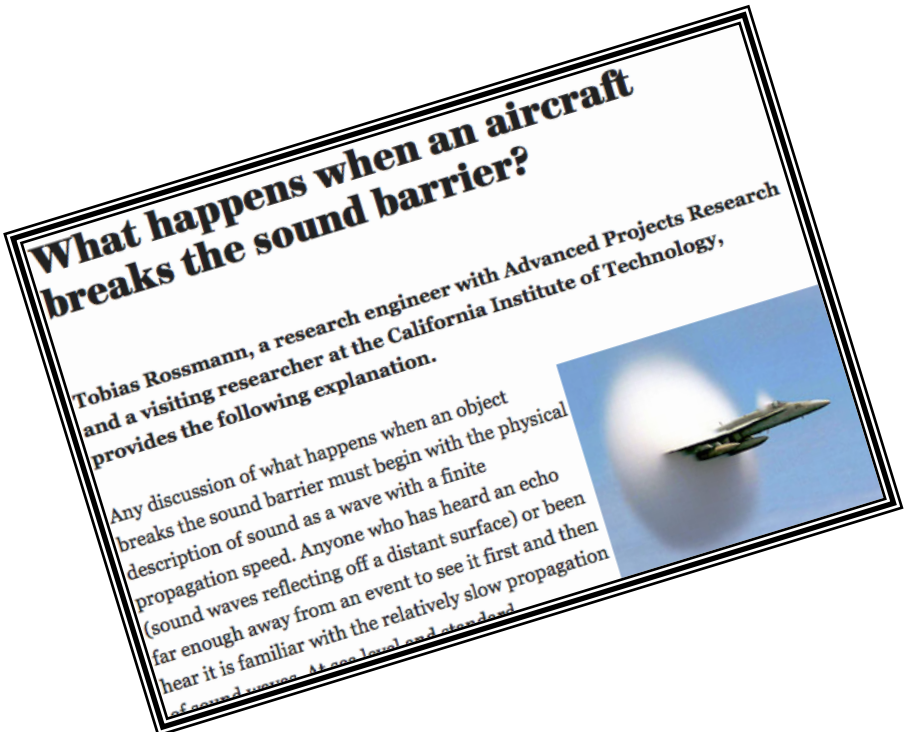
Close Reading and Text Dependent Questions in Science
What Happens When An Aircraft Breaks The Sound Barrier (Physics – HS)

The text selection, *What Happens When An Aircraft Breaks The Sound Barrier,* can be found at the following link: http://www.scientificamerican.com/article.cfm?id=what-happens-when-an-airc

We apologize that we cannot include this reading directly; it is copyrighted material and we do not have special permissions that would allow us to post it publically. If you have difficulty accessing this article at the site above, please check the **Science Page of Aspen/SIS** for assistance accessing it.



Look in the Student Learning Outcome (SLO) Documents for guidance on when this should be taught. These can be found on the BPS Science Department's website: http://bpsscience.weebly.com/ You will find the Student Learning Outcomes documents organized there by grade level.

What Happens When An Aircraft Breaks The Sound Barrier (Physics – HS)
Student Questions

1. A friend of yours explains to you what she witnessed at a fireworks show. She stated that she saw the fireworks in the sky with bright flashing colors, but then a few seconds later she heard the sound of the explosion. What information from the article could you use to explain the phenomenon that your friend observed?

2. Using the information from the article, explain what a "sonic boom" is and summarize the process by which it occurs.

3. You are watching a low flying jet plane fly overhead. When it flies overhead you do not hear anything at first, and then a moment after it passes you hear the sound from the jet. What can you infer about the speed of the jet relative to the speed of sound?

4. Using information from the article, explain what the image included with the article is showing.

5. Explain the relationship between the first paragraph in the article and the paragraphs that follow.

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Sample Answers

1. **A friend of yours explains to you what she witnessed at a fireworks show. She stated that she saw the fireworks in the sky with bright flashing colors, but then a few seconds later she heard the sound of the explosion. What information from the article could you use to explain the phenomenon that your friend observed?**
   Sound travels at a finite speed. It takes time for the sound waves caused by the exploding fireworks to travel the far distance from the explosion in the sky to where your friend is on the ground.

2. **Using the information from the article, explain what a "sonic boom" is and summarize the process by which it occurs.**
   A sonic boom occurs when a fast moving object such as a jet moves a speed that is greater than the speed of sound it is emitting. The sound waves will "pile up" in front of the object creating a barrier of pressure. When the fast moving object passes through this sound wave pressure barrier an explosive sound can be heard which is called a "sonic boom."

3. **You are watching a low flying jet plane fly overhead. When it flies overhead you do not hear anything at first, and then a moment after it passes you hear the sound from the jet. What can you infer about the speed of the jet relative to the speed of sound?**
   The jet plane was flying at a speed faster than the speed of the sound it was producing.

4. **Using information from the article, explain what the image included with the article is showing.**
   It is image taken of a F-18 jet breaking the sound barrier. The cloud that is shown in the image is caused by condensation of water vapor in the air due to lower pressure regions of air that surround the aircraft due to its high speed. This vapor cloud appears near the back of the jet as it continues at its high speed.

5. **Explain the relationship between the first paragraph in the article and the paragraphs that follow.**
   The first paragraph gives introductory information about the finite speed of sound. This sets up the next paragraph that relates the speed of sound to how sonic booms are created. The next paragraph follows with more details on this process, and the final paragraph gives an example of it occurring with a visual and an explanation of the science that the visual captured.