PHYSICS IN MOTION
gpb.org/physics-motion

Unit 6C
The Doppler Effect
Note-Taking Guide TEACHER

Main Ideas, Key Points, Questions:

After watching the video segment, write down key points, main ideas, and big questions.

Objective(s):

- *Understand that the relative motion between the source of a wave and the observer of a wave causes a difference between the emitted and observed frequencies of the wave.*
- *Recognize that when the source of a wave and the observer of a wave move toward each other that the frequency observed is greater than the frequency emitted.*

Notes:

During the video segment, use words, phrases, or drawings to take notes.

Summary:

After watching the video segment, write at least three sentences explaining what you learned. You may ask yourself: "If I was going to explain this to someone else, what would I say?"

Copyright © 2018 Georgia Public Broadcasting. All rights reserved. Use or distribution by an unintended recipient is prohibited.

PHYSICS IN MOTION
gpb.org/physics-motion

Unit 6C
The Doppler Effect
Questions to Consider TEACHER

Answer the following.

1. **When an emergency vehicle siren approaches you, how does its observed pitch compare to what you hear after the vehicle passes you?**

   The observed pitch of the siren as it approaches you is greater than the observed pitch after it passes you.

2. **Define the Doppler effect in your own words.**

   The Doppler effect is the difference between the observed frequency and the emitted frequency of a wave caused by the source and the observer of the wave moving relative to each other.

3. **When an emergency vehicle siren approaches you, how does the wavelength of the sound that reaches you compare to the actual wavelength of the sound that the siren emits?**

   The wavelength of the observed sound when the siren approaches is shorter than the actual wavelength that the siren emits.

4. **What types of waves experience the Doppler effect?**

   All waves experience the Doppler efect when there is relative motion between the source and the observer.

5. **Why are you able to observe the Doppler effect on earth with sound waves but not with light waves?**

   Light waves travel much quicker on earth than sound waves. In order for the Doppler effect to be observed, the relative velocity between the source and the observer must be a significant fraction of the speed of the wave.

6. **When stars move away from a telescope, what color do they appear to be compared to the actual light they emit?**

   When stars and galaxies move away from a telescope, they appear to be red because red light is on the lower frequency end of the visible spectrum. This phenomenon is called a red shift.

questions continued on next page

Copyright © 2018 Georgia Public Broadcasting. All rights reserved. Use or distribution by an unintended recipient is prohibited.

PHYSICS IN MOTION
gpb.org/physics-motion

Unit 6C
The Doppler Effect
Questions to Consider TEACHER

Answer the following.

7. **What is it called when a galaxy is moving toward a telescope at a very high speed?**

When stars and galaxies move toward a telescope, it is called a blue shift, because blue light is on the higher frequency end of the visible spectrum.

8. **What are two everyday applications of the Doppler effect?**

The Doppler effect is used in radar guns by police officers and in the Doppler radar used by meteorologists to make weather predictions.

9. **What variables must be known to determine the observed frequency of a wave?**

The direction and speed of the observer, the direction and speed of the source, and the emitted frequency and speed of the wave must be known to determine the observed frequency of the wave.

10. **If the observer moves toward the source, will the observed frequency be greater than or less than the emitted frequency? Will the numerator of the Doppler effect equation need to increase or decrease for this to happen?**

If the observer moves toward the source, the observed frequency will be greater than the emitted frequency, and the numerator of the Doppler effect equation must increase.

11. **If the source is moving toward the observer, will the observed frequency be greater than or less than the emitted frequency? Will the denominator of the Doppler effect equation need to increase or decrease for this to happen?**

If the source moves toward the observer, the observed frequency will be greater than the emitted frequency, and the denominator of the Doppler effect equation must decrease.

12. **What is created when an object travels faster than the speed of sound?**

When an object travels faster than the speed of sound, a sonic boom is created because the sound waves created by the object bunch up together.

Copyright © 2018 Georgia Public Broadcasting. All rights reserved. Use or distribution by an unintended recipient is prohibited.