

ASSESSMENT

Vocabulary Handout - Key

- 1 Frequency**
number of waves passing a fixed point in a set amount of time
- 2 Radio Waves**
part of a whole system of waves, called the electromagnetic Spectrum. Radio waves are ones that can be heard. Others are X-ray microwave, light, and more.
- 3 Wavelength**
distance between high points in waves. Each kind of wave has a certain shape and length. Where they peak will differ.
- 4 Doppler Effect**
the recognition that sound waves seem to change pitch according to their distance from a receiver of that sound.

TEACHERS GUIDE



**DOPPLER EFFECT
DOMONSTRATION SET**
ITEM # W-0055

ENERGY - SOUND

Have you ever noticed how a passing car or parade gets louder as it gets closer, and quieter as it goes away?
How does this fact hold the answer to severe weather forecasting?

Students strike any of the three aluminum tuning forks with the included rubber mallet. As students whirl the ringing fork on its tether, they observe the seeming pitch change that results from the change in distance between the fork and their ears. Compare each fork's response. This forms the basis for understanding other uses of Doppler technology.



Materials

- Doppler Effect Demo Set
- Websites on weather forecasting using Doppler
- Video of a weather forecast that mentions Doppler or a clip from the movie Twister
- Vocabulary handout

Goals & Objectives

Students will:

- Recognize what sound waves are and how they are useful.
- Recognize what Doppler Effect is and how it is used.
- Summarize the historical development of Doppler.

ASSESSMENT

Participation, Vocabulary sheet, Hypothesis, research paragraphs with citations.

ACTIVITIES

- 1 Discuss how a passing parade band, racecar or motorcycle sounds as it passes. (For younger or struggling students, have them act it out.)
- 2 Ask if they know how that this phenomenon has a scientific explanation, and can be used to save lives.
- 3 Show the weather video or movie clip.
- 4 Hand out the vocabulary sheets and ask them to use the internet or science book to define. (Again, for struggling students, put in small groups and compete for which group can be done correctly first.
- 5 In an open area, choose 1 student to strike a fork, and another student to swing the fork on the tether, well away from the other students. Discuss variations in sound per distance.
- 6 Group students into three groups, each group with its own fork, and repeat step Compare and contrast each fork. Which fork is higher pitched? Which is easier to hear or to notice a difference? Hypothesize about the cause of those differences, using the vocabulary on the handout. Teacher should give verbal feedback to guide students to the correct answer. (Higher frequencies are easier to notice differences in, as the wavelength is so condensed that changes are more noticeable.)
- 7 Ask students how this knowledge allows people to forecast storms. What is the connection? Students should write their hypothesis on a sheet of paper. Next they should use the Internet to answer the question "how does Doppler radar work?" Summarize their findings in one paragraph, and include source information. Students should then state separately how close their hypothesis was. (Answers should be similar to the following: Doppler sends out waves tuned to a precise frequency, which bounce back when they hit a weather system. If the frequency speeds up over time, it indicates the system is moving closer.)
- 8 Assign students to research the history of Doppler. In one paragraph, they should find the year it began (1842), who discovered it (Christian Doppler), any equations offered to express the information, and 3-4 "landmarks" along the way. They should include source information for this paragraph as well.

S T U D E N T
H A N D O U T

Student Name: _____

Vocabulary List

1 Frequency

3 Wavelength

2 Radio Waves

4 Doppler Effect

