Waves at Work

How wave energy helps people observe, heat, and treat.

PS.6.d "energy associated with waves has many applications."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline each sentence that describes a wave application. Circle words that show whether the waves collect information or cause a physical change.

Useful Energy in Waves

1. Wave energy travels from place to place without carrying matter along with it. This transfer can make useful changes. In a hospital, an ultrasound probe sends high-frequency sound waves into a patient's body. Different tissues reflect some of the waves back to the probe. A computer uses the returning signals to create an image. The sound waves provide information about structures inside the body while avoiding an incision. The waves must be strong enough to detect but controlled to keep exposure low.

2. Radio waves also carry energy and information. Weather radar stations send pulses of radio waves toward clouds. Raindrops, snow, and hail scatter part of each pulse back to the station. By measuring how long the return takes and how strong it is, scientists locate precipitation and estimate its intensity. This helps meteorologists warn communities about severe storms. Radar does not push the storm away. Its wave energy is used to gather information that supports decisions about safety.

3. Some technologies use wave energy to cause a physical change. Microwave ovens produce electromagnetic waves that transfer energy to water molecules in food. As the molecules move and rotate more, the food warms. In another application, carefully focused ultrasound can break up certain kidney stones into smaller pieces. Doctors select settings for the goal and the body part involved. These examples show that a wave application can either collect information or transfer energy in a way that produces a planned effect.

2 ANSWER WITH EVIDENCE

Use the passage

1. How do ultrasound waves help create an image inside a patient's body?

2. How is the purpose of weather radar different from the purpose of a microwave oven?

3. What detail shows that radar gathers information about a storm instead of changing the storm?

4. What physical change can carefully focused ultrasound cause, according to the passage?

3 YOUR TURN

Your own words

Propose one use of wave energy in a school or community that is not described in the passage. Write exactly three sentences that name the wave type, explain what the waves do, and state the intended benefit or change.

Waves at Work

PART 1 · READ AND MARK

Underline each sentence that describes a wave application. Circle words that show whether the waves collect information or cause a physical change. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	How do ultrasound waves help create an image inside a patient's body?	**Different tissues reflect some sound waves back to the probe, and a computer uses the returning signals to create an image.**
2	How is the purpose of weather radar different from the purpose of a microwave oven?	**Weather radar uses returning radio waves to gather information about precipitation. A microwave oven transfers wave energy to water molecules so food warms.**
3	What detail shows that radar gathers information about a storm instead of changing the storm?	**The station measures how long the waves take to return and how strong they are to locate precipitation and estimate its intensity.**
4	What physical change can carefully focused ultrasound cause, according to the passage?	**It can break certain kidney stones into smaller pieces.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

A school could use an infrared sensor to control lights in an empty hallway. The sensor sends infrared waves and detects waves reflected by nearby people. When no reflected signal is detected, the system can turn lights off to save electrical energy.

Accept any accurate wave application not used in the passage, as long as the response names a wave type, explains its role, and states a realistic benefit or change. The student response must contain exactly three sentences.