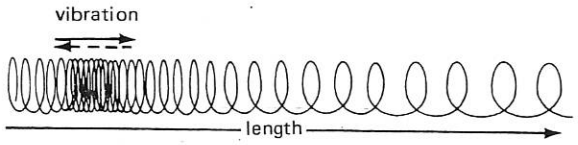
AIM 14 | How is light different from sound?

Sound, you have learned, is a form of *energy*. It has no weight and does not take up space. But sound can do *work*. It can make things move. That is why sound is a form of energy. Energy is *the ability to make things move.*

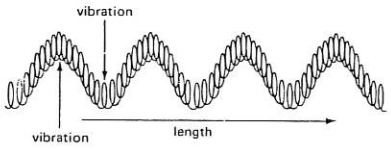
Light is a form of energy, too. But light is different from sound in many ways. How are light and sound different?

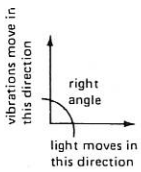
1. *Sound* waves are *longitudinal* waves. A longitudinal wave vibrates in the *same* direction as its length. This is what a longitudinal wave looks like. (Remember Aim 4?)



Light waves are *transverse* [trans VURS] waves. A transverse wave vibrates at *right angles* to its length. (A right angle looks like this: ⌐ .)

This is what a transverse wave looks like.





2. *Sound* waves move only through a *medium*. That is a solid, liquid, or gas.

Light waves do not need a medium. Light waves can move through a *vacuum*. There is no matter at all in a vacuum, not even air.

3. *Sound* waves travel through air at about 335 *meters* (1,100 *feet*) per second.

Light waves travel *much* faster. Light travels at a speed of about *300,000 kilometers* (186,000 miles) per second. This is the fastest speed in nature. Nothing travels faster than light.

4. *Sound* waves bend around corners easily. *Light* waves do not. Light waves travel in *straight lines*.

COMPARING SOUND AND LIGHT

Figures A and B show energy waves.

Look at the figures. Then answer the questions.

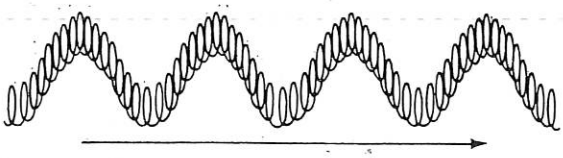


Figure A

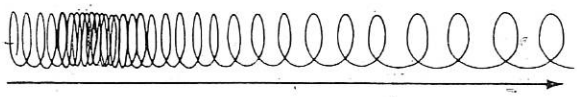


Figure B

Answer with the figure letter.

1. Which wave vibrates in the *same direction* as its length? _____
2. Which wave vibrates at right angles to its length? _____
3. Which figure shows a *sound* wave? _____
4. Which figure shows a *light* wave? _____

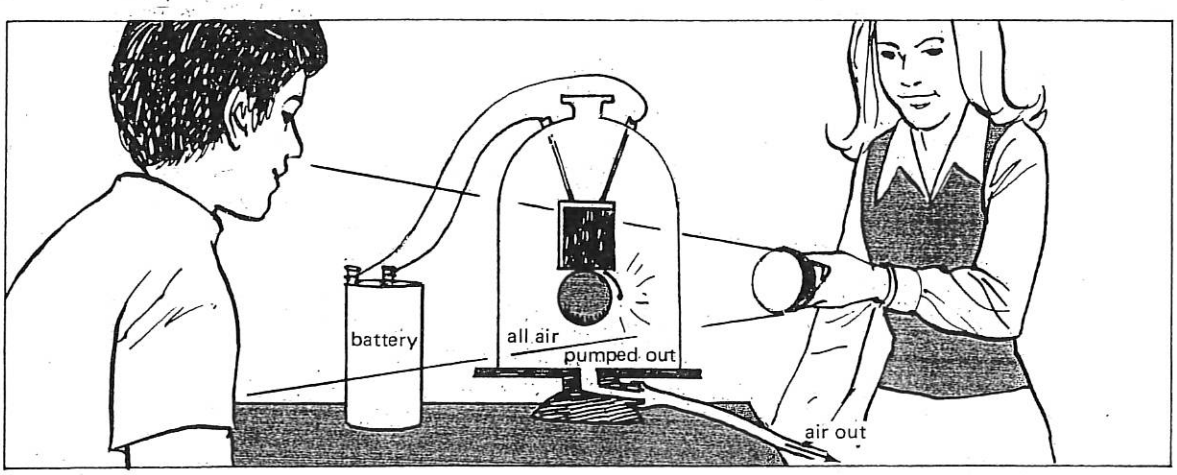
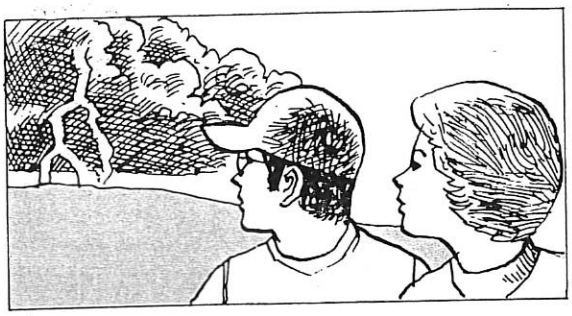


Figure C

Now look at Figure C.

5. Is there air in the jar? _____
6. What word describes the "*absence* of air"? _____
7. **a)** Do the students hear the bell ringing? _____

   b) Why? _____
8. If the flashlight is switched on, the light _____ pass through the jar.
   will, will not
9. Does light pass through a vacuum? _____
10. Which needs a *medium* in order to travel, sound or light? _____



There is a lightning and thunder storm a distance away.

Lightning and thunder happen at the same time. But you do not experience them at the same time.

Figure D

11. Which of the following is correct? Circle the letter of your answer.

a) You hear thunder before you see the lightning.

b) You see lightning before you hear the thunder.

12. **a)** How fast does sound travel through air? _____

b) How fast does light travel? _____

13. Try to figure out this one.

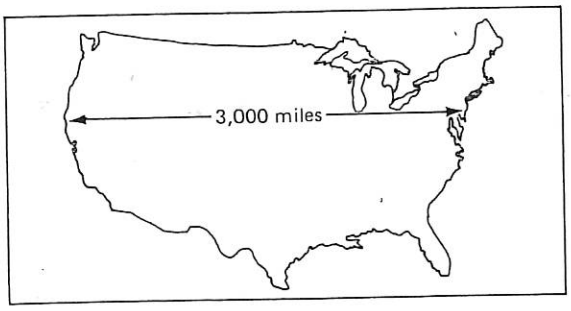


Figure E

The United States is about 3,000 miles across.

Light travels about 186,000 miles per second.

How many times can light travel across the United States in just one second? _____

14. How many round trips could light make across the United States in one second?

_____

15. Look at Figure F.

a) Will the girl hear her classmate calling? _____

b) This shows that sound _____ (does, does not) move around corners.

Figure F

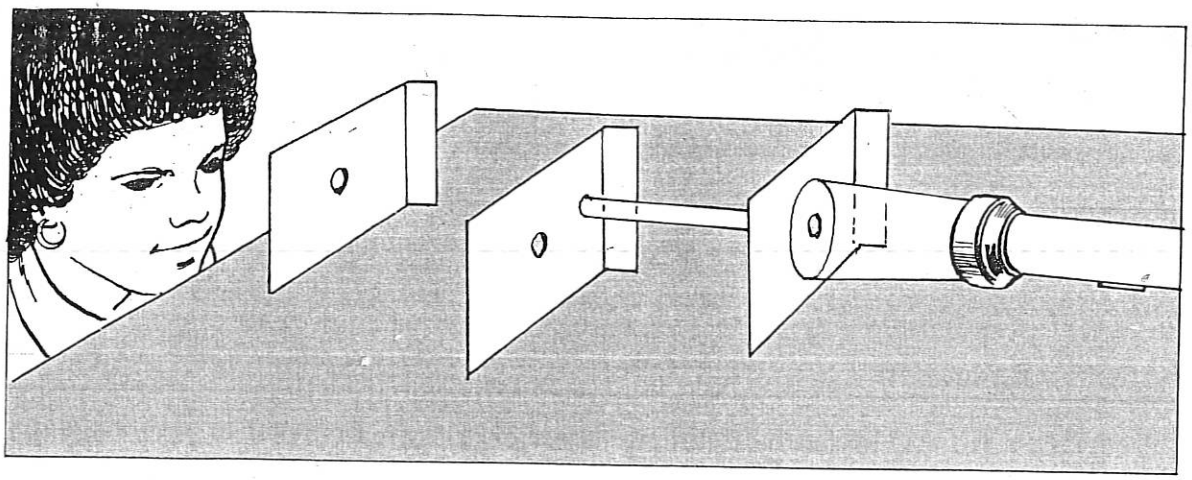


Figure G

16. Each piece of cardboard has one hole. Are the holes in a straight line? _____

17. Does the girl see the flashlight bulb? _____

18. This shows that light _____ move around corners.
does, does not

19. Without moving her head, what can the girl do to see the light? _____

_____

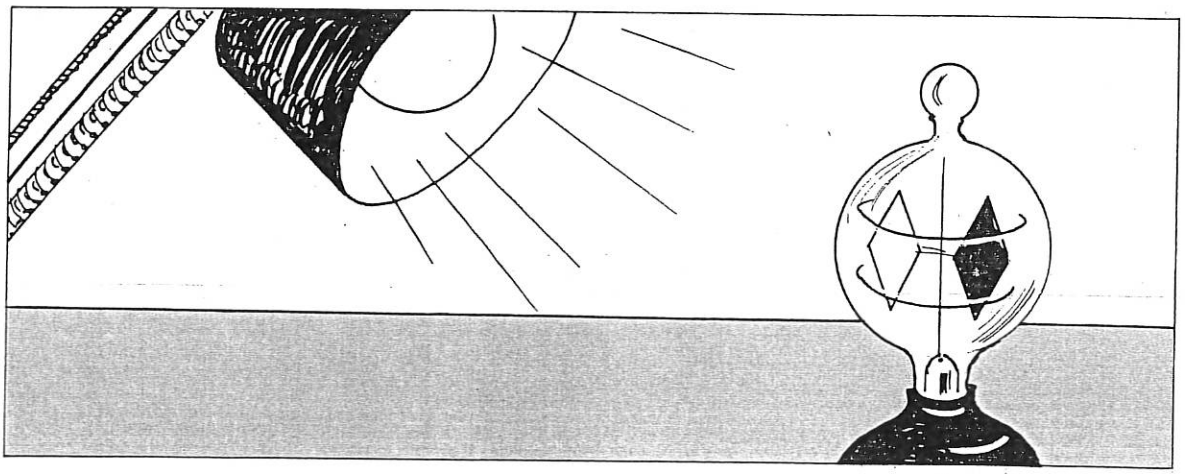


Figure H

Figure H shows a *radiometer*. The light from the bulb is turning the blades.

20. How can you stop the blades from turning? _____

_____

21. What is the definition of energy? _____

_____

22. Why are sound and light forms of energy? _____

SOUND OR LIGHT?

Several characteristics are listed on the chart. Each one belongs to either sound or light. Which one is it? Write either *sound* or *light* in the boxes.

	Characteristic	Belongs to *Sound* or *Light*?
1.	Moves about 335 meters per second	
2.	Transverse waves	
3.	Moves around corners	
4.	Moves only in a medium	
5.	Moves about 300,000 kilometers per second	
6.	Longitudinal waves	
7.	Does not move around corners; moves in a straight line	
8.	Moves in a vacuum	

REACHING OUT

1. Outer space contains very little matter. It is like a vacuum. How do we know that light can travel through a vacuum? _____

_____

_____

_____

2. Another form of energy that you know travels at the speed of light. We use this energy in our daily lives. What is this form of energy?

_____

_____

_____

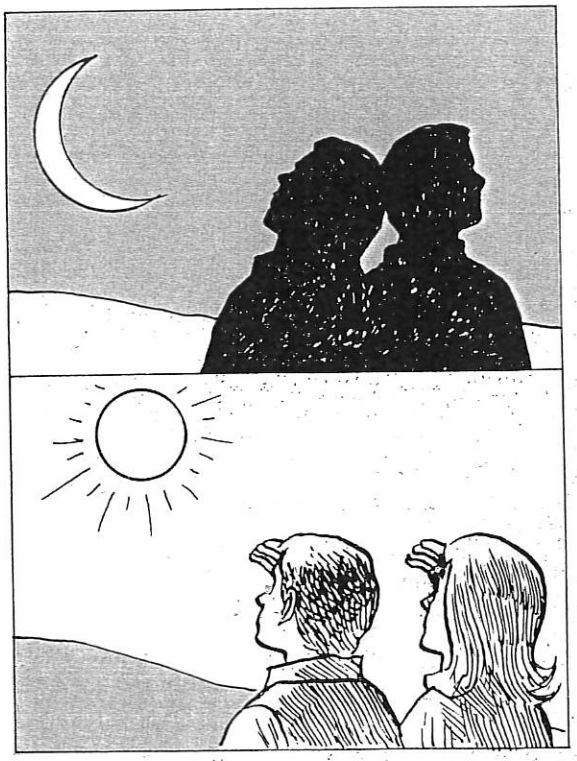


Figure I