

# Keep The Lights Burning, Abbie

(GPN #37)



Author: Peter and Connie Roop

Illustrator: Peter E. Hanson

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**Program Description:** LeVar travels to the rocky shores of mid-coast Maine to tour a modern day lighthouse, joins a sailing family for a day at sea on their 100-foot coasting schooner, and learns about the mystery of putting a ship in a bottle.

## Spoon Light

**Key Words:** light, concave mirrors, reflection

**Concept:** A concave (bowl-shaped) mirror can be used to enlarge and redirect light.



In the story **Keep the Lights Burning, Abbie**, the lighthouse beacon was made by lanterns placed in a horizontal circle. Each lantern had a shiny bowl-shaped mirror behind it. These special mirrors were used to enlarge the light from each lantern and reflect it out to sea.

**Materials:** Large spoon that is round and shiny, new pencil, glow-in-the-dark paper such as glow-in-the-dark stars or any brightly colored paper, tape, flashlight.

1. Hold up a large, round spoon (the rounder, the better) so that the back of the spoon is facing you. Point into the middle of the spoon using your index finger. Hold your finger so that it is almost touching the spoon. Closely observe the reflection of your finger on the back of the spoon. Then turn the spoon over so that the front of the spoon is facing you. Again point into the middle of the spoon with your index finger. How is the reflection of your finger different? (The reflection of your finger will be much larger and will almost cover the inside of the spoon.)

The spoon is similar in shape to the shiny mirrors used behind the lanterns that Abbie had to light. Just as with the spoon and the reflection of your finger, the mirrors behind the lanterns reflected and enlarged the light coming from the lanterns.

2. Because it could hurt your eyes if you were to shine a bright light into the spoon, make a model of a light by taping a glow-in-the-dark star or a brightly colored paper dot to the eraser end of a new pencil.

3. Hold up the spoon so that the front of the spoon is facing you. Then move the star end of the pencil toward the center of the spoon. Watch for the point where the image of the star becomes very large. You may not be able to see the star shape but the color of the star will fill the inside of the spoon. If you are using glow-in-the-dark paper, try the same thing in a dark area after exposing the star to light. The glow of the star will light up the inside of the spoon.

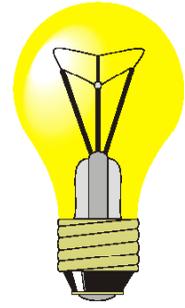
4. Think about the spoon and then look at a flashlight. What part of a flashlight is like the spoon? (The shiny bowl-shaped mirror behind the bulb.) Why is there a shiny bowl-shaped mirror behind the bulb? (It will enlarge the light from the bulb and reflect it forward.)



# Bent Beam

**Key Words:** light rays

**Concept:** A beam of light can be bent.



The lighthouse that LeVar visited had a beacon with a 1000 watt light bulb that was surrounded on the top and bottom by glass prisms. The lighthouse keeper explained that the prisms bent the light rays from the bulb that would shine down to the floor and up to the ceiling back to the middle of the beacon and out to sea. Light rays usually travel in a straight line, but light rays will bend (i.e. change direction) as they pass from one substance into a different substance. Light rays passing from air into glass will bend as they did in the lighthouse beacon. Light rays will also bend as they pass from air into water.

**Materials:** Round, clear glass or plastic jar with a lid, water, pencil, flashlight, foil, knife or scissors.

1. Fill a round, clear-glass or plastic jar with water. Place a pencil in the jar and look at it from the side of the jar. The pencil will appear to be bent at the point where the pencil enters the water. This is because the light reflecting from the part of the pencil in the water is bent slightly by water. Slowly move the pencil up and down. Notice that the bend in the pencil also moves. Whatever part of the pencil is just below the waterline is where the bend will appear.
2. Remove the pencil and place a lid securely on the jar. Tilt the jar to be sure that it doesn't leak, then hold the jar up horizontally in front of your eyes. As you look through the jar you will notice that objects look different. They look stretched out, just as they did when LeVar looked through the glass in the lighthouse beacon. The light rays being reflected off the objects are bent as they pass from the air, into and out of the water, before finally reaching your eye. You know that the objects have not changed. Only the light rays have been changed.
3. Cover the front of a flashlight with foil. Then use a knife to cut a thin slit in the foil from the center down, so that only a narrow beam of light shines through. Place the flashlight on a table or other flat surface so that the slit in the foil is at the bottom. Place the round jar filled with water in front of the light so that the beam of light shines through the jar. Move the jar back and forth in front of the light. What happens to the beam of light? (It is bent.) Why is the light bent? (The beam of light is bent as it passes from the air into the water and back into the air. Light is bent whenever it passes through different substances.)