Imagine going outside on a clear night and looking up at the sky. What do you see? You should see little points of light scattered throughout the sky. These little points of light are stars, planets, galaxies, and other objects in outer space. But how do our eyes see these things? And what can we learn from looking at just one point of light in the sky?

The Eye to Sky show explores astronomy by studying light from objects in space. Your students will be amazed as they learn that light is a form of electromagnetic radiation – and there are other forms of this energy that we can’t perceive with our eyes! We will explore the anatomy of the human eye and how we see the light from distant objects. Students will discover how our eyes and telescopes gather and focus light. We will figure out how to overcome some obstacles that make viewing the night sky a challenge. Then we can get to know our cosmic neighbors a bit better as we take a look at the Sun, the Moon, the planets, and the stars...all things we can see here from Earth with our unaided eyes. After this show, your students will never look at the night sky the same way again!

The following activities are meant to help you prepare your students to understand some of the major concepts covered in our show. Please remember to use appropriate safety measures for all activities. Adults should always supervise students during experiments.

Thank you for scheduling a Franklin Institute Traveling Science Show. We are excited to visit you soon!
MIRROR MIRROR

Light behaves in certain ways when it hits a reflective surface. In this activity, students will explore what happens when light is reflected. During the Eye to Sky show, they will then learn how we take advantage of reflected light to get a better view of the sky.

EQUIPMENT
Flashlight
Mirror
Metal Spoon
3x5 Card
Pen or Marker

PROCEDURE
1. Shine a flashlight directly at the mirror. What happens to the light?
2. Shine the flashlight to one side of the mirror and shine it at the mirror from an angle. What happens to the light now? How is it different from when you shined the light straight at the mirror?
3. Look at your reflection in a spoon. What do you notice about your reflection?
4. Look at your reflection in a mirror. How is this different from your reflection in the spoon?
5. Look at your reflection in a spoon again. Move the spoon closer and further away from you. How does your reflection change?
6. Write a word on the 3x5 card and hold it facing the mirror. What do you notice about the reflected word?
SEE WHAT?

Your eye is a sensor that detects light. When light enters your eye, it activates nerve cells which then send signals to your brain. The brain then interprets these signals as things we see. Sometimes, the brain can be tricked into misinterpreting what we see. For example, some images called optical illusions can be interpreted by our brains to be either one thing or another. In this activity, students will explore some optical illusions. During the Eye to Sky show, we will examine how the light we perceive from objects in the sky can trick our brains.

EQUIPMENT

This Page
Pencil
Ruler

PROCEDURE

1. Look at the image to the right. What do you see? Do you see a woman or a saxophone player?

2. Look at the image to the bottom left. What do you see? Is this a spiral or concentric circles? (Hint: trace the lines with a pencil to find out).

3. Look at the image to the bottom right. Which soldier is taller? Measure to find out. Were you correct? Why might someone make a mistake looking at this image?
SOLAR SYSTEM ON A ROLL

Our Solar System is REALLY big. During the Eye to Sky show, students will learn about the relationship between the Sun, the Earth, and the Moon. In this activity, students will create a scale model of the solar system to explore the relative distances between the objects we see in our solar system.

EQUIPMENT

Toilet Paper (1 full roll per model)
Felt tip markers in 10 different colors
Clear tape for repairs
A long hallway or other large space

PROCEDURE

1. Tear one piece of toilet paper from the roll and use as a test sheet for the markers. Practice writing gently on the toilet paper.

2. Make a dot on the seam between the first and second sheets of toilet paper. Label this dot “Sun”.

3. Using the table below, mark the distances to each object as you unroll the paper. The number in the table is the number of toilet paper sheets needed to reach the object’s orbit from the sun, so keep a running count as you go. Make a dot and write the object’s name at each distance indicated, making repairs as necessary.

4. When the model is complete, find a large space and unroll the toilet paper. What do you notice about the distances between objects in our solar system?

Note: In this activity, only the relative distances between the objects in the solar system are represented (not the relative sizes of the objects). At this scale, Jupiter would be the size of a grain of salt.

<table>
<thead>
<tr>
<th>PLANET</th>
<th>DISTANCE FROM SUN (km / mi)</th>
<th>SQUARES OF TOILET PAPER TO PLANET’S ORBIT (FROM SUN)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mercury</td>
<td>57,910,000 km / 35,983,606 mi</td>
<td>2.0</td>
</tr>
<tr>
<td>Venus</td>
<td>108,200,000 km / 67,232,363 mi</td>
<td>3.7</td>
</tr>
<tr>
<td>Earth</td>
<td>149,600,000 km / 92,957,130 mi</td>
<td>5.1</td>
</tr>
<tr>
<td>Mars</td>
<td>227,940,000 km / 141,635,350 mi</td>
<td>7.7</td>
</tr>
<tr>
<td>Asteroid Belt</td>
<td>414,436,363 km / 257,518,817 mi</td>
<td>14.0</td>
</tr>
<tr>
<td>Jupiter</td>
<td>778,330,000 km / 483,631,840 mi</td>
<td>26.4</td>
</tr>
<tr>
<td>Saturn</td>
<td>1,429,400,000 km / 888,187,982 mi</td>
<td>48.4</td>
</tr>
<tr>
<td>Uranus</td>
<td>2,870,990,000 km / 1,783,950,479 mi</td>
<td>97.3</td>
</tr>
<tr>
<td>Neptune</td>
<td>4,504,000,000 km / 2,798,655,850 mi</td>
<td>152.5</td>
</tr>
<tr>
<td>Pluto/Kuiper Belt</td>
<td>5,913,520,000 km / 3,674,490,973 mi</td>
<td>200.0</td>
</tr>
<tr>
<td>Oort Cloud</td>
<td>7,480,000,000,000 km / 4,647,856,517,935 mi</td>
<td>225,000 (do not include in model)</td>
</tr>
</tbody>
</table>