**Sign the Way**

**THE CHALLENGE**

Learn about the types of signs transportation engineers use to convey information to drivers and how drivers see signs at night.

**GRADE LEVEL**

Middle School

**ACTIVITY DURATION**

45 minutes

**MATERIALS**

- Sign color and shape chart (on page 2) printed on 11X17 or larger sheet of paper (can laminate for reuse)
- Drawing paper, colored pencils, crayons or markers
- Small pieces of sign sheeting material (optional)
- Hand-held microscopes (optional)
- Laptop or tablet to show videos (optional)

**SET UP**

Room with tables preferred, but can be taught outside

**ACTIVITY**

Transportation Engineers use signs to provide warning and guidance to drivers, so they can travel safely and efficiently from point A (e.g., home) to point B (e.g., school). The design of traffic signs follows certain rules. In this activity, students will learn about a few of those rules and then students will apply that knowledge by designing their own sign. Students will also learn about fluorescence and how drivers see signs at night.

Begin by asking students what traffic signs (not business or advertisement) they saw while traveling from their home to school. Have the students verbally identify the signs’ colors and shapes.

Next, talk about the three main types of signs.

- **Regulatory** – These signs are red, white, or black. They help keep us safe. They are the law.

Next, go over the sign color and shape chart on page 2. Have students identify the sign shape and primary background color of the signs listed (written, verbally, or both). For example, what shape is a YIELD sign (triangle)? What color is a YIELD sign (red and white)? Explain the meaning of each sign (regulation – you must do it). Discuss as a group. Individual pictures of these signs may also be used, if available.

Some sign sheeting is fluorescent so drivers can see the signs better during the day. Visible light contains all the colors of the rainbow (ROYGBIV), but there is more yellow light than the blue light during the day. At dawn and dusk, there is more blue light. Fluorescent sign sheeting changes blue light to yellow light making it more visible at dawn and dusk, or in overcast conditions.

Ask the students how drivers see signs at night. After listening to answers, note that at night drivers use their vehicle’s headlights to illuminate the roadway. Most objects bounce or reflect the emitted light off their surface in an equal, but opposite direction, away from the driver. So, how do we see signs? Sign sheeting contains tiny beads or prisms that allow the sign to direct the light from a vehicle’s headlights back to the driver’s eyes. This is called retroreflectivity. Different types of sign
sheeting use the properties of reflection and refraction (bending of light) to retroreflect light and thus illuminate signs at night.

Watch the following videos about retroreflective materials:

- [https://www.youtube.com/watch?v=rDRTmymuNyE](https://www.youtube.com/watch?v=rDRTmymuNyE)
- [https://www.youtube.com/watch?v=S4vYq31cpc](https://www.youtube.com/watch?v=S4vYq31cpc).

Have students design a traffic sign for one of the following situations based on the sign color and shape rules they learned (individual or group activity):

- Your school wants to create an area where cell phones cannot be used. Create a sign that can be posted in the area to help people understand this new rule.
- Your favorite type of animal wants to cross the street. Create a sign that could be posted in the area to warn drivers about this situation.

Have students discuss their sign designs, as time permits.

FOR ADDITIONAL DISCUSSION

Talk to the students about why it is important for signs to look the same across the United States. Discuss with students the challenges associated with driving at night.

LEVEL OF DIFFICULTY

IMPORTANT: It is crucial to have a conversation with the classroom teacher prior to performing the activity. This will aid in understanding the educational level of the class which will help determine the appropriate level of difficulty of the materials and items for discussion. For example, regular classes versus gifted & talented or advanced placement classes.

Increase difficulty by:

1. Increasing the level of detail about retroreflective sign sheeting (e.g., beaded versus prismatic).
2. Adding activity where students examine pieces of sign sheeting with hand-held microscopes and identify the type of sheeting (beaded versus prismatic) and the light properties used to retroreflect light (reflection, refraction, or both).

Decrease difficulty by:

1. Only discussing sign colors and shapes.
2. Providing a blank sheet of paper and having students draw a picture of an existing traffic sign they have seen.

<table>
<thead>
<tr>
<th>Sign Shape</th>
<th>Color</th>
<th>Sign</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Triangle</td>
<td>Red</td>
<td>Yield</td>
<td>Regulation (Yield)</td>
</tr>
<tr>
<td>Rectangle (vertical)</td>
<td>White</td>
<td>Speed Limit 50</td>
<td>Regulation (Speed Limit)</td>
</tr>
<tr>
<td>Rectangle (horizontal)</td>
<td>Green</td>
<td>← Pulaski</td>
<td>Direction Information (Destination Sign)</td>
</tr>
<tr>
<td>Square</td>
<td>Blue</td>
<td>H</td>
<td>Service, Tourist, &amp; Evacuation Information (Hospital)</td>
</tr>
<tr>
<td>Square</td>
<td>Brown</td>
<td>Recreation &amp; Cultural Interest (Hiking)</td>
<td></td>
</tr>
<tr>
<td>Diamond</td>
<td>Orange</td>
<td>Construction Warning (Workers)</td>
<td></td>
</tr>
<tr>
<td>Diamond</td>
<td>Yellow</td>
<td>Warning (Horizontal Roadway Alignment)</td>
<td></td>
</tr>
<tr>
<td>Pentagon</td>
<td>Fluorescent Yellow-Green</td>
<td>Warning (School Children Crossing)</td>
<td></td>
</tr>
<tr>
<td>Octagon</td>
<td>Red</td>
<td>STOP</td>
<td>Regulation (Stop)</td>
</tr>
</tbody>
</table>