**📍 Station 1: Solar Signal Shield**

**NGSS: 4-PS3-2**  
**Objective:** Build a "sun-activated" signal system using reflected light and a circuit.

**Materials:**

 1 **LED**

 1 **battery** + **battery holder**

 2 **wires** or **foil strips** (to complete your circuit)

 1 **small mirror** or piece of **aluminum foil**

 1 **paper cup** or **cardboard dome** (to act as your “signal shield”)

 **Flashlight** (if sunlight isn’t available)

**Student Directions:**

**Build the Circuit**

* Connect the **positive wire** from the battery to the **positive leg** of the LED.
* Connect the **negative wire** from the battery to the **negative leg** of the LED.
* Make sure everything is securely connected using the battery holder.

**Step 1: Mount the LED in the Shield**

* Place the LED inside the **paper cup** or **cardboard dome** to act like a signal lamp.
* Cut a small hole if needed to let the LED poke through the top of the dome.

**Step 2: Use Reflected Light to Signal**

* Hold the **mirror or foil** to reflect **sunlight** (or flashlight beam) onto the dome.
* **Aim the beam** at the LED shield.
* Try tilting the mirror or foil to create a **flashing effect**, like an **SOS signal**.

**Observe & Record:**

**What do you notice when light hits the reflective surface?**  
→ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
→ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**What happens when you move or tilt the reflective surface?**  
→ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Real-World Connection:**

**Why would a light-based signal be helpful in a jungle rescue situation?**  
→ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
→ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**What energy transformations happen in your design?**  
→ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

🔍 What do you notice when light hits the reflective surface?  
→ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

💡 Why would this be useful in a jungle rescue?  
→ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

### 📍 **Station 1: Solar Signal Shield**

**NGSS Alignment:** 4-PS3-2 – Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.

### ✅ **ITEEA STEL Standards – Elementary Level**

**STEL 1A** – The study of technology uses knowledge and skills from other subject areas.  
→ Students apply science concepts (light reflection, energy transfer) with technology design.

**STEL 2A** – Technological systems are designed to meet needs and wants.  
→ The activity models a real-world communication solution using technology.

**STEL 4A** – Break systems into parts to see how they work together.  
→ Students build and analyze a system: LED + power + reflector = light signal.

**STEL 5A** – Technology can be used to communicate information.  
→ The project involves using light to send a visual message—mimicking SOS signals or emergency flashes.

**STEL 7A** – The engineering design process helps people solve problems.  
→ Students brainstorm, construct, and improve their signal device for effectiveness and accuracy.

**STEL 8A** – Design is a creative process for meeting needs and wants.  
→ Students choose materials and design the shape of their light shield to optimize performance.

### ✅ **Common Core Math Standards – Elementary Level**

**CCSS.MATH.CONTENT.3.MD.C.5–7** – Relate area and geometry to real-world construction tasks.  
→ Students might measure and plan the layout of the signal shield and reflector components.

**CCSS.MATH.CONTENT.4.MD.A.1** – Solve problems involving measurement and conversion of measurements.  
→ Students may measure distance from flashlight to shield, angle of light reflection, or plan dome dimensions.

**CCSS.MATH.PRACTICE.MP2** – Reason abstractly and quantitatively.  
→ Students consider how energy is transferred and calculate or reason about brightness and alignment.

**CCSS.MATH.PRACTICE.MP4** – Model with mathematics.  
→ Students model a system showing energy flow from battery to LED and interaction with light beams.

**CCSS.MATH.PRACTICE.MP5** – Use appropriate tools strategically.  
→ Students use mirrors, foil, and flashlights purposefully to test light angles and signal effects.

### ✅ Summary

This activity integrates **energy science, communication technology, and basic circuit building** in a context of creative problem-solving. It aligns with **ITEEA STEL standards** by emphasizing systems, design thinking, and technological applications. It also supports **Common Core Math Practices** through modeling, measurement, spatial planning, and strategic tool use.