

Bring more light into your box (Observation 3)

Bring more light into your box using light refraction. See if you can create the same effect as Solar Demi's soda bottle lights.

What you'll need:

- your box
- a little water
- A test tube or water container
- Transparent, translucent, opaque, and reflective materials for experimenting.



What you'll do:

Step 1: Fill Tedros test tube with water and put on the cap.

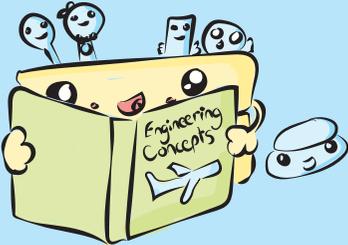
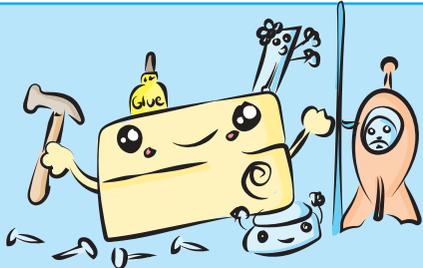
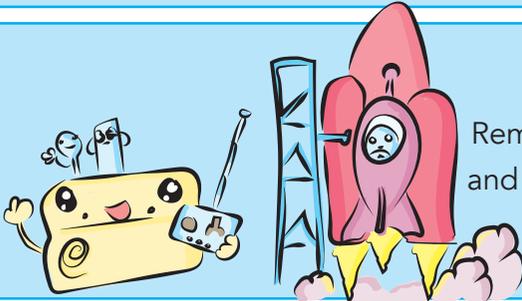
Step 2: Place the test tube half way through the hole in the top of your box. Look through your viewing hole to make observations.



Be sure not to insert the bottle light all the way down into the hole. You could block all light from entering the box with the test tube accidentally!

You can use the Engineering Design Process

You can use the Engineering Design Process to create new inventions that solve problems.

Step 1	<p>Think and Define Recognize the problem or design opportunity.</p> 
Step 2	<p>Learn Read, explore, and talk to people to gain the knowledge you need to solve your problem.</p> 
Step 3	<p>Try Try stuff, build stuff, see what happens, experiment, make observations.</p> 
Step 4	<p>Improve Remember what didn't work well and try again. Make your solution better.</p> 



Can you build a better solar light?

Solar Demi's light seems to work really well for many reasons. His light has a simple design, is easy to build and is made from common materials. Can you make design improvements to make a better solar light?



How could you improve the design of the soda bottle light?

Try stuff, see what happens!

It's okay if you don't automatically know how to make the design better. Sometimes, the best way to figure out how to improve something is to ask more questions and experiment!

I don't know how to make it better, but I do have some questions!



Ask Questions:

Ask questions to help you decide what to improve. Ask questions based on observations and information you gathered throughout the unit and Luzvimenda's story.



Example Question:

Does the bottle have to be full of water? Could it be full of air?

How could you investigate, test, or find an answer to your question?

We could try comparing how well a bottle full of water illuminates the inside of a box compared to a bottle full of air. We can simply look to see which makes the inside of the box brighter.

Now think of some questions of your own.

What are your questions?

How could you investigate, test, or find answers to your questions?

Draw a picture showing how you could investigate.

Engineering Design Challenge:

Follow these guidelines for your engineering challenge!

Design Problem:

Use your ideas to make a better solar light. Make improvements to Meng Demi's light design.

Success criteria:

Make the light shine brighter or find a design improvement based off one of the questions you asked on the previous page.

What improvement will you make to the bottle light?

What materials will you use for your improvements?



Material Constraints:

It is important that your solution can be built with the materials you can find around you. You may not use electricity.

What materials will you use for your project?



Make a plan, then build your improved solar light:

Think of ideas for your design improvements! Be creative!

Wow! Those are some really good ideas!

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My Improvement Idea

Draw and label your improvement strategy here.



Describe how your design works and what it does.
