Simplify Science™

Engineering Challenge

Exploring Light

Exploring Light

Engineering Challenge

Standards

1-PS4-2: Make observations to construct an evidence-based account that objects can be seen only when illuminated.

Vocabulary

- light: *energy that helps us see*
- light source: *where light comes from*
- darkness: *an area without light*

Learning Goal

The student will design a solution to create light in a dark box and accurately describe how light helps them see objects.

Success Criteria

- **Criteria 1-** The student will design a working solution that allows light to shine on the object in the box.
- **Criteria 2-** The student will provide a relevant description of how they created light to see the object in the box.

Teacher Materials

- scissors or box cutter

Individual Materials

Each student will need:

- engineering challenge recording sheet
- pencil
- cardboard box with a pre-cut square flap on one end (see example)
- pen
- toy figure or eraser
- flashlight
- ball point pen(s)

Teacher Directions

Exploring Light: Engineering Challenge

Before the Challenge

- Pre-cut the square flap in each group's box. *(See example)*
- Determine student groupings *(independent, pairs, or groups)* and prepare supplies.
- Provide each student with a copy of the engineering challenge recording sheet (pgs. 5-6).
- Students will need a pencil and coloring supplies.

window flap example

Challenge Opener

- Remind students that light can help us see in the dark, and light has to come fro[m a] light [sou]rce.
- Read the engineering challenge to students "Create enough light in the box to see t[he] oy t[hro]ugh the window".
- Show students an example box with the toy inside. Discuss how hard it is to [see] the t[oy] inside the box through the window without light.
- Ask students: "A problem is something that needs to be solved. What is [the] probl[em] in our challenge today?"
- Tell students that today, they will be able to use the given materials to fin[d a] way t[o] reate enough light in the box to see the toy.
- Pass out group materials like the pens and the flashlights.
- You may need to show students how they can use the pen to c[reate] [hol]s in [the] cardboard to help light get in. Students could also use their scissors with supervision.

Challenge

- Ask students what they are planning on doing t[o] ir bo[x] their challenge and share a few answers.
- Have students put their finger on the star on [the] re[cor]ding [shee]t (pg. 5). Read the directions
- Have students draw and label thei[r] n on [the] re[cor]d sheet (pg. 5).
- Allow students to begin creating [the]ir solution a[s] they [fi]sh their drawing or have students color and add details until the time limit has passed or all students [ha]ve fi[nis]hed d[ra]wn their plan on the recording sheet.
- Students will use the materials gi[ven] beg[in] on their solution.
- Walk around to give support and supervise.

Reflection

- After students have completed, have students complete the reflection question (pg. 6).
- When students have completed their answers, share a few with the class.
- Discuss the challenge with students.
- Ask students what the light source was in the challenge.
- Remind students that light is energy that helps us see, and we can use a light source to help us see things in the dark.

Teacher Script

Exploring Light: Engineering Challenge

Before the Challenge

- "Today we will need our challenge recording sheet that I have passed out, a pencil, and crayons. When the challenge begins, you will be given pens, a flashlight a cardboard box, and a toy."

Challenge Opener

- "Light can help us see in the dark, and light has to come from a light source."
- "Let's look at the challenge. Today you will need to create enough light in the b[illegible] see [illegible] to through the window."
- "Take a look at this example. The window in the box is this flap. We can look thro[illegible] the[illegible] and s[illegible] that there is darkness on the inside, and we can't see the toy."
- "A problem is something that needs to be solved. What is the problem in our challen[illegible]oday?"
- "Today, you will be able to use the given materials to find a way to create [illegible]ght [illegible]e box to see the toy."
- "I am going to pass out some ball point pens and a flashlight for you to [illegible] today."
- "You can use your pen to poke holes in the cardboard to help the light s[illegible] throu[illegible]."

Challenge

- "What are we planning on building for our challenge toda[illegible]"
- "Everyone find and put your pointer finger on the star o[illegible]e [illegible]ording [illegible]eet. H[illegible]e, draw and label a picture of what you will build."
- "When you are done drawing and labeling your picture, [illegible]tinue to color and label your drawing until everyone has completed their drawing."
- "Now that everyone has completed [illegible]eir dr[illegible]ing, [illegible]an b[illegible]in to use your materials."
- "You can begin to build."

As Needed:

- "How can the light get in the box[illegible]"
- "Do you need help creating holes?"

Reflection

- "Now that we have created solutions, turn to the next page. It says, 'How did you use light to see the toy in the box?' Write your answers on the lines."
- "Let's share a few answers."
- "Did your design work?"
- "What was the light source in this challenge?"
- "Light is energy that helps us see, and we can use a light source to help us see things in the dark."

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Name: _____

Engineering Challenge

Exploring Light

Challenge:

Create enough light in the box to see the toy through the window.

☆ Directions: Draw and label what you will do to your box to help light shine on the toy.

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Name: _____

Engineering Challenge

Exploring Light

Reflection:

Directions: Think about how you solved the challenge and describe it.

How did you use light to see the toy in the box?

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Name: _____ Sample Work

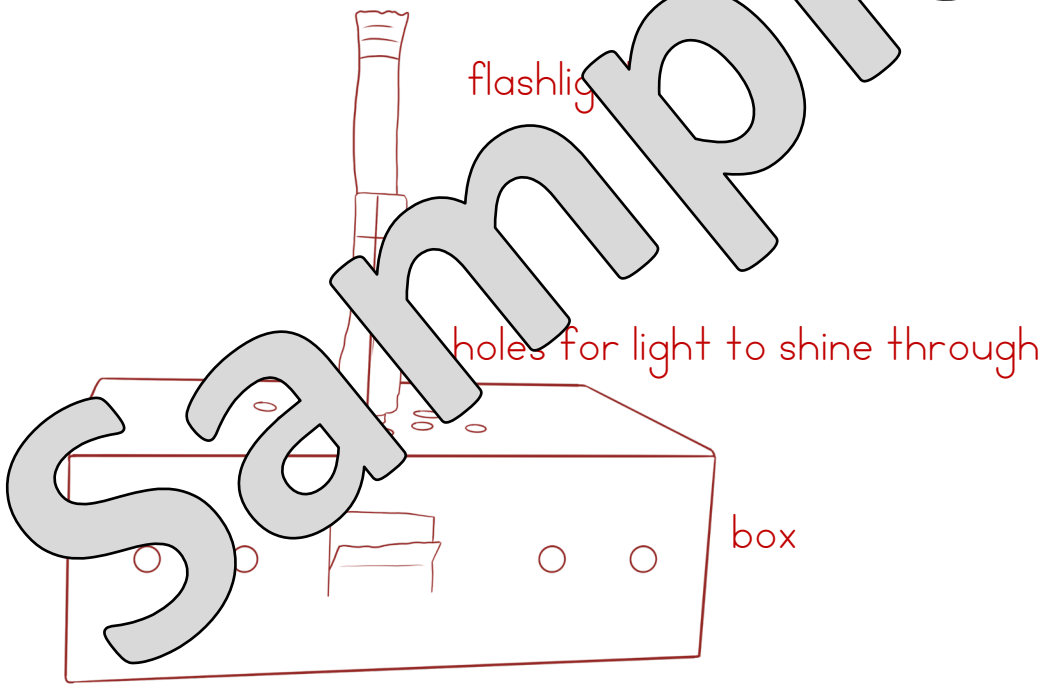
Engineering Challenge

Exploring Light

Challenge:

Create enough light in the box to see the toy through the window.

☆ Directions: Draw and label what you will do to your box to help light shine on the toy.



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Name: _____ Sample Work

Engineering Challenge

Exploring Light

Reflection:

Directions: Think about how you solved the challenge and describe it.

How did you use light to see the toy in the box?

I put holes in the box on the top. I used a flashlight to shine in the holes.

Sample

Creating Shade: Engineering Challenge

Materials used:

- cardboard box
- toy
- flashlight
- ballpoint pen