


# Light & Shadow Play Interactive Exhibit

## DESIGN, BUILD, AND PLAY GUIDE



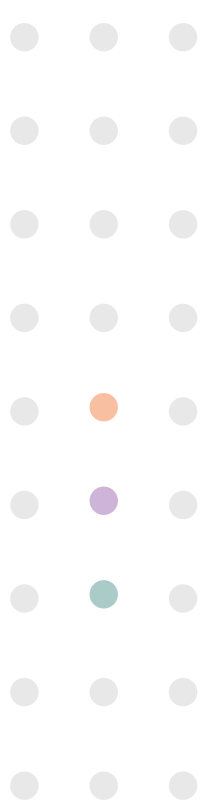
Light and Shadow Play is an open-ended exploration of the art and science of light. Learners investigate big ideas like **cause and effect** or **reflection and refraction** by playfully rearranging light sources and physical materials and observing the lights and shadows produced, kind of like a shadow puppet show!

This activity uses a wide variety of physical materials such as bright colorful lights, paper cutouts, and kitchen utensils. The material selection helps to communicate that even everyday objects can be tools for creativity and inquiry.

We would like to acknowledge and credit the Tinkering Studio at the Exploratorium for the development of “Light Play” ([bit.ly/exploratorium-light-play](http://bit.ly/exploratorium-light-play)). Their work has deeply inspired and informed this activity. We strive to respect the values and goals of the original activity while making adaptations so that this activity can be implemented in a variety of contexts and learning environments.

# Set Up

To create a Light and Shadow Play experience you'll need a few key elements: a wide variety of objects that create interesting shadows and reflections, several small light sources, a space to arrange materials, and some guiding prompts to support learners in tinkering and exploring.

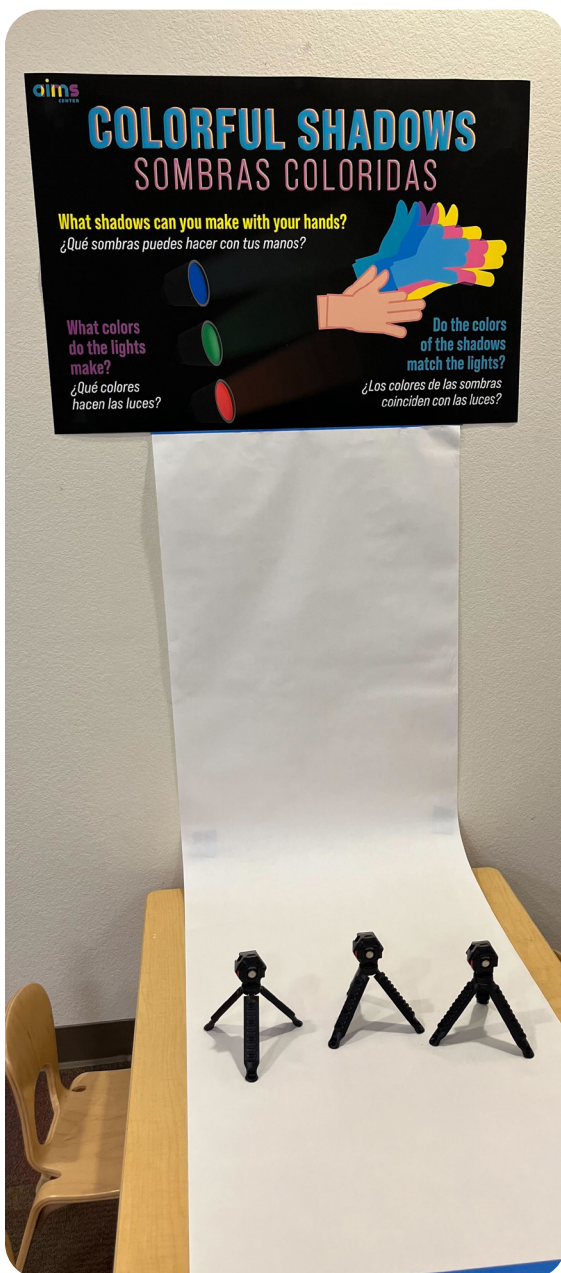


## Space

We suggest setting up this exploration at a **low, child-height table** that is placed against a wall. You can have some chairs available at the table, but make sure that there is plenty of space for learners to walk around the table.

Make the space as dark as you can. A **darker space** makes it easier to see the light and shadow effects. If you are setting up this exhibit in a space where you don't have control over the lighting, consider setting up something like a curtain to block some of the light. Or, ask if it's possible to turn off a few lights in the space near your exhibit.

A long piece of **white craft paper** taped to the wall and the table creates a nice surface that makes it easier to see reflections and shadows. You could also try white fabric or a light-colored wall surface.



# Lights

A **bright “single-point” light source** is preferred to create a sharp, well defined shadow regardless of distance. A light source that consists of multiple LEDs will cause the shadow to have a fuzzy outline.

We suggest the Sunset Lamp Projection Sunset Light found on Amazon. This light is a single point source that can easily be adjusted to 16 different colors (including red, blue, or green). The Sunset Lamp is quite bright even in a well lit room, provides a wide beam at a short distance, and comes with an easily adjustable stand.



## Overlapping Colored Lights

Different color light sources arranged in overlapping positions will create interesting shadows. We suggest that you use three separate light sources, each set to a different color (red, blue, and green). If you’re using a light source like the Sunset Lamp, you can simply set each light to a different color.

## Alternative

You can also try using small flashlights in paper cup stands. Cut a small notch in each cup and use colored cellophane over the flashlight lens.

**Tip:** Cover the flashlight with two layers of cellophane to emit a stronger color.





# Materials for Shadows

These are suggested materials you can collect, but we encourage you to find other items that can make interesting shadows. See page 11 for recommended material specifications and sample links.

- **Everyday objects**

Kitchen utensils and supplies, hair scrunchies, sponges, craft supplies, recycled objects

- **Figurines or toys**

Posable human figures, plastic animal figures

- **Items from nature**

Sticks and leaves

- **Cardboard and paper**

Cut into various shapes

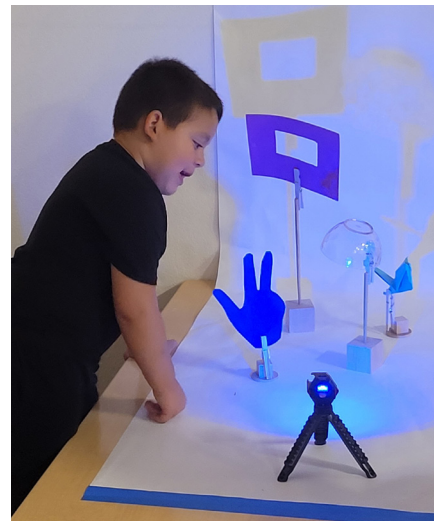
- **Reflection and refraction materials**

Colorful see-through films, plastics

(Chinet® cut plastic crystal cups make great shadows!)

## Be creative!

Gather other items and materials to explore what shadows they make.



## Clips & Stands

Take some time to create clips and stands that allow learners to position objects in their light play at different heights and levels. Good stands should be easy and safe for small hands to manipulate, they should come in a variety of heights, and should be as lightweight as possible so that they don't interfere their light and shadow play.



### Materials:

- 1" and 2" wooden cubes (you can often find these premade in online stores)
- Wooden clothespins
- Wooden chopsticks cut to various heights (the tapered end of the chopstick helps to create a sturdy joint when inserted into the block; wood dowels can also work)
- Wood glue or Elmer's glue
- Drill and drill bit that is the same diameter as the chopstick or dowel

### Steps:

1. Drill a hole halfway into the center of the wooden cube.
2. Insert chopstick or dowel into the hole. Add a small amount of glue if needed.
3. Glue a clothespin to the end of the dowel with the "mouth" of the clothespin facing up.

To create shorter stands, you can glue the clothespin directly to the wooden cube without adding a chopstick or dowel.

## Adaptations

### Don't have easy access to a drill?

Tape the dowel or chopstick to the side of the cube with strong, heavy duty tape.

### No time to DIY?

Try looking for inexpensive picture stands that are designed to hold photos using a small clip.





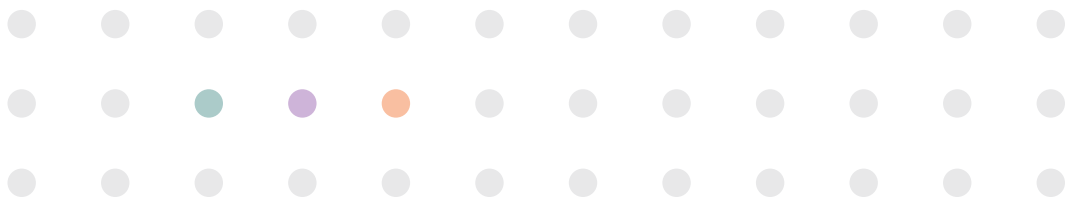
## Before You Launch Your Exhibit

It's important to take some time to play with materials and to experience this activity as a learner. This can provide valuable information about how you might need to adapt materials or change the setup of the exhibit.

For example, maybe you set up the Light and Shadow exhibit, tinker with materials as a learner would, and you notice that the shadows and lights aren't as vibrant as you'd like them to be. You take some time to adjust the lighting in the space to make it darker. This results in a better experience for your learners!

### **Safety considerations**

Before launching your exhibit, test your light sources to make sure materials do not get too hot and cellophane (if used) does not melt. Attend to any other safety concerns that may arise.



# Facilitation

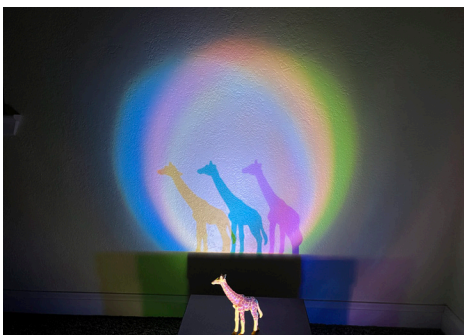
## Getting started

Here are some prompts to try out alongside the exhibit. Prompts can be delivered through printed posters and signage or if there is a staff member, educator, or volunteer present in the space, they can engage learners and offer these prompts in their conversations. We suggest leaving each series of prompts in the exhibit space for at least a week. After a couple of weeks, you can introduce new prompts. Feel free to adjust the prompts and timing according to your preferences and how you observe community members interacting. If you use printed materials, consider having the prompts translated into the languages that your community speaks.

### Phase 1: Colorful Shadows

#### **Prompts:**

- What shadows can you make with your hands?
- What colors do the lights make? Do the colors of the shadows match the colors of the lights?
- What shadows do other objects make?
- Try moving your objects. What happens to the shadow when you move your object?



#### **Tip**

Place just a few physical materials in the light play space for the first phase. This can help encourage learners to use their hands, and to pay close attention to the lights and shadows as there are fewer physical materials to play with.



## Phase 2: Shadow Stories

In this phase, introduce the idea of narrative and storytelling and bring in some new materials to facilitate telling stories with light and shadow.

### **Prompt:**

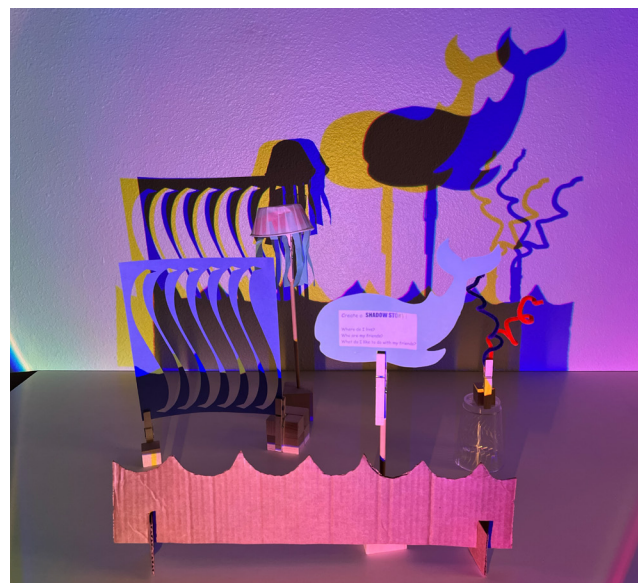
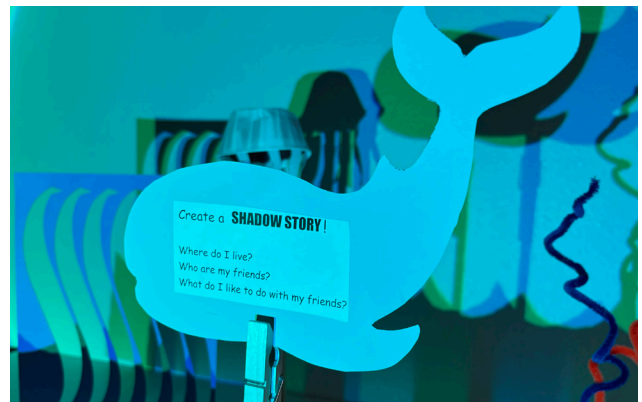
Shadow Stories! Make shadows with these objects and tell a story together as you play.

### **Go beyond poster-prompts:**

Try adding prompts directly to the light play materials.

Examples:

- “Try moving this around on the table.  
What happens to the shadows when you move this?”
- “Where do I live? Who are my friends?  
What do I like to do with my friends?”





## Phase 3: Continue the Exploration

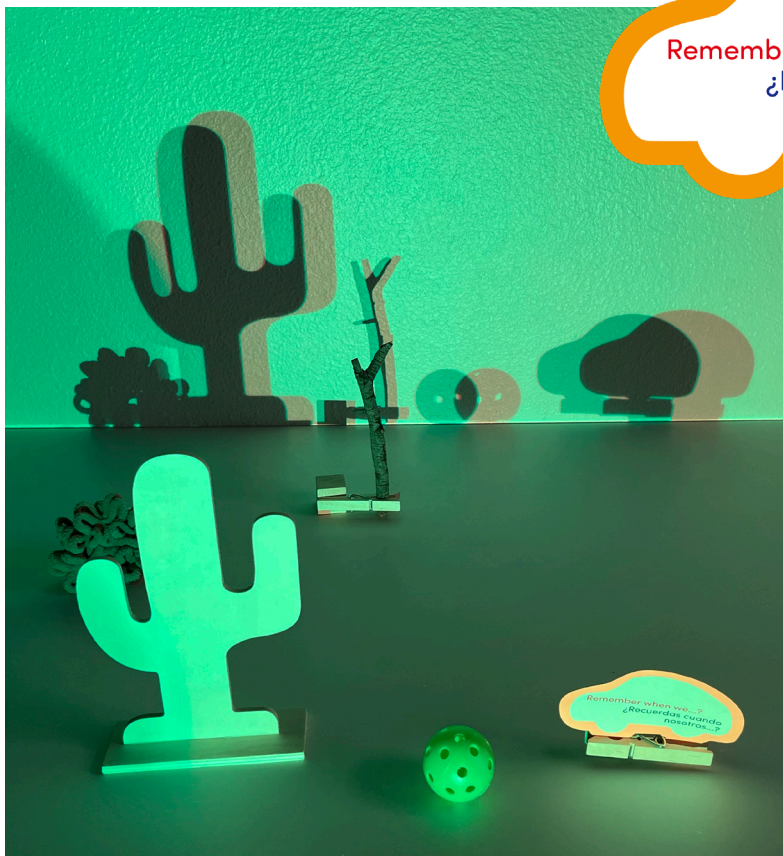
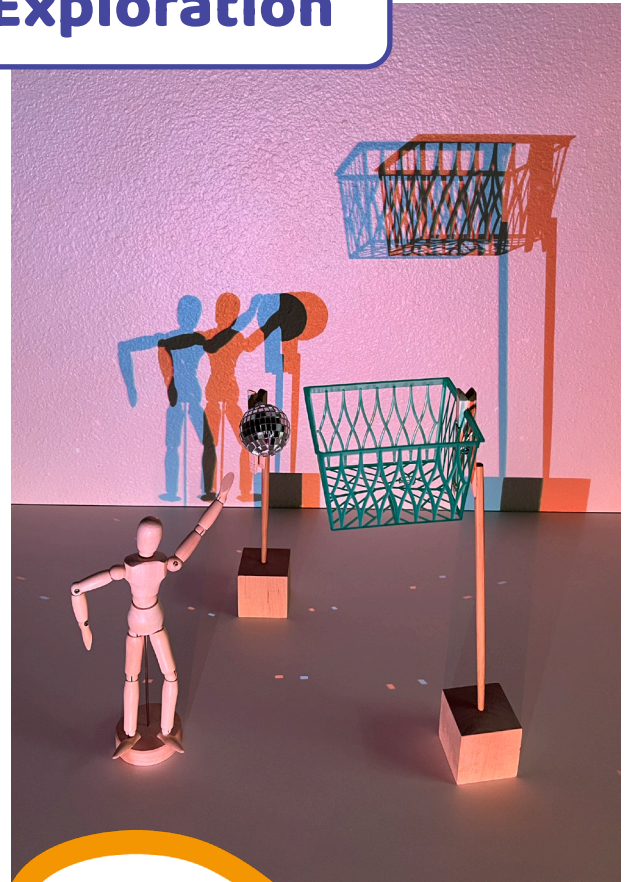
In this phase, try an adaptation of one of the previous phases. For example, if your learners enjoyed storytelling and you are in a space where family members are often present, encourage learners to tell family stories.

### **Examples:**

Use the materials to create a family story with shadows!

- What shadows will help tell your story?
- What colors do you want to use?
- Remember when we...?

Are there other materials or prompts that might be more relevant, meaningful, or interesting to your community? Try them out!

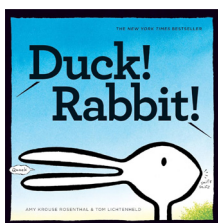


Remember when we...?  
¿Recuerdas cuando  
nosotros...?



# Literature

Here are some fantastic books about light and shadow to consider incorporating into your exhibit. You can display the books near the exhibit and make them available for families to engage with alongside the activity. You might also consider a special read-aloud time during a family event, followed by shadow explorations!



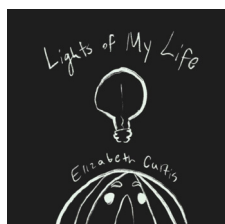
## ***Duck! Rabbit!***

by Amy Krouse Rosenthal



## ***Shadowville***

by Michael Bartalos



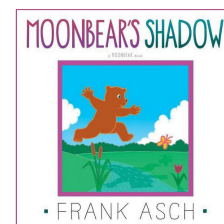
## ***Lights of My Life***

Elizabeth Aryn Curtis



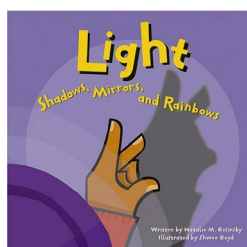
## ***Shadow***

by Suzy Lee  
(pictures only)



## ***Moonbear's Shadow***

by Frank Asch



***Light: Shadows, Mirrors, and Rainbows*** by Natalie Myra Rosinsky  
(Available in English and Spanish)

- Illustrations on pages 8 & 9 provide helpful visuals of the science of light and shadow to highlight.
- Illustrations on pages 10 & 11 provide helpful visuals of shadow play to highlight.



***Oscar and the Moth*** by Geoff Waring  
(Available in English & Spanish)

- Illustrations on pages 22, 23, 24 & 25 provide helpful visuals of the science of light and shadow to highlight.




# Resources

All resource links can be found at  
[bit.ly/light-and-shadow-play-exhibit](https://bit.ly/light-and-shadow-play-exhibit)

## Materials

This list provides details about the items and materials needed for your light and shadow play exhibit. The sample links point to possible locations where you may purchase these items. Search terms are also included that can help you find similar items sold from other online retailers. You may also find similar items in local stores.

### Set Up Materials








Item	Specifications	Sample Links
<b>White paper</b> See page 2	<ul style="list-style-type: none"> <li>Uncoated butcher paper works well</li> <li>Should be approximately 3 feet wide</li> </ul>	 <b>36" x 180' butcher paper</b> Link: <a href="https://amzn.to/3UChS7b">amzn.to/3UChS7b</a>  <b>30" x 50' all-purpose paper roll</b> Link: <a href="https://bit.ly/all-purpose-paper-roll">bit.ly/all-purpose-paper-roll</a>
<b>Materials stands</b> Plan on 4 stands See page 5	<ul style="list-style-type: none"> <li>Create stands with a variety of heights</li> <li>Picture holders with clips can work, too</li> </ul>	<b>Wooden cubes</b> Link: <a href="https://bit.ly/1-in-wooden-cubes">bit.ly/1-in-wooden-cubes</a>   <b>Chopsticks</b> Link: <a href="https://amzn.to/49lhZZo">amzn.to/49lhZZo</a>   <b>Picture clip holders</b> Link: <a href="https://amzn.to/3SZSwyM">amzn.to/3SZSwyM</a>



## Light Sources


You may choose to use lamps or flashlights; both are not needed.

See page 3




Item	Specifications	Sample Links
<b>Lamp</b> Plan on 3 lamps	<ul style="list-style-type: none"> <li>Light should be capable of displaying multiple colors (RGB)</li> <li>Some come equipped with remote control to change colors and adjust the brightness</li> <li>Light should stand on its own</li> </ul>	 <p>Search terms: "sunset lamp with remote and stand"</p> <p>Link: <a href="https://amzn.to/3SYA6OZ">amzn.to/3SYA6OZ</a></p>
<b>Power strip or USB power adapters</b>	<ul style="list-style-type: none"> <li>Consider the charging requirements for the lights you are using</li> <li>If the lamps come with adapter blocks then a standard power strip can be used; however, if the lamps are powered by USB cables and do not include adapters, then either adapter blocks and a standard power strip or a USB power strip will need to be purchased</li> </ul>	<p>Search terms: "power strip with usb ports"</p> <p>Link: <a href="https://amzn.to/3UK0hdp">amzn.to/3UK0hdp</a></p>  <p>Link: <a href="https://amzn.to/3SNDlwe">amzn.to/3SNDlwe</a></p> 
<b>Flashlight</b>	<p>If you choose to use flashlights, consider covering the flashlight in colorful cellophane to create different colored lights, or purchasing flashlights that come in red, green, and blue light colors.</p>	<p><b>Multi-colored flashlights</b></p>  <p>Link: <a href="https://amzn.to/3UVPkFL">amzn.to/3UVPkFL</a></p> <p><b>Mini flashlights</b></p> <p>Link: <a href="https://amzn.to/3wiglZJ">amzn.to/3wiglZJ</a></p>  <p><b>Colorful Cellophane</b></p>  <p>Link: <a href="https://amzn.to/3I0d0Bb">amzn.to/3I0d0Bb</a></p>
<b>Paper cups</b> 1 per flashlight	<p>These will be used to hold the flashlights.</p>	<p>Link: <a href="https://amzn.to/3OL6mmd">amzn.to/3OL6mmd</a></p> 

## Materials for Shadows

See page 4

Item	Specifications	Sample Links
<b>Materials for shadows</b>	<p>Choose a variety of objects that will make interesting shadows.</p> <ul style="list-style-type: none"> <li>• Some may be solid, while others may be transparent or have interesting designs that will interact with the lights.</li> <li>• Consider selecting materials children may be familiar with in other contexts (a hairbrush, for example).</li> <li>• Natural materials such as pinecones or leaves work well, too!</li> </ul>	
<b>Crystal cups</b>	<ul style="list-style-type: none"> <li>• 9 oz. size works well</li> <li>• Chinet make particularly interesting shadows!</li> </ul>	<p>Link: <a href="https://bit.ly/chinet-crystal-cups">bit.ly/chinet-crystal-cups</a></p> 

# Prints

Print	Recommended Print Details
<p><b>Colorful Shadows Poster</b></p>  <p>See page 7</p>	<p><b>Standard Letter Size (11" x 8.5")</b></p> <ul style="list-style-type: none"> <li>You can print this size on any printer</li> <li>Print in color on white cardstock then laminate or display the print in a tabletop acrylic sign holder</li> </ul> <p>Link: <a href="https://bit.ly/colorful-shadows-poster-01">bit.ly/colorful-shadows-poster-01</a></p> <p><b>Large Poster Size (36" x 24")</b></p> <ul style="list-style-type: none"> <li>You may need to order a poster this size from a print store such as Office Depot</li> <li>Use removable mounting tape to hang up the poster</li> </ul> <p>Link: <a href="https://bit.ly/colorful-shadows-poster-02">bit.ly/colorful-shadows-poster-02</a></p>
<p><b>Shadow Story Prompts</b></p>  <p>See pages 8–9</p>	<p>Make a copy of the provided template. You can use the provided prompts or edit them to make your own!</p> <ul style="list-style-type: none"> <li>Print and cut out the prompts then adhere them to various items with glue or tape.</li> </ul> <p>Link: <a href="https://bit.ly/shadow-stories-template">bit.ly/shadow-stories-template</a></p>
<p><b>Light &amp; Shadow Play Interactive Exhibit Design, Build, and Play Guide</b></p> 	<p>This guide is made available online to print and share.</p> <p>Link: <a href="https://bit.ly/light-and-shadow-play-exhibit-guide">bit.ly/light-and-shadow-play-exhibit-guide</a></p>