ST. AUGUSTINE LIGHTHOUSE & MARITIME MUSEUM

St. Augustine Lighthouse & Maritime Museum
Legends of the Light Post-Visit Activities

We hope you and your family enjoyed your visit to the St. Augustine Lighthouse and Maritime Museum! Use the educational activities below to deepen your experience with the *Legends of the Light* exhibit and learn more about lighthouses and the science of light behind their operation.

Primary Learning Objectives

Upon completing these activities, participants will…

1. Understand the purpose of lighthouses.
2. Know the definitions of *daymark* and *nightmark* and understand how sailors use lighthouses to navigate.
3. Be able to explain *reflection* and *refraction* and understand how lighthouse Fresnel lenses use these properties of light to magnify their light source.

St. Augustine Lighthouse Vital Statistics

Height: 165 feet
Stairs: 219
Made of: bricks (1.2 million!), iron, and granite
Built in: 1871-1874
Lamp Fueled by: 1874-1885—lard oil (pig fat); 1885-1936—kerosene; 1936-today—electricity
Daymark: black and white spiral stripes on the tower; red lantern
Nightmark: continuous white light with a long white flash every 30 seconds

Activities:

Create Your Own Lighthouse
Broken Straw Refraction
Mirrored Reflection

Create Your Own Lighthouse Worksheet

Lighthouses help ships stay safe on the water. They also help sailors figure out where they are. If you were to build a new lighthouse anywhere in the world, where would you put it?

Where will you build your lighthouse? ____

Florida	Virginia	Michigan (Great Lakes)
Northeast Florida	Maryland	Oregon
Florida Gulf Coast	New Jersey	Alaska
Florida Keys	New York	California
Georgia	Massachusetts	North Carolina
South Carolina	Maine	Or another place?

Describe the natural environment on this coastline:

____

____

Why do you need a lighthouse here?

____

____

A *daymark* is what a lighthouse looks like during the day. Each one is different so sailors could tell them apart. The St. Augustine Lighthouse's daymark is a black and white spiral tower with a red top.

A *nightmark* is the flashing pattern of the lighthouse's light. Just like it daymark, each lighthouse has a different nightmark. The St. Augustine Lighthouse's nightmark is a white fixed flash every 30 seconds.

Create a unique daymark and nightmark for your lighthouse and describe here:

Daymark:

Nightmark:

Color:

Light Pattern:

What will you build the lighthouse out of?____

How tall will it be? _________________________feet

What kind of fuel will light the lamp?

___Lard Oil ___Kerosene ___ Electricity ___Solar Energy

What size lens will you need?
___1st Order ___2nd Order ___3rd Order ___4th Order ___5th Order ___6th Order

<u>Hands-On Activity:</u>
Create an drawing of your lighthouse, its location, and its unique daymark on an additional piece of paper.

<u>Writing Activity (for older children)</u>:
Using what you now know about lighthouses and maritime activity in the region you chose, write a letter to government officials requesting funds to build your lighthouse.

In your letter you must make a strong argument for the need for a lighthouse in this particular place. Why should the government give you money for a lighthouse? How will you use the money they provide? Issues you might want to address include: problems that a lighthouse would solve; how the lighthouse would help the community; why your particular lighthouse would be best in this location; how you plan to build and maintain your lighthouse; how other lighthouses have helped places in the past.

<u>Advanced Word Problems:</u>
1) Determine the height and circumference of your lighthouse's tower. Calculate the area of your tower using the appropriate formulas.
2) Determine the shape, height, and width of the lantern at the top of your tower. Determine the area and volume of these polygons.
3) Convert your tower's height from feet to yards; from feet to meters; from meters to centimeters or kilometers
4) Create a scale for your lighthouse (ex: 1 inch :: 10 feet) Use a ruler and draw your lighthouse to scale
5) How far from the ocean will you build your lighthouse? Give your answer in feet, meters, and miles.

Mirrored Reflection Activity

Things You'll Need

A handheld mirror
A shiny spoon

Definition

Reflection - the property of light changing direction when it contacts an object, like a mirror

Activity

Take the mirror and use it to look at your face. Why can you see your face in the mirror? What happens when you move the mirror? Can you use it to look at other things around you?

Explanation

When you look in the mirror and see your face, you are actually seeing your *reflection*. Reflection is light bouncing off a surface. In the case of the mirror, the light bounces off the mirror and returns to your eyes, which is why you can see your face.

If you move the mirror, your viewing angle changes and the reflection changes as well. Can you use the mirror to look at something behind you or around a corner?

We use reflection in many ways. Drivers use mirrors to look at traffic around them. Dentists use small mirrors to look in the back of your mouth. Scientists use mirrors in telescopes to look at faraway galaxies.

Activity

Hold the shiny spoon in your hand with the bowl of the spoon pointing upward. Look at yourself in the reflection of the spoon. Rotate the spoon so you look at yourself in both sides. What does your reflection look like?

Explanation

The curved part of the spoon reflects light differently than the flat mirror. The light reflects off the curved spoon in different directions, which is why your reflection looks so weird. If you've ever stood in front of a curved mirror, you may have noticed how it makes your body look extra tall and stretched out or extra short. This is because light reflecting off a curved surface like a spoon or curved mirror bounce off in different directions.

Can you think of other ways we use reflection?
What kinds of things would we not have or not be able to do without reflection?

Broken Straw Refraction Activity

Things You'll Need

One clear glass with water in it
A straight straw (something similar like a pencil would work too)

Definition

Refraction - the property of light changing direction as it passes through an object, like a lens

Activity

Place the glass with water on a flat surface like a kitchen counter or table. Place your hand behind it. Look at your hand through the glass. What do you see? Do your fingers and hand look stretched out?

Your hand looks like it is stretched because when look at your hand through the glass, the light bends and changes what you see.

Explanation

Light bending through a clear object, like a glass of water, is called *refraction*. We use refraction for many things. Eyeglasses, lasers, cameras, telescopes, use refraction to bend light.

Scientists and mathematicians have even figured out how to calculate the direction light will bend through a clear object. That is how eyeglasses are able to help people to see.

Activity

Put the straw or pencil in the glass. Make sure the water is low enough that part of the straw or pencil sticks out of the water. What do you see? Does the part of the straw or pencil in the water look different than the part that is sticking out of the water? The straw or pencil should look like it is broken into two pieces.

Explanation

This is because the part of the straw in the water is being refracted. The bending light makes it look different that the part of the straw that is not in the water. You might notice the same thing happens when someone is standing in a pool. The bottom half of their body in the water looks different than the top half that is not in the water.

Can you think of other ways we use refraction?
What kinds of things would we not have or be able to do if we did not use refraction?

Fresnel lenses in lighthouses

French physicist and mathematician Augustin Fresnel (pronounced Freh-nel) used his understanding of refraction and reflection to create lenses for lighthouses. Back in the early 1800s, lighthouses were not very bright. Fresnel decided to make a new lens with glass prisms that would refract and reflect light and make all the beams of light go straight out to sea. This made lighthouses brighter and helped sailors stay safe on the ocean.