

Let There Be Light

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Grade: 3rd/4th

Subjects: Social Studies, Art, Language Arts

Lesson Overview

Students will learn about the history of lighthouses. Students will learn about some of the duties a lighthouse keeper was required to perform. Students will learn about the distinguishing characteristics of lighthouses. Students will examine photos of lighthouses in Door County, Two Rivers, and Manitowoc in order to identify certain characteristics. They will match descriptions of the lighthouses to their photos. Having learned about shapes, sizes, day marks and night signatures, students will create their own unique lighthouses.

Learning Context

Students are learning about Wisconsin's maritime history. They will already know about the history of travel on the Great Lakes, dangers involved with such travel, and the types of jobs mariners have, including the duties of the Coast Guard. The students will have made a visit to our local Coast Guard station, and will have learned some local history about the Two Rivers lighthouses. This lesson on lighthouse characteristics will enhance their knowledge of the Lighthouse Service and Coast Guard's role in the history of lighthouses.

Duration - two 60-minute class periods. Extension activities will require more time.

Sources Consulted

Wisconsin Lighthouses A Photographic & Historical Guide by Ken & Barb Wardius

Western Great Lakes Lighthouses Michigan and Superior by Bruce Roberts and Ray Jones 2nd edition

Family Fun August, 2011

www.factmonster.com/ipka/a0800631.html (history of lighthouses)

www.us-lighthouses.com (photos and history of lighthouses from around the world)

<http://www.michiganlights.com/lighthouseservice.htm> (history of Lighthouse Service)

<http://lighthouse.boatnerd.com/gallery/Michigan/default.htm> (photos and history)

<http://www.terrypepper.com/lights/index.htm> (photos and history)

Learning Objectives

At the end of this lesson, students will be able to:

1. Have a better understanding of the history of lighthouses.
2. Appreciate the coast guard's role in the history of lighthouses.
3. Identify certain characteristics of a lighthouse, including its shape, size, and day markers.
4. Identify the specific lighthouses in and near their community.
5. Create their own unique lighthouses with distinguishing day markers.

Wisconsin Learning Standards

English Language Arts Standards

Reading: Informational Text Grade 3 and Grade 4

Key Ideas and Details

- **RI.3.1.** Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers.
- **RI.4.1.** Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.

Craft and Structure

- **RI.4.4.** Determine the meaning of general academic and domain-specific words or phrases in a text relevant to a *grade 4 topic or subject area*.

Integration of Knowledge and Ideas

- **RI.4.7.** Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears.
- **RI.4.9.** Integrate information from two texts on the same topic in order to write or speak about the subject knowledgeably.

Social Studies Standards

Content Standard Social Studies Standard B - History: Time, Continuity, and Change

Content Standard: Students in Wisconsin will learn about the history of Wisconsin, the United States, and the world, examining change and continuity over time in order to develop historical perspective, explain historical relationships, and analyze issues that affect the present and the future.

- B.4.1 Identify and examine various sources of information that are used for constructing an understanding of the past, such as artifacts, documents, letters, diaries, maps, textbooks, photos, paintings, architecture, oral presentations, graphs, and charts
- B.4.4 Compare and contrast changes in contemporary life with life in the past by looking at social, economic, political, and cultural roles played by individuals and groups
- B.4.8 Compare past and present technologies related to energy, transportation, and communications and describe the effects of technological change, either beneficial or harmful, on people and the environment
- B.4.9 Describe examples of cooperation and interdependence among individuals, groups, and nations

Content Standard Social Studies Standard D - Economics: Production, Distribution, Exchange, Consumption

Content Standard: Students in Wisconsin will learn about production, distribution, exchange, and consumption so that they can make informed economic decisions.

- D.4.3 Identify local goods and services that are part of the global economy and explain their use in Wisconsin

Art Standards

A. VISUAL MEMORY AND KNOWLEDGE

Content Standard

Students in Wisconsin will know and remember information and ideas about the art and design around them and throughout the world.

PERFORMANCE STANDARDS

By the end of grade 4 students will:

- A.4.1 Develop a basic mental storehouse of images
- A.4.2 Learn basic vocabulary related to their study of art

B: ART AND DESIGN HISTORY, CITIZENSHIP, AND ENVIRONMENT

Content Standard

Students in Wisconsin will understand the value and significance of the visual arts, media and design in relation to history, citizenship, the environment, and social development.

PERFORMANCE STANDARDS

By the end of grade 4 students will:

- B.4.1 Understand that artists and cultures throughout history have used art to communicate ideas and to develop functions, structures, and designs
- B.4.2 Recognize that form, function, meaning, and expressive qualities of art and design change from culture to culture and artist to artist

C: VISUAL DESIGN AND PRODUCTION

Content Standard

Students in Wisconsin will design and produce quality original images and objects, such as

paintings, sculptures, designed objects, photographs, graphic designs, videos, and computer images.

PERFORMANCE STANDARDS

By the end of grade 4 students will:

- C.4.7 Develop basic skills to produce quality art

D. PRACTICAL APPLICATIONS

Content Standard

Students in Wisconsin will apply their knowledge of people, places, ideas, and language of art and design to their daily lives.

PERFORMANCE STANDARDS

By the end of grade 4 students will:

- D.4.1 Know basic information, such as the history, public art, and unique architecture, of their own cultural community
- D.4.2 Know about artists and designers, such as architects, furniture designers, critics, preservationists, museum curators, and gallery owners, in their community
- D.4.3 Know that the environment influences the look and use of art, architecture, and Design

H. VISUAL THINKING

Content Standard

Students in Wisconsin will develop perception, visual discrimination, and media literacy skills to become visually educated people.

PERFORMANCE STANDARDS

By the end of grade 4 students will:

- H.4.3 Show differences among colors, shapes, textures, and other qualities of objects in their artwork
- H.4.4 Create three-dimensional forms with paper, clay, and other materials

K. MAKING CONNECTIONS

Content Standard

Students in Wisconsin will make connections among the arts, other disciplines, other cultures, and the world of work.

PERFORMANCE STANDARDS

By the end of grade 4 students will:

- K.4.1 Connect their knowledge and skills in art to other areas, such as the humanities, sciences, social studies, and technology
- K.4.5 Know art includes activities, such as museum curation, historic preservation, collecting, and writing about art and design

Materials Needed:

Per teacher/class:

Interactive whiteboard or screen
Computer
Photos of lighthouses
Flashlights (at least two)
Sheet of Shape Labels (attachment)
Description of local lighthouses (attachment)
Names of local lighthouses (attachment)

Art activity materials

Per student:

- 18 ounce plastic cup with circular bottom
 - Variety of colors for students to choose from
- Plastic tape
 - Variety of colors for students to choose from
- 9 ounce clear plastic cup
- Black card stock
- Tacky glue
- Battery-operated tea light
- Soothing “seashore” music CD (optional)

Additional Materials for Extension Activities

Eagle Bluff Journal 1895 by Phyl Mielke
The Little Red Lighthouse and the Great Gray Bridge by Hildegard H. Swift (book and video-Weston Woods)
“The Little red lighthouse and the Great Gray Bridge” a Reader’s Theater Play, adapted from the book
Great Lakes Lighthouses puzzle
Historic Great Lakes Lighthouses Coloring Book by Joseph A. Arrigo
A deck of Lighthouse playing cards (or photos of lighthouses glued to cardstock for game)
Paper for journal writing
Paper for lighthouse drawings
Pencils, color pencils, markers for journaling or drawing

Lighthouse Vocabulary

Day marker: the daytime markings on a lighthouse or other aid to navigation, usually shape and color patterns

Fog horn, fog signal: a horn sounded in foggy conditions to give warning

Night Signature: pattern of light flashes or light colors to distinguish one lighthouse from another during the night

Conical: Shaped like a cone

Cylindrical: Shaped like a cylinder

Skeletal: Having an inner stairwell encased in a tower, with supporting beams of metal surrounding it

Octagonal: Shaped like an octagon (eight-sided)

Range lights: a system involving two lights, one normally taller than the other, with one aligned in front of the other, that allows the mariner to arrange them vertically one over the other and is known as getting "on range."

Screw Pile: an off shore light built upon metal piles, or beams, that were drilled into the lake bottom

Spark Plug: an off shore light built upon a metal tube that was screwed into the lake bottom

Pharologist: one who studies lighthouses. *Pharos* is the Greek word for lighthouse.

Fresnel Lens: A type of lighthouse lens built with multiple layers of prisms around the top and bottom, projecting an intense beam of light

Background

First lighthouses

Nature provided the first lighthouses in the way of glowing volcanoes. Later, humans would build huge bonfires, or hang metal baskets of fire from a pole to signal sailors out in the harbor.

The first human-built lighthouse was Pharos of Alexandria, Egypt, built in about 280 BC. It was the tallest one, at 450 feet (comparable to a 45-story skyscraper). Its source of light was an open fire at the top. It survived for 1500 years until an earthquake destroyed it in the 14th century.

The word for people who study lighthouses is *pharologists*.

A lighthouse is a tower with a bright light at the top, located at an important or dangerous place regarding navigation, or travel over water. Two main purposes of a lighthouse are to serve as a navigational aid and to warn boats of dangerous areas. The message a lighthouse sends is either **STAY AWAY, DANGER, BEWARE, or COME THIS WAY.**

Lighthouse Distinguishing Characteristics

Lighthouses were built with various designs. Some are tall (on flat ground) or short and squat (on high cliffs or rocky coasts). Some are square, octagonal, conical, or cylindrical.

Lighthouses were constructed of various materials. Some are built of stone, others of brick, concrete, wood, steel, cast iron, tabby (a mixture of shells, lime, sand and water).

To help a sailor determine his location, the Lighthouse Board (in charge of lighthouses from 1852-1910) issued an order to have each lighthouse painted in different colors and/or designs.

At night, lighthouses are distinguishable by their lights. Early on, the lighthouses were given multiple lights, but this was expensive. Mounting a group of lights on a rotating framework made it possible to produce a special pattern of light for each lighthouse. This made it look like the light was flashing on and off.

When the Fresnel (pronounced "Frey Nel") lens was invented in 1822, it enabled man to produce an unlimited number of flashing light combinations, and it also brightened the light so that it could be seen at greater distances. The two types of Fresnel lenses are: fixed, showing a steady light, and revolving, which produces a flash.

The flashing light pattern is called its characteristic. A light could send out a flash every five seconds, or it could have a fifteen-second period of darkness followed by a three-second period of brightness. Mariners look at a light list or a maritime chart to tell what light flashes a particular pattern. Then, they are able to determine their position on water relative to the land.

Another way to distinguish a lighthouse is by the color of its light. Most lighthouses have a white lamp, but some use red or green lights, and some use a combination.

In fog, when day marks and light patterns are undetectable, a sailor relies on the fog signal of a lighthouse. Early on, cannons, fog bells, steam whistles, reed trumpets, and sirens were used to indicate a lighthouse location. Today, an automatic sensor, which detects moisture in the air, turns on the fog signals when needed. Radio beacons (electronic devices) can also be sent out.

Lighthouse Keepers

In the early days, Lighthouse keepers set the lamps at sunset, and extinguished them at sunrise. During the night hours, keepers would climb the steps to the tower, sometimes three times in an eight-hour shift, and check that the lamp was still lit. They also checked that the weights that helped rotate the light were wound. During the day, brass was shined, glass windows were cleaned of all soot, and the lens was polished. This could take all day.

The Keeper had to write daily in a log detailing everything from the weather to the amount of fuel that was used to who visited the lighthouse that day. The fog signal had to be kept in working order, and often times the lighthouse had to be repainted.

Lighthouse Keepers also saved lives, sometimes taking rescue boats out to stranded ships. They endured terrible weather conditions, and many lighthouse keepers lost their lives while on duty, or because of illness.

The Lighthouse Service and the Coast Guard

In 1789, President George Washington signed the ninth act of the U.S. Congress which stated that all states were to turn over their lighthouses to the central government. In creating the U.S. Lighthouse Establishment, aids to navigation became the responsibility of the Secretary of the Treasury.

In 1852, Congress passed legislation to establish a U.S. Lighthouse Board. Twelve lighthouse districts were established, and military naval officers were given the role of inspector of lighthouses. They were charged with building lighthouses, seeing that they remained in good condition, and seeing that lenses were working properly. New technology, including the Fresnel lens and improved fog signals, was applied to the lighthouses. Qualifications for becoming a Lighthouse Keeper became stricter. Color schemes were created in order to differentiate among the lighthouses' day marks.

In 1886 electricity was used for the first time to light the Statue of Liberty.

The U.S. Lighthouse Service was formed in 1910. For the first time, civilians were given duties formerly reserved for military officers. More technological advancements were made, including automation and rotation of light bulbs.

In 1939, the U.S. Coast Guard took over the duties of the U.S. Lighthouse Service. Advancements in lighting systems and radio technology continued, and by 1990, all but one lighthouse (Boston Harbor Island, Massachusetts) were automated. Lighthouse Keepers were eliminated.

Lighthouses today

Today all lighthouses are automated, except for the first lighthouse ever built in America- the Boston Light (built in 1716). Most lighthouses today have been turned over to non-profit organizations for the purpose of teaching new generations about the rich maritime history of our country.

Names and Locations of Lighthouses

Close to Home

Rawley Point Lighthouse
Two Rivers North Pierhead Light
Manitowoc North Breakwater Lighthouse
Algoma North Pierhead Light
Kewaunee Pierhead Lighthouse

Door County

Eagle Bluff Lighthouse
Bailey's Harbor Lighthouse
Bailey's Harbor Range Lights
Cana Island Lighthouse
Chambers Island Lighthouse
Sherwood Point Lighthouse
Sturgeon Bay Ship Canal Lighthouse
Plum Island Range Lights

Shapes of Lighthouses

Skeletal (Devils island, one of the Apostle Islands, Wisconsin)

Conical (Outer island, one of the Apostle Islands, Wisconsin)

Hexagonal (Sand Island, one of the Apostle Islands, Wisconsin)

Square (Raspberry Island, one of the Apostle Islands, Wisconsin)

Triangular (New Charleston harbor, Sullivan Island, South Carolina)

Octagonal (Cape Romain Light, South Carolina)

Screw Pile (Drum Point Lighthouse, Solomons, Maryland)

Spark Plug/Round Caisson (Miah Maul Shoal Light, Egg Island Point, New Jersey)

Day Marks and Night Signatures

There are no two lighthouses that are the same. Every lighthouse was built specifically for the location it stands on. This location provides ships with the clearest message possible about a particular geographic area.

Lighthouses come in different sizes, shapes, colors, and materials. Some lighthouses are tall, short, stand alone, are built on top of a house, are square, round, or even octagon shaped.

All lighthouses have what is called a day mark and night signature. The day mark, also known as color scheme or paint pattern, is used so that in the day time ships can tell one lighthouse from another. To identify a lighthouse at night ships use the night signature, also known as the light pattern.

PROCEDURE

Day One

Focus Question: When a ship is out on Lake Michigan at night, how does the captain know which port city he is close to? (He has a GPS, maps, navigational equipment, lighthouses, etc.) How did sailors long ago, before GPS and radios were invented, find their way safely to the shoreline? (They used maps or saw lighthouses or fires built by other people.)

Setting a purpose for the lesson: In our Wisconsin history class we will learn how to differentiate, or tell the difference between, lighthouses. We will determine the day time and night time characteristics of a lighthouse. We will study the shapes, styles, and materials used in designing lighthouses. We will create our own lighthouses at the end of this lesson.

1. Go over the basic history of lighthouses, as noted in the background portion of this teacher's lesson. Depending on the students, you may also choose to give them a copy of the history and have them take turns reading aloud in class. You do not need to read through the entire history, but highlight the areas of interest to your students.

2. If you have an interactive whiteboard or computer screen, show pictures of the various lighthouse shapes, as noted in this teacher's lesson. Point out the shapes on the lighthouses. You may also print out pictures of lighthouses (or cut them from calendars, magazines, or old books) and display them on a bulletin board. Be sure to use photos that are not copyrighted. Include the shape labels. (attachment)

Students should be able to give a general description of each lighthouse as you show it. Ask them what shape the lighthouse appears to have.

3. Using the lighthouse photos from the earlier portion of the lesson, now point out the variety of materials used in constructing the lighthouses. (Stone, brick, concrete, steel, wood, cast iron, tabby) Explain the reasons for using certain materials. For example, wooden structures would wear out because of the stormy weather. Steel or metal sometimes lasted longer than rocks or shells. Some materials were easier to get because they were located nearby. (Consider dolomite or limestone in Door County.)

Ask students to picture a scene in which a lighthouse is to be constructed. What type of materials would work best for that lighthouse? Are those materials nearby? How would you transport the materials needed to build the lighthouse? Students should be able to use their previous lessons in Wisconsin maritime history to establish the connection between construction of lighthouses and the economic impact on communities, such as buying, selling, and transportation of materials.

4. Day marks and night signatures were created to make it easier for sailors to determine where their location was. Using the teacher's information about Lighthouse Distinguishing Characteristics and Day Marks and Night Signatures, discuss with students the importance of creating different day marks and light patterns. If you have time, consider showing photos of Eagle Bluff Lighthouse and Chambers Island Lighthouse. These two are very similar in their day marks, but students should be able to pick out the differences (shape of tower and its connection to the keeper's quarters is different).

As an example of night signatures, give flashlights to each of two students, and ask them to create their own light pattern based on frequency of light and darkness. An example would be to shine the light for three seconds, then turn it off for ten seconds, and repeat. Take turns, making sure each student has an opportunity to create a light pattern. Ask them why it would be important for them to each have a different pattern. (A sailor would know which lighthouse to steer towards based on its light pattern.)

Students will need to understand the importance of having day markers and night signatures when they create their own lighthouse.

5. Read the descriptions given for various local lighthouses. (attachment) Ask students to match the descriptions to the photos of the lighthouses. Do this for each of the lighthouses. Discuss how the words used in the descriptions are clues to helping the students identify the lighthouses.

Students will be told that tomorrow they will create their own unique lighthouses based on the information they've learned into today's portion of the lesson. They will also participate in matching activities.

Day Two

1. Students will play one of several matching games. These games can be adjusted to meet your individual needs. For example, you can change the level of difficulty by using new, never before seen, photos of lighthouses.

- Game One: Match the local lighthouses to their descriptions. (attachment) Game can be played on interactive whiteboard or as a card game.
- Game Two: Match lighthouses to their shapes. Use Shape labels (attachment) and photographs of lighthouses.
- Game Three: Match the lighthouse to its name.

2. Students will use what they've learned in the lesson to create their own unique lighthouses. Follow the directions given for teaching the art lesson.

Art Activity:

Students will create their own lighthouses.

Art materials needed (per student):

- One 18 ounce plastic cup with circular bottom
 - Provide a variety of colors for students to choose from
- Plastic tape
 - Provide a variety of colors for students to choose from
- One 9 ounce clear plastic cup
- Black card stock (6 inch square)
- Tacky glue
- One Battery-operated tea light
- Soothing "seashore" music CD (optional)

Before creating the lighthouses, have photos of lighthouses on display for students to refer to for inspiration. You may also want to play soothing "seashore" music in the background, complete with seagulls!

1. First, students choose an 18 ounce plastic cup and colored plastic tape. By offering a variety of colors, students will be able to create unique "day marks" on their lighthouses.

2. Next, students make stripes by attaching the tape to the cup. Stripes will work best if they are horizontal, rotating around the cup. Three is the suggested number of stripes, but students can make multiple, narrow stripes by trimming the width of the tape.
3. The third step is to trace the bottom of the clear plastic cup onto the black card stock.
4. Next, cut out the circle that was traced. Students use the left over card stock to cut out rectangle windows and a door.
5. For the next step, trim the top inch or so from the clear cup so that it sits on the colored cup with about a half inch of overlap.
6. At this point, the colored cup sits upside down, and the clear cup sits on top of it, also upside down.
7. Use tacky glue to adhere the black card stock circle to the bottom of the clear cup.
8. Glue the windows and door to the colored cup.
9. Turn the tea light on and set it on the top of the colored cup.
10. Place the clear cup over the light.
11. You may wish to provide extra materials for embellishing their lighthouses, or create a scene that incorporates the lighthouses. This will take extra time.
12. Ask students to name their lighthouses!

Extension Activities

❖ Language Arts

- Students will form groups and prepare the Reader's theater play based on *The Little Red Lighthouse and the Great Gray Bridge*. They can perform this play for the younger students in the school.
- Students will read or be read to from portions of the book *Eagle Bluff Journal 1895*. Students will take note of the style of writing used in the book (journal entries).
 - Journal Entries to read:
 - Jan. 1-reason for the journal; names of family members
 - April 13-Pa lit the light for the first time this season
 - April 20-smelting
 - April 27-*Fanny Hart* makes first stop of the season
 - May 2-Gardening
 - May 6-buying piglets; watercress salad
 - May 11-black bear spooks horses; building of a new school
 - May 13-Ludington Car Ferry
 - May 15, 16, 17-Expecting the Inspector
 - June 1, 2-sturgeon Bay Canal; Death's Door
 - June 3, 4-Storms
 - June 11-inside house description
 - July 20-lighthouses and their unique looks

- August 3-Saturday chores
 - August 5-separate oil house materials arrive
 - August 11-harvest
 - August 28-Supply boat brings requisitioned items
 - Sept. 9-first day of school
 - Sept. 29-Storm; reason for name Eagle Bluff
 - Nov. 3-*Dahlia* removes buoys
 - Nov. 9-steam barge runs aground
 - Nov. 10-teacher wants Walter to write a book about living in a lighthouse
 - Nov. 29-Thanksgiving
 - Dec. 7-pa turns off light
 - Dec. 10-Christmas trees headed to Chicago; lifesaving stations
 - Dec. 22-rescue on the ice
 - Note from the Author
- After reading the indicated entries, students will create their own journal entries of life as a light keeper's son or daughter.

❖ Social Studies/Art

- Students will play a matching game using Lighthouse playing cards. In addition to playing according to the card game's rules, players will also be asked to identify features on the particular lighthouses that they match, such as day marks, shape, location, or even the actual name of the lighthouse.
- Students will tour a local lighthouse. They will see firsthand the characteristics that make the lighthouse unique.

❖ Art

- Students will create a book of drawings (classroom or individual, depending on enthusiasm) of lighthouses. Drawings will be specific to the shapes, types, and day marks. Lighthouses may be reproductions or new creations.
- Students may color pages from a lighthouse coloring book during free time.

❖ Technology/Social Studies/Language Arts

- Students will create their own Power Point presentations on lighthouses. Subjects could include:
 - Shapes of lighthouses
 - Day Marks of lighthouses
 - Wisconsin Lighthouses of Lake Michigan or Lake Superior
 - History of lighthouses

- Other topics suitable to this lesson
 - Students can watch the Weston Woods video performance of *The Little Red Lighthouse and the Great Gray Bridge*. Afterwards, they can use the internet to research more information about this lighthouse on the Hudson River.
- ❖ General
- Students may put together the Great Lakes Puzzle during free time.

Assessment

Students will show sufficient knowledge of lighthouse characteristics. They will be able to identify shape, day markers, and other features on a photo of a lighthouse. Students will be able to identify many, if not all, of the local lighthouses. Students will successfully create a unique lighthouse and will be able to name their distinguishing characteristics.

Many of the matching games are self-assessments. By monitoring the students, you will gain information about the students who do or do not meet the performance standards.

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Attachments

- Descriptions of Local Lighthouses
- Lighthouse Shape Labels
- Names of Local Lighthouses
- Lighthouse Distinguishing Characteristics
- History of Lighthouses

Descriptions of local lighthouses

1. This short, steel white tower looks like a 3-layered square wedding cake.
2. This soaring white cylinder tower surrounded by a steel skeletal structure stands over 110 feet tall. It is white with a red lantern room.
3. A white lantern room sits on top of a red wooden square tower.

4. This steel and concrete square tower is 43 feet tall and sits on top of a fog signal building. It is white with a red roof.

5. This cylinder lighthouse is made of metal and is painted red.

6. This cylinder lighthouse was built with large flat light-colored rocks from the local area. A birdcage lantern room sits on top.

7. The front range light is the shortest lighthouse in Wisconsin. A white octagonal (8-sided) upper level sits on top of a square lower level.

8. The rear range light is taller than its partner and looks like an old red and white country schoolhouse.

9. This 86 foot tall cylinder lighthouse, originally constructed of Cream City brick, is now covered with white riveted iron sheeting.

10. The Front Range light is a 40-foot tall metal skeletal tower. The Rear Range Light is a 65-foot tall cylinder tower surrounded by a skeletal structure. It has a red lantern. Both lights display red and white striped banners.

11. This 100-foot tall white lighthouse has a unique steel cylinder tower 8-foot in diameter surrounded by a steel skeletal lattice.

12. This square tower is attached diagonally to the light keeper's quarters. It is made of Cream City brick.

13. This twin to Eagle Bluff is also made of Cream City brick. The tower attached to the keeper's quarters is octagonal on the top level, and square on the bottom.

14. This short, square white tower is attached to a red brick light keeper's house that resembles a country schoolhouse.

Answers to Shape Matching Game

1. Manitowoc Breakwater Light (Manitowoc, WI)
2. Rawley Point Lighthouse (Two Rivers, WI)
3. Two Rivers North Pierhead Light (Two Rivers, WI)
4. Keewaunee Pierhead Light (Kewaunee, WI)
5. Algoma Pierhead Light (Algoma, WI)
6. Bailey's Harbor Light (Door County, WI)
7. Bailey's Harbor Front Range Light (Door County, WI)
8. Bailey's Harbor Rear Range Light (Door County, WI)
9. Cana Island Lighthouse (Door County, WI)
10. Plum Island Range Lights (Door County, WI)
11. Sturgeon Bay Ship Canal Lighthouse (Door County, WI)
12. Eagle Bluff Lighthouse (Door County, WI)
13. Chambers Island Lighthouse (Door County, WI)
14. Sherwood Point Lighthouse (Door County, WI)

History of Lighthouses

First lighthouses

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Lighthouses were constructed of various materials. Some are built of stone, others of brick, concrete, wood, steel, cast iron, tabby (a mixture of shells, lime, sand and water).

To help a sailor determine his location, the Lighthouse Board (in charge of lighthouses from 1852-1910) issued an order to have each lighthouse painted in different colors and/or designs.

At night, lighthouses are distinguishable by their lights. Early on, the lighthouses were given multiple lights, but this was expensive. Mounting a group of lights on a rotating framework made it possible to produce a special pattern of light for each lighthouse. This made it look like the light was flashing on and off.

When the Fresnel (pronounced “Frey Nel”) lens was invented in 1822, it enabled man to produce an unlimited number of flashing light combinations, and it also brightened the light so that it could be seen at greater distances. The two types of Fresnel lenses are: fixed, showing a steady light, and revolving, which produces a flash.

The flashing light pattern is called its characteristic. A light could send out a flash every five seconds, or it could have a fifteen-second period of darkness followed by a three-second period of brightness. Mariners look at a light list or a maritime chart to tell what light flashes a particular pattern. Then, they are able to determine their position on water relative to the land.

Another way to distinguish a lighthouse is by the color of its light. Most lighthouses have a white lamp, but some use red or green lights, and some use a combination.

In fog, when day marks and light patterns are undetectable, a sailor relies on the fog signal of a lighthouse. Early on, cannons, fog bells, steam whistles, reed trumpets, and sirens were used to indicate a lighthouse location. Today, an automatic sensor, which detects moisture in the air, turns on the fog signals when needed. Radio beacons (electronic devices) can also be sent out.

Lighthouse Keepers

In the early days, Lighthouse keepers set the lamps at sunset, and extinguished them at sunrise. During the night hours, keepers would climb the steps to the tower, sometimes three times in an eight-hour shift, and check that the lamp was still lit. They also checked that the weights that helped rotate the light were wound. During the day, brass was shined, glass windows were cleaned of all soot, and the lens was polished. This could take all day.

The Keeper had to write daily in a log detailing everything from the weather to the amount of fuel that was used to who visited the lighthouse that day. The fog signal had to be kept in working order, and often times the lighthouse had to be repainted.

Lighthouse Keepers also saved lives, sometimes taking rescue boats out to stranded ships. They endured terrible weather conditions, and many lighthouse keepers lost their lives while on duty, or because of illness.

The Lighthouse Service and the Coast Guard

In 1789, President George Washington signed the ninth act of the U.S. Congress which stated that all states were to turn over their lighthouses to the central government. In creating the U.S. Lighthouse Establishment, aids to navigation became the responsibility of the Secretary of the Treasury.

In 1852, Congress passed legislation to establish a U.S. Lighthouse Board. Twelve lighthouse districts were established, and military naval officers were given the role of inspector of lighthouses. They were charged with building lighthouses, seeing that they remained in good condition, and seeing that lenses were working properly. New technology, including the Fresnel lens and improved fog signals, was applied to the lighthouses. Qualifications for becoming a Lighthouse Keeper became stricter. Color schemes were created in order to differentiate among the lighthouses' day marks.

In 1886 electricity was used for the first time to light the Statue of Liberty.

The U.S. Lighthouse Service was formed in 1910. For the first time, civilians were given duties formerly reserved for military officers. More technological advancements were made, including automation and rotation of light bulbs.

In 1939, the U.S. Coast Guard took over the duties of the U.S. Lighthouse Service. Advancements in lighting systems and radio technology continued, and by 1990, all but one lighthouse (Boston Harbor Island, Massachusetts) were automated. Lighthouse Keepers were eliminated.

Names of local lighthouses

Manitowoc North Breakwater
Light

Algoma North Pierhead Light

Kewaunee Pierhead Lighthouse

Two Rivers North Pierhead
Light

Rawley Point Lighthouse

Eagle Bluff Lighthouse

Chambers Island Lighthouse

Sturgeon Bay Ship Canal
Lighthouse

Bailey's Harbor Range Lights

Bailey's Harbor Lighthouse

Cana Island Lighthouse

Sherwood Point Lighthouse

Plum Island Range Lights

Lighthouse Distinguishing Characteristics

Lighthouses were built with various designs. Some are tall (on flat ground) or short and squat (on high cliffs or rocky coasts). Some are square, octagonal, conical, or cylindrical.

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automatic sensor, which detects moisture in the air, turns on the fog signals when needed. Radio beacons (electronic devices) can also be sent out.

Day Marks and Night Signatures

There are no two lighthouses that are the same. Every lighthouse was built specifically for the location it stands on. This location provides ships with the clearest message possible about a particular geographic area.

Lighthouses come in different sizes, shapes, colors, and materials. Some lighthouses are tall, short, stand alone, are built on top of a house, are square, round, or even octagon shaped.

All lighthouses have what is called a day mark and night signature. The day mark, also known as color scheme or paint pattern, is used so that in the day time ships can tell one lighthouse from another. To identify a lighthouse at night ships use the night signature, also known as the light pattern.

Lighthouse Shape Labels

Skeletal

Square

4

Conical

Triangular

3

Screw Pile

Spark Plug

Octagonal

8

Hexagonal

6

Cylindrical