A. Purpose of Lighthouses

I. Pretrip Activities: "Why a Lighthouse?"

A. Use the lighthouse history packet, the "Navigating in the Fog" game, lighthouse vocabulary sheets, and lighthouse diagrams to introduce lighthouses. Familiarize children with the purpose of lighthouses. Learn the terms, operations, and technology of lighthouses. Students will gain an awareness of the history and locations of lighthouses.

II. Field Trip Activities: "A Trip to Remember"

A. Tour of the Raspberry Island Light Station grounds at Apostle Islands National Lakeshore. The tour will give students a basic understanding of the buildings and grounds and the signal "characteristics" that make Raspberry Island Light Station unique. This tour includes the history of the light station and the role of the National Park Service.

III. Posttrip Activities: "Caution Construction Zone"

A. Students will apply their knowledge and understanding of lighthouses by constructg a model of a lighthouse and making an oral presentation describing its parts and their es.

Purpose of Lighthouses
Lesson Plan

Lesson Title I: "Why a Lighthouse"

Purpose of Lighthouses (Pretrip Activity)

Lesson Summary:

Introduce lighthouses. Familiarize children with the purpose of lighthouses. Learn the terms, operations, and technology of lighthouses. Students will gain an awareness of the history and locations of lighthouses.

Learning Objectives:

Students will be able to understand the importance of lighthouses and how they work.

Wisconsin Curriculum Standards Integration Reference:

English Language Arts Standard:
- A. Reading/Literature: A.4.1, A.4.2, A.4.4/ A.8.1
- C. Oral Language: C.4.1, C.4.2, C.4.3/ C.8.1, C.8.2, C.8.3
- D. Language: D.4.1, D.4.2/ D.8.1, D.8.2
- F. Research and Inquiry: F.4.1/ F.8.1

Math Standard:
- C. Geometry: C.4.1, C.4.2, C.4.3/ C.8.1, C.8.3
- D. Measurement: D.4.3

Social Studies Standard:
- A. Geography: People, Places, and Environments: A.4.4, A.4.6, A.4.7, A.4.8/ A.8.4, A.8.8, A.8.10
- B. History-Time, Continuity, and Change: B.4.1, B.4.8

Recommended Duration:

45 minutes to 90 minutes.

Discussion Questions:

1) What is a lighthouse?

2) What do lighthouses look like?
3) How can one lighthouse be distinguished from another?
4) Why do we have lighthouses?
5) Are they important and why?
6) Where are lighthouses located?
7) What happens in fog when the light isn't visible?
8) What fuels were used to produce light?
9) What is the difference between a lighthouse and a light station?

Resources and Materials:

- Fog Game Rule Worksheet
- Lighthouse History Packet
- Vocabulary worksheet
- Diagrams of lighthouses and Fresnel lens
- Blindfold
- Lighthouse treasure (optional)

Activities and Procedures:

1) Introduction Activity - Navigating in the Fog. (Refer to Navigating in the Fog game rules worksheet)

2) Read and discuss History of Lighthouses. (Refer to attached History of Lighthouses packet and the above discussion questions.)

3) Label one or more of the drawings of lighthouses and the drawing of the Fresnel lens. (Refer to attached diagrams of lighthouses and attached vocabulary sheet)

Other Suggested Activities:

None

Evaluation and Assessment Procedures:

Finished/labeled diagrams of lighthouses and Fresnel lens. (These can be added to the Log Book.)

Lighthouse History

Information from The United States Lighthouse Society
244 Kearny Street
San Francisco, CA 94108
(415) 362-7255

(Can be used for Pretrip and Posttrip Activities)

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Many years ago, people decided to explore the waters by boat. During the day they could find their way back to the landing place by looking for a pile of rocks that had been left there. These were the first daymarks. But how could they find their way home at night? Since much of the shoreline looked very similar, friends had to light a bonfire on a high point to guide them to the right landing area. Still later they used a pole or a tripod to hang a metal basket containing a fire as a method of signaling.

Our first lighthouses were actually given to us by Nature herself. Sailors sometimes used landmarks such as glowing volcanoes to guide them. In the Ancient World, trading ships were eventually built enabling navigators to sail long distances to buy and sell goods. In the days of wooden ships with sails, the wind and waves could easily push them against the rocks and wreck them. And so, the need for lighthouses as warning signals arose.

One of the Seven Wonders of the Ancient World was a lighthouse - the famous Pharos of Alexandria, Egypt. It is the first one that is recorded in history and was built about 280 B.C. Those records tell us that it was the tallest one ever built -450 ft. (comparable to a 45 story skyscraper) and used an open fire at the top as a source of light. Can you imagine being the keeper, climbing to the top to light the fire, and then forgetting the matches or whatever was used in those days to start a fire?

This fantastic structure survived for 1500 years until it was completely destroyed by an earthquake in the 14th Century. Slave labor was used to build it, and it took twenty long years to complete. It was a three part tower with a square base, a second story with eight sides and a narrow, taller; round third story. At night they believe its lighted fire could be seen for thirty miles, whereas by day it produced a column of smoke for a daymark. Today we call people who study (or are interested in) lighthouses pharologists. The name comes from that famous lighthouse.

What is a lighthouse? It is a tower with a bright light at the top, located at an important or dangerous place regarding navigation (travel over water). The two main purposes of a lighthouse are to serve as a navigational aid and to warn boats of dangerous areas. It is like a traffic sign on the sea.

Do all lighthouses look alike? Although we often think of a lighthouse as a tall, white conical tower, there are many, many variations of design. Depending on its location, it might be tall (where the land was very flat) or short and squat (where there was a high cliff or rocky coast). It could be square, octagonal (with eight sides), conical (like an ice cream cone upside down), cylindrical (like a very fat pipe), or even like a skeleton. You might find the lighthouse standing alone, attached to the building where the lighthouse keeper lives, or connected to the keeper's quarters by an enclosed walkway. Sometimes the lantern room is built into the roof of the keeper's house.

When the lighthouses were built, they were constructed with whatever materials were most readily available. They were designed to fit the local geographic and climatic conditions. Some are made of stone; others brick, concrete, wood, steel, cast iron, and even tabby (a mixture of shells, lime, sand, and water). So you can see that each lighthouse is very unique.

Where are lighthouses located? They can be found in a variety of places, on rocky cliffs or sandy shoals on land, on a wave swept reef in the sea, and at entrances to harbors and bays. They serve to warn the sailor of dangerous reefs beneath the sea or perilous rocky coasts on land, and to guide ships into a safe harbor or back out to sea. So the message of the lighthouse might be - STAY AWAY, DANGER, BEWARE, or COME THIS WAY. Every lighthouse tells the mariner, "This is exactly where you are."

Our country has several coastlines used by ships from around the world. In the East it borders the Atlantic Ocean, in the West the Pacific Ocean, and in the South, the Gulf of Mexico. But we also have another very important area of coastline where the land meets the sea, the Great Lakes. All of these four areas bordering our country need and have lighthouses, as well as some of our more important navigable inland waterways.

How could one lighthouse be distinguished from another? Years ago, before they had all the sophisticated technology of today - loran, radar, sonar, on ship electronics, radio beacons, etc. - ships near shore in the daytime would use lighthouses as a landmark. This use gave them an additional name - a Daymark.

Imagine that you are the captain of a ship sailing along the coast. You need some landmarks to help you find your position. When you look on shore, you see a tall red brick tower. Then you sail about forty miles down the coast and you see another round red brick tower -just like the first one. How would you know where you are? This is the way things were along a portion of the Virginia and North Carolina coast in the 1870's. To help the mariner determine his location the Lighthouse Board (which was in charge of lighthouses from 1852-1910) issued an order to have each lighthouse painted in different colors and/or designs. This is the best example of DAYMARKS we can see today.

But, what about nighttime - the most dangerous time to navigate, and the main reason lighthouses exist? You can't see colors or patterns at night, but you can see lights. However, unless there was some way to make each light different, you could have the same problem. Early on, in a few places in our country, multiple lights (that is, two or three together) were built. Building double or triple lighthouses was one way to help the sailors at sea determine their location, but it was a very expensive way to do it. Mounting a group of lights on a rotating framework made it possible to produce a special signature (the first flashing characteristic) for each lighthouse, so they could be easily told apart.

The invention of the Fresnel lens in 1822 was probably the most important discovery in lighting technology. As well as enabling man to produce an unlimited number of flashing combinations, it also intensified (brightened) the light so it was much more helpful to the mariner, and could be seen at greater distances.

The Fresnel (pronounced "Frey Nel") lens can be compared to a huge lamp shade except that it is made of hundreds of pieces of beautiful, specially cut glass. It surrounds the lamp bulb, but differs from a lamp shade, which concentrates the light downward. This lens, due to its special design, and because it is made of glass, intensifies the glow from the light. It takes the rays of light which normally scatter in all directions and bends (refracts and reflects) them, focusing them into a single beam of light, which shines out in a specific direction.

Fresnel lenses are of two types: Fixed - which shows a steady light all around the horizon and Revolving - which produces a flash or a characteristic. The number of flashes per minute depends on the number of flash panels and the speed at which the optic (lens) revolves.

Different periods of darkness and light produce a unique flash pattern for each light. For example, a light can send out a flash every five seconds, or it might have a fifteen second period of darkness and a three second period of brightness, or any number of other combinations. The individual flashing pattern of each light is called its CHARACTERISTIC. Mariners have to look at a light list or a maritime chart which tells what light flashes that particular pattern and what color the light is as well. Then they are able to determine their position at sea in relation to the land.

Fresnel lenses come in seven commonly used sizes (called orders). The larger ones (1st order), used on major seacoasts, flash a more powerful beam which shines as far as twenty one miles out to sea. Sixth order lights, the smaller ones, are used in bays where they don't have to shine as far or as brightly.

Most look like a beehive or barrel; some have bull's-eyes and can contain from two to twenty four different panels. Those with the fewest flash panels (two) are called clamshell or bivalve lens. A clockwork type mechanism (which had to be wound by hand every few hours before the advent of electricity) is used to make these revolving lenses rotate around the lamp itself to produce the flash. The movement of the lens is timed precisely so the bull's-eye panel will pass by when a flash is due.

These lenses are really beautiful works of art; most contain hundreds of prisms - pieces of specially ground, cut and polished glass which, when arranged in a certain way, bend (reflect and refract) the light. Thus all the rays of the light are collected and redirected into a single pencil beam of light. This makes it much brighter and more effective. The lenses themselves can weigh as much as four tons.

Another way to distinguish lights is through the use of color. Although most lights have a white lamp, some do use red and others green lights, as well as combinations of the colors.

What happens in fog when the light isn't visible? Have you ever been out in a car on a dark, stormy, very foggy night? You know how difficult it is to see other cars on the road. Now, picture yourself sailing along a black- looking sea in a thick pea soup fog with no stars shining or moonlight visible. The windshield wipers are working overtime, but the view of the light from the lighthouse is being blocked by the fog. In situations like this there is another method of notifying the mariner using sound. It is called a foghorn. The first one was used in 1719 at Boston light and it was, of all things, a cannon. Can you imagine being a lighthouse keeper and having to fire the cannon every hour when there was fog? During a long spell of fog you wouldn't get any sleep. Later they

tried various other means of making a noise for warning. Fog bells were used as well as steam whistles and reed trumpets and sirens. The sounds they gave out were generally low pitched and very mournful - almost like a wail. Each one emitted a specific number of blasts every minute so it could be told apart from all others. Today, an automatic sensor which detects moisture in the air turns on the fog signals when needed. There are also soundless fog signals called radio beacons (an electronic device).

These fog signals were not placed everywhere. Although some places experience no fog problems, fog warning devices are very necessary in New England, on the Pacific Coast, and in Alaska.

What fuels were used to produce light? The main source of power for the light today is electricity, although in some places they use acetylene gas. For thousands of years before the electric lamp bulb was invented by Thomas Edison in 1879, different fuels were used to illuminate the lamps. First, it was wood and coal for fires, then bales of oakum and pitch, and rows of candles. Later lamps were lit using various fuels - sperm whale oil (produced by cooking the blubber of the whale), lard oil (from animal fat), kerosene (a fuel like gasoline with a petroleum base), etc.

When they first designed a lighthouse with an enclosed lantern room it was possible to use candles for light. One lighthouse used 60 candles! Most used far fewer candles which were sometimes arranged in a circular candelabra or a chandelier with two tiers, or on a frame.

Next came spider lamps which consisted of a shallow brass pan containing oil with either four, eight or more wicks usually arranged in a circle, but other shapes such as a rectangle were also used (since a spider has eight legs, the first one probably had eight wicks!).

Two very important discoveries occurred in the late 1700's. The parabolic reflector was a bowl-like device with a small oil lamp in the center. The light from the lamp was gathered and focused into a beam. This was similar to putting a mirror behind a flame. Thus the first really efficient lighthouse was created. Think of a flashlight which has a silver reflector behind the tiny bulb to increase the brightness of the light. It is based on the same principle.

The invention of the hollow wick oil lamp (the Argand lamp) resulted in a light which was seven times brighter than a candle. This lamp was used with various types of fuel inside the Fresnel lens until the electric light bulb was invented.

The first lighthouse ever to use electricity in this country was the Statue of Liberty in 1886. Yes, this special symbol of freedom was used as a lighthouse in New York harbor for the first fifteen years of her existence.

When were the first lighthouses built in our country? In colonial times, before we became an independent nation, men realized the need for lighthouses at the major ports to help guide ships into the harbors, to prevent them from crashing, and thereby losing their precious cargoes. So, the first lighthouses were built by the colonies (which were called states when we became the United States of America). In those days the ship owners had to pay a fee (toll) for the use of the lights which helped cover the costs of their construction and maintenance. Each ship which passed by a

lighthouse on its way into or out of a port paid a tax based on the weight of the cargo it was carrying. They paid a penny for each ton of goods on board ship. You have to remember that in those days a penny was worth a lot more than it is today. Once we gained our independence from Great Britain and the federal government took charge in 1789, this fee was eliminated.

What is the difference between a lighthouse and a light station? A lighthouse is the tower itself containing the lantern room with the lamp which shines its light. A light station (which is usually onshore, but occasionally on offshore islands) is the property containing all of the outbuildings (as many as eight) of the "station", as well as the lighthouse tower itself. There were usually separate living quarters, depending on the number of lighthouse keepers and assistants living there. Besides these, there would probably be an oil (or fuel) house, a barn, a boat house, and a fog-signaling building.

What duties did lighthouse keepers perform? Before the days of electricity, they had to light the lamp at sunset and extinguish it at sunrise. During an 8 hour watch at night they had to climb the stairs in the tower one to three times a night to check on the light and wind the weights that operated the clock. Some lighthouses have as many as two hundred steps! Keepers earned the name "wickie" because one of their chores was to trim the burned lamp wick, so it wouldn't smoke and dirty the lens. The brass in the building had to be shined, and all the windows cleaned. Often it took a whole day to clean and polish the lens alone. It was very important to keep both the lens and the lantern room windows clean so the light would not be diminished (lessened) in any way. A daily log had to be kept detailing everything from the weather to the amount of fuel consumed. Keepers also had to tend to the mechanism used to operate the fog signal. During the year many items had to be painted. Keepers and their families were kept very busy.

What is the most important aspect of the lighthouse? Of course it is the light that shines out from the lantern room at the top which encloses and protects the lens. This lantern room is made of metal and glass which is divided into sections by pieces called astragals. Usually the astragals are vertical (up and down), but some are diagonal.

What is happening to lighthouses at present? Today, all of the lighthouses in our country have been automated, except the one at Boston, which still has keepers (for sentimental reasons only). Many of the lighthouses are now no longer needed because of advances in technology, and they have been or are being turned over to various government agencies or non-profit local organizations to maintain and administer. It is important to keep them in good condition for future generations to learn about their place in the history of our country. They also need protection from vandalism and threats of erosion. And it is a special experience to be able to climb the stairs just as the keepers did and picture what life was like in times past.

Why are people interested in lighthouses? The word "lighthouse" represents a variety of ideas and emotions...beauty, romance, isolation, fear, danger, security, sacrifice, home, etc. Lighthouses are usually stunning buildings in spectacular surroundings. Lighthouse stories epitomize some of the classic themes used by storytellers throughout history. The technology is interesting, the buildings are beautiful, the stories of the lighthouse keepers are fascinating. The keepers were a group of regular people who selflessly staffed isolated stations to help ensure the safety of others. All of these aspects combine to explain the growing popularity of lighthouses. It is important to save these buildings and their stories for the future.

"Navigating in the Fog" Game

Adapted from Point Reyes National Seashore
4th Grade Lighthouse Curriculum

(Pretrip Activity)

In foggy weather, the light from lighthouses cannot be seen. On foggy days, ships in the area of a light station rely on the blast of the fog signal as a warning of possible dangers. Sailors can identify the source of the fog signal by the number of seconds between blasts. In this game, students get a feel for what it is like to be on a ship blinded by the fog as they to try to navigate around dangerous obstacles.

The Game:

Children form a column two arms length wide, that snakes around the room or outside on the playground. The children in the column represent rocks in the sea with foghorns on them. One child, who represents the ship, is blindfolded. The object is for the ship to make it through the column of rocks safely to the harbor and capture the golden treasure that awaits the ship at the end of the column (the treasure can be any object placed at the end of the column). As the ship moves through the column of rocks the teacher will raise his/her hand every ten seconds at which time the closest foghorn to the ship responds with a "hoooonk" sound to warn the ship away. If the ship touches another child (rock), the ship has crashed and sinks. If successful, the ship makes it all the way to the harbor without touching a rock and captures the treasure by grasping it. The next ship can be the next child in the column, or be chosen by the teacher, or by the present ship.

Follow Up Discussion:

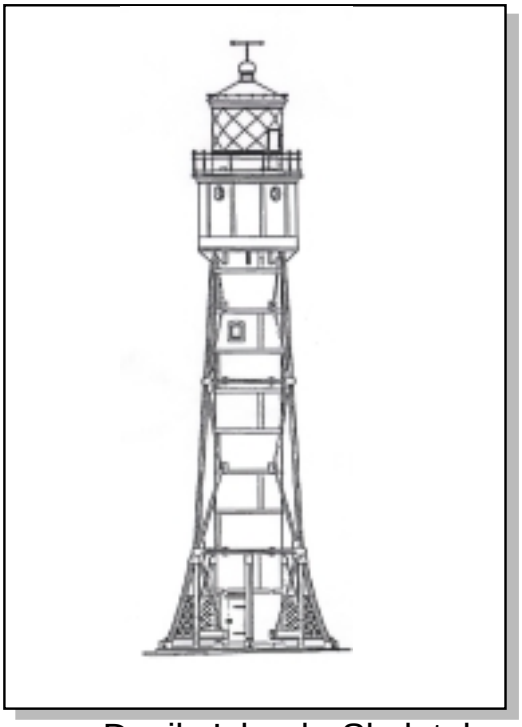
What were the disadvantages of foghorns compared to lighthouses?

They had limited range (3 to 5 miles depending on conditions, whereas the lighthouse could be seen up to 24 miles).
Their exact location could only be estimated unlike the lighthouse.
The old ones ran on steam or compressed air and were hard to maintain and operate.

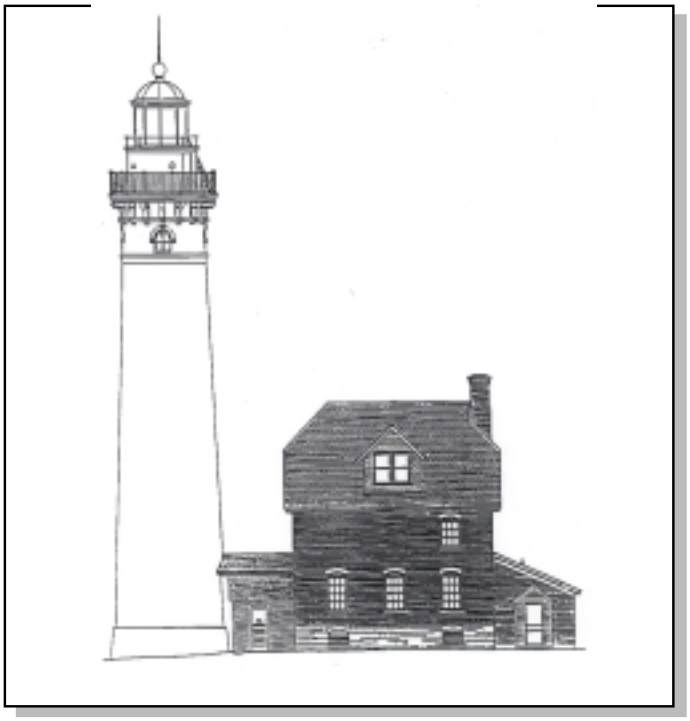
What effect do fog and waves have on the foghorn sounds?

The sound can bounce off waves and fog and make it difficult to tell where the sound is coming from.

Shapes of Lighthouses

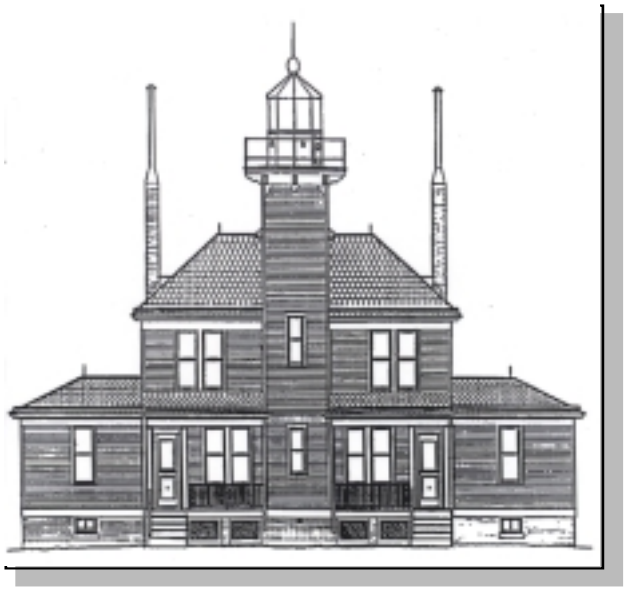


Devils Island - Skeletal



Outer Island - Conical

Sand Island - Six Sided



Raspberry Island - Square

Other Shapes Include:

(Look for these lighthouses on the Internet or in the library)

Triangular -	New Charleston Harbor Sullivan Island, SC
Octagonal -	Cape Romain Light, SC
Screw Pile -	Drum Point Lighthouse Solomons, MD
"Spark Plug" or Round Caisson -	Miah Maull Shoal Light, NJ

Examples of Lighthouses with Daymarkers*:

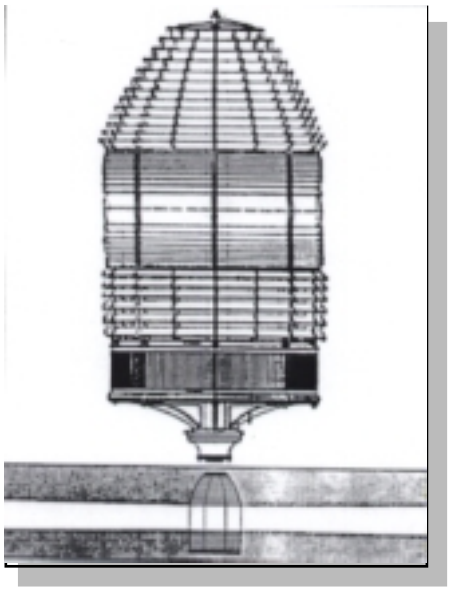
Cape Lookout Lighthouse
Beaufort, NC

Cape Hatteras
Buxton, NC

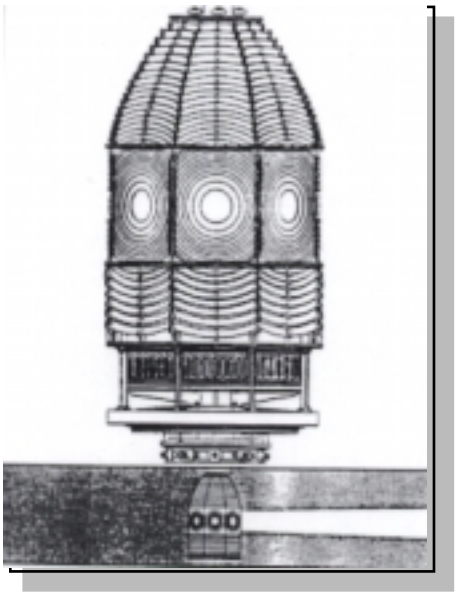
Fire Island Lighthouse
Long Island, NY

Bodie Island Lighthouse
Oregon Inlet, NC

(* Daymarker - A unique color scheme or design which identifies a specific lighthouse during daylight hours.)



A fixed Fresnel lens sends light beams in all directions all of the time. The light does not flash.



A revolving Fresnel lens sends out separate light beams (like spokes from a wheel hub). As the lens revolves, the light appears to flash.

Automated lens at Devils Island

Automated lens at Outer Island

Glossary of Lighthouse Terms

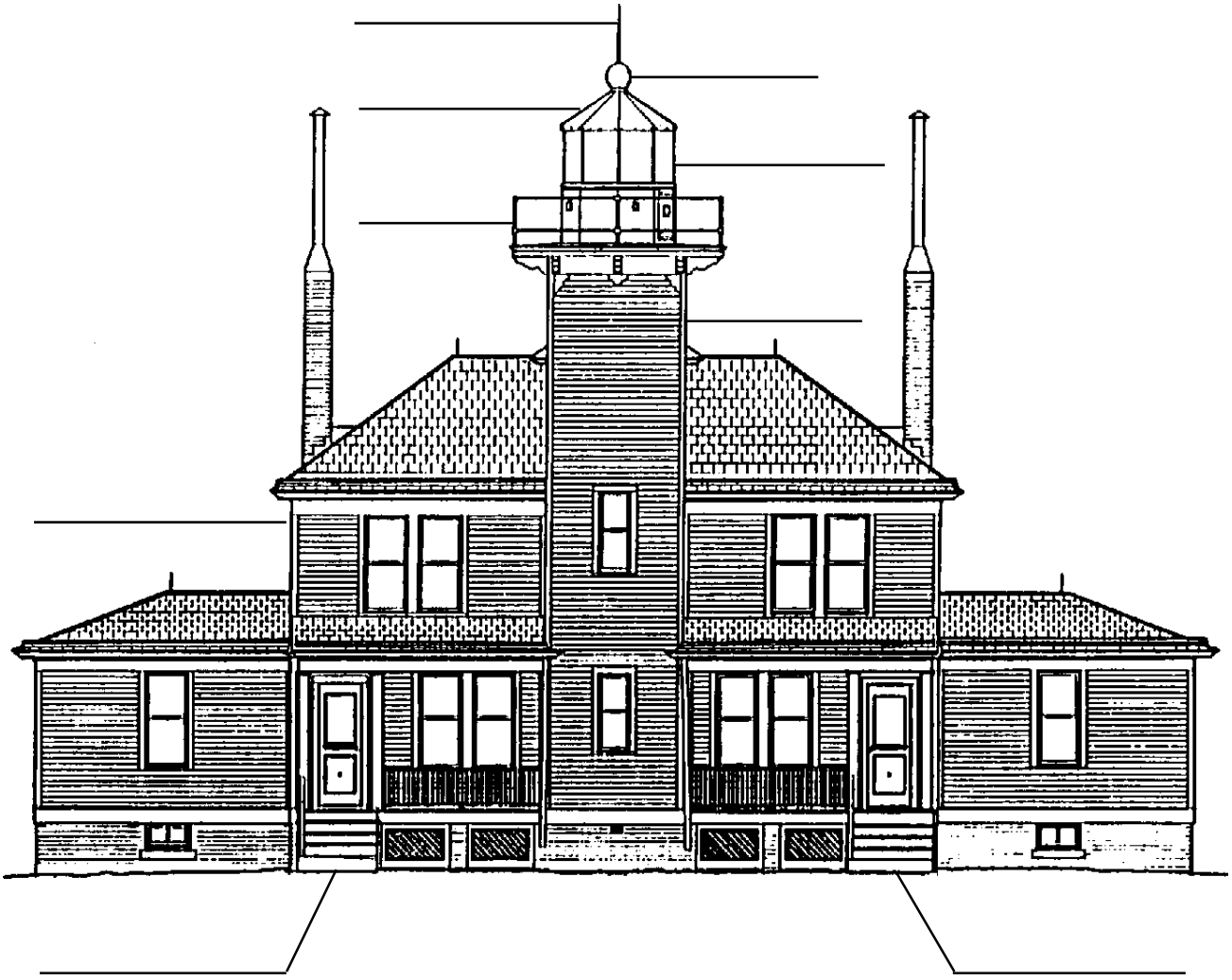
(Can be used for Pretrip and Posttrip Activities)

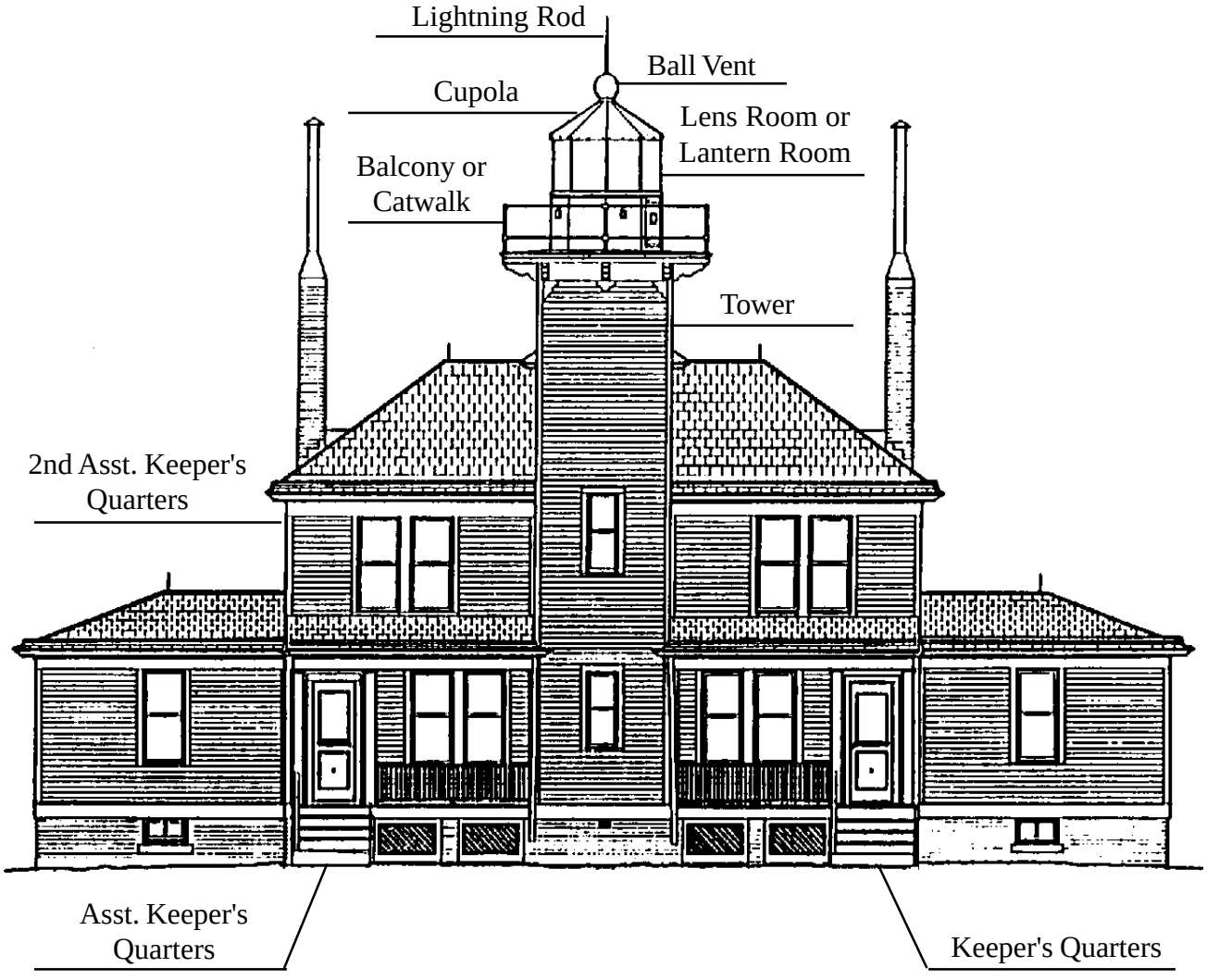
(Vocabulary words in bold print will be used for the activity that identifies the parts of a lighthouse and Fresnel lens.)

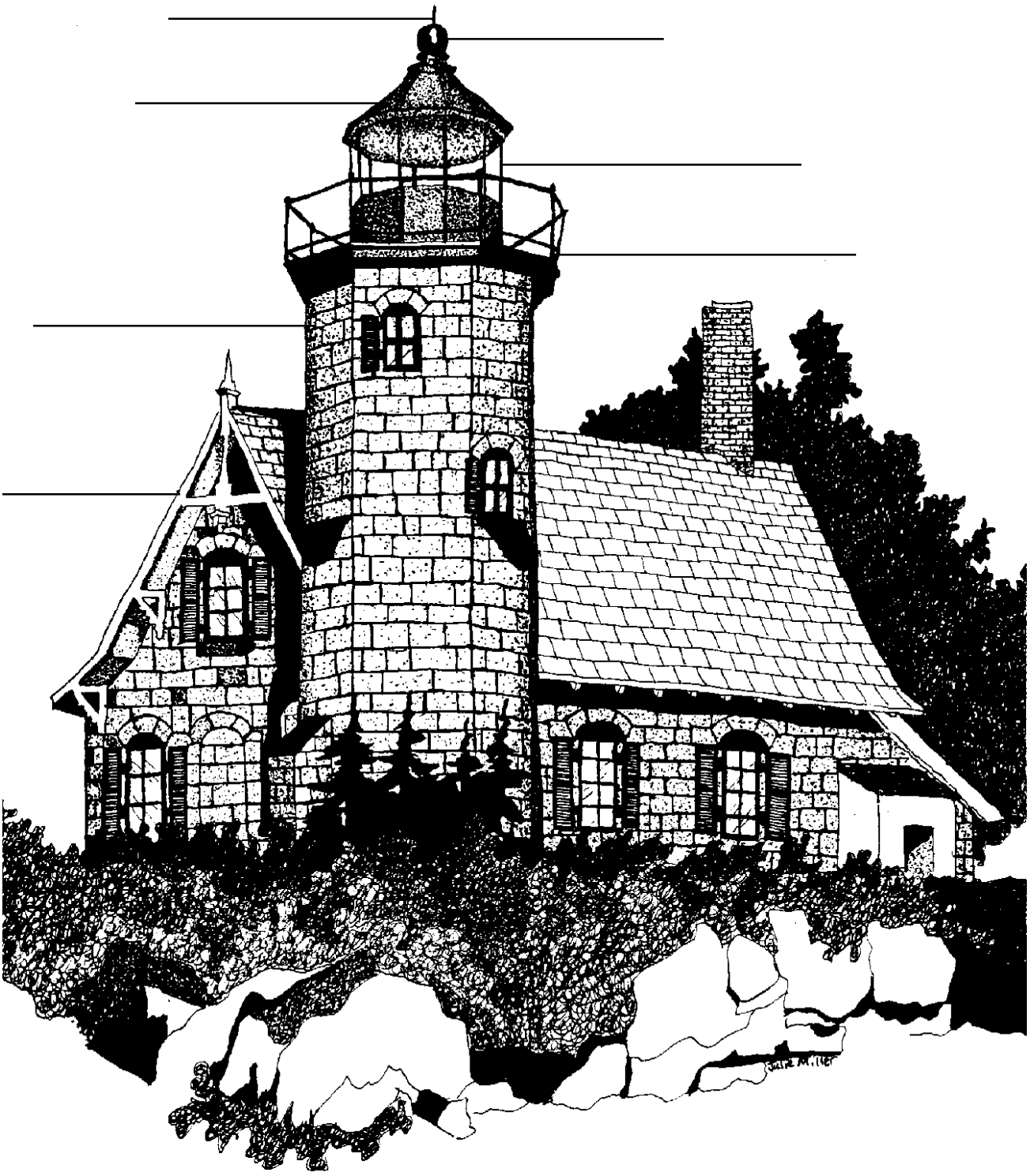
ARGAND LAMP	A hollow wick oil lamp (see wick).
ASSISTANT KEEPER	Assists the head keeper in the operation of the lighthouse.
ASTRAGAL	Metal bar (running vertically or diagonally) dividing the lantern room glass into sections.
BALL VENT	A vent on top of the dome to control air flow.
BRASS VENT	A vent in the lens room for controlling air flow to the wick of the lamp.
BULL'S-EYE	A convex lens used to concentrate (refract) light.
CATWALK/ BALCONY	On a lighthouse tower, a platform or walkway located outside the watch room and/or the lantern room.
CHARACTERISTIC	Individual flashing pattern of each light.
DAYMARK	Unique color scheme or design which identifies a specific lighthouse during daylight hours.
DISPERSE	Spread out.
DOME or CUPOLA	Rounded roof on top of some lighthouse towers.
FIXED LIGHT	A steady non-flashing beam.
FOCAL PLANE	A plane where rays of light appear to spread after refraction and reflection in a lens.
FOG SIGNAL	A device (such as a whistle, bell, cannon, horn, siren, etc.) which provides a specific loud noise as an aid to navigation in dense fog.
FOG SIGNAL BUILDING	Building that houses the fog equipment.
FRESNEL LENS	A type of optic consisting of a convex lens and many prisms of glass

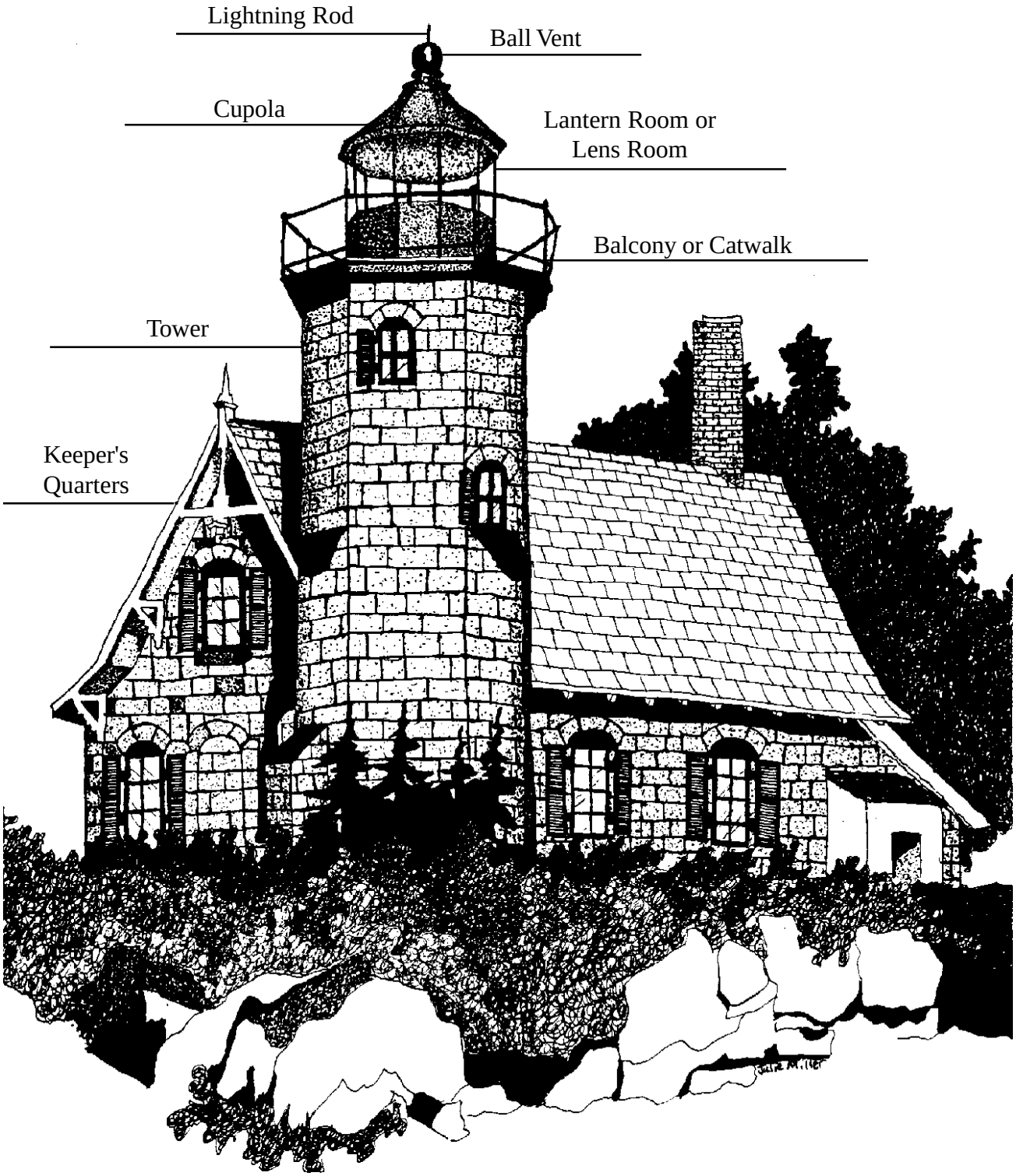
	which focus and intensify the light through reflection and refraction.
FUEL	A material that is burned to produce light (fuels used for lighthouses included wood, lard, whale oil, tallow, kerosene). Today, besides electricity and acetylene gas, solar power is also used.
HEAD KEEPER	Person who takes care of the light in the lighthouse and is responsible for the operation of a light station.
KEEPER'S QUARTERS	Place where the keepers live.
LAMP	The lighting apparatus inside a lens.
LANTERN ROOM	Glassed-in housing at the top of a lighthouse tower, containing the lamp and lens.
LENS	A curved piece of glass for bringing together or spreading rays of light passing through it.
LIGHTNING ROD	A grounded, metal rod placed on a high structure to prevent damage by conducting lightning to the ground.
LIGHTHOUSE	A lighted beacon of major importance in navigation.
LIGHT STATION	A complex containing the lighthouse tower and all of the outbuildings, i.e. the keeper's living quarters, fuel house, boat house, fog-signal building, etc.
LOG	A book for maintaining records, similar to a diary.
NAVIGATION	The charting of a course for a ship or aircraft.
ORDER	Size of the Fresnel lens which determines the brightness and distance the light will travel. The size or order of the lens ranges from 1 to 6, with 1 being the largest and 6 being the smallest. Example: There is a 3 1/2 order Fresnel lens at the Michigan Island lighthouse.
PHAROLOGIST	One who studies lighthouses.
PRISM	A transparent piece of glass with at least three similar faces paralleling a single axis that refracts or disperses light. A Fresnel lens is made up of many prisms.

REFLECT	Bend or throw back light.
REFRACT	To deflect (or bend) light from a straight path.
REVOLVING LIGHT/ ROTATING LENS	One which produces a flash or characteristic.
SPIDER LAMP	Shallow brass pan containing oil and several wicks.
TOWER	Structure supporting the lantern room of the lighthouse.
WATCH ROOM or SERVICE ROOM	A room immediately below the lantern room where fuel and other supplies were kept. This is where the keeper prepared the lanterns for the night and often stood watch. The clock-works (for rotating lenses) were also located there.
WICK SOLID	A solid cord, used in spider lamps, that draws fuel up to the flame.
"WICKIE"	A nickname given to lighthouse keepers derived from the task of trimming the wick of the lamps.




Lightning Rod
Ball Vent
Cupola
Lens Room or
Lantern Room
Balcony or
Catwalk
Tower
2nd Asst. Keeper's
Quarters
Asst. Keeper's
Quarters
Keeper's Quarters

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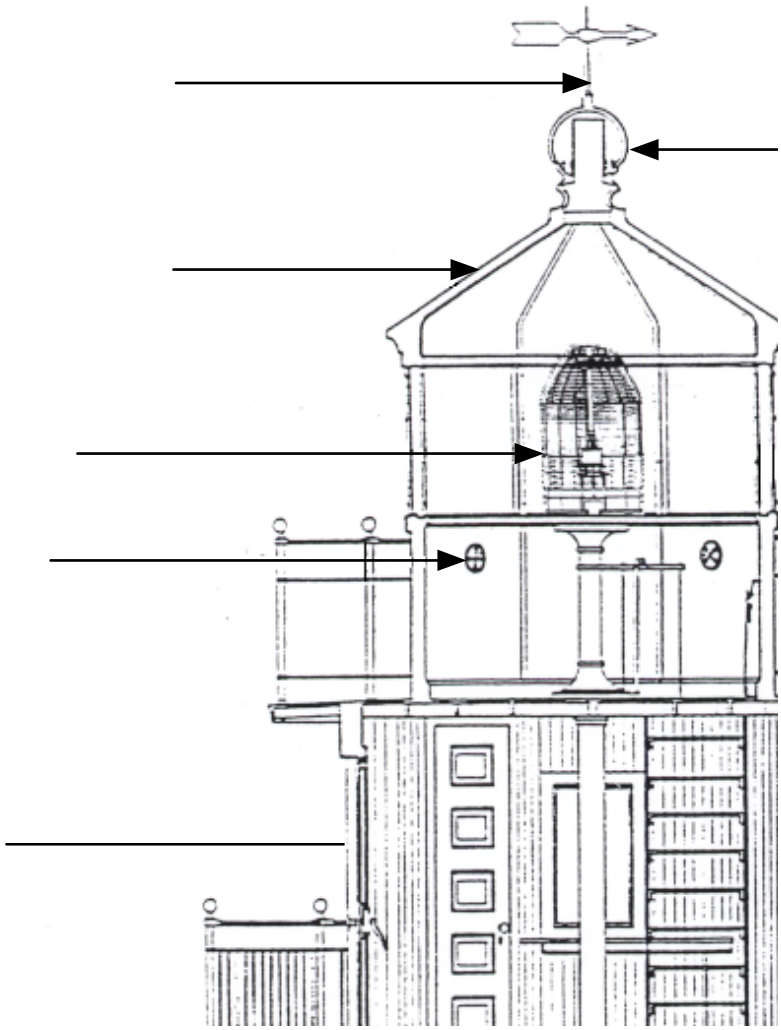
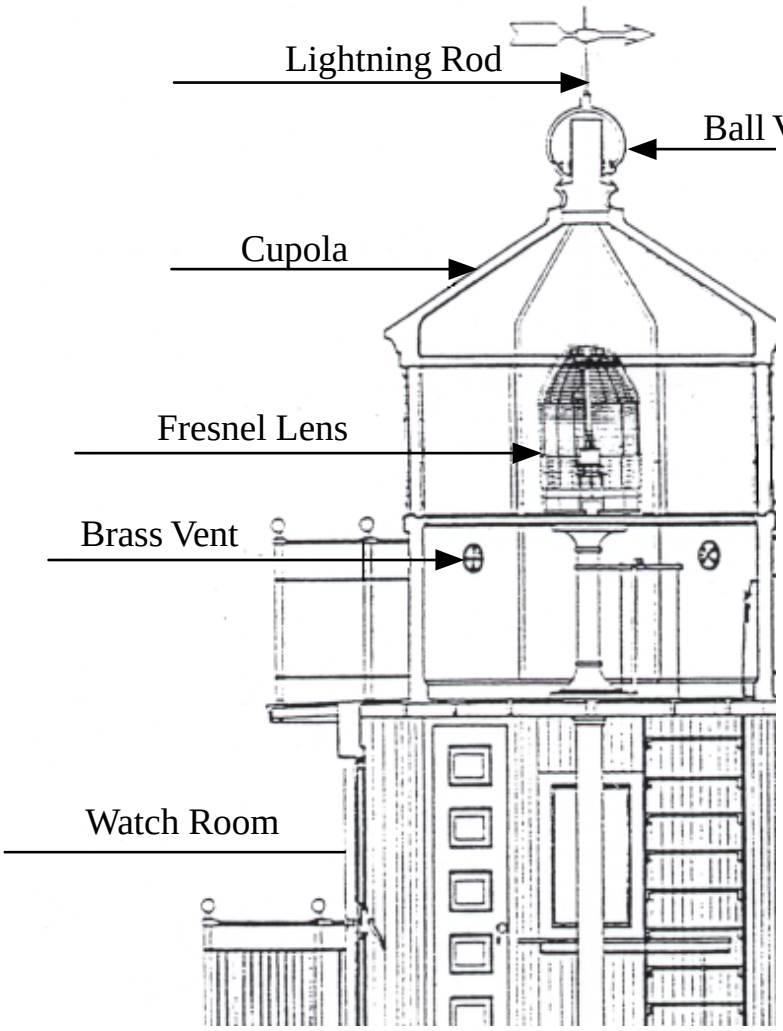
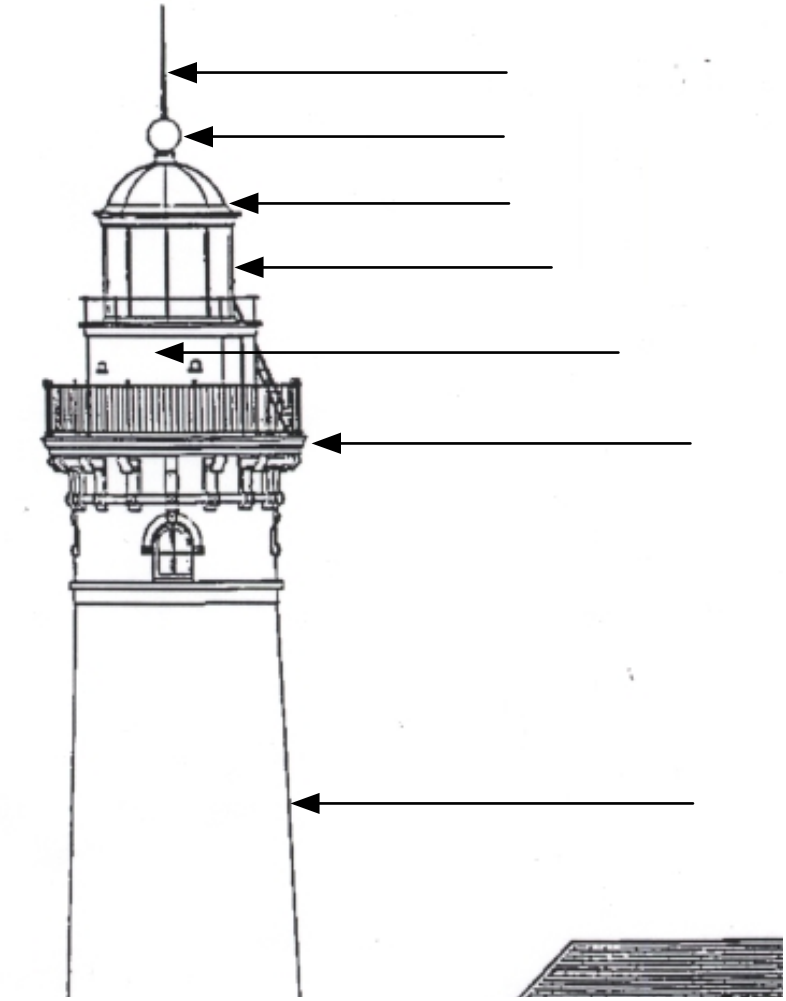
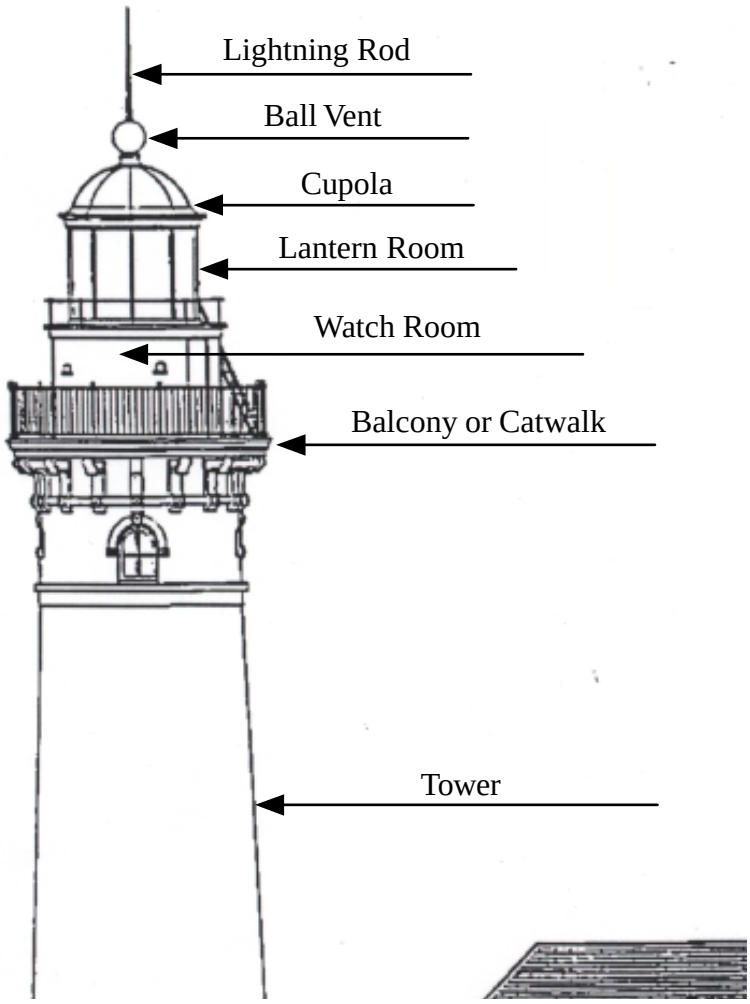
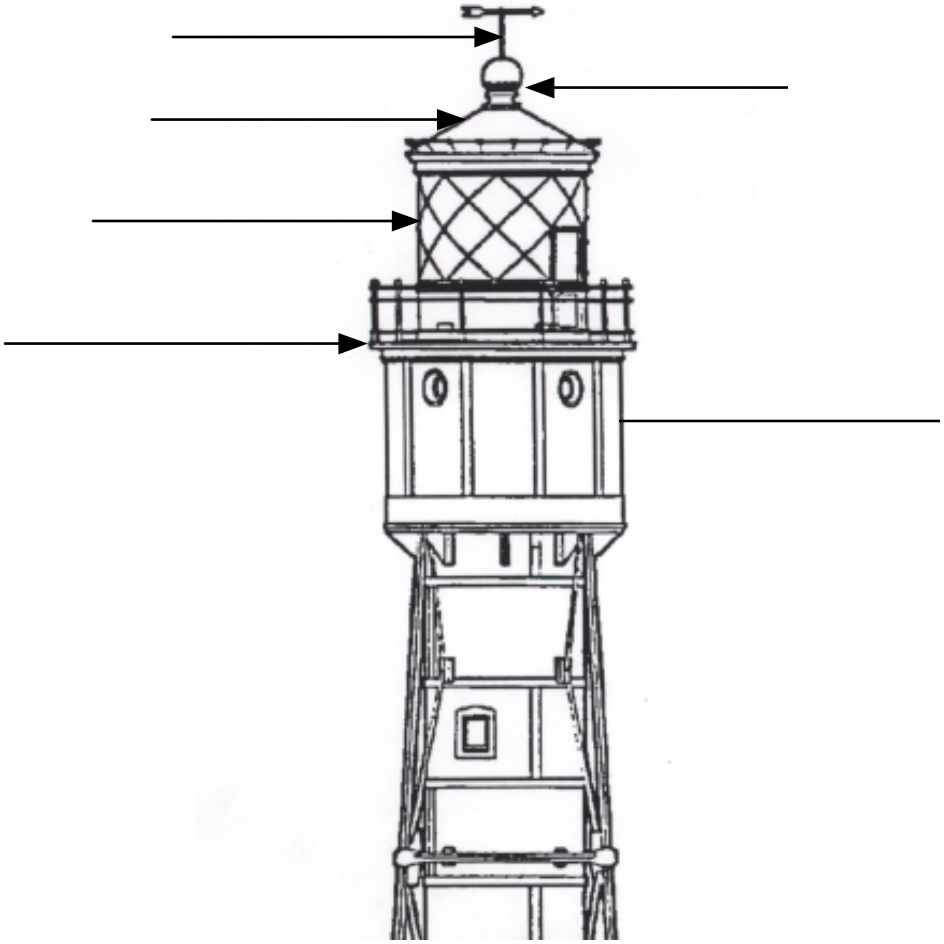


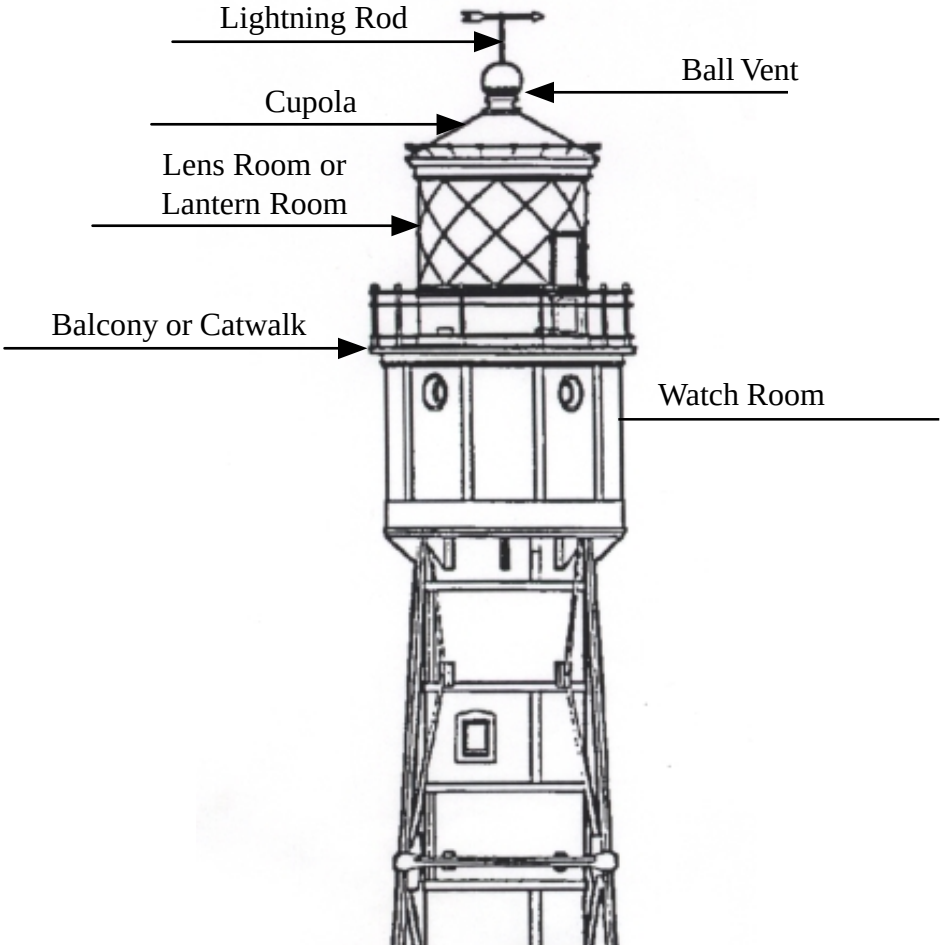

Lightning Rod
Ball Vent
Cupola
Fresnel Lens
Brass Vent
Watch Room
Lantern Room
Balcony or Catwalk
Balcony or Catwalk
Tower





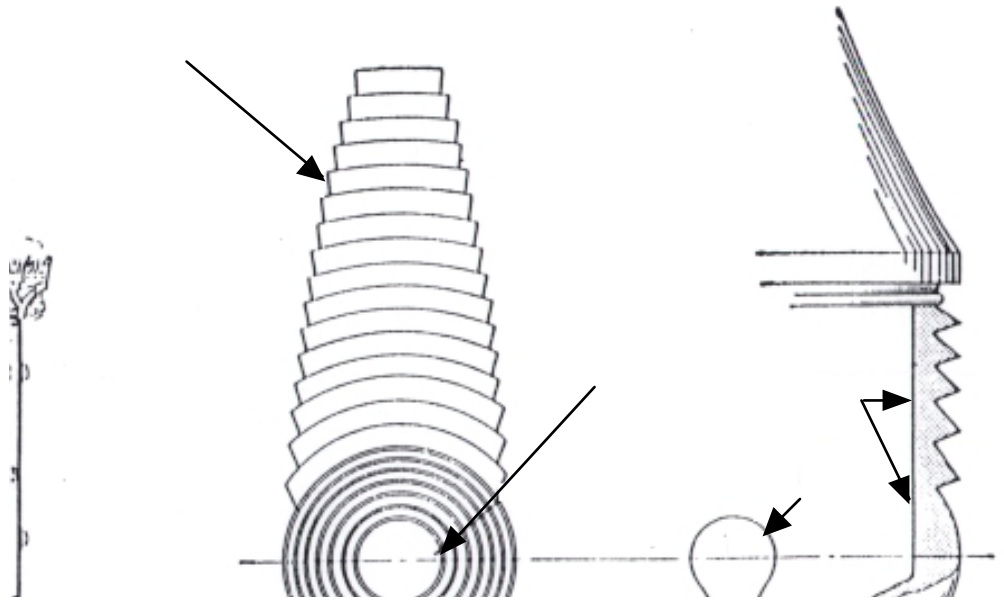
Keeper's Quarters




Lightning Rod
Ball Vent
Cupola
Lens Room or
Lantern Room
Balcony or Catwalk
Watch Room

Tower

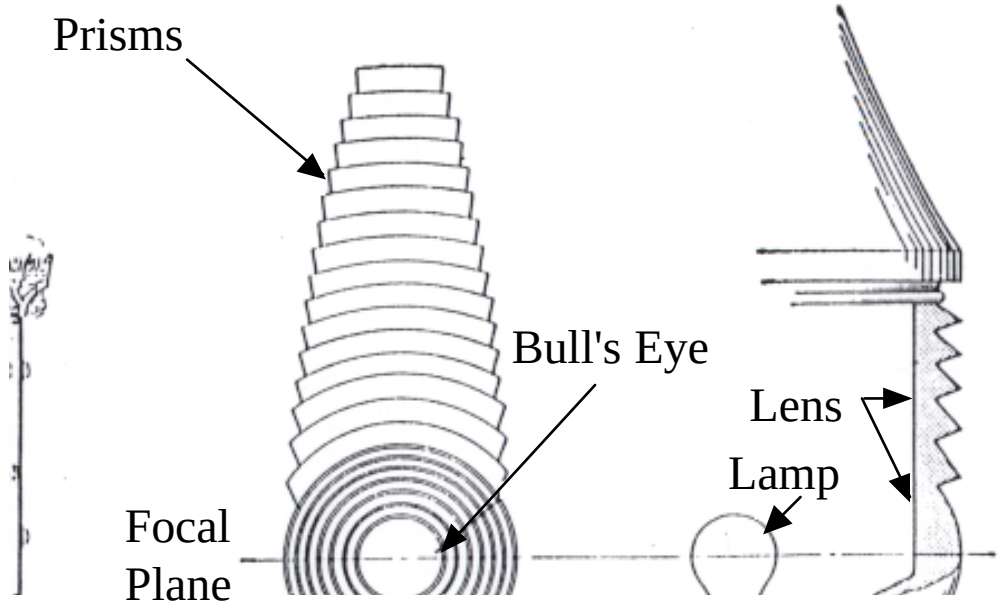
Fresnel Lighthouse Lenses



Flash Panel with Bull's Eye

Non-Flashing "Beehive" Lens

Fresnel Lighthouse Lenses



Prisms

Flash Panel with Bull's Eye

Non-Flashing "Beehive" Lens

Purpose of Lighthouses
Lesson Plan

Lesson Title II: A Trip to Remember

Purpose of lighthouses (Part 1 - Trip Activity) or (Part 2 - Research Project)

Lesson Summary:

Part 1 - Tour of the Raspberry Island Light Station grounds at Apostle Islands National Lakeshore. The tour will give students a basic understanding of the buildings and grounds and the signal "characteristics" that make Raspberry Island Light Station unique. This tour includes the history of the light station and the role of the National Park Service.

Part 2 - If you live in an area with a lighthouse contact the proper authorities to schedule a tour. If that is not an option, have the students research a lighthouse of their choice using the internet, library books, videos, the National Park Service, or other sources. (See Address List)

Learning Objectives:

Part 1 - Students will be able to:
- tell why Raspberry Island was chosen as the site for a light station.
- name 3 activities which the lighthouse keepers did to care for the lighthouse and grounds on Raspberry Island.
- identify the light station buildings at Raspberry Island.

Part 2 - Students will be able to:
- tell why a lighthouse was built in any certain location.
- name 3 activities which the lighthouse keepers did to care for the lighthouse and grounds.
- identify buildings and their uses at a light station or lighthouse.

Wisconsin Curriculum Standards Integration Reference:

English Language Arts Standard:
- B. Writing: B.4.3/ B.8.3
- C. Oral Language: C.4.2/ C.8.2
- D. Language: D.4.1/ D.8.1

Science Standard:
- B. Nature of Science: B.4.1, B.4.2, B.4.3/ B.8.1, B.8.2, B.8.3, B.8.4, B.8.5, B.8.6
- H. Science Applications: H.4.1, H.4.2/ H.8.3

Social Studies Standard:
- A. Geography: People, Places, and Environments: A.4.1, A.4.2, A.4.8/ A.8.1, A.8.8
- B. History-Time, Continuity, and Change: B.4.1, B.4.8/ B.8.1, B.8.8
- D. Economics: Production, Distribution, Exchange, and Consumption: D.4.7/ D.8.7

Recommended Duration:

45 minutes to 90 minutes (Raspberry Island tour takes 45 minutes)

Discussion Questions:

Part 1
1) Why was Raspberry Island chosen for a light station?
2) What do you see from the front yard at the Raspberry Island Light?
3) How did sailors differentiate the Raspberry Island light and fog signal from all the others in the Apostle Islands?
4) What did lighthouse keepers and their families do to maintain the grounds and buildings?
5) What does the National Park Service do today to preserve the lighthouse grounds and buildings? What can you do to help preserve the grounds and buildings?

Part 2
1) Why is the lighthouse or light station you are studying built where it was?
2) Picture yourself as a lighthouse keeper or child of a light keeper. What do you see? What duties and chores would you have to perform to maintain the lighthouse?

Resources, Materials, and Appendix Items:

- A lighthouse or light station to tour.
- Research materials
- Various books on lighthouses
- National Park Service

Activities and Procedures:

Part 1
The National Park Service will provide a tour of the buildings and grounds. This lesson will focus on the grounds (see grounds outline). It will include the new light, fog signal building, boathouse/ dock, garden plots, pit toilets, wood shed, barn, and a little about the lighthouse itself. At the end of the tour students will have some time to play croquet (directions insert).

Part 2
Research project on lighthouse of your choice

Other Suggested Activities:

Part 1
Read short stories or poems. Examples . . .

<u>We the Keeper's Kids</u>
By: Fran Carpenter Platski (She was a child on Raspberry Island Light and Outer Island Light.)

Lighthouse Families
By: Cheryl Shelton-Roberts & Bruce Roberts (This has a story on Outer Island Light, p. 175 - 189)

Apostle Islands Bingo

Part 2
Lighthouse Activities Book by Elinor De Wire

Evaluation and Assessment Procedures:

Part 1
Have the discussion questions printed as an assignment sheet.
Draw a map of the Raspberry Island Light station.
Draw one of the buildings at the Raspberry Island Light Station.
Gather information the students will need to use in building a model of the Raspberry Island Light Station.
Entry in Work Book Log

Work Book Log :
Date:
Temperature and Weather:
Duties and Activities:
Reflection and Observations:

Part 2
Oral presentation of student research project

Internet Website List:

www.nps.gov
http://www.cr.nps.gov/history/maritime/maripark.html
http://www.nps.gov/crweb1/history/maritime/lightinf.html
http://www.nps.gov/crweb1/history/maritime/nhllight.html
http://www.nps.gov/crweb1/history/maritime/ltread.htm
http://www.cr.nps.gov/history/maritime/ltinv.html

utline for a tour of the Raspberry Island Light Station Grounds

Theme: **Maintaining critical aids to navigation was a complex job requiring many skills and duties.**

I. Introduction *(start on lawn in front of the lighthouse)*

Welcome to Raspberry Island Light Station. Take a look around you. What do you see? (answer) A beautiful complex of buildings all alone on an island in Lake Superior.

Imagine that you were stationed here. What sorts of duties or chores would you have to attend to? What would you do for fun?

As we walk around the light station today we will identify the various buildings and features, describe their functions, and discuss some of the duties required of the lighthouse keepers and their families to maintain the station.

II. Why Here? *(near the flagpole)*

A. It took a lot of time, effort and money to build, operate, and maintain this station. Why was it built here?

1. Opening of the Soo Locks in 1855 connected Lake Superior to the lower lakes.
2. The lake became a nationally important "highway" for transporting resources, people, and cargo.
3. As communities grew along the south shore, many ships began sailing through the Apostles.

B. Point out the channel between Raspberry and the mainland.

1. Boats sailing between Chequamegon Bay and the head of the lake used the west channel through the Apostles.
2. The west channel follows the route you took from Bayfield and continues to the west between Raspberry and York islands.
3. Raspberry Island light illuminates the west channel.

III. The Light *(assemble at the light pole)*

A. From 1863 until 1952 the Raspberry Island Light shone from the lighthouse tower. Now this automated beacon is the Raspberry Island Light.

1. The original fifth order Fresnel Lens is now in the Madeline Island museum.

B. How can sailors tell this light apart from the other Apostle Islands lights? (What is its signature?)

1. Rate of flash (every 2.5 seconds)
2. Color (white...red and green are used at other Apostle lights)

C. What if it was foggy and sailors could not see the light?

IV. The Fog Signal *(turn to look at fog signal building)*

A. The fog signal building was finished in 1903.

1. Originally it housed a 10 inch steam whistle (like a locomotive whistle)
2. In 1933, the whistle was converted to a diaphone (fog horn). Engines and air compressors replaced the boilers, a dormer was added to house the horns.

B. How could sailors identify this fog signal?

1. Frequency and duration of sound (imitate fog horn "ooooo gaa").

C. How did all the bricks and machinery for the fog signal get here?

V. Dock, Boathouse, and Tramway *(assemble near top of the stairs)*

A. Boat originally kept at sandspit (supplies carried to lighthouse on trail)

B. Dock and boathouse built in this location in 1877/78.

1. Imagine hauling supplies and equipment up and down the stairs.

C. Tramway added in 1902 to aid in construction of the fog signal.

D. Most supplies were shipped to the island. What resources were already here?

VI. Garden and Outbuildings *(assemble near the vegetable garden)*

A. Raspberry keepers took pride in their gardens.

1. Flower gardens to beautify the grounds.
2. Vegetable garden for fresh herbs and produce.
3. The present gardens were reestablished by the National Park Service in 1982 based on interviews and historical photographs. Varieties growing today are similar to those grown in the 1920s garden.
4. Also cherry tree (and sand cherries at the sand spit)

B. Animals housed in the barn (now the ranger residence)

C. Island forest an important resource.

1. Some trees (east & west) needed to be cleared to improve visibility of light.
2. Trees also cut for fire wood to cook and heat the house.
3. Wood shed is directly behind the lighthouse.

D. What are the small buildings to either side of the wood shed?

VII. Outhouses and Swing *(assemble behind the lighthouse)*

A. One of the outhouses was for the head keeper and one was for the assistants. Which was which? (head keeper had a sidewalk)

1. These outhouses no longer in operation.

B. What could light keepers and their families do for fun? (look for clues)

1. Swing
2. Picnic
3. Croquet (students can play at conclusion of grounds tour if time allows)

VIII. Conclusion *(return to the light pole)*

A. List some of the chores and duties required of the keepers to maintain the station.

1. Light the light, operate the fog signal, polish brass, trim the wick, wind the clock plant the garden, mow the lawn, cut and haul firewood, paint the buildings, clean the outhouses, repair the dock...

B. When this automatic light was installed, no one was here to do that any more.

C. Who cares for the station today?

1. The light is automatic and there is no fog signal, but since 1970 the National Park Service has performed many of the same tasks the lighthouse keepers once did to care for the buildings and grounds. It is still a complex job requiring many skills and duties.

Purpose of Lighthouses
Lesson Plan

Lesson Title III: "Caution: Construction Zone"

Purpose of Lighthouses (Posttrip Activity)

Lesson Summary:

Students will apply their basic understanding of the terms, operations, and technology of lighthouses.

Learning Objectives:

Students construct a model of a lighthouse and orally present what they've learned in the pretrip and trip activities.

Wisconsin Curriculum Standards Integration Reference:

English Language Arts Standard:

- A. Reading/Literature: A.4.1, A.4.2, A.4.3, A.4.4/ A.8.1, A.8.2, A.8.3, A.8.4
- C. Oral Language: C.4.1, C.4.2, C.4.3/ C.8.1, C.8.2, C.8.3
- D. Language: D.4.1, D.4.2/ D.8.1, D.8.2
- E. Media and Technology: E.4.1, E.4.2, E.4.3, E.4.4, E.4.5/ E.8.1, E.8.2, E.8.3, E.8.4, E.8.5
- F. Research and Inquiry: F.4.1/ F.8.2

Math Standard:

- C. Geometry: C.4.1, C.4.2, C.4.3, C.4.4/ C.8.1, C.8.2, C.8.3, C.8.4, C.8.5
- D. Measurement: D.4.1, D.4.2, D.4.3, D.4.4, D.4.5/ D.8.1, D.8.2, D.8.3, D.8.4

Recommended Duration:

Several hours (Construction time may vary).

Discussion Questions:

1) What style of lighthouse did you use when making your model?
(square, octagonal, conical, cylindrical, skeletal)
2) Does your lighthouse have day markers? Why or why not?
3) Describe how the sections and rooms of your lighthouse are used.
4) Does your lighthouse include a foghorn? Why or why not?
5) What questions do you still have about lighthouses?

Resources, Materials, and Appendix items:

- Lighthouse diagrams from the "pre-trip" activity.
- Vocabulary sheet from "pre-trip" activity (page A14).

- Books and photos of a variety of lighthouses.
- Glue, tape, paper clips, or any securing material.
- Recyclable materials such as: glass jars, bottles, aluminum pie plates, foil, paper towel and toilet - paper rolls, shoe boxes, newspaper, magazines, paper bags, rubber bands, paper clips, plastic milk containers, potato chip canisters, oatmeal boxes, paper mache, etc.
- History of Lighthouses (page A4)

Activities and Procedures:

1) This activity may be done in teams of students or individually. Ask students to construct a model of a lighthouse or light station. Use recyclable materials to construct the model.

2) Ask students to orally present to class (or another class) explaining the importance of their lighthouse and describe how the different parts of the lighthouse are used. They should answer any questions that others may have about the parts or importance of their lighthouse.

Other Suggested Activities:

- Students write a creative story about a trip on the water. Story needs to include their interaction with a lighthouse. They should use at least ten vocabulary words from the pretrip vocabulary sheet.

Evaluation and Assessment Procedures:

The completed lighthouse model.
The oral presentation.
Enter reflections and observations in the Work Book Log.

Work Book Log :
- Date:
- Temperature and Weather:
- Duties and Activities:
- Reflection and Observations: