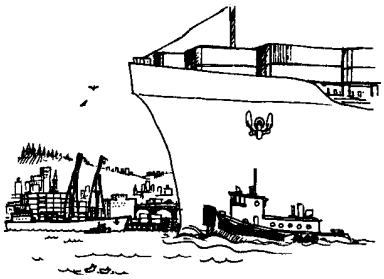
Waterborne

Key Concepts

1. Humans use estuaries for coastal ports.
2. Transportation provides many human occupations.
3. Ships float differently in different kinds of water (eg. fresh, salt, warm, cold).



Background

The use of waterways for travel has always rivaled that of their use in supplying food. From dugout canoes to super tankers, water travel continues to provide an effective means of transportation. Many estuaries are used as coastal ports where cargo is transferred to land or river-going transportation. "Lord Plimsoll's mark," which helps shippers adjust their cargo loads for variations in buoyancy, is introduced.

Materials

For the class:

- copies of student reading, "Waterborne"

Teaching Hints

"Waterborne" is a reading introducing the concept of buoyancy (without providing the concept a name) and "Lord Plimsoll's mark" which will appear again in future activities. This reading may be accomplished by individual students or small working groups.

If you are located near a port, consider contacting the port authority for information regarding tours. Otherwise, you may wish to supplement the activity with audiovisual aids related to ports and transportation.

Key Words

bow - front part of a ship or boat

cargo - the load on a ship; freight

container - a crate the size and shape of a moving van that can be placed directly onto a truck or railroad car

harbor - a protected inlet used as an anchorage for boats, or ships

load line - line painted on a ship that shows how low in the water the ship may safely ride

Lord Plimsoll - Englishman who developed Plimsoll Mark, which was adopted in 1876

mast - a long pole or spar rising from the keel or deck of a ship

port - a harbor

stern - back of a ship

tanker - a ship that carries liquids

vessel - ship or boat larger than a rowboat

wharf - a structure built at a shore for ships to lie alongside; pier; dock

Extensions

1. Arrange for a class tour of a nearby port.
2. Have students select an item that has been carried on a ship and make a web chart of the occupations of the people that might have helped to get the product to them.
3. If available, clip and analyze daily lists of ships in port (found in the daily newspaper of a port city). These lists often include the name of the ship, information on its cargo, flag country, destination and departure date. Construct a chart of shipping activity. Locate the ships' flag country on a map or globe.
4. Have students create a word search using new terms from the reading.

Answer Key

1. Lots of things sold near you were probably carried on a ship. Ships are particularly well designed for transporting large, relatively low value cargo over long distance. For example, ship cargo's range from imported cars, electronic equipment, bananas, and coffee to coconuts.

2. Jobs might include: longshoreman (longshoreperson?), harbor pilot, ship captain, ship crew, crane operator, fork lift operator, truck driver, carpenter, environmental planner, etc.

3. Problems listed could include: pollution of many types and loss of habitat because of traffic, construction, landfill, dredging, etc.

4. Overloaded ships ran a much greater risk of swamping and sinking in poor weather than properly loaded ships. Swamping and sinking are obviously dangerous to sailors.

5. Modern ships have a Plimsoll mark for the same reasons that older, sailing vessels had them: to protect the crew and vessel from overloading.

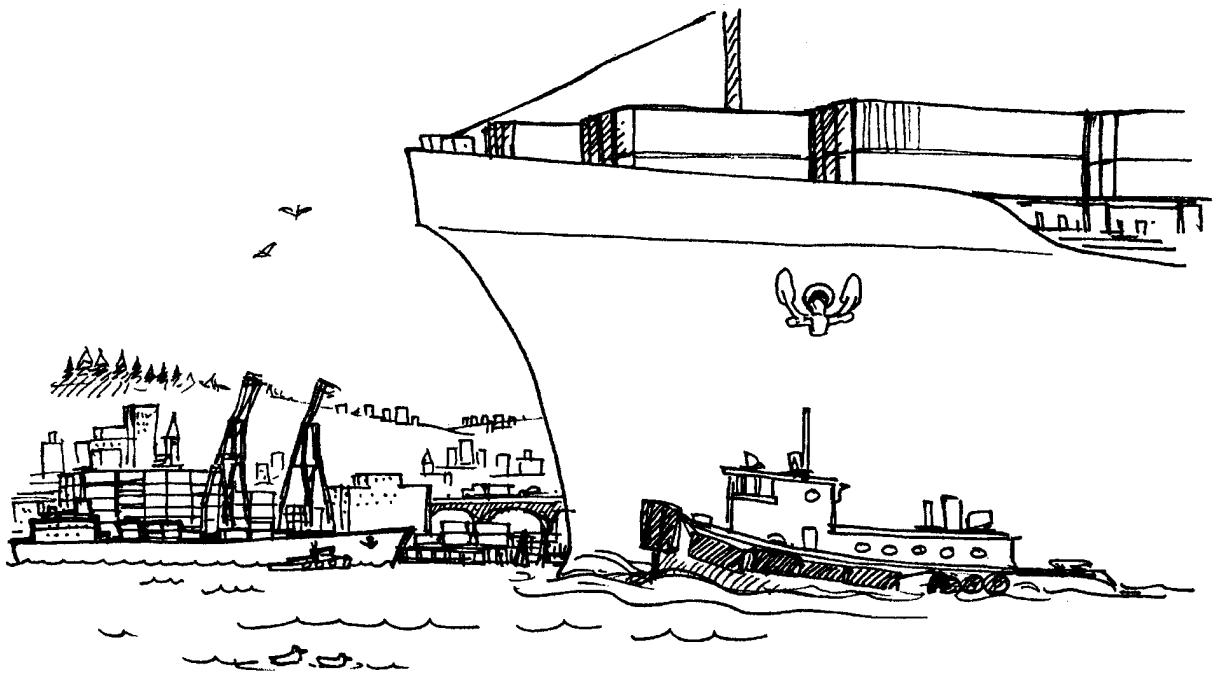
6. Since the Bahamas Star is in freshwater, the boat will sink to the "F" mark when fully loaded with peanuts. This question assumes that your students know that New Orleans is not in the tropics.

7. The owners of the Indianolan can add cargo. Adding cargo will cause the boat to ride lower in the water. Riding lower in the water means the waterline is higher up the Plimsoll mark.

8. Since ships float differently in different kinds of water, different lines are needed to designate a full cargo.

9. A vessel which never left tropic ocean ports might not need a Plimsoll mark. Since many tropical ports are at the mouths of large, freshwater rivers, a vessel-maker would be foolish not to engrave a Plimsoll mark.

Waterborne



Many estuaries have become busy coastal ports. Ships come from all over the world to load and unload their cargo. Products we use every day come to us by ship. Cargo ships carry solid things like lumber, fruit, machinery, and shoes. Many new cargo ships carry containers. The containers are the size and shape of moving vans. Containers can hold just about any solid objects. Tanker ships carry liquids or powders. Special ships called passenger liners or cruise ships carry people across the ocean.

1. What are two things sold where you live that were probably carried on a ship?

   a.

   b.

2. A port provides many jobs. List 4 jobs that are related to the port.

   a.

   b.

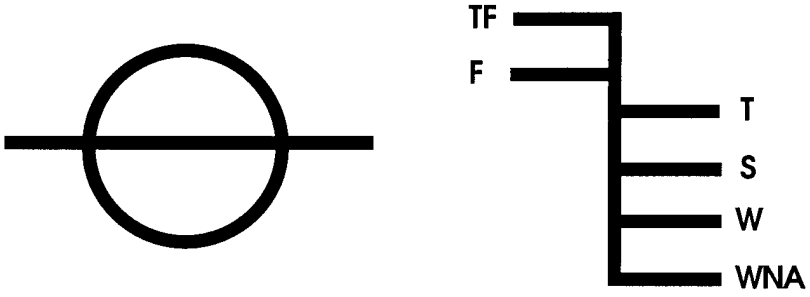
   c.

   d.

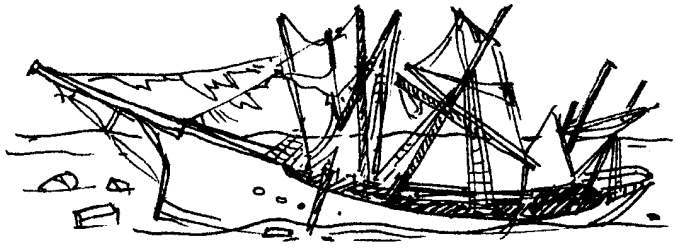
3. Sometimes estuaries are used as ports. What are some problems that a port might cause for the estuary environment?

You can learn a lot about a ship by just looking. You can tell which country the ship is from. All ships in port "wear" their country's flag on the stern. The stern is the "back" of the ship. The flag of the country the ship is visiting flies from the mast. The ship's name is painted on the bow, or "front", of the ship. The home port is painted on the stern. You can also tell what company owns the ship. Ships from the same company have their smokestacks, or funnels, painted the same way.

If you look closely, you can also see a mark which is painted on the side of every large ship. It is called "Lord Plimsoll's" mark. It looks like this:



There is an interesting story behind this mark. Samuel Plimsoll was born in Bristol, England in 1824. Plimsoll bought and sold coal. The coal was shipped in sailing vessels. Plimsoll saw many ships sailing with heavy loads. The ship owners were heavily insuring their vessels against loss. Then the ship owners were overloading the vessels. Many vessels sank in storms. Because of the insurance, the ship owner might not lose any money. The danger to the sailors on the ships, however, was very great.



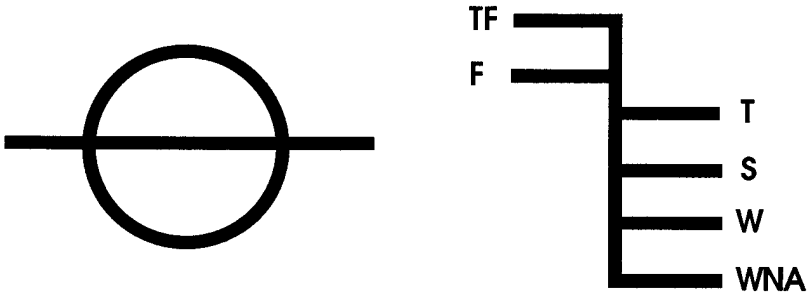
4. Why was it dangerous to sailors to sail on overloaded ships?

Plimsoll decided to do something. He wanted to make the people aware. First, he wrote a book called *Our Seamen*. His book succeeded in making the government act. The "Merchant Shipping Act" law was adopted in 1876. The law fixed the limits to which a vessel may be loaded. The load line shows how low in the water the ship may ride. The line still appears on the side of all large ships. It is called the Plimsoll line or "Lord Plimsoll's mark".

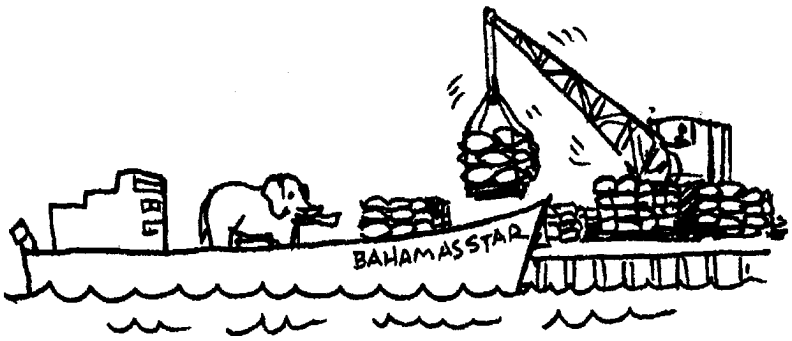
The Plimsoll mark helps ensure the safety of the vessel and crew. Today, shipbuilders determine the load line. Workers engrave the mark on the side of the ship. The Plimsoll mark measures a vessel's safe loading. The mark is good in any water and in any season.

5. Why do modern ships have Plimsoll marks?

Let's look at a Plimsoll mark and see what we can learn.



Notice there are two marks to the left of the vertical line. These are the depths to which the vessel may be loaded in freshwater. The "TF" shows the depth in tropical freshwater. The "F" shows the depth in other freshwater.



6. The Bahamas Star is taking on a cargo of peanuts at New Orleans. New Orleans is on the freshwater Mississippi River. The ship moves lower in the water as the peanuts are loaded. Which Plimsoll mark letter will be at the water's surface when it is fully loaded?

The right side of the line is the saltwater side. The vessel may be loaded to "T" in the tropics. The remaining letters are for other waters. The vessel may be loaded to "S" in the summertime. It may be loaded to "W" in the wintertime. The "WNA" is a special mark. It is for ships sailing in the North Atlantic in the wintertime. These ships can only be loaded to "WNA".

7. Longshoreman Laura is enjoying a summertime walk on the dock. She notices that the Indianolan is loaded to the "WNA" level. She knows that the allowable level mark is "S". Which should she tell the owners, to remove cargo or to add more? Why?

Why so many marks? Perhaps you have guessed by now. Ships float differently in different kinds of water. Let's look at a vessel loaded in freshwater to the mark "F". When it enters the ocean, it will float at the line marked "S". Why does this information matter to anyone? Well, we've seen that at one time ships were overloaded. This information protects the crews. It is also important to the ship owner. The same ship can safely carry more cargo in the summer than in the winter.

8. Why is more than one line on the Plimsoll mark?

9. When might a vessel not need a Plimsoll mark?