



Smithsonian

Navigating at Sea



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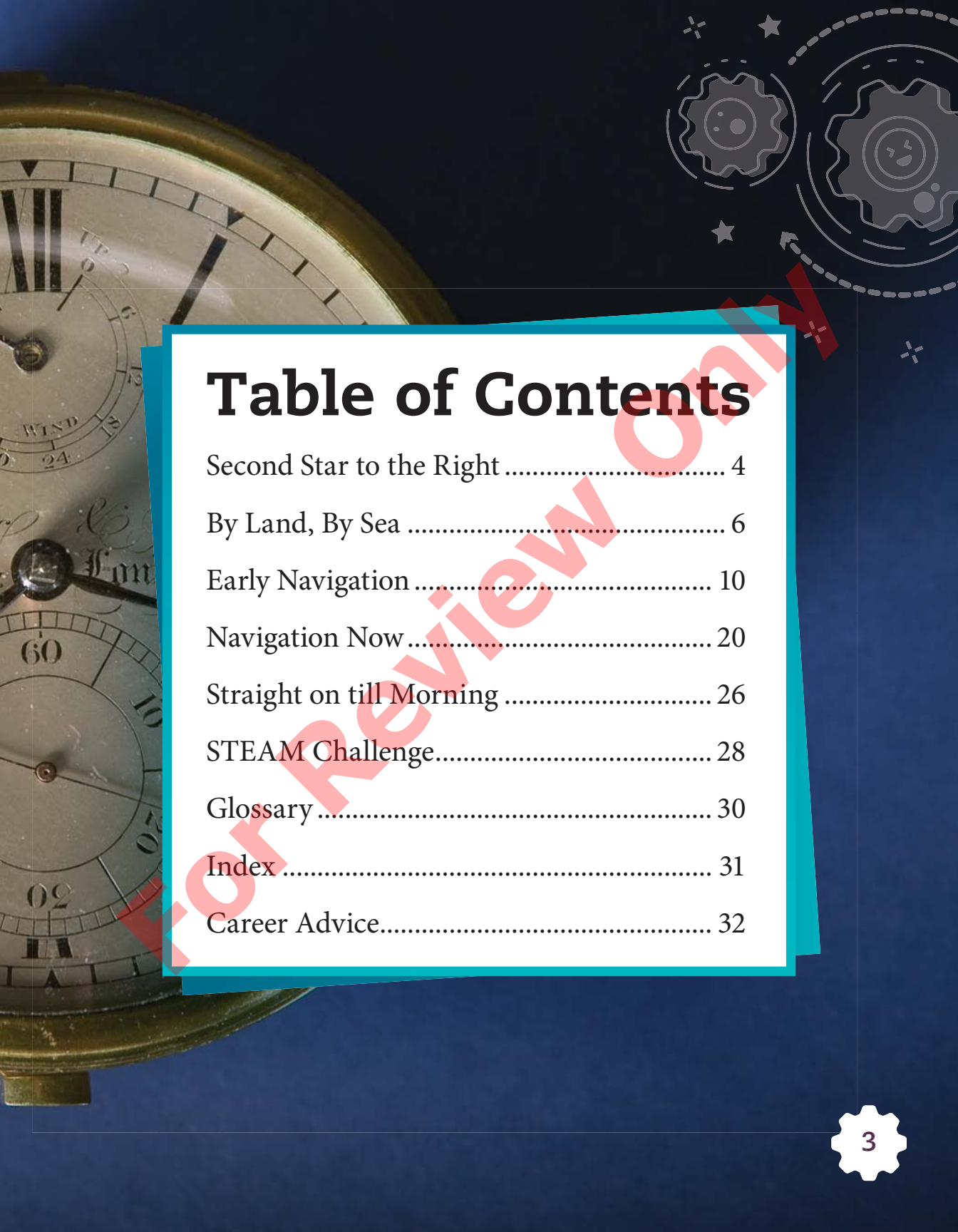


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Second Star to the Right

Peter Pan follows the stars to Neverland. “Second star to the right and straight on till morning!” he cries as he **navigates** the sky. He leads his group toward a grand adventure. The stars tell him just where to find it.

Neverland is not real, of course. But following the stars is. It was one of the first ways people learned to navigate. They followed the stars both on sea and on land. They used stars to position themselves. Then, they could figure out where they needed to go.

Instruments have changed over time. Better and better technology is used. It is more precise than it has ever been. But the roots of navigation remain. In many ways, we still follow the stars.



A sailor uses the stars to find his position at sea.



By Land, By Sea

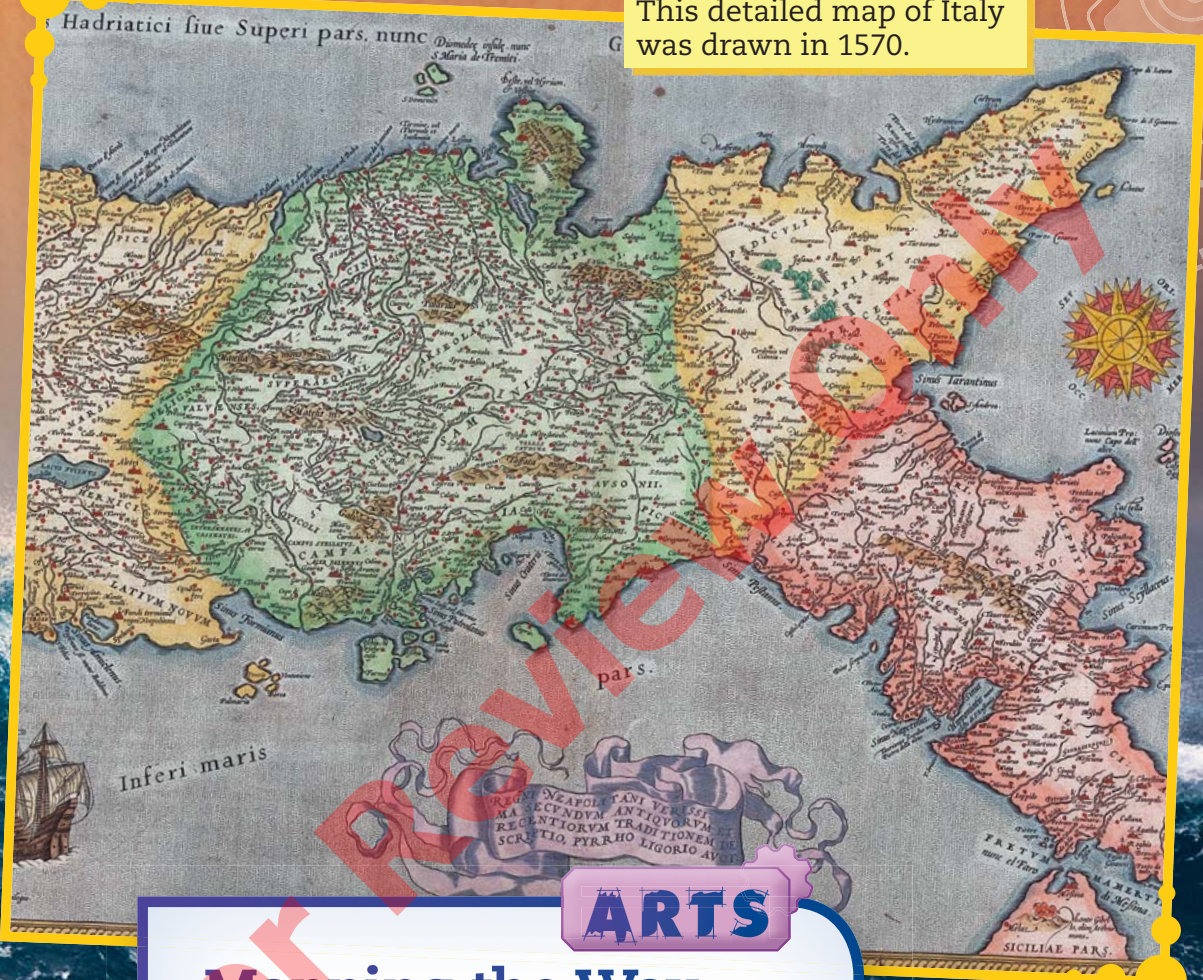
Since they first walked, people have been on the move. They travel to explore new areas. This has always been easiest by land. People can walk across land and rest when they need to. They can find food and water along the way. They can use landmarks as guideposts.

Traveling by sea is riskier than traveling by land. The sea is always changing. There are few landmarks that stay in one place on the water. It is not as easy to find resources out in the sea. The sea itself is full of dangers. People cannot just swim through the water and rest when needed.

This 1773 engraving shows villagers from Tahiti traveling by boat.



This detailed map of Italy was drawn in 1570.



ARTS

Mapping the Way

A common navigation tool is a map. For most of history, maps were drawn by hand. They were a true art form. Modern maps are usually made by computers. In this way, they are now more science than art.

Latitude and Longitude

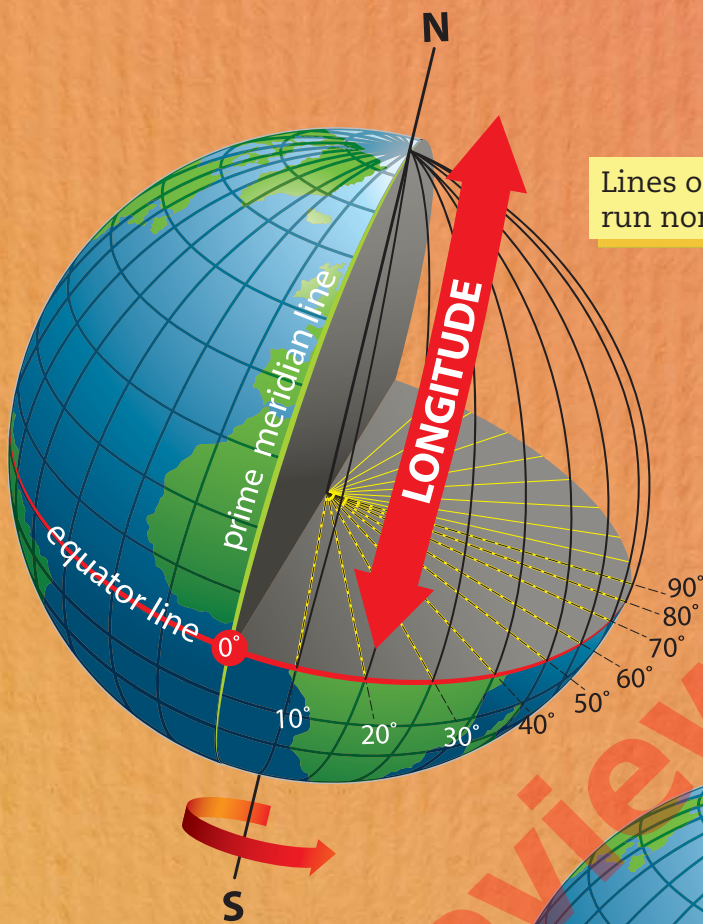
To pinpoint their location, people made an invisible grid around Earth. This grid is made of two sets of lines. Lines of latitude circle Earth from east to west. These lines are **parallel**. They never cross each other. The center line is the equator.

Lines of longitude run north and south. These lines are not parallel. They meet at the poles. These lines are also called *meridians*. The center line is the prime meridian. Both sets of lines are measured in **degrees**. With degree **coordinates**, any spot on Earth can be found.

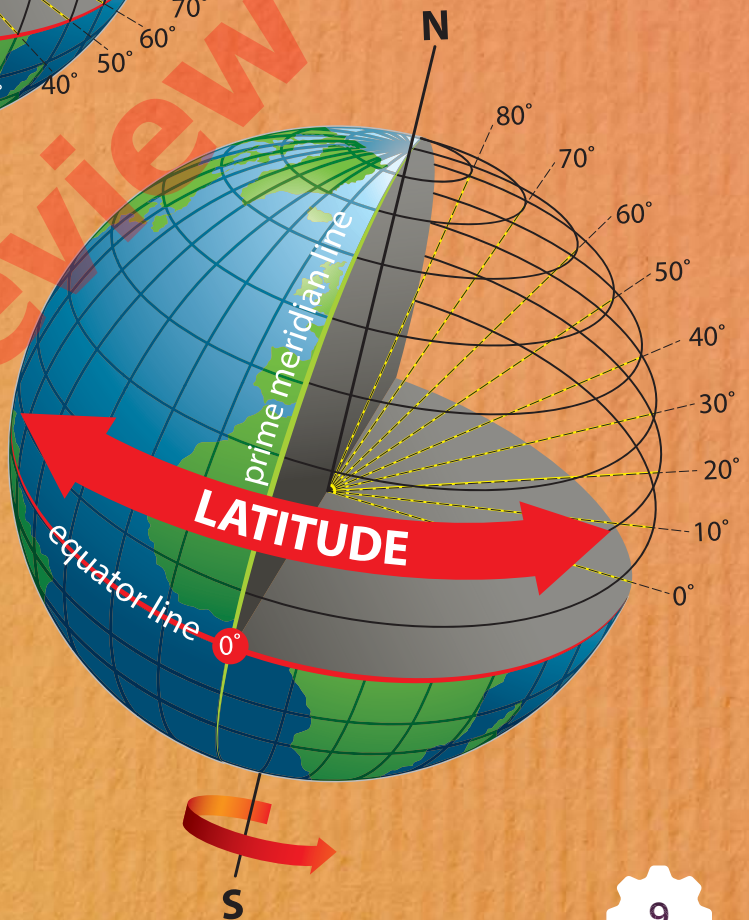
Early navigators could use this grid to help them—if they could figure it out at sea. They began to make tools to help them find what they needed to know.



Navigation is from the Latin word *navis*, which means “ship.” To navigate is to steer a ship.



Lines of longitude run north and south.



Lines of latitude run east and west.



STEAM CHALLENGE

Define the Problem

You are on a ship traveling across the ocean when suddenly the navigational equipment for the ship breaks down! You know that you need to travel north to get to the closest shore. Your task is to build a device that will help you find north. Then, you can figure out the best plan to navigate the ship safely to land.



Constraints: The items you have to work with are: a pencil, paper, a magnet, paperclips, a plastic cup, a bowl, water, string, bamboo skewers, and a cork.



Criteria: A successful device will be able to rotate and clearly point north.





Research and Brainstorm

How have people found north in the past? Which methods will work best on a ship at sea?



Design and Build

Create a plan for how you will use the materials to find north. What purpose will each part serve? What materials will work best? How will you make it clear which direction is north? Build the model.



Test and Improve

Test your device by using it to point north. Then, use a compass or a map to tell if the device is successful. Did you find north? How might you improve your plan? Modify your design, and try again. If your design was successful, try a different method.



Reflect and Share

How might your plan change if you needed to travel at night? How would your plan change if you needed to travel east instead of north? Which part of the process was most challenging?

