



Making A Compass & Magnetic Attraction

Overview & Major Themes

Students will use magnets to build a compass, use compass directions, read a map and work together to complete this lesson scenario:

Constitution has been called to help another American ship in peril. Students are the ship's new navigators. They must direct the ship using cardinal directions and landmarks to reach the injured American ship, but there are many obstacles in their way. Students will learn that magnetic attraction and direction are related, and will use direction and locations with a homemade compass to help *Constitution* find its way.

Objectives

- Students will learn the 8 major cardinal directions.
- Students will learn which way is north in their classroom.
- Students will use and apply the cardinal directions, give other directions related to place names, and write a step-by-step procedure for others to understand.

Outcomes

- Students will learn about magnets and compasses, how to use a compass to write directions, and how to read a map.
- Students will apply what they learned about directions to how *Constitution* sailors steered the ship at sea in 1812.
- Materials & Resources
- Sewing Needles
- Compass
- Magnets
- String
- Black electrical tape
- Bar magnet (with labeled poles) – hung from the ceiling before the lesson
- Groups of students, 4 to a group
- Maps of *Constitution*'s Obstacles for each 4-person group
- Illustration of "The Wheel"

Instructional Activity

5 min.

Explore ‘The Wheel’ illustration with students. Explain to them that they have been promoted on board *Constitution*, and the Captain has given orders for them to change the ship’s course in order to help a fellow ship that is in distress. What are these sailors using to steer the ship? How do they know which way to go? Now they have to steer the Ship, and they’ve been given some intelligence that there are many obstacles (Enemy ships! A winding river! British blockades! Islands!) to avoid in order to help the other ship in distress. As a team, you are going to have to plot a course to steer the Ship through these obstacles.

5 min.

First, discuss with students: How do you know which course you must sail? Do you know how you could use a magnet to find your direction?

5 min.

Show students the compass. Discuss: what is this? Do you know what it does? (shows direction) Do you know how it works? (needle is a magnet attracted to magnetic north pole).

5 min.

Discuss: what is a navigator? How would you use a compass? What would this mean for you as the Ship’s navigator?

5 min.

Show students the bar magnet, and explain that the largest magnet on Earth IS the Earth. What would that mean for other magnets? If a magnet is allowed to hang free, the North-seeking pole of the magnet will point toward magnetic north. Explore the cardinal directions with students in your classroom, and mark the directions on the walls of your room.

2 min.

Students begin group activity: Now, you are on board *Constitution*, and we need to help the other ship. You are the Ship’s Navigator; plot your course using the cardinal directions you just learned.

5 min.

Split students into groups of 4. Each group should assign the following roles: a compass maker, compass reader, recorder, and course plotter. Groups will be given a needle and a magnet, and the compass-maker will rub the needle 50 times against the magnet. Test the needle with the hanging bar magnet and mark North by

taping one end of the needle with the black tape. Groups will use the needle to determine north, south, east, and west.

5 min.

Give students the map of obstacles. First they must choose which way is North on their map by turning the map (all groups can choose a different way – it will make every group’s final set of directions different), and labeling the compass on the map. Then, groups will work together to figure out a path to help *Constitution* find the ship in distress. The start and end locations are indicated below each map.

20 min.

Groups will then draw their path on the map and write directions with the obstacles shown on the paper to find their way towards the distressed ship. They must include obstacles such as landmarks and North, South, East, West as they figure out the path towards the distressed ship. (Example: We must sail north up the river until we reach the British fort on the island, and then turn east. Next, we will sail east and turn south at Bird Island to avoid the British blockade).

20 min.

After all students have finished their path and directions to guide *Constitution* to save the distressed ship, students then switch directions with another group. Did every group choose the same path? Why not?

10 min.

Allow students to play the Steer the Ship online game for fun at the end of the lesson.
