

Summer at the Library 2022

MAKE WAVES



Middle School and Up

Sailing the 7 Seas

Learn how sailors navigate their way! When they are sailing in the middle of the ocean, there are no landmarks to denote where they are. They only have the sun, the stars, and a simple tool called a compass to find their way.

What will you learn?

- How to navigate the seas using a compass
- How a compass works
- How to build a compass

Materials:

- Steel sewing needle
- Magnet (horseshoe, bar, etc.)
- Wax Paper
- Bowl
- Water
- Scissors
- Pencil

Instructions:

- **Magnetize the needle.** Take the magnet and place it on the center of the needle. Rub the magnet back and forth from the center of the needle to one end of the needle approximately 50 times.
 - Reverse the needle and begin rubbing it from the center to the other end of the needle using the end of the magnet you did not use before. This will create a magnetic north and south pole on the needle.
- **Needle flotation device.** Cut a piece of wax paper out in a circle that has a diameter slightly larger than the needle. Weave the needle in then out of the wax paper so it



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will not fall off. With a pencil, mark “N” or “north” on the wax paper where the north pole of the needle is. Make marks for east, south, and west as well.

- **Float the needle.** Fill a bowl with water. Carefully place the wax paper on top of the water with the needle on the top side. Make sure your magnet has been put away because it will attract the needle. Watch carefully to see if your needle has been properly magnetized.
 - If the needle is properly magnetized the end of the needle you rubbed with the north end of the magnet will point toward magnetic north.

Reflection Questions:

- If you put the magnet near the magnetized needle, what happens?
 - What might this say about the earth’s magnetic field?
- What else are magnets used for?
 - Did you know magnetism is related to electricity?
- If you used this compass to create a treasure hunt, do you think someone could find the treasure?

Explanation:

Earth has a magnetic field around both poles - the north pole and the south pole. The magnetic field is similar to a bar magnet with a tilt 11 degrees off of Earth's axis that spins in a circle once every 24 hours that gives us night and day.

The point on the Earth's axis at both the north and south poles is called magnetic north and south. This point on the Earth's surface changes over time. The poles may wander each year more than 5 miles. This means that while “north” and “south” stay the same on a map, “magnetic north” and “magnetic south” can change over time.

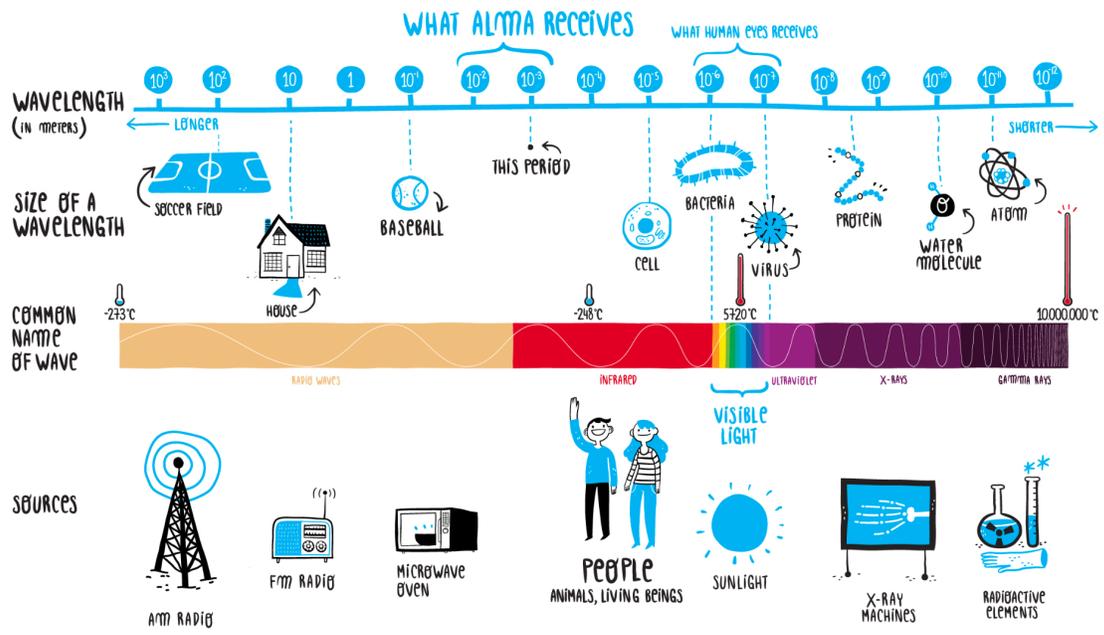
When a sailor is in the middle of the ocean and there are no landmarks they can use for navigation, they depend on the sun, the stars, and the compass to determine which direction they’re sailing in.

Electromagnetic force is one of the 4 main forces in physics. The diagram below shows different types of electromagnetic waves that we know of and how we use them.



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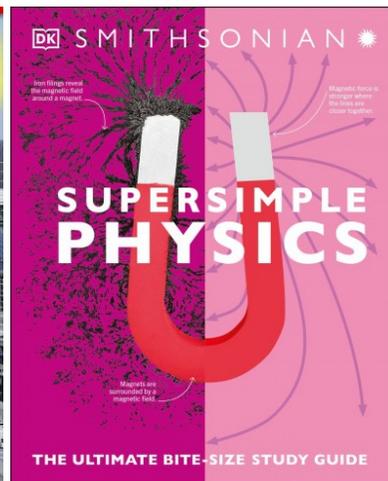
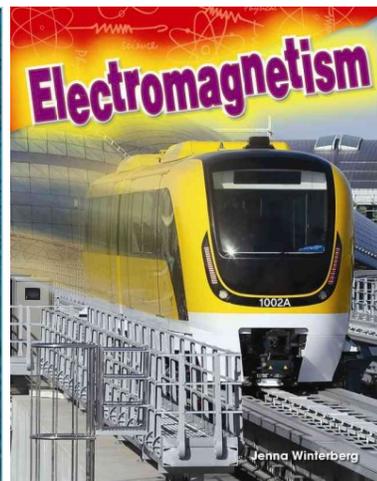
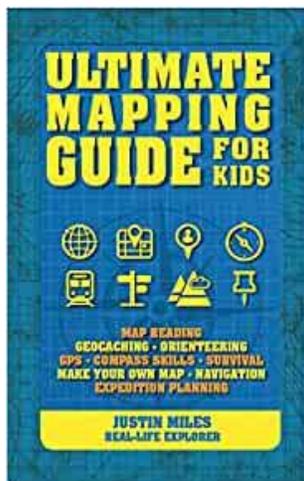
THE ELECTROMAGNETIC SPECTRUM



Information drawn from [Kids Fun Science](#) and [Alma](#).

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Keep on sailing! Check out these titles for further inspiration and fun.



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Guide created by Joy Hariprasad.



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