

## What is a compass?

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A reproduction of a compass from 1607. Photo by: Virginia State Parks staff/Wikimedia.

A compass is a device that shows direction. It is one of the most important tools for navigation.

Magnetic compasses are the most well-known type of compass. This type of compass has changed over time. However the idea of how it works is the same. Magnetic compasses have a magnetized needle. The needle rotates, so it lines up with the Earth's magnetic field. The ends point to what are known as magnetic north and magnetic south.

Very early compasses were made of a magnetized needle. It was connected to a piece of wood or cork. The wood or cork floated in a dish of water. As the needle would settle, the marked end would point toward magnetic north.

Historians think China was the first to create a magnetic compass. The Chinese used them for navigation. Chinese scientists may have developed these tools as early as the 11th or 12th century. Western Europeans soon followed at the end of the 12th century.

## **Staying On Course**

By the 1400s, explorers realized that the "north" pointed to by a compass was not the same as Earth's true geographic north. This is called variation. It is also called magnetic declination.

Variation is not a huge problem when using magnetic compasses near the equator. But the difference is much greater closer to the North and South Poles. It can lead someone off-course.

Other





adaptations have been made to magnetic compasses

over time. Ships used to be made out of wood. But eventually they were made out of iron and steel. The metal of these newer ships affected compass readings. This difference is called deviation.

One way to address deviation is to put iron balls near the compass. Bar magnets can also keep the compass working correctly. Deviation also matters on airplanes. There is metal in airplanes.

There are a lot of different types of magnetic compasses. The most basic are ones you can carry around. People often use those on hikes. Magnetic compasses can have other features. Some have magnifiers for use with maps. Other compasses have markings in Braille for the visually impaired. The most complicated compasses are complex devices on ships or planes. Those devices can calculate and adjust for motion, variation and deviation.

## Other Types Of Compasses

Some compasses do not use Earth's magnetism to indicate direction. The gyrocompass was invented in the early 20th century. It uses a spinning device called a gyroscope. The device follows Earth's axis of rotation to point to true north. This type of compass is often used on ships and aircraft.

A solar compass uses the sun. The most common method is to use a compass card and the angle of the shadow of the sun to show direction.

There are ways to use the sun as a compass even without a compass card. One way is to make a shadow stick. A shadow stick is a stick placed upright in the ground. Pebbles are placed around the stick. A piece of string is used to track the shadow of the sun across the sky. That helps a navigator figure out east and west.

Another type of solar compass is an old-fashioned analog (not digital) watch. Using the watch's hands and the position of the sun, it is possible to determine north or south. Simply hold the watch parallel to the



ground (in your hand) and point the hour hand in the direction of the sun. Find the angle between the hour hand and the 12 o'clock mark. This is the north-south line. In the Southern Hemisphere, north will be the direction closer to the sun. In the Northern Hemisphere, north will be the direction further from the sun.

There is a lot of technology now that helps people get where they need to go. GPS is one example. The oldfashioned compass is still a valuable tool. Many airplanes and ships still use highly advanced compasses. For people traveling on foot or in small boats, a simple pocket compass is still useful.



Quiz

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Read the paragraph from the section "Other Types Of Compasses."

There is a lot of technology now that helps people get where they need to go. GPS is one example. The old-fashioned compass is still a valuable tool. Many airplanes and ships still use highly advanced compasses. For people traveling on foot or in small boats, a simple pocket compass is still useful.

Which word helps you understand the meaning of "valuable"?

- (A) helps
- (B) advanced
- (C) simple
- (D) useful
- Read the selection from the introduction [paragraphs 1-4].

Magnetic compasses are the most well-known type of compass. This type of compass has changed over time. However the idea of how it works is the same.

What does the author mean by "well-known"?

- (A) smart
- (B) popular
- (C) unpopular
- (D) improved
- Examine the image in the introduction [paragraphs 1-4].

How does this image help you understand magnetic compasses better?

- (A) by showing where the needle points
- (B) by showing what a magnet looks like
- (C) by showing different types of compasses
- (D) by showing what an early compass looked like

Read the section "Other Types Of Compasses."

Based on the first image in the section and the paragraphs in the section, what do we know about the gyrocompass?

- (A) Gyrocompasses use gyroscopes to tell direction.
- (B) A gyrocompass is better than a solar compass.
- (C) Ships use gyrocompasses to navigate.
- (D) A gyrocompass is a modern compass.