GOING ON A BEARING HUNT

An Introduction to Using a Compass

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An Introduction to Using a Compass

Skill Level
Beginner, Intermediate

Learner Outcomes
The learner will be able to:
- *Identify parts of a compass*
- *Use the compass to find bearings*

Educational Standard(s) Supported
Math: 4.MD.C.5

Success Indicator
Learners will be successful if they:
- *Can use a compass to describe the bearing of an object*
- *Can use a compass to locate an object if given a bearing*

Time Needed
20 minutes

Materials List
Compasses
Pencil and paper
"Bearing Hunt" student worksheet

Introduction to Content

In this lesson, students will learn how a compass works and use compasses to describe bearings.

Lesson adapted from: "Where's your teacher?" TeachEngineering.org
https://www.teachengineering.org/activities/view/cub_navigation_lesson05_activity1

Introduction to Methodology

The instructor will first walk the students through the parts of a compass, then show students how to use a compass to find bearings. Students will then practice this skill, finding bearings of mystery objects around the classroom.

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Terms and Concepts Introduction

Parts of a compass: base plate, direction of travel arrow, magnetic needle, orienting needle, degree dial, orienting needle

Bearing: In navigation, the bearing is the angle of the imaginary line between two objects relative to north.
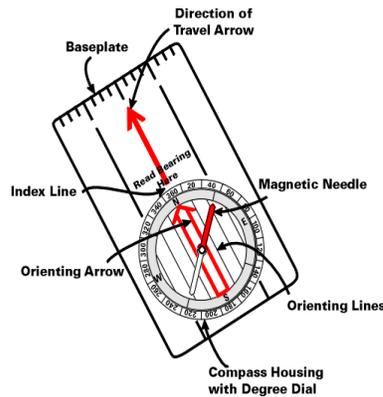

Image Source:
https://www.princeton.edu/~oa/manual/mapcompass2.shtml

Setting the Stage and Opening Questions

Do you know what we use compasses for? Do you know how compasses work?
> We didn't always have GPS and smartphones with maps. A compass is a tool that can help us get around that doesn't rely on modern technology. Compasses work using magnetism. The earth has an arrow with a magnet that is attracted to Earth's magnetic north.

Hand each student a compass and explain the parts of a compass:
1. A **base plate** with **direction of travel arrow** marked on it. Explain that you always hold the compass flat (i.e. parallel to the ground) with this arrow pointed away from you when you read the compass.
2. A **magnetic needle** floats on liquid so it can spin freely. It has two colors: the red side points north. Ask students to hold their compasses flat and look at their compass needle. Can they point to North?
3. A **degree dial** has the numbers 0 to 360. These are degrees around a circle. This degree dial can turn. Invite students to turn the dials. Inside this ring is the **orienting arrow** which is aligned to the N bearing (360°) and rotates with the dial. You will also see the letters N, E, S and W indicating north, east, south and west.

Explain the proper way to hold a compass: Flat (parallel to the ground), with the direction of travel pointed away from you and away from other metals and magnets.

Explain bearings: We can use our compasses to describe an object's location or our direction of travel. One common technique is to use **bearings**. A bearing is the angle of the imaginary straight line between you and another object relative to north. Imagine there is a circle around you, divided into 360 degrees, with 0 (and 360) pointed north. If the object line is directly in front of you, it would be a 0 or 360° bearing (north). If the object was straight to your right, it would be a 90° bearing (or east). If the object was directly behind you, it would be a 180° bearing (south). If it was to your left, it would be 270° (west).

Show students how to find bearings:
1. Pick an inanimate object in the room (e.g. chalkboard).
2. Face the object holding the compass near your body, with the direction of travel arrow pointed away.
3. Rotate the dial until the red magnetic N arrow lines up with the interior orienting arrow. A good way to remember this is "RED in the SHED".
4. Read the top number on the dial that lines up with the direction of travel arrow.
5. Ask students what bearings they got. If they are different, ask them why. (Answer: the bearing depends on the location where you took the bearing.)
6. Show students how to find the direction of a given bearing. Example: to face 300°. Turn compass dial until 300 degrees is at the top. Then, holding the compass near your body with the direction of the travel arrow pointed away, turn your body until the red needle is inside the red arrow.

Experience

1. Hand out the "Bearing Hunt" worksheets.

2. Instruct students to write down their location (e.g. "my desk", "beside the bookshelf" etc.).

3. Then, students should identify five objects around the classroom as targets.

   Note: Students should keep these objects secret and not discuss their choices with the other students.

4. For each object:

   a. Write down the first letter(s) of the object in the worksheet. For example: fire extinguisher would be "F.E."

   b. Use the compass to find the bearing to that object and record the bearing in worksheet.

5. When everyone has recorded five bearings on the "Student A" side of the worksheet, instruct students to leave their worksheets where they are, and switch places with someone else in the classroom.

   Note: It is important that Student B start from the same location as Student A.

6. Students will use the bearings recorded by their classmate, and try to identify the names of the target objects, filling out the "Student B" side of the worksheet.

7. Have students return the worksheet to the original student to see if they correctly identified the objects!

Share

Were you able to identify all of your classmate's targets?

Process

Why was it important to start from the same location? What would happen if you tried to start from a different location? *(Remind students that a bearing describes a relationship between two set points in space.)*

Generalize

Can you think of times when you might need to use a compass?

Apply

You start from a trailhead and hike into the woods going due west (270°). If you want to find your way back to the trailhead, what bearing would you follow? *Answer: 90° (east)*

Life Skill(s)

- Follow instructions. (HEAD)

- Gather relevant information for decision-making. (HEAD)

- Use the senses to gain new information or find new ways to use information. (HANDS)

- Use basic reading, writing and mathematical skills. (HEAD)

Bearing Hunt Student Worksheet

Starting location: _____

Student A		Student B
Name: _____		Name: _____
First letter(s) of object	**Bearing**	**Name of object**

Answer this!

You start from a trailhead and hike into the woods going due west (270°). If you want to find your way back to the trailhead, what bearing would you follow? _____

4.MD.C.5 Geometric measurement: understand concepts of angle and measure angles. Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement.

    a. Understand that an angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where the two rays intersect the circle.

    b. Understand that an angle that turns through 1/360 of a circle is called a "one-degree angle," and can be used to measure angles. An angle that turns through none-degree angles is said to have an angle measure of n degrees and represents a fractional portion of the circle.