Following directions using a map worksheet

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Download Lesson 5 (68KB)Teach your students some basic and more complex directional skills so they can navigate nature and the greater biosphere. This lesson starts with teaching basic directions and mapping techniques, then moves on to taking latitude and longitude coordinates and using global-positioning-system (GPS) units.Lesson Objectives and MaterialsObjectivesStudents willunderstand cardinal directions. practice using maps. learn how to use a compass. use a GPS unit and understand latitude and longitude coordinates.MaterialsNM data-collection form Field guides or animal fact sheets Compass Compass wheel Different maps Field journals (bound scientific notebooks) A 4-foot-square piece of colored paper Transparent tape Note cards Globe GPS unit Directions and MapsIn two parts, teach your students about the cardinal directions and how to use a compass and maps. The lesson includes outdoor activities.Follow these steps:Part 1: Directions1. Sit in a circle outside. Ask studentsWhere's the Sun? What direction is the Sun? Which way is north?2. Use an object, such as a branch, to depict north. Explain the other cardinal directions and use a mnemonic device to aid students' memory, such as the sentence "Never eat soggy Wheaties."3. Ask students to use materials in the area to mark the other directions.4. Explain what a compass is and how it functions.5. Use a compass to test the accuracy of where students placed objects to mark directions in step 3. Make any needed corrections.6. Say the different directions out loud, and ask students to point where the direction is on a compass wheel or on a makeshift wheel outside. You can also hand out cards with directions for students to place on the wheel. For older students, ask them to determine more precise directions, such as northwest or southeast.7. Go inside and ask students to find north and other directions in the classroom.8. Have the students make direction markers and post them on the walls of the classroom. Double check the location with a compass.Part 2: Maps1. Explain to students how to use maps. Demonstrate several types of maps, such as topographic, city, or state maps.2. Ask students to list what information they can get from a map, such as directions, landmarks, and building projects.3. Ask students to work together to determine which map would be best to find their way in the following scenarios:Going from your house to a downtown library (city map) Going from your house to a different elevation (topographic map) Going from your house to a different country (world map) Going from the school to the airport (road map) Practical and AssessmentPractical: Test your students' understanding of directions and mapping by taking them outside and asking them to point or position cards in the directions you say aloud (such as east, west, or southeast).Assessment: How did your students do? Here are some ways to assess your students' comprehension, reflective of grade level.Exceeds standard: Student was able to point or place cards in the correct direction eight out of eight times. Meets standard: Student was able to point or place cards in the correct direction seven out of eight times. Below standard: Student was able to point or place cards in the correct direction fewer than seven out of eight times. GPS UnitsTeach students about mapping latitude and longitude lines using GPS units. This lesson is split into three parts. The first part focuses on an activity of mapping the schoolyard to engage students, the second part introduces GPS units and how to use them, and the final part ties the others together by getting students to pinpoint exact locations on the schoolyard map.Follow these steps:Part 1: Mapping the Schoolyard GeographicallyPrelesson Preparation: Create a rough diagram of your schoolyard on a 4-foot-square piece of colored paper. You will add landmarks and points of interest later.1. Show students your diagram of the schoolyard and discuss the orientation.Which way is north on our school grounds? What kinds of things could we add to make it easier for new students to find their way around our school? Make a list.2. Ask students to sketch a map of the schoolyard in their field journals, noting important landmarks and geography.3. Brainstorm different elements they'd like to include on the map, such as flagpoles, swings, trees, baseball diamonds, or lights.4. Write the points of interest you come up with on note cards, and give one to each student.5. Each student will draw the object listed on his or her note card on small pieces of paper. They will add these to the schoolyard diagram.6. Ask students to attach each item to the diagram where they think it belongs. Use transparent tape so students can move the objects around easily in the next section.Part 2: Latitude and Longitude Lines and Using GPS Units1. Ask students how they can validate the location of objects placed on the diagram in the previous activity. Brainstorm possible answers.2. Refer to the NM data-collection form, and point out the section on taking latitude and longitude.3. Show the students a globe, and explain to them the lines of latitude and longitude.Lines of latitude run horizontally and provide locations north and south, depicting north as a positive number and south as a negative number. Lines of longitude run vertically and provide locations east and west. Explain that each number reflects location in degrees, minutes, and seconds. For example, one reads "47* 15' 25" as "47 degrees, 15 minutes, and 25 seconds." You can write a coordinate in many different ways to precisely express a location on earth. For example, you can write "47* 15' 25" as "47.256944" or "47*15.416666'." Each degree of latitude represents 69 miles, each minute 1.15 miles, and each second 0.02 miles. Degrees of longitude vary in size, decreasing as one moves in both directions toward the poles.4. Follow the NM lesson on how to use a GPS unit.5. Pair students together, and equip each pair with a GPS unit. Explain that one student will read the unit while the other student records readings in his or her field journal.6. Ask students to walk the schoolyard from south to north, writing latitude numbers every 50 feet as directed.7. Repeat the step for writing longitude numbers from east to west.8. Return to the classroom and ask students what they observed and whether there was a number pattern.9. Use a globe or a map to review why the numbers increase and decrease.10. Talk about satellites and show how they work.Part 3: Mapping the Schoolyard with GPS Units1. Explain to students that they'll use the GPS unit to test the precision of objects placed on the schoolyard map.2. Take latitude and longitude numbers (as a group) around different points of the schoolyard -- at the corners and around the perimeter every 10 feet or so.3. Ask students to take GPS readings of their objects in the schoolyard.4. Record all numbers on the large schoolyard map, and move the objects to the correct location as needed.Customization TipsIs the lesson too simple or advanced for your students? Here are some ways to customize the lesson based on grade level:Grade K: Help students create and post objects on the map. Grade 1: Create symbols for students to place on the map. Grade 2: Give students more independence to make symbols and to use a map key. Grades 3-6: Encourage students to map the schoolyard using GPS locations as they learn latitude and longitude coordinates. Grades 7 and up: Challenge students to convert GPS and map locations from degrees and minutes into decimal degrees. Use grid paper to draw the school to scale. Practical and AssessmentPractical: Test your students' understanding of GPS units and latitude and longitude readings. Place Popsicle sticks in different locations around school grounds. Ask students to use their GPS units to record the latitude and longitude of each stick.Assessment: How did your students do? Here are some ways to assess your students' comprehension of the material, reflective of grade level.Exceeds standard (4): Student was able to identify the correct latitude and longitude coordinates ten out of ten times. Meets standard (3): Student was able to identify the correct latitude and longitude coordinates nine out of ten times. Below standard (2): Student was able to identify the correct latitude and longitude coordinates eight out of ten times. Teacher TipsDon't have a GPS unit? Try using Google Earth or other online programs to pinpoint different longitude and latitude coordinates. Or use a globe or a military map for inexact estimates.VocabularyWe use these terms throughout this and other NatureMapping lessons:Cardinal directions: North, south, east, and west. Latitude line: Horizontal line on the globe that shows the angular distance, in degrees, minutes, and seconds, of a point north or south of the equator. Lines of latitude are often referred to as parallels; they run from east to west. Longitude line: Vertical line on the globe that shows the angular distance, in degrees, minutes, and seconds, of a point east or west of the prime meridian. Lines of longitude are often referred to as meridians; they run from north to south. Global-positioning system (GPS): A system of satellites, computers, and receivers able to determine the latitude and longitude of a receiver on Earth by calculating the time difference for signals from different satellites to reach the receiver.Related NatureMapping ActivitiesIf you enjoyed this lesson, check out these links to additional NatureMapping materials:Introduction to Mapping, Part I: An activity that teaches students about map elements and using them to find map locations, the idea of map scale, and how to measure using pacing.Introduction to Mapping, Part II: Teaches the idea of map scale and how to read topographic maps.Using Maps: Where Are You?: Students learn how to locate the township, range, and section, latitude and longitude, or Universal Transverse Mercator coordinates of their homes and school.

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