

Revised 6/09



**Pima County Natural Resources, Parks and Recreation
Environmental Education Field Study**

**Map and Compass
High School Level**

Description: Map and Compass

A fun and practical way to explore the desert is through orienteering, or the use of map and compass to find your way. Students learn how the Earth's natural magnetic field interacts with a compass and how wildlife relies on magnetic fields to navigate. Each student will use a compass with a topographic map to determine bearing and distances to specific map points.

Linked to Arizona Academic Standards: Math S1, C3, HSPO1; S4, C3, PO7; S4, C4, PO9. Health S2, 2PA-P5, PO1. Social Studies 3SS-P1 PO1; 3SS-D1 PO5.

Duration: 2 hours

Objectives:

- Learn the theory of why Earth has a magnetic field
- Identify the importance of the Earth's magnetic field to wildlife
- Learn the parts of a magnetic compass and how to use it to find direction
- Use the skill to navigate successfully through a compass course
- Learn to read a topographic map
- Use a magnetic compass and topographic map to determine direction and distance between two points

Conceptual Framework:

- Opportunities to experience nature through orienteering can contribute to human physical, mental and emotional health.

Vocabulary:

Base plate, bezel, convection current, crust, degree, direction of travel, inner core, magnetic field, magnetism, mantle, needle, outer core, pace, scale, topographic

Materials:

Case of magnetic compasses (30 compasses per case)

Dry erase board, markers

Teaching compasses (oversized, non-working compasses demonstration)

5 clipboards/25 students

Pencils

Course directions and course direction keys

Clue cards

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Description of activity:

- Students learn the accepted theory of how the Earth's magnetic field is formed due to the movement of molten iron in the Earth's outer core and mantle. The use of this magnetic field by wildlife such as birds, insects, whales, sea turtles and sharks is discussed, as well as how humans use the magnetic field to navigate.
- Students learn the history of the development of a magnetic compass and the compass' contribution to exploration and discovery during human history. The parts of a magnetic compass are discussed which leads to the actual use of the compass to find one's direction.
- After students learn how to use the compass correctly, they are challenged to navigate in small groups through an orienteering course. At each checkpoint along the course, students collect word clues that add up to become an environmentally-themed quote.
- After students have completed the course and collected all of the word clues, the meaning of the quotes is discussed as well as the practical applications of the magnetic compass.
- Students learn to read a topographic map of the area. Using a magnetic compass and topographic map, students determine directions and distance between two points.

Late arrivals: To save time, have the students follow the course through checkpoints 1-5 only. Delete checkpoints 6-10. You could also abbreviate the explanation of the science behind Earth's magnetic field and focus on how to use the compass.