

# Chestnut Ridge Orienteering and Species Identification

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## Objectives

Students will be able to:

1. Navigate from point to point using a compass and a map
2. Collect data using ARC GIS base maps, as well as Collector and Leaf Snap applications



## Extensions:

- A. 8<sup>th</sup> grade:**
1. Extract pigments within various leaves and compare the results to determine why leaves fall
- B. 7<sup>th</sup> grade:**
1. Calculate total distance traveled
  2. Calculate average speed
  3. Distinguish between average and instantaneous speeds
  4. Distinguish between distance and displacement

## Standards

### NYS P-12 Intermediate Science Standards

S2.3 Carry out their research proposals, recording observations and measurements to help assess the explanation.<sup>1</sup>

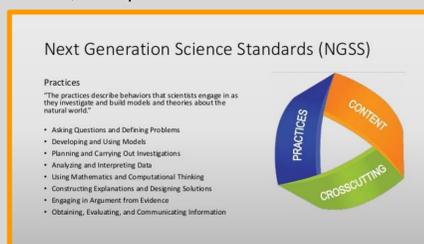
- S2.3c collect quantitative and qualitative data

4.4g Without direct contact, a magnet attracts certain materials and either attracts or repels other magnets. The attractive force of a magnet is greatest at its poles.<sup>1</sup>

## Extensions:

**A. 6.2a** Photosynthesis is carried on by green plants and other organisms containing chlorophyll. In this process, the Sun's energy is converted into and stored as chemical energy in the form of a sugar. The quantity of sugar molecules increases in green plants during photosynthesis in the presence of sunlight.<sup>1</sup>

**B. 5.1b** The motion of an object can be described by its position, direction of motion, and speed<sup>1</sup>



## SCIENCE AND ENGINEERING PRACTICES

"Science and Engineering Practices describe what scientists do to investigate the natural world and what engineers do to design and build systems. The practices better explain and extend what is meant by "inquiry" in science and the range of cognitive, social, and physical practices that it requires. Students engage in practices to build, deepen, and apply their knowledge of core ideas and crosscutting concepts."<sup>2</sup>

## Chestnut Ridge Field Trip

### Team Building

Seventh and eighth grade students are brought on an annual field trip to Chestnut Ridge Park to participate in team building activities to:

- Improve communication
- Improve motivation
- Create a more cohesive and productive environment

### GIS Skill Set

Students will be taken on a nature walk to improve their GIS skills set, which are in high demand in both academic and professional fields. The skills include, but are not limited to:

- Curiosity about their environment
- Data collection
- Geographic foundations (e.g. topographic maps)
- Adaptability
- Communication

## Orienteering Nature Walk

### Materials:

- Smart Phones equipped with Collector and Leaf Snap applications
- White paper
- Compasses
- Chestnut Ridge Orienteering Map
- Watch

### Procedure:

1. Initial data point to be taken at Shelter #21. Document closest tree species. No orienteering code will be available.
  - Record departure time
  - Plot data point on Chestnut Ridge GIS Map
2. Departing from Shelter #21, students will orient the map using the compass and direct the class toward the designated trail.
3. At the trail head, plot the second point. No orienteering code.
4. Students will follow the designated trail markers, while searching for the first orienteering location. Students must pay attention to changes in elevation, changes in direction, water sources etc. to determine the exact location of the orienteering goal. Once found, a data point will be recorded.
5. Aside from the three orienteering markers found along the trail, the trail itself will be plotted every ten minutes.
6. Upon return to the shelter, final time should be documented and total time should be calculated.
7. Once back at school, the data will be synced with the online program and data analysis can begin. (See 7<sup>th</sup> and 8<sup>th</sup> grade extensions. )

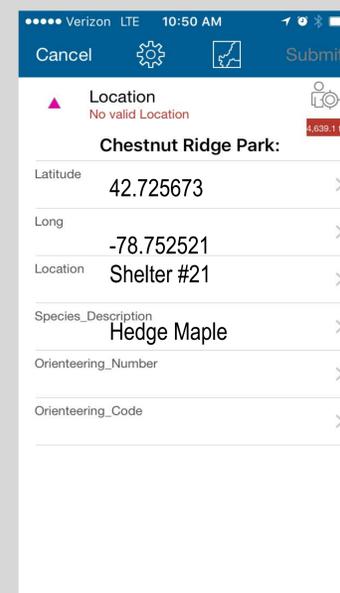
\*\* If planning to perform the 8<sup>th</sup> grade extension, different colored leaves should be collected and brought back to school.

## Orienteering Map



Designated area of focus

## Data Collection



Orienteering codes and numbers can be found on the map and will be entered at the appropriate locations.

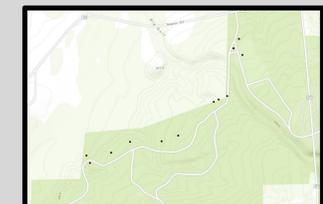
## Extensions

- A. 8<sup>th</sup> Grade: Paper Chromatography-** (Fall season) Collect leaves of different colors and extract colors once back at school to determine the answer to "Why do leaves fall in the fall?"<sup>3</sup>



Chromatography Lesson

- B. 7<sup>th</sup> Grade: Calculate distance, displacement and speed.** Students use the ruler tool in ARC GIS to measure the distance of the total hike, and then compare it to the displacement. In order to calculate the average speed, the total time spent hiking must be recorded. Use the answer to help distinguish between instantaneous and average speeds.



**DISTANCE VS. DISPLACEMENT**  
Use the "Measure" tool on ARC GIS to measure the total distance the hikers travelled as well as how far they were displaced from their original position. Document below.

TERM	DEFINITION	MEASUREMENT (MILES)
DISTANCE		
DISPLACEMENT		

What was your AVERAGE SPEED?

FORMULA:  $Speed = \frac{Distance}{Time}$

WORK STATION

Given Values:  
S=  
D=  
T=

THINK ABOUT IT: How is this value different from instantaneous speed?

## References

1. NYS P-12 Intermediate Science Standards
2. Next Generation Science Standards  
<https://www.nextgenscience.org/>
3. <http://blog.teachersource.com/2015/11/02/chromatography-autumn-leaves/>

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