

## "Navigation" - Curriculum



### Learning Objectives

Students will:

- Gain a better understanding of real world use of geometry and algebra.
- Apply skills to indoor and outdoor exercises that are interactive and engaging

### Timing:

Each of these lessons are a 90 minute lesson plan. They can be broken down f

*MOI = Method of Instruction (Research, Lecture, Workshop, etc.)*

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## Lesson 1: Reading a Topographic Map and Nautical Chart

Deciphering a

## **Topographic Map**

Using a local map and a non-local map show different regions and explain how topographic maps work.

*MOI: Presentation requiring student interaction.*

## **Deciphering a Chart**

Using a Chart you may do the same thing as with the Local Map and Non-Local Map.

*MOI: Presentation requiring student interaction.*

## **Learning the Key**

The Key is a very important part of any map. However on most topographic maps you will find it lacking.

*MOI: Student Analysis, Student Discovery.*

## **Contour Lines, Interval, and Depth Soundings**

Contour Lines are a great way to explain 3D and 2D and charting. Contour lines can't touch so the rings

*MOI: ~~Map/Chart Work,~~ Presentation requiring student interaction,*

## **Local Map/Chart Finding Reference Points**

Using the local map show how it highlights certain reference points so that students who live in the area

MOI: *Presentation, Student Analysis, Map/Chart Work.*

### **The Three Norths**

The Three Norths Explains how you make a Sphere into a Rectangle and why compasses don't point North.

MOI: *Map/Chart Work, Presentation* .

### **Declination**

Declination is a great way to challenge the modern mind with basic arithmetic. Explain how it is important.

MOI: *Presentation requiring student interaction, Map/Chart Work.*

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## **Lesson 2: Using a Compass**

### **Compass Vocabulary**

Compass Vocabulary is very important so that students can follow exact instructions. It is also a great way to...

MOI: *Presentation* , *Quiz, Worksheet*

### **Compass History**

The history of navigation, the compass, and other navigation tools as well as the discovery of Longitude.

MOI: *Presentation.*

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## How a Compass Works

How a compass works will explain where a compass points. How the Earth's Magnetic Poles work and why.

*MOI: Presentation, Compass Work.*

## Bearing vs. Azimuth

This is comparing and contrasting two differing ways of reading a compass and giving headings. 360 degrees.

*MOI: Compass Work, Map Chart Work .*

## How to Take a Heading/Bearing

This lesson on how to orient the compass and how to take a heading is important, without this knowledge you cannot navigate.

*MOI: Compass Work.*

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## Lesson 3: Triangulation

### Points We Can Use to Triangulate

Students should identify what points on the map they could use to triangulate their position.

*MOI: Map/Chart Work, Presentation.*

### **Visual Triangulation**

This exercise allows students to estimate. This skill is very essential for much of navigation. Getting the

*MOI: Student Analysis, Student Discovery.*

### **Bearing Triangulation**

This exercise is to improve on visual bearings. It is to show how precision matters in certain navigating s

*MOI: Compass Work, Map/Chart Work, Student Analysis, Student Discovery.*

### **Reverse Triangulation**

Reverse Triangulation is simply starting from a known point and taking headings on three points. This is

*MOI: Student Analysis, Student Discovery, Map/Chart Work, Compass Work.*

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## **Lesson 4: Plotting a Course / Route**

### **How to Set a Course / Route**

Demonstrate or explain an Orienteering competition. This is to set expectations for the students. This ex

*MOI: Presentation, Map/Chart Work, Compass Work.*

## Heading Off

When an object is in the way students will need to learn to head off to keep a proper course. If they don't

*MOI: Student Discovery, Student Analysis, Compass Work.*

## Thinking Ahead & Leaving a Trace

Students need to think ahead when planning a course. This lesson helps them start to translate what the

*MOI: Student Discovery, Student Analysis, Compass Work, Map/Chart Work.*

## Setting a Course

Finally, students will set a course of their choice. This can be checked by peers, by the teacher or by a c

*MOI: Student Discovery.*

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## Lesson 5: Deciphering a Course / Route

### How to Navigate a Course

Explains to students that have now created the course, how to properly navigate to more than one point

*MOI: Presentation, Student Analysis, Map Work/Chart Work, Student Discovery.*

### **Common Navigation Errors**

A brief lesson on some of the common mistakes that take place during navigation and why they occur. A

*MOI: Student Discovery.*

### **Dead Reckoning**

Dead Reckoning is a great way to interject some basic algebra. Explain how based off of Time distance

*MOI: Presentation, Compass Work, Map/Chart Work, Problem Sheet.*

### **Set and Drift**

If there is time you can then work from Dead reckoning into set and drift. Where on land you don't have t

*MOI: Presentation, Compass Work, Map/Chart Work, Problem Sheet.*

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## **Lesson 6: Using a GPS**

### **How a GPS Works**

Most students are reliant on Global Positioning Systems (GPS) to figure out where they are. It is time to

*MOI: Presentation requiring student interaction.*

### **Finding You**

Without a you are here sign most students will find themselves lost on a true GPS reader. A chartplotter

*MOI: Presentation requiring student interaction, Student Discovery, Student Analysis.*

### **Inputting a Point**

Explain how to input a point or waypoint into the GPS. Each GPS reader is different and therefore this can

*MOI: Student Discovery, Student Analysis, Presentation.*

### **Setting a Route**

Once students have plotted individual points of interest or waypoints it will be important for them to figure

*MOI: Student Discovery, Presentation requiring student interaction.*

### **Navigating a Course**

Once students have set a route they must figure out how to actual navigate that route using both GPS a

*MOI: Student Discovery.*



