

In the Wilderness: Navigation

Compass: Finding Distance to a Landmark with Compass and Calculator

“The Objects in the mirror may be closer then they appear, but out on the open landscape they could be much farther then they appear.”

— A Wise Old Geezer

THE 2¢ OF A WISE OLD GEEZER

A Frequently Asked Questions I get from my students are, “Hey WOG, how far away do you think that peak is? It’s off the topo.” Or “Can we hike to that grove of trees for class today, there might be a spring there?” My response is “How far is it?” We don’t know it’s off the map.” The rule is until we have a good educated guess as to the time needed to hike somewhere we don’t start, because on a clear dry day in a featureless landscape twenty miles can seem like a two. Therefore the student’s goal is find the distance; my goal is to have the students learn a skill that will help them as an adult. With that in mind my response is, “No better time to learn to calculate how far away something is than right now.” If you have your calculator and a compass all you need is to apply the simply trig equation, the Law of Sines to find the answer. The LAW OF Sines is a powerful triangle tool which is used to find missing sides or an angle of any triangle.

A NOTE FOR THE EDUCATOR

GRADES:

11-12 and Adult Education

ACADEMIC STANDARDS ADDRESSED

- Earth Science – Earth’s Magnetic Poles
- Trigonometry – Law of Sines
- Critical Thinking and Problem Solving
- Nature Awareness

READ:

1. NOL15 Document: The Hard Skills of Plane Trigonometry
2. NOL15 Document: Converting Paces to Miles

LEXICON:

1. Oblique Triangle
2. Sine
3. Arcsine

4. Adjacent side
5. Adjacent angle
6. Opposite side
7. Opposite angle

THE ESSENTIALS

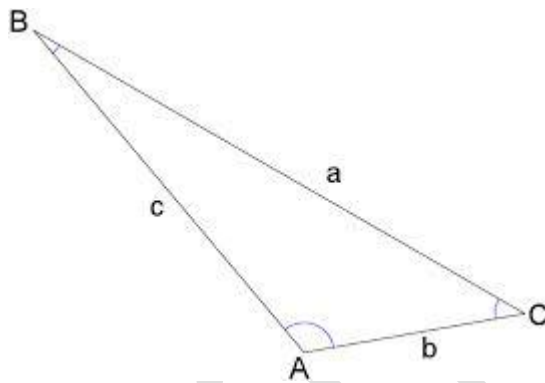
WHAT DO I NEED TO HAVE?

- Compass
- Calculator
- Note pad and pencil

WHAT BASICS DO I NEED TO KNOW?

You need to be able to identify the following on your compass

1. Using your calculator or calculator app to find the sine of and an angle
2. Using your calculator or calculator app to find the angle if given the sine of it.
3. Find the missing angle if given two of the angles of a triangle
4. How far you walk in 50 paces
5. How far you can walk in an hour



USE THE LAW OF SINES TO FIND A SIDE IF YOU KNOW ITS OPPOSITE SIDE AND ONE OTHER ANGLE AND ITS OPPOSITE SIDE

$$\frac{\text{Sine } A}{a} = \frac{\text{Sine } B}{b} = \frac{\text{Sine } C}{c}$$

Or it can be written as

$$a = \text{Sine } A \frac{b}{\text{Sine } B}$$

FINDING THE DISTANCE TO A FAR OFF LAND MARK?

We will use the law of sines to find the distant to a far off landmark we will construct the given triangle on land. Make Point-B the distant landmark, you will need to Mark Point-A pace and pace out a distance of

thirty paces or more for Point-C. After taking the headings from Point-A to Point-B and Point-A to Point-C you have all you need to fill in the equation. Let me give you a bit more details.

MARK POINT A AND POINT C

1. Identify Point-A

Find a starting point to mark Point-A that will give you a clear line of sight to Point-B and in line with where you plan on having Point-C and remember you need to have clear line of sight from Point-C to Point-B and you need to be able to see your mark for Point-A from Point-C

2. Identify Point-C

From Point-A count out 30 or more paces and mark the location for Point-C so you get a good sight on it from Point-A. Jot down your Paces.

3. Identify all the Angles

3.1. Measure Angle BAC and Angle ACB

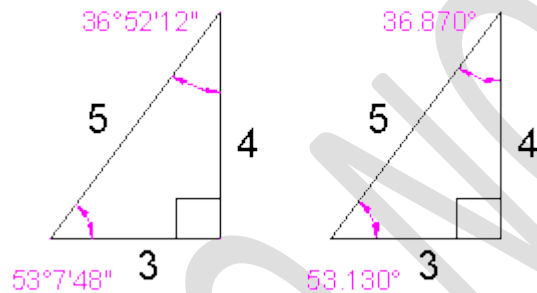
3.2. Calculate Angle ABC (Hint, keep it simple... All you need is basic arithmetic here)

4. Substitution

Plug your numbers and for your angles and the distance you paced out into the equation

$$a = \text{Sine } A \frac{b}{\text{Sine } B}$$

LET'S CHECK OURSELVES WITH THE 3,4,5 TRIANGLE



$$a = \text{Sine } A \frac{b}{\text{Sine } B}$$

$$a = \text{Sine } 90^\circ \frac{30 \text{ paces}}{\text{Sine } 53.13^\circ}$$

$$a = 50 \text{ paces}$$

TURNING THE CRANK

1. So what was your answer in paces?
2. What is your answer in feet?
3. How much time would it take for your hike?

SUMMARY

The value of a mechanic is directly proportional to the tools he own and has mastery of application. If Mechanic-A can carry all his tools in one hand and Mechanic-B needs a forklift to deliver his tool chest and he has mastery of each tool you know who will have the highest earning power. The same goes for woods

men but the tools are going to be the equations in his or her brain. Remember the more you apply these skills the more robust the connections in your brain will be because of the wraps of myelin and results in better recall and your ability to work quickly, look for applications.

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