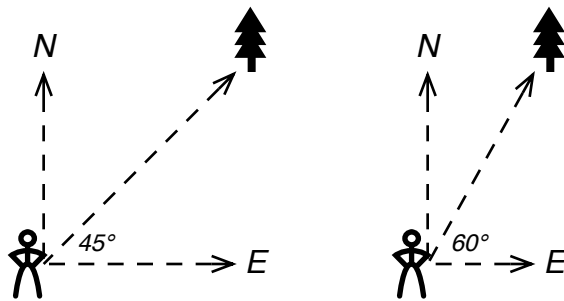


HW Set 1 Preliminaries

Problem 1 (triangulation)

A tree is located at some location. Using east as the reference direction, you have to rotate an angle of 45° from that direction to face the tree.

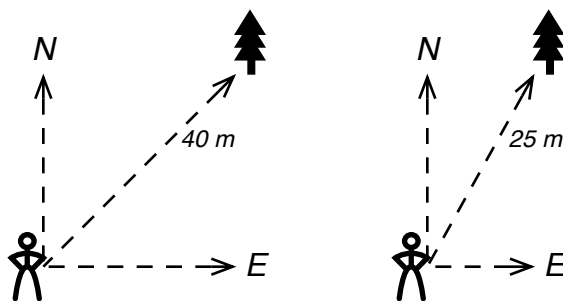


You then walk due east for 20 m. At that point, you have to turn 60° from east to face the tree.

- Use triangles to find the distance from the first location to the tree.
- Use triangles to find the distance from the second location to the tree.
- Write the position of the tree relative to the first location as a vector in cartesian coordinates. Use the east and north directions as axes.
- Write the position of the tree relative to the second location as a vector in cartesian coordinates. Use the east and north directions as axes.

Problem 2 (trilateration)

A tree is located at some location. You measure that the tree is 40 m away.



You then walk due east for 20 m. At that point, the tree is 25 m away.

- Use triangles to find the direction (angle) of the tree as measured from the east direction at the first location.
- Use triangles to find the direction (angle) of the tree as measured from the east direction at the second location.
- Write the position of the tree relative to the first location as a vector in cartesian coordinates. Use the east and north directions as axes.
- Write the position of the tree relative to the second location as a vector in cartesian coordinates. Use the east and north directions as axes.

Problem 3

- a. Find the conversion factor, the value (with units) that you multiply a number by, that converts a value in miles to kilometer.
- b. Find the conversion factor that converts a value in kilometers to meters.
- c. Find the conversion factor that converts a value in hours to seconds.
- d. Use the above results to find the conversion factor that converts a value in miles per hour to meters per second.

Problem 4

- a. What is the result of the following calculation to the correct number of significant digits?

$$\frac{1.2 \times 34.5}{678.90}$$

- b. What is the result of the following calculation to the correct number of significant digits?

$$\frac{1.23 \times 45.67}{890}$$