Task #1

Vectors $\vec{A}$ and $\vec{B}$ are shown below.

(a) Find the components of $\vec{A}$ and $\vec{B}$. ROTATE MARKER

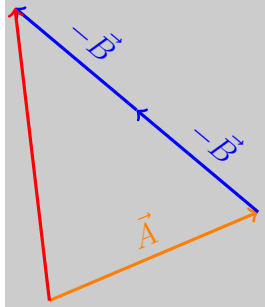
Solution:

$A_x = 9.21\,\text{m/s}$ $\quad$ $A_y = 3.91\,\text{m/s}$

$B_x = 5.36\,\text{m/s}$ $\quad$ $B_y = -4.49\,\text{m/s}$

(b) Sketch out what $\vec{R} = \vec{A} - 2\vec{B}$ would look like. ROTATE MARKER

Solution:

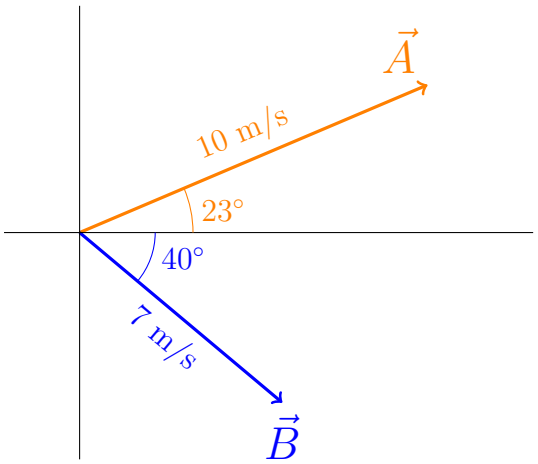


(c) Calculate the magnitude and direction of $\vec{R}$

Solution:

$R_x = -1.51\,\text{m/s}$ $\quad$ $R_y = 12.89\,\text{m/s}$

$\vec{R} = 12.98\,\text{m/s}$ 83.3° N of W



Task #2

The summit of a mountain, 2450 m above base camp, is measured on a map to be 4580 m horizontally from the camp in a direction 38.4° west of north.

(a) Find the x-, y-, and z- components of the displacement vector from camp to summit. (Use $+x$ as east, $+y$ as north and $+z$ as up.) ROTATE MARKER

Solution:

$$D_x = -2844.9\,\text{m} \qquad D_y = 3589.3\,\text{m} \qquad D_z = 2450\,\text{m}$$

(b) Find the magnitude of the displacement vector.

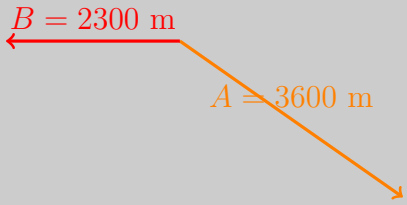
Solution:

$$D = 5194.1\,\text{m}$$

Task #3

You are at a location 3600 meters at a direction 35° south of east from a watchtower. Your endpoint is 2300 meters due west of the watchtower. How far and in what direction should you travel to get to your endpoint?

Solution:



$$\vec{A} + \vec{R} = \vec{B}$$
$$\vec{R} = \vec{B} - \vec{A}$$

$A_x = 2948.9$ $\qquad$ $A_y = -2064.9$

$B_x = -2300$ $\qquad$ $B_y = 0$

$R_x = -5248.9$ $\qquad$ $R_y = 2064.9$

$\vec{R} = 5640.5$ m @ 21.5 ° W of N