1.65 •• As a test of orienteering skills, your physics class holds a contest in a large, open field. Each contestant is told to travel 20.8 m due north from the starting point, then 38.0 m due east, and finally 18.0 m in the direction 33.0° west of south. After the specified displacements, a contestant will find a silver dollar hidden under a rock. The winner is the person who takes the shortest time to reach the location of the silver dollar. Remembering what you learned in class, you run on a straight line from the starting point to the hidden coin. How far and in what direction do you run?

Phys 131 Homework #1

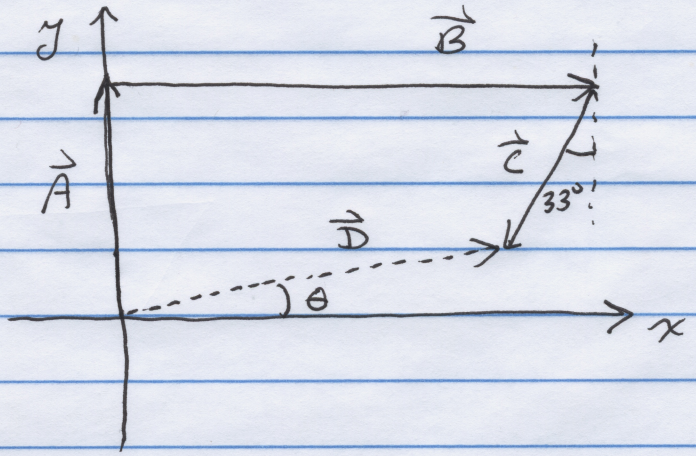
1.67 (1.65 in 15th edition)

$\vec{A} = 20.8\text{ m}$ @ 90° (North)

$\vec{B} = 38.0\text{ m}$ @ 0° (East)

$\vec{C} = 18.0\text{ m}$ @ -123° (33° west of South)

Find $\vec{D} = \vec{A} + \vec{B} + \vec{C}$



$A_x = A\cos 90^\circ = 0$ $\quad A_y = A\sin 90^\circ = 20.8\text{m}$

$B_x = B\cos 0^\circ = 38.0\text{m}$ $\quad B_y = B\sin 0^\circ = 0$

$C_x = 18.0\cos(-123^\circ) = -9.80\text{m}$ $\quad C_y = 18.0\sin(-123^\circ) = -15.10\text{m}$

$D_x = A_x + B_x + C_x = 28.20\text{m}$ $\quad D_y = A_y + B_y + C_y = 5.70\text{m}$

$D = \sqrt{D_x^2 + D_y^2} = \boxed{28.8\text{ m}}$

$\theta = \tan^{-1}(D_y/D_x) = \boxed{11.4^\circ}$