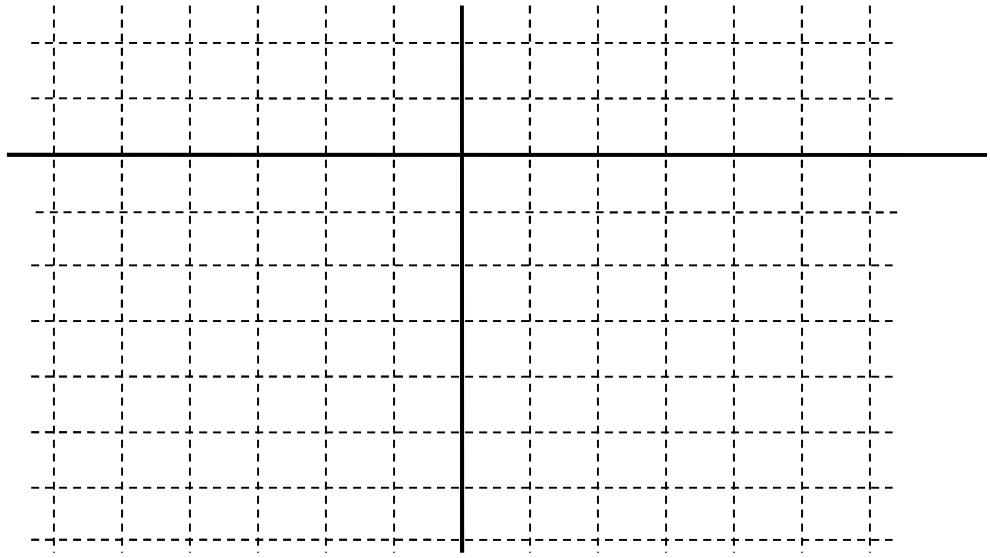
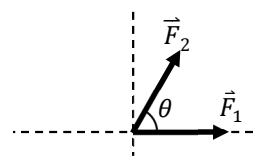
3.5 Bob first walks 20.0 m at 60.0° S of E, then 30.0m at 30.0° S of W, then an unknown direction and distance. Bob's final position is 5.00 m due east of his initial position. Use component wise addition to determine the third leg of the trip (distance and direction). Check your work by sketching the graphical addition on the grid below. Note: In this example, things won't line up perfectly on the gird lines. Let each tick mark below indicate 5 m.



3.6 Add the following vectors: $\vec{A} = 8.00$ @ 30.0° N of W, $\vec{B} = 10.0$ @ 40.0° W of S. Express your result in both Cartesian and polar forms. Include a sketch showing the graphical vector addition.

3.7 You are told $\vec{R} = \vec{A} + \vec{B} + \vec{C}$. $\vec{A} = 8.00\ due\ north$, $\vec{B} = 6.00$ @ 30.0° E of S, and $\vec{R} = 10.0\ due\ west$. Determine the unknown vector $\vec{C}$. The usual Cartesian, polar, and graphical answers are expected.

3.7½ For this problem be very careful to distinguish between force *vectors* and force *magnitudes*. Two force vectors ($\vec{F}_1$ & $\vec{F}_2$) have identical magnitude F. The first force is aligned with the positive x-axis. The second can be applied at any angle θ between 0° & 180°.



a) At what angle should $\vec{F}_2$ be placed to cause a net force magnitude of $1.75F$?
Hint: first pretend you actually know the angle and determine $\vec{F}_{NET} = \vec{F}_1 + \vec{F}_2$ as usual. Next determine the magnitude as usual. At this point you have a relationship between the net force magnitude (given in problem statement) and the angle (what to find).

b) What direction does the net force vector point when $F_{NET} = 1.75F$?

c) At what angle should $\vec{F}_2$ be placed to cause a net force magnitude of $\frac{F}{2}$?

d) At what angle should $\vec{F}_2$ be placed to cause a net force magnitude of F?

e) What angle gives no net force?

f) What is the maximum possible net force magnitude? What angle should be used to cause maximum net force?