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Examples- adding (and subtracting) vectors

1. Displacement A has magnitude of 1 km and direction E, and displacement B has magnitude 0.5 km and direction 30° N of E. Find the overall displacement $\vec{C} = \vec{A} + \vec{B}$.

- I. Graphical Method
 - set up a scale (e.g. 10 cm = 1 km) and draw the vectors to scale and at the specified angles.



- use a ruler to measure the length of $C \approx 1.4$ km
- use a protractor to measure $\theta \approx 10^{\circ}$ N of E.

II. Component method

- Re-draw A and B on an x-y coordinate system
- Use trig to calculate the x and y components of A and B.



2. Subtracting vectors

Suppose we have a vector \vec{B}

The vector having the same magnitude as B but pointing in the *opposite* direction is



 \overline{B}

Note that B and –B are *different* vectors. With this definition, then consider $\overline{A} - \overline{B} = \overline{A} + (-\overline{B})$, that is, to find the difference between 2 vectors we add one vector to the negative of the other vector.



 $\overrightarrow{A} + \overrightarrow{B}$ and $\overrightarrow{A} - \overrightarrow{B}$ do not have the same magnitude or the same direction.