## Vector Addition 1

Because vectors have a direction as well as a magnitude, they can't be added using the same methods as scalars.

**Example 1**
Jack pushes on a box with a force of $100\ N\ [East]$. Jill pushes on the same box with a force of $100\ N\ [West]$. What is the net force on the box?

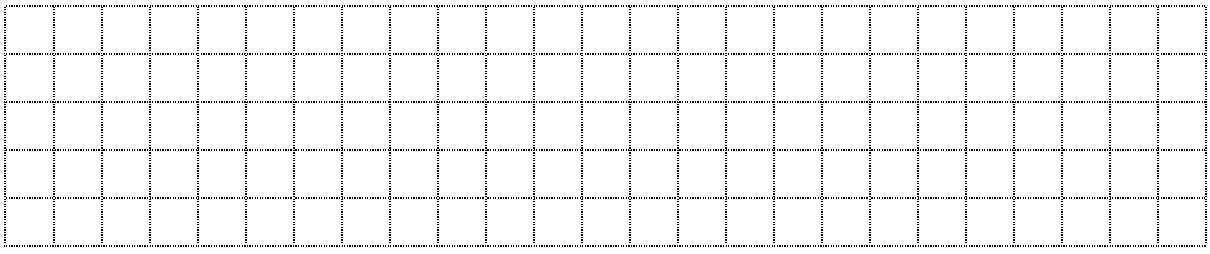
Vector addition can be carried out using one of several methods. The first is the graphical, or scale diagram method.

## Adding Vectors Using Scale Diagrams

To add two or more vectors using a scale diagram:

1. Draw the first vector to scale.
2. Draw the second vector to scale, but it must start from the tip of the first vector.
3. Repeat step 2 for any additional vectors.
4. Draw an arrow that points from the start of the first vector to the end of the last vector. This is known as the **resultant vector**, and is the sum of the other vectors.
5. Determine the magnitude and direction of the resultant by measuring with a ruler and protractor.

**Example 2**
A dog walks $200\ m\ [East]$, stops to pay his respects to a fire hydrant, and then continues walking another $400\ m\ [East]$. Determine the displacement of the dog at the end of his walk.



**Example 3**

A cyclist travels $5\ km\ [N]$, then turns right and travels another $10\ km\ [E]$. Determine the displacement of the cyclist at the end of her ride.

**Homework**

Add the following combinations of vectors using **scale diagrams**:

1. $A + B$
2. $A + C$
3. $B + D$
4. $B + F$
5. $C + E$
6. $C + D$
7. $D + F$
8. $F + D$
9. $A + B + F$
10. $A + B + C + D + E + F + G$

$A = 100\ m\ [N]$
$B = 50\ m\ [E]$
$C = 42.5\ m\ [S]$
$D = 63.5\ m\ [W]$

$E = 94.5\ m\ [S]$
$F = 15\ m\ [N]$
$G = 175\ m\ [W]$