<u>Drawing & Adding Vectors</u>

<u>Motion</u> - involves a change in the position of an object over time.

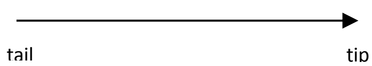
Motion can be described in **scalar** or **vector** terms. '**Scalar'** means there is no reference to direction (distance, speed & acceleration). '**Vector'** means one takes note of direction (displacement, velocity & acceleration). Physicists prefer vectors. In symbol form, how do you know a variable is a vector? ________________________________.

<u>Working with NESW reference coordinates</u>

Quite often we use north/south/east/west reference coordinates but the object is moving or is positioned obliquely (ie: NOT due north,south,east or west). So we might say the position is 25 km [E 35° S]. To translate this, start pointing east, then drop 35° towards south. This is the direction! There are other ways to describe direction, but I prefer this way since you follow the directions in order!

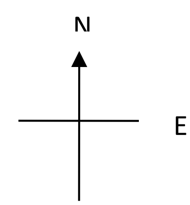
<u>Drawing & Adding Vectors</u>

Vectors are represented by a line with an arrowhead at the end in the direction of travel. The tail is the origin (start) and the tip is the end or arrowhead.



Use a scale of 1 cm = 100 m and draw the following accurately. * is the reference point.

*



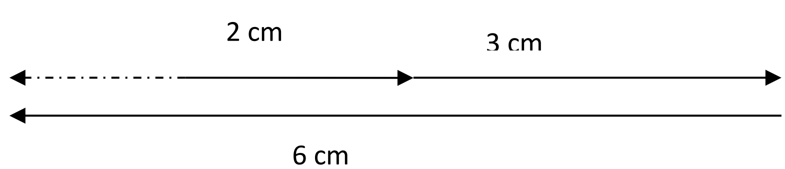
*

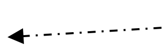
*

200 m [E] *150 m [W 45° S]* *300 m [N 10° E]*

*Adding **<u>Collinear</u>** vectors* – these are vectors that are drawn in 1 plane. In other words, in 1 dimension (1D) or in a straight line. (north and south vectors, up and down vectors). Simply draw (add) them tail-to-tip style. The resultant vector (the sum, the answer) is draw from the tail of the first vector to the tip of final vector. It is dotted 

ie: 2 cm [right] + 3 cm [right] + 6 cm [left] would look like this:



 = the resultant. You could measure, but logic tells you it's 1 cm [left].

You can also use scale drawings (OK) or math (**preferable**). Math results would use integers in 1 dimension. ie: set [right] = +ve. Therefore, you would have:

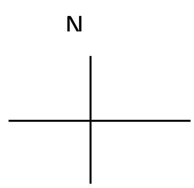
(+2 cm) + (+3 cm) + (-6 cm) = -1 cm [right].

* you always set the final [direction] as the one you set +ve. You can <u>reverse the direction</u>.
So… -1 cm [right] = +1 cm [left] Notice: I switch the sign AND the direction!

Adding ***<u>Non-Collinear</u>*** *vectors* – these are vectors that are drawn in 2 planes. In other words, in 2 dimensions (2D) or **not** in a straight line. (north and east vectors, up and left vectors). Simply draw (add) them tail-to-tip style. The resultant vector (the sum, the answer) is draw from the tail of the first vector to the tip of final vector. (<u>tail-to-tip</u>) It is dotted. –·–·–·–·–·–·▶

<u>Try this one</u>: I start at reference point A and travel 300 m [W], then 100 m [N] and then 300 m [N] at which point I stop. This is point B. Label these points.
What is the distance travelled? Δd = ______________.
How do I calculate the displacement? $\vec{\Delta d}$ = _______

Remember it is the *straight line* change in position. You will need to do a tip-to-tail scale drawing.
Hint: look at Fig. 1.8 on page 10 of your text. Tail-to-tip connect 'A' to 'B'. Try!



1 cm = 50 m

*start

Remember: include scale and reference coordinates! Accuracy counts!
Mathematic solutions are preferred. Do you know how to do this? **Ask for help if uncertain!**