VECTORS

VOCABULARY, SYMBOLS & FORMULAS

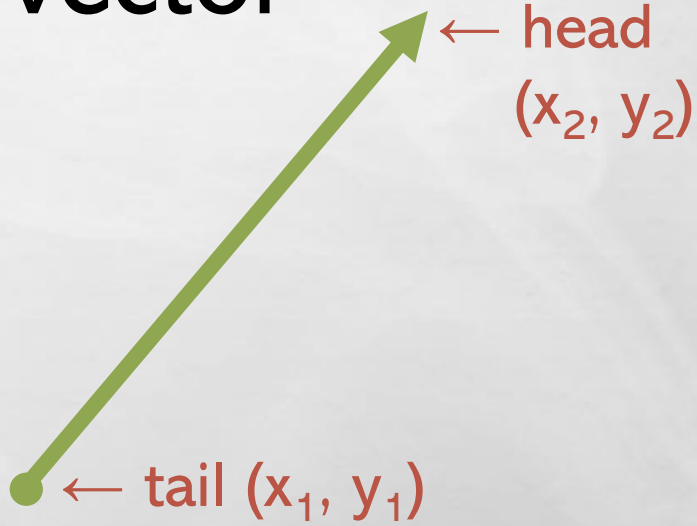
- Today is just about creating a vocabulary and formula sheet to reference throughout the unit.
- Do NOT expect to understand anything today!
- We will learn about each item one day at a time in more detail with examples.

VECTOR -

- a directed line segment that has both magnitude and direction
- represented by $\boldsymbol{v}$ or $\vec{v}$

TAIL / HEAD -

- the tail is the initial point of the vector
- the head is the terminal point (arrow-tip) of the vector



COMPONENT FORM -

- symbolic way to represent a vector
- formula: $\vec{v} = \langle x_2 - x_1, y_2 - y_1 \rangle$

STANDARD FORM -

- the result of finding component form, which puts the initial point at the origin
- represented by $\vec{v} = \langle x, y \rangle$

MAGNITUDE -

- the size/length of a vector
- represented by $\|\boldsymbol{v}\|$ or $\left\|\vec{v}\right\|$
- formula: $\left\|\vec{v}\right\| = \sqrt{x^2 + y^2}$

DIRECTION -

- the angle a vector makes with the x-axis
- represented by θ
- formula: $\theta' = \tan^{-1}\left(\frac{y}{x}\right)$

RESULTANT VECTOR -

- the result of adding or subtracting two or more vectors
- represented by: $\vec{r} = \vec{a} + \vec{b}$

UNIT VECTOR -

- a vector that is one unit long
- represented by $\vec{i}$ and $\vec{j}$
- formula: $\vec{u} = \frac{\vec{v}}{\|\vec{v}\|}$

DOT PRODUCT -

- a scalar quantity associated with two vectors
- represented by $\vec{v} \bullet \vec{w}$
- formula: $\vec{v} \bullet \vec{w} = v_1 w_1 + v_2 w_2$

ORTHOGONAL VECTORS -

- vectors that form a 90° angle and have a dot product $= 0$

ANGLE BETWEEN TWO VECTORS -

- formula: $\theta = \cos^{-1}\left(\frac{\vec{v} \bullet \vec{w}}{\|\vec{v}\| \cdot \|\vec{w}\|}\right)$

VECTOR IN TRIG FORM -

- used to make applications easy!
- represented by $\vec{v} = \left\|\vec{v}\right\| \langle \cos\theta, \sin\theta \rangle$

VECTOR APPLICATIONS -

- $\vec{r} = \vec{a} + \vec{b}$
- $\|\vec{r}\|$ = resultant speed or distance