Let's learn about vectors take it slow.
In 2 or 3 dimensions, they will go.
In every direction, they will move.
In your life, we'll see how they are used.

Can you plank on your desk?

Today's learning objective:

By the end of class, I will be able to understand vector nomenclature.
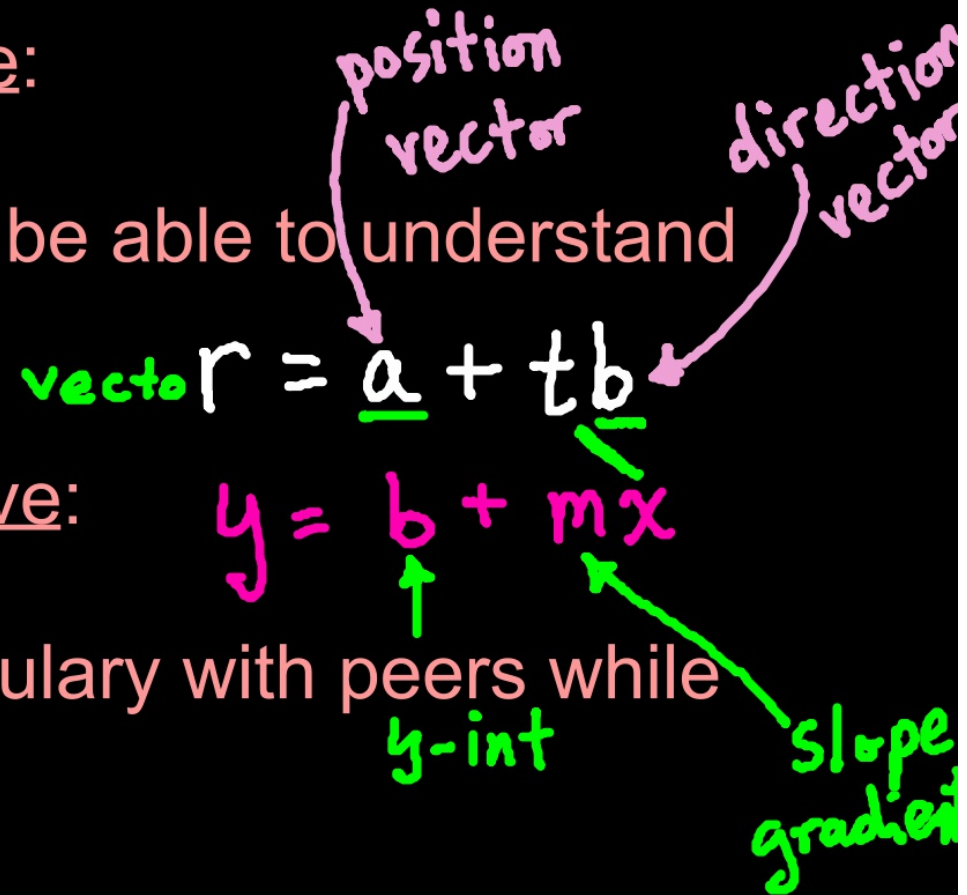
Today's language objective:

*I will utilize vector vocabulary with peers while solving problems.
Nomenclature
Magnitude
• Position vector
• Direction vector
• Equation of a vector
• Parameter (t) $\approx$ variable (x) $\approx$ time

position vector

direction vector

vector $r = \underline{a} + t\underline{b}$

$y = b + mx$

y-int

slope gradient

$$r = \begin{bmatrix} 3 \\ 2 \\ 14 \end{bmatrix} + t \begin{bmatrix} 1 \\ -10 \\ -2 \end{bmatrix}$$

Find position after
10 seconds of flight

t = seconds

$$\begin{bmatrix} 3 \\ 2 \\ 14 \end{bmatrix} \begin{array}{l} x \quad EW \\ y \quad NS \\ z \quad alt \end{array}$$

$$10 \begin{bmatrix} 1 \\ -10 \\ -2 \end{bmatrix} \begin{array}{l} 10 \\ -100 \\ -20 \end{array}$$

$$\begin{bmatrix} 13 \\ -98 \\ -6 \end{bmatrix}$$

$(13, -98, -6)$

15.) Consider the points P(2, −1, 5) and Q(3, −3, 8). Let L_1 be the line through P and Q.

(a) Show that $\overrightarrow{PQ} = \begin{pmatrix} 1 \\ -2 \\ 3 \end{pmatrix}$.

$$\begin{pmatrix} 3 \\ -3 \\ 8 \end{pmatrix} - \begin{pmatrix} 2 \\ -1 \\ 5 \end{pmatrix} = \begin{bmatrix} 1 \\ -2 \\ 3 \end{bmatrix}$$

(b) The line L_1 may be represented by $r = \begin{pmatrix} 3 \\ -3 \\ 8 \end{pmatrix} + s \begin{pmatrix} 1 \\ -2 \\ 3 \end{pmatrix}$.

$$\begin{bmatrix} \pi \\ -2\pi \\ 3\pi \end{bmatrix}$$

$$\begin{bmatrix} 2 \\ -4 \\ 6 \end{bmatrix}$$

(i) What information does the vector $\begin{pmatrix} 3 \\ -3 \\ 8 \end{pmatrix}$ give about L_1?

(ii) Write down another vector representation for L_1 using $\begin{pmatrix} 3 \\ -3 \\ 8 \end{pmatrix}$.

(b)   The line L_1 has equation $\begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} -3 \\ 4 \\ 2 \end{pmatrix} + s \begin{pmatrix} -4 \\ 6 \\ -1 \end{pmatrix}$.

Write down the coordinates of two points on L_1.

$(-3, 4, 2)$ $(-7, 10, 1)$

$(-3 - 4e, 4 + 6e, 2 - e)$

1.)   A line L passes through A$(1, -1, 2)$ and is parallel to the line $r = \begin{pmatrix} -2 \\ 1 \\ 5 \end{pmatrix} + s\begin{pmatrix} 1 \\ 3 \\ -2 \end{pmatrix}$.

(a)   Write down a vector equation for L in the form $r = a + tb$.

$$L = \begin{pmatrix} 1 \\ -1 \\ 2 \end{pmatrix} + t\begin{pmatrix} 1 \\ 3 \\ -2 \end{pmatrix}$$

The line L passes through point P when $t = 2$.

(b)   Find   origin

(i)   OP ;

$$\begin{pmatrix} 3 \\ 5 \\ -2 \end{pmatrix}$$

$$\begin{bmatrix} 1 \\ -1 \\ 2 \end{bmatrix} + 2\begin{bmatrix} 1 \\ 3 \\ -2 \end{bmatrix}$$

origin

After solving those problems, do you feel like a beast?