

Name: _____ Date: 11/13/25

Session 14

Review of parametric equations!

Create a table for the following parametric equations! $-2 \leq t \leq 2$

$$x = 2t^2$$

$$y = 5t + 1$$

Now, graph the function. Determine its direction and draw arrows to show direction!

Finally, eliminate the parameter in the following parametric equations!

(it doesn't matter if its $x =$ or $y =$, whatever is easier for you to solve for!)

Now, we move on to vectors!!

What is the definition of a vector?

Useful properties to know!

(as you practice, these will become less scary, I promise!!)

$$\vec{u} + \vec{v} = \vec{v} + \vec{u}$$

$$c(\vec{u} + \vec{v}) = c\vec{u} + c\vec{v}$$

$$\vec{u} + (\vec{v} + \vec{w}) = (\vec{u} + \vec{v}) + \vec{w} \quad (c+d)\vec{u} = c\vec{u} + d\vec{u}$$

zero
vector

$$\vec{0} = \langle 0, 0 \rangle$$

$$\vec{u} + \vec{0} = \vec{u}$$

$$(cd)\vec{u} = c(d\vec{u}) = d(c\vec{u})$$

$$\vec{u} + (-\vec{u}) = \vec{0}$$

$$1 \cdot \vec{u} = \vec{u}$$

$$|c\vec{u}| = |c||\vec{u}|$$

$$0 \cdot \vec{u} = \vec{0}$$

$$c \cdot \vec{0} = \vec{0}$$

Some more helpful stuff to know about vectors!!

$$|\vec{a}| = \sqrt{(a_x)^2 + (a_y)^2}$$

The white raft you are in is travelling at a speed of 35mph heading $N 35^\circ W$. The current of the water is 20mph heading $S 51^\circ E$. What is the resultant vector and the direction?

Dot product!

If you have $\vec{a} = \langle a_1, a_2 \rangle$ and $\vec{b} = \langle b_1, b_2 \rangle$,

then your formula is

$$\vec{a} \cdot \vec{b} = (a_1 b_1) + (a_2 b_2)$$

Your answer should just
be a number, not a
vector!

If you have an angle between $\vec{a}$ and $\vec{b}$, then

$$\vec{a} \cdot \vec{b} = |\vec{a}| |\vec{b}| \cos \theta \quad \text{or} \quad \cos \theta = \frac{\vec{a} \cdot \vec{b}}{|\vec{a}| |\vec{b}|}$$

If $\vec{a}$ and $\vec{b}$ are perpendicular (orthogonal),
then and only then,

$$\vec{a} \cdot \vec{b} = 0$$

$\uparrow$
regular
zero

properties of dot product

$$\vec{u} \cdot \vec{v} = \vec{v} \cdot \vec{u}$$

$$(c\vec{u}) \cdot \vec{v} = c(\vec{u} \cdot \vec{v}) = \vec{u} \cdot (c\vec{v})$$

$$(\vec{u} + \vec{v}) \cdot \vec{w} = \vec{u} \cdot \vec{w} + \vec{v} \cdot \vec{w} \quad |\vec{u}|^2 = \vec{u} \cdot \vec{u}$$

Determine the Dot product of the two vectors and the angle between them!

$$\vec{a} = 3\mathbf{i} + 4\mathbf{j}$$

$$\vec{b} = 5\mathbf{i} - 2\mathbf{j}$$

Determine the Dot product of the two vectors and the angle between them!

$$\vec{a} = \langle 15, 6, -10 \rangle$$

$$\vec{b} = \langle 2, 5, -3 \rangle$$