

C) A ship is heading due south at 15 mph. The current is flowing northwest at 3 mph. Find the actual bearing and speed of the ship.

$$\text{ship + current} = \langle 15\cos 270 + 3\cos 135, 15\sin 270 + 3\sin 135 \rangle \\ = \langle -2.121, -12.878 \rangle$$

$$\theta = \tan^{-1}\left(\frac{-12.878}{-2.121}\right) = 80.6 \text{ Ref angle}$$

$$\text{Bearing} = 180 + 80.6 = 260.6^\circ$$

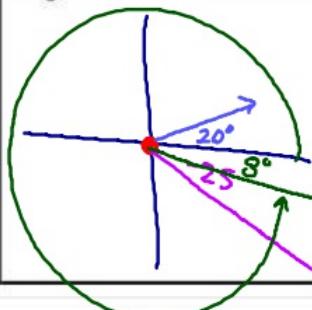
$$\text{Speed} = \sqrt{(-2.121)^2 + (-12.878)^2} = 13.052 \text{ mph}$$

Shooting a basketball: A basketball is shot at an angle 65° with an initial speed of 12m/sec.

a. Find the component form of the initial velocity.

b. Give an interpretation of the horizontal and vertical components of the velocity.

Combining Forces: A force of 40 lbs acts on an object at angle of 20° . A second force of 65 pounds acts on the object at an angle if -25° . Find the direction and magnitude of the resultant force.



$$\angle \text{ positive} \\ \theta = \tan^{-1}$$

$$\langle 40\cos 20 + 65\cos(-25), 40\sin 20 + 65\sin(-25) \rangle$$

$$\text{ref angle } -8.132^\circ$$

$$\text{direction: } 360 - 8.132 = 351.868^\circ$$

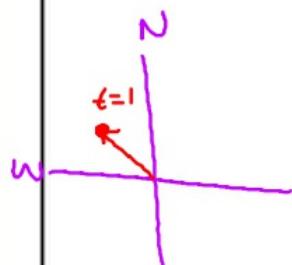
$$\text{mag} = 94.7 \text{ lbs}$$

What you'll Learn About

- Parametric Equations/Parametric Curves/Eliminating the Parameter
- Lines and Line Segments/Simulating Motion with a grapher

A ship is heading northwest at 12 mph.

PARAMETRIC EQUATIONS



a. Find the component form of the ship after 1 hour.

$$\langle 12 \cos 135, 12 \sin 135 \rangle$$

b. Find the component form of the ship after 2 hours.

$$\langle 24 \cos 135, 24 \sin 135 \rangle$$

c. Find the component form of the ship after 3 hours.

$$\langle 36 \cos 135, 36 \sin 135 \rangle$$

d. Write the parametric equations for the boat at any time t.

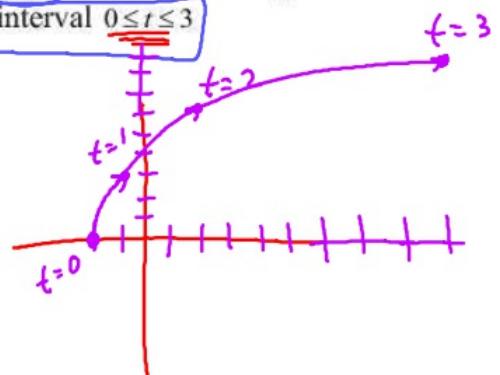
$$\langle 12t \cos 135, 12t \sin 135 \rangle$$

$$x = 12t \cos 135 \quad y = 12t \sin 135$$

For the given parameter interval graph the parametric equations

A. $x = t^2 - 2$ $y = 3t$ on the interval $0 \leq t \leq 3$

t	x	y
0	-2	0
1	-1	3
2	2	6
3	7	9



B. $x = t^2 - 2$ $y = 3t$ on the interval $0 \leq t \leq 5$

C. $x = t^2 - 2$ $y = 3t$ on the interval $-3 \leq t \leq 1$

D. $x = t^2 - 2$ $y = 3t$ on the interval $-\infty \leq t \leq \infty$

time →
1) Solve 1 equation for t
2) Substitute into other equation

Eliminate the parameter and identify the graph of the parametric curve

A) $x = t^2 - 2$ $y = 3t$

$$9x+18=y^2$$

B) $x = 1 - 2t$ $y = 2 - t$

$x = t^2 - 2$ $\frac{y}{3} = t$ $\sqrt{9x+18} = y$

✓ $x = \left(\frac{y}{3}\right)^2 - 2$ $\frac{y}{3} = t$

$x = \frac{y^2}{9} - 2$ $x + 2 = \frac{y^2}{9}$

C) $x = 2\cos(t)$ $y = 2\sin(t)$

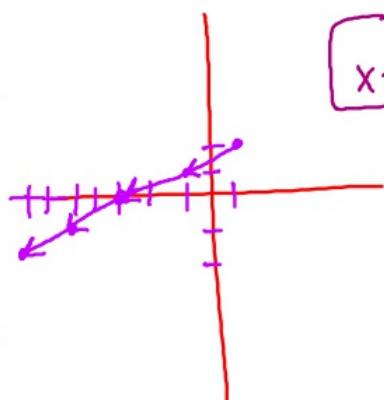
D) $x = 3\cos(t) - 2$ $y = 4\sin(t) + 5$

E) $x = 2\sec(t)$ $y = 2\tan(t)$ $0 \leq t \leq 2\pi$

$$x = 1 - 2t \quad y = 2 - t$$

$$0 \leq t \leq 4$$

t	x	y
0	1	2
1	-1	1
2	-3	0
3	-5	-1
4	-7	-2



Graph and
Eliminate Parameter

$$x = 1 - 2t$$

$$y = 2 - t$$

$$x = 1 - 2(-y + 2)$$

$$-y + 2 = t$$

$$(11) \quad x = 1 + t \quad y = 2 \quad 0 \leq t \leq 3$$

Graph and
Eliminate Parameter

$$(15) \quad x = t^2 \quad y = t + 1 \quad 0 \leq t \leq 4$$

$$(21) \quad x = t - 3 \quad y = \frac{2}{t} \quad -5 \leq t \leq 5$$