# Practice Worksheet

## Vectors and Parametric Equations

***Write a vector equation of the line that passes through point P and is parallel to $\vec{a}$. Then write parametric equations for the line.***

1. $P(-2, 1), \vec{a} = (3, -4)$

$x = -2 + 3t$
$y = 1 - 4t$
$x = \text{start} \pm \text{forward/back } t$

2. $P(3, 7), \vec{a} = (4, 5)$

$x = 3 + 4t$
$y = 7 + 5t$

3. $P(2, -4), \vec{a} = (1, 3)$

$x = 2 + t$
$y = -4 + 3t$

4. $P(5, -8), \vec{a} = (9, 2)$

$x = 5 + 9t$
$y = -8 + 2t$

***Write the equation of each line in parametric form.***

choose a pt on graph

5. $y = 3x - 8$

$m = \frac{\vec{a}}{} = \frac{3}{1} = \frac{b}{a}$
$\langle 1, 3 \rangle$ $(0, -8)$
$x = 0 + 1t$
$y = -8 + 3t$

6. $y = -x + 4$

$m = -1 = b/a$
$\langle 1, -1 \rangle$ $(0, 4)$
$x = t$
$y = 4 - t$

7. $3x - 2y = 6$

$m = 3/2$
$\langle 2, 3 \rangle$ $(0, -3)$
$x = 2t$
$y = -3 + 3t$

8. $5x + 4y = 20$

$m = -5/4$
$\langle 4, -5 \rangle$ $(0, 5)$
$x = 4t$
$y = 5 - 5t$

***Write an equation in slope-intercept form of the line with the given parametric equations.***

9. $x = 2t + 3$, $y = t - 4$

$t = y + 4$
$x = 2(y + 4) + 3$
$x - 3 = 2y + 8$
$2y = x - 11$
$y = \frac{1}{2}x - \frac{11}{2}$

10. $x = t + 5$, $y = -3t$

$t = x - 5$
$y = -3(x - 5) = -3x + 15$

11. $x = t + 4$, $y = t - 9$

$t = x - 4$
$y = x - 4 - 9 = x - 13$

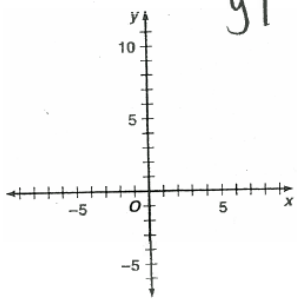
12. $x = 7t + 3$, $y = -6t + 8$

$t = \frac{x - 3}{7}$
$y = -6\left(\frac{x - 3}{7}\right) + 8$
$= -\frac{6}{7}x + \frac{74}{7}$

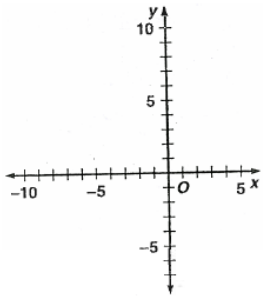
***Set up a table of values and then graph each line from its parametric form.***

13. $x = 5t + 3$, $y = -2t + 7$

| $t$ | $x$ | $y$ |
|---|---|---|




14. $x = 3t - 9$, $y = -2t + 5$



motion of ball → $X = V_0 \cos\theta t$ ⇐ $y = V_0 \sin\theta t + S_0 - 16t^2$ (ft) $-4.9t^2$ (m/s)

horizontal component

# Practice Worksheet $h(t) = -16t^2 + V_0 t + h_0$

## Using Parametric Equations to Model Motion (position function)

$V_0$ & $\theta$ will be given

vertical

$S_0 = h_0$

***For each exercise,***
***a) write parametric equations to represent the path of the object,***
***b) graph the path, and***
***c) solve.***
***Round your answers to the nearest hundredth.***

**1.** A rock is tossed at an initial velocity of 50 m/s at an angle of 8° with the ground. After 0.8 seconds, how far has the rock traveled horizontally and vertically?

$X = V_0 \cos\theta t = 50(\cos 8)(.8) = 39.6\text{ m}$

$h_0 = 0$

$V_0 = 50$
$\theta = 8°$
$t = .8$

$y = 50(\sin 8)(.8) + 0 - 4.9(.8)^2 = 2.43\text{ m}$

**2.** A toy rocket is launched at an initial velocity of 80 ft/s at an angle of 80° with the horizontal. How long will it take for the rocket to be 10 feet horizontally from its starting point. What will its vertical distance be at that point?

$V_0 = 80$ $\theta = 80°$
$t = ?$
$X = 10$
$y = ?$

$10 = 80\cos 80t$
$t = .72$ seconds

$y = 80(\sin 80)(.72) - 16(.72)^2$
$= 48.43$ ft.

**3.** A bullet is shot at a target 200 feet away. If the bullet is shot at a height of 5 feet, with an initial velocity of 150 ft/s, and at an angle of 10° with the horizontal, when will it reach the target, and what will be the height where it hits?

$X = 200'$ $t = ?$
$S_0 = 5$ $y = ?$
$V_0 = 150$ ft/s
$\theta = 10°$

$200 = 150(\cos 10)t$
$t = 1.35$ seconds

$y = 150(\sin 10)(1.35) + 5 - 16(1.35)^2$
$= 11.00$ ft

**4.** A disk is thrown from a height of 5 meters at an initial velocity of 65 m/s at an angle of 10° with the ground. After 0.5 second, how far has the disk traveled horizontally and vertically?

$S_0 = 5$ m
$V_0 = 65$ m/s
$\theta = 10°$
$t = .5$ sec

$X = 65(\cos 10°)(.5) = 32\text{ m}$
$y = 65(\sin 10)(.5) + 5 - 4.9(.5)^2$
$= 9.42\text{ m}$