

### 9-5 Parametric Equations Day 1

**Parametric Equations:** Have 2 equations to allow for a third variable or parameter:  
 $x = f(t)$   
 $y = g(t)$

Ex 1) Make a table of points and then graph the equations if:

$$x = t^2 - 4 \quad -2 \leq t \leq 3$$

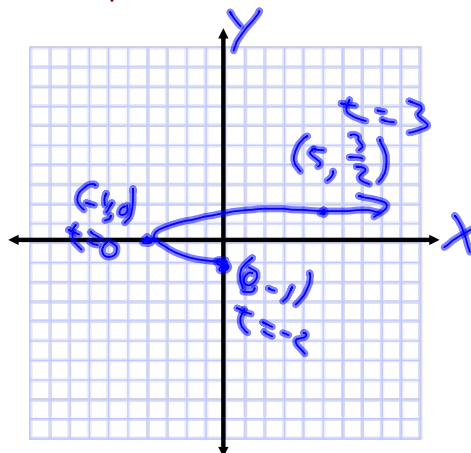
$$y = t/2$$

t	x	y
-2	0	-1
0	-4	0
3	5	1.5

$$x = (-2)^2 - 4$$

$$x = 4 - 4 = 0$$

$$y = \frac{-2}{2} = -1$$



Ex 2) **Eliminate the parameter**—convert the parametric equations to rectangular.

a)  $x = 3t - 3$   
 $y = 2t + 1$

$$x + 3 = 3t \Rightarrow \frac{x+3}{3} = t$$

$$y = 2\left(\frac{x+3}{3}\right) + 1$$

$$y = \frac{2x+6}{3} + 1$$

$$y = \frac{2}{3}x + \frac{6}{3} + 1$$

$$y = \frac{2}{3}x + 3$$

b)  $x = t$   
 $y = -4t$

$$y = -4x$$

$$c) \begin{aligned} x &= (1/4)t \\ y &= t^2 \end{aligned} \rightarrow (4x) = t$$

$$y = (4x)^2$$

$$y = 16x^2$$

$$d) \begin{aligned} x &= 3 \cos t \\ y &= 4 \sin t \end{aligned}$$

$$\sin^2 \theta + \cos^2 \theta = 1$$

$$\frac{1}{3}x = \cos t$$

$$\frac{1}{4}y = \sin t$$

$$\sin^2 t = \left(\frac{1}{4}y\right)^2$$

$$\sin^2 t + \cos^2 t = 1$$

$$\left(\frac{1}{4}y\right)^2 + \left(\frac{1}{3}x\right)^2 = 1$$

$$\frac{1}{16}y^2 + \frac{1}{9}x^2 = 1$$

$$\frac{y^2}{16} + \frac{x^2}{9} = 1$$