Warm up
Translate the following parametric equations into rectangular form and name the conic.

1. $x = 6\cos\theta + 1 \qquad y = 4\sin\theta + 2$

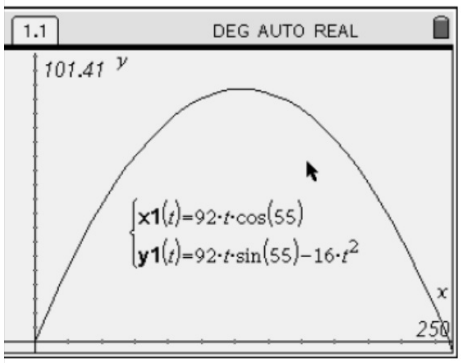
2. $x = 2\cos\theta - 3 \qquad y = \sin^2\theta - 2$

3. Change from degrees to radians:

a) 300° $\frac{5\pi}{3}$ b) -150° $\frac{7\pi}{6}$ c) 220° $\frac{11\pi}{9}$

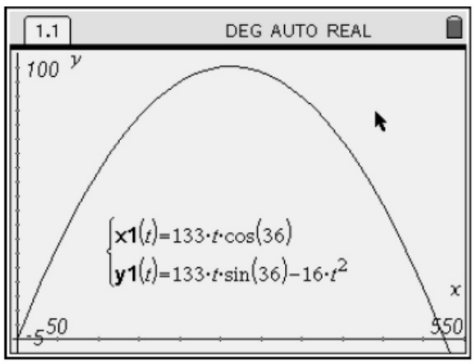
4. Change from radians to degrees:

a) $\pi/12$ 15° b) $-5\pi/6$ 210 c) $4\pi/3$ 240°



3

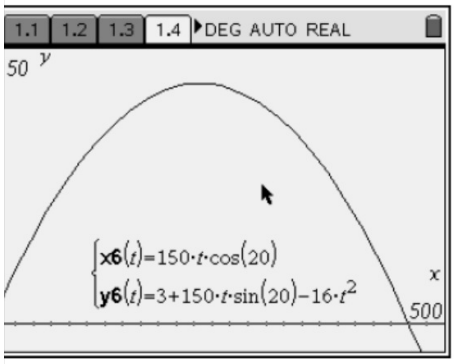
The maximum height reached is about **88.7 ft** and the horizonta
distance traveled is about **249 ft**.



4

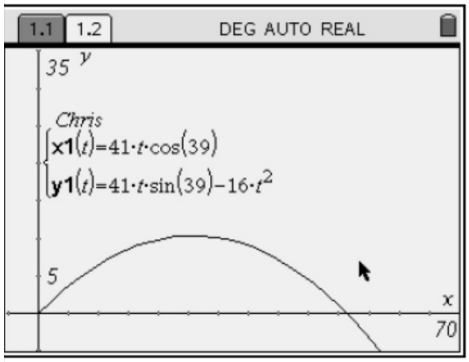
ll will land about **526 feet** from where it was hit after about
conds.

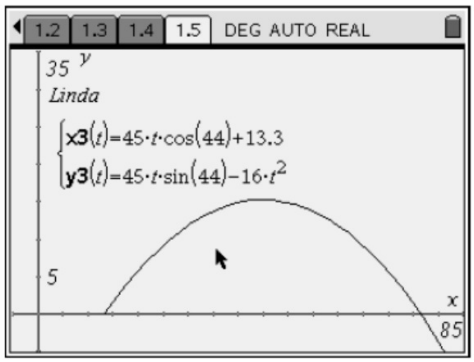
ll will **easily clear** the fence.

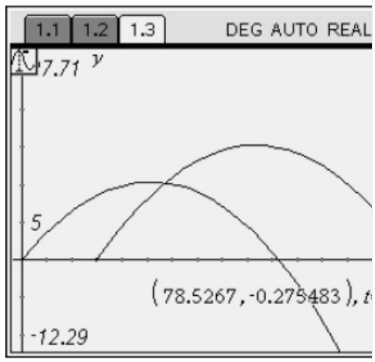


5

At 400 ft, the ball's height is only 19.8 feet, so it **will not make i**
over the fence and Sammy does not get the grand slam.







In order to obtain correct time values for Linda's curve, use approximately $1.96 - t$

$0 < t < 2$

Thrower	**Chris**	**Linda**
Max height	10.4 ft	15.3 ft
Horizontal distance	51.0 ft	64.7 ft
Time to hit ground	1.6 s	2.0 s

Chris' ball hits the ground first. The two balls paths never meet.

[redacted]

A football place kicker is kicking a ball at a n angle of 50^0 and an initial velocity of 85 ft/s. What is the hang time of the punt?

3. The hang time of the punt is 4.07 seconds.

What is the maximum height of the ball?

4. The maximum height of the ball is 66.245 ft.

How far down the field will the ball travel?

222

5. The ball will travel 265.013 ft, 88.338 yards

Elmo the human cannonball is set to make his trip across the circus floor. The cannon is set to fire at 45 ft/s and at a 60^0 angle. How high must the catching net be set if it is sitting 46 feet away?

x

6. Elmo's catching net must be 12.81 ft high to catch him.

[redacted]

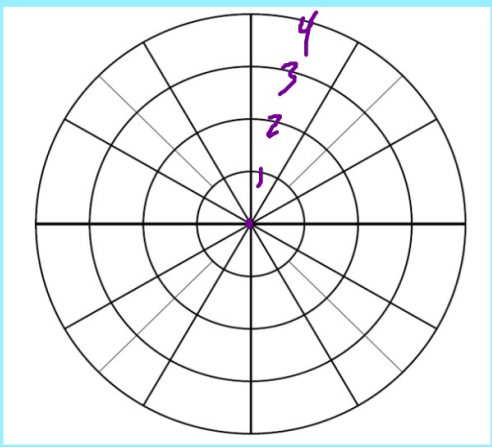
Objective: Graph polar coordinates

A polar coordinate systems uses distances and angle to record the position of a point. Points are written as (r, θ) where $|r|$ is the distance from the pole (origin).

(x, y)

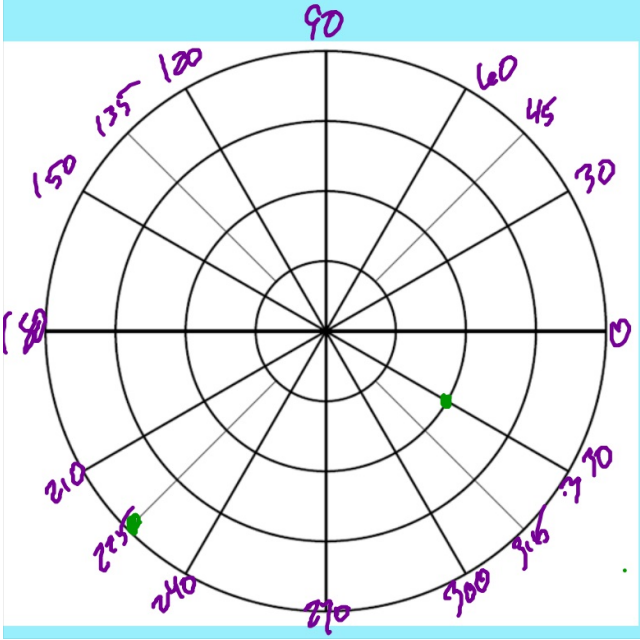
Positive angles mean counterclockwise movement and negative angles mean clockwise movement

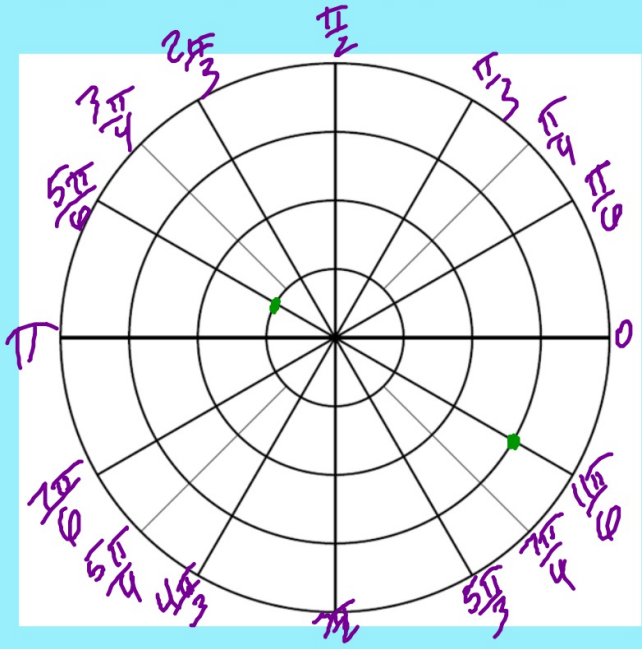
(r, θ)



Graphing Polar Coordinates

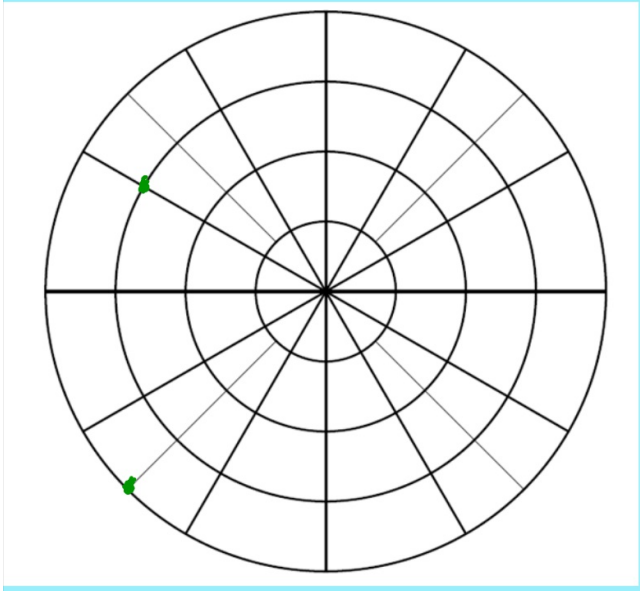
(4, 225) (2, -30) (1, 5π/6) (3, -π/6)

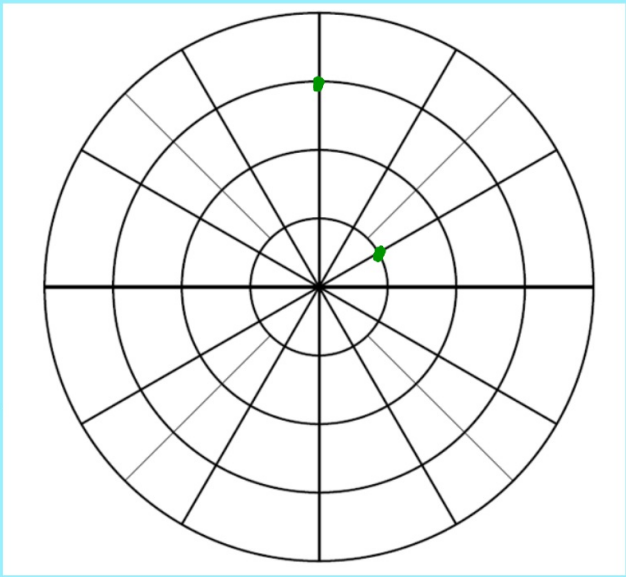




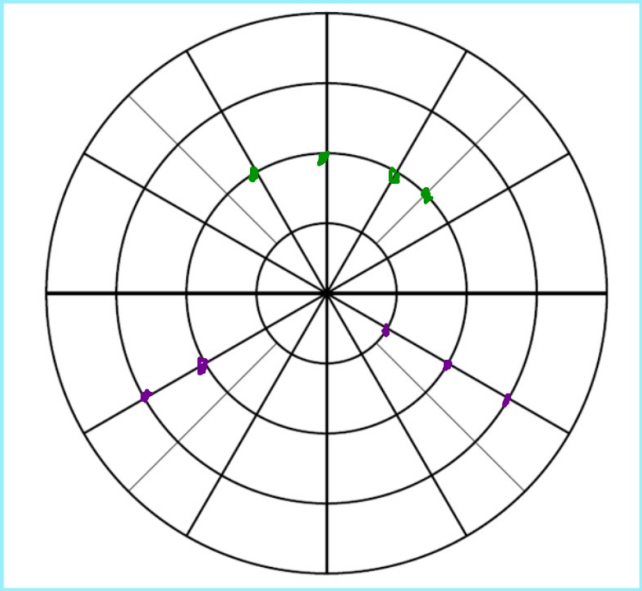
Graphing Polar Coordinates

(-4, 45) (-3, -30) (-1, 7π/6) (-3, -π/2)





Plot (4,135°) (4,-225°) (-4,315°) (-4,-45°)



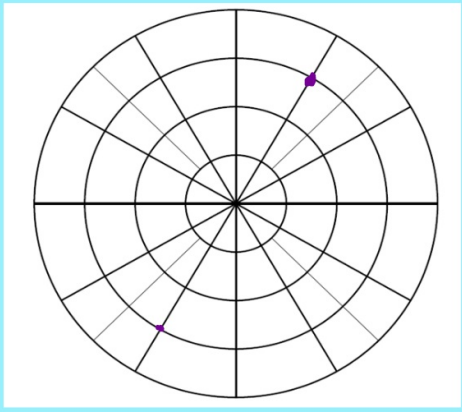
(+,+)
(−,+)
(+,−)
(−,−)

Steps for finding 3 different points for the same given

1. add or subtract 2π or 360°
2. replace r with - r and add π or 180°
3. replace r with - r and subtract π or 180°

(3, 60°)

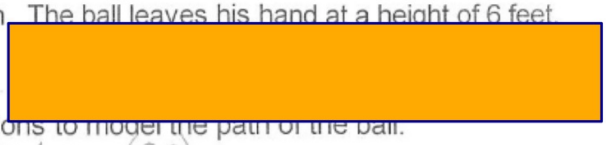
Example find three additional points between -2π and 2π for (2,π/6)



(2, −11π/6)
(−2, −5π/6)
(−2, 7π/6)

(3, −300°)
(−3, 240°)
(−3, −120°)

3. Projectile Motion Khris Davis throws a baseball with an initial velocity of 115 feet per second at an angle of 20° to the horizon. The ball leaves his hand at a height of 6 feet.



a) Write parametric equations to model the path of the ball.

$x(t) = 115t\cos(20)$

$y(t) = -16t^2 + 115t\sin(20) + 6$

b) How long is the ball in the air? 2.6

c) Assuming that the throw is on target, if Khris was 270 feet away from home plate when making the throw, will the catcher be able to catch the ball? Yes @ 2.5 sec ball is 270.1 ft and height 4.33 ft

1. A ball is kicked with an initial velocity of 60 ft per second at an angle of 38° to the horizon.

a) Find the initial horizontal velocity and vertical velocity. x 47.3 y 36.9

b) Write the parametric equations that will model the path of the ball.

c) Find the x and y coordinates of the ball at t=2 seconds. 94.6, 9.9

d) Find the time it takes for the ball to land back on the ground and the range (total horizontal distance).

2.31

$x = 60\cos(38)T$

$y = -16T^2 + 60\sin(38)T$

2. A baseball is hit from 2 ft above the ground with an initial velocity of 80 ft. per second at 40° to the horizon.

3.252sec 199 ft.

a) How far does the ball go before hitting the ground (be sure to adjust for the initial height of 2 ft).

b) Will the range be greater or less if the angle is 45° instead of 40°? By how much?

c) What if the angle is increased to 50°?

d) For which of the angles above will the ball clear a 10-ft tall fence that is 190 feet from home plate?