A distress flare is shot straight up from a ship's bridge 75 ft above the water with an initial velocity of 76 ft/sec. Graph the flare's height against time, give the height of the flare above water at each time, and find when the flare hits the water.

$y = -16t^2 + v_0 t + y_0$ (init vel., init pos.)

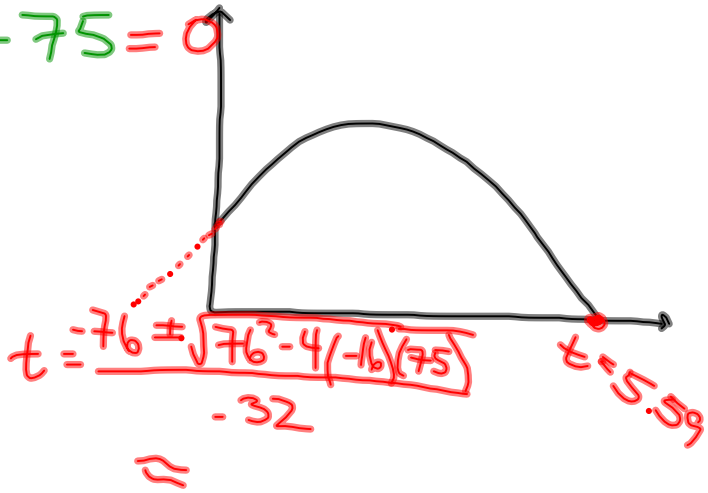
$x = t$

$y = -16t^2 + 76t + 75 = 0$

$x = t$

t	y
0	75
1	
2	
3	

Table

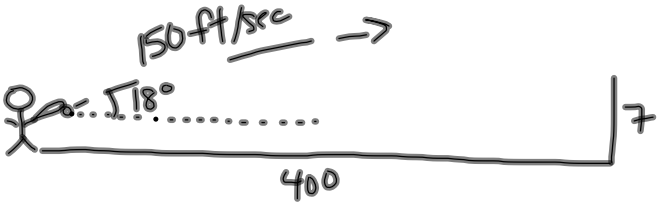


$t = \frac{-76 \pm \sqrt{76^2 - 4(-16)(75)}}{-32}$

$t \approx 5.59$

Feb 27-9:10 AM

Kevin hits a baseball 3 ft above the ground with an initial speed of 150 ft/sec at an angle of 18 degrees with the horizontal. Will the ball clear a 7 ft wall that is 400 ft away?



$x = v_0 \cos\theta t$

$y = -16t^2 + v_0 \sin\theta t + y_0$

$x = 150\cos(18°)t$

$y = -16t^2 + 150\sin 18° t + 3$

$\frac{400}{150\cos 18°} = \frac{150\cos 18° t}{150\cos 18°}$

$t = 2.8$ sec.

$y = -16(2.8)^2 + 150\sin 18° \cdot 2.8 + 3$

$= 7.2$ ft.

Feb 27-9:10 AM

6.4 Polar Coordinates

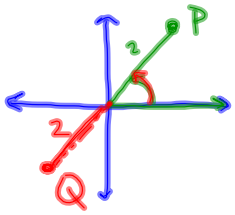
Obj: 1. Convert points & eqs. from polar to rectangular & vice versa.

rectangular (x, y)

Polar: (r, θ)

r: radius; θ: angle from zero

Plot: $P(2, \frac{\pi}{3})$



$Q(-2, \frac{\pi}{3})$

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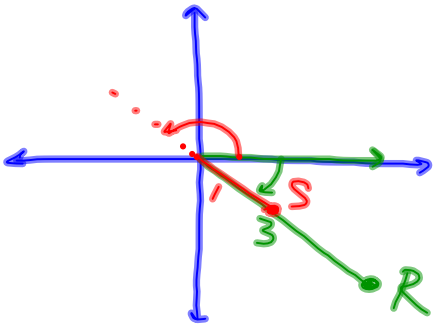
Plot: $R(3, -45°)$ $S(-1, \frac{3\pi}{4})$



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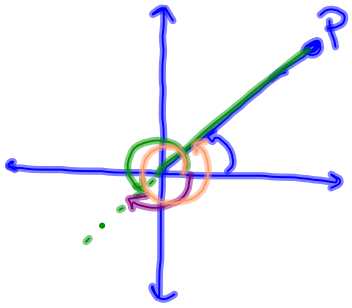
If point P is $\underset{r}{3}, \underset{\theta}{\frac{\pi}{3}}$, find all polar coordinates for P.



$\frac{\pi}{3} + \pi$

$(-3, \frac{4\pi}{3})$

$(-r, \theta \pm \pi)$

$(r, \theta \pm 2\pi)$

Feb 27-10:23 AM

Coordinate Conversion

$(x, y) \longleftrightarrow (r, \theta)$

$x = r\cos\theta$ $\quad r^2 = x^2 + y^2$

$y = r\sin\theta$ $\quad \tan\theta = \frac{y}{x}$

Convert from polar to rectangular:

$P(\underset{r}{3}, \underset{\theta}{\frac{5\pi}{6}})$ $\quad Q(2, -200^\circ)$

$x = 3\cos\frac{5\pi}{6} = -2.6$

$y = 3\sin\frac{5\pi}{6} = 1.5$

$(-2.6, 1.5)$

$x = 2\cos(-200^\circ) = -1.88$

$y = 2\sin(-200^\circ) = .68$

$(-1.88, .68)$

Feb 27-10:27 AM

Convert: $P(\underset{x}{-1}, \underset{y}{1})$ to polar form.

$r^2 = x^2 + y^2$

$r^2 = (-1)^2 + 1^2$

$r^2 = 2$

$r = \pm\sqrt{2}$

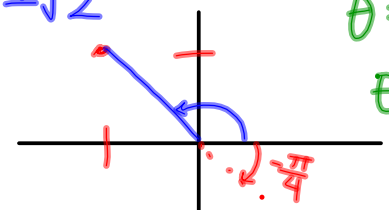
$\tan\theta = \frac{y}{x}$

$\tan\theta = \frac{1}{-1}$

$\tan\theta = -1$

$\theta = \tan^{-1}(-1)$

$\theta = -\frac{\pi}{4}$



* $(-\sqrt{2}, -\frac{\pi}{4})$
* $(\sqrt{2}, \frac{3\pi}{4})$

Feb 27-10:32 AM