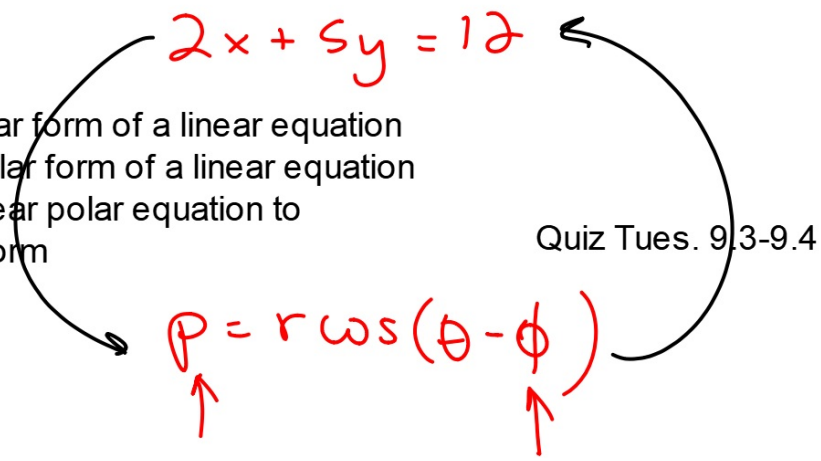
Trig 9.4

Write the polar form of a linear equation
Graph the polar form of a linear equation
Convert a linear polar equation to rectangular form

Quiz Tues. 9.3-9.4



radians

normal

θ

φ

Polar Form of a Linear Equation

The polar form of a linear equation, where p is the length of the normal and ϕ is the positive angle between the positive x-axis and the normal, is

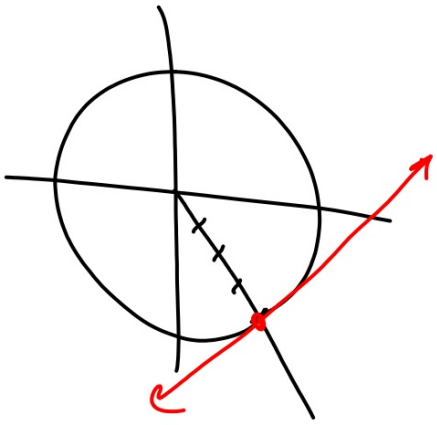
$$p = r\cos(\theta - \phi).$$

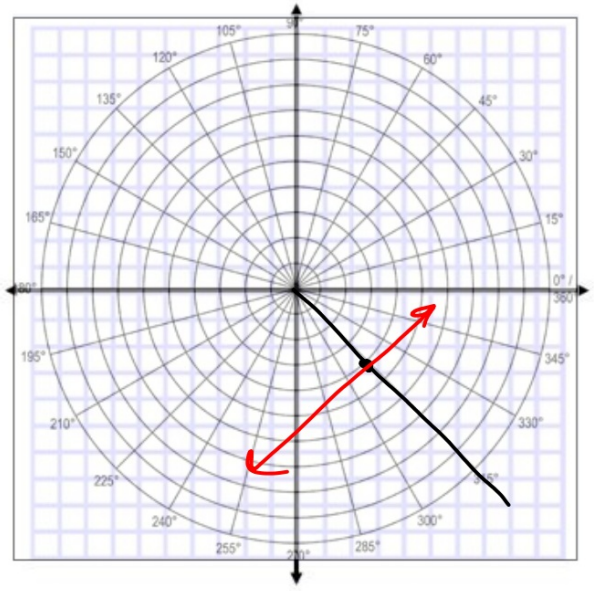
whiteboards

$$\cos(A \pm B) = \cos A \cos B \mp \sin A \sin B$$

$4 = r\cos(\theta + 45)$

-45




90°
105°
75°
120°
60°
135°
45°
150°
30°
165°
15°
180°
0° / 360°
195°
345°
210°
330°
225°
315°
240°
300°
255°
285°
270°

Write each equation in polar form. Round ϕ to the nearest degree.

12. $7x - 24y + 100 = 0$

13. $21x + 20y = 87$

cos(A+B)

Write each equation in rectangular form.

7. $3 = r\cos(\theta - 60°)$ (A, B)

8. $r = 2\sec\left(\theta + \frac{\pi}{4}\right)$

$3 = r(\cos\theta\cos 60 + \sin\theta\sin 60$

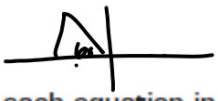
$3 = r\left(\frac{1}{2}\cos\theta + \frac{\sqrt{3}}{2}\sin\theta\right)$

$3 = \frac{1}{2}r\cos\theta + \frac{\sqrt{3}}{2}r\sin\theta$

$6 = r\cos\theta + \sqrt{3}r\sin\theta$

$6 = x + \sqrt{3}y$

$x + \sqrt{3}y - 6 = 0$



Write each equation in rectangular form.

18. $6 = r\cos(\theta - 120°)$

19. $4 = r\cos\left(\theta + \frac{\pi}{4}\right)$

$4 = r\left(\cos\theta\cos\frac{\pi}{4} - \sin\theta\sin\frac{\pi}{4}\right)$

$4 = r\left(\frac{\sqrt{2}}{2}\cos\theta - \frac{\sqrt{2}}{2}\sin\theta\right)$

$4 = \frac{\sqrt{2}}{2}r\cos\theta - \frac{\sqrt{2}}{2}r\sin\theta$

$4 = \frac{\sqrt{2}}{2}x - \frac{\sqrt{2}}{2}y$

$8 = \sqrt{2}x - \sqrt{2}y$

$\sqrt{2}x - \sqrt{2}y - 8 = 0$

$6 = r(\cos\theta\cdot\cos 120 + \sin\theta\sin 120)$

$6 = r\left(\cos\theta\cdot\frac{-1}{2} + \sin\theta\cdot\frac{\sqrt{3}}{2}\right)$

$6 = \frac{-1}{2}r\cos\theta + \frac{\sqrt{3}}{2}r\sin\theta$

$\quad\quad\quad x \quad\quad\quad y$

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

$12 = -x + \sqrt{3}y$

$x - \sqrt{3}y + 12 = 0$

$$r = 2\sec\left(\theta + \frac{\pi}{4}\right)$$

$$\frac{r}{1} = \frac{2}{\cos\left(\theta + \frac{\pi}{4}\right)}$$

$$2 = r\cos\left(\theta + \frac{\pi}{4}\right)$$

$$2 = 2\cos\left(\theta + \frac{\pi}{4}\right)$$

Graph each polar equation.

24. $6 = r\cos(\theta - 45°)$

25. $1 = r\cos\left(\theta - \frac{\pi}{6}\right)$