Trigonometry

⚠ Use radians! (θ_r vs θ_d).

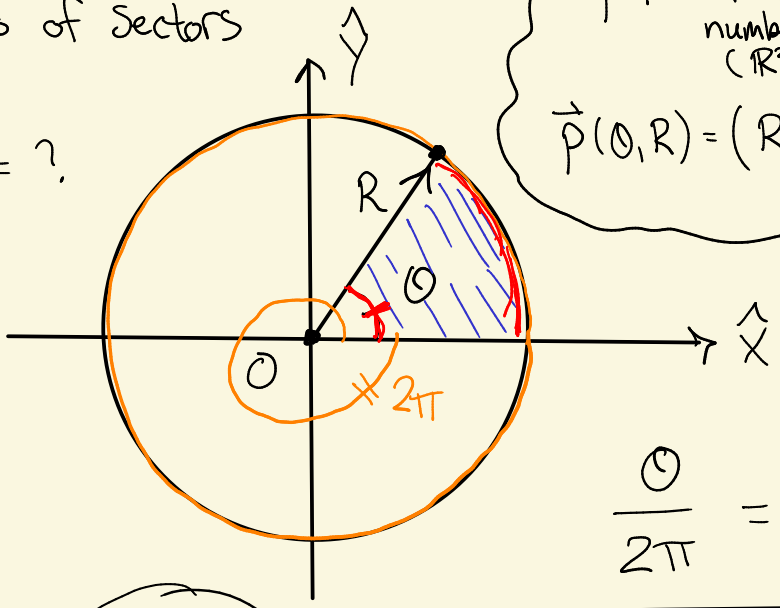
Aside

$\vec{p}$: 2 real numbers ($\mathbb{R}^2$) → vector

$\vec{p}(\theta, R) = (R\cos(\theta), R\cdot\sin(\theta))$

- Areas of sectors

$A(\theta, R) = ?$



$$\frac{\theta}{2\pi} = \frac{A(\theta,R)}{A(2\pi,R)} = \frac{A(\theta,R)}{\pi R^2}$$

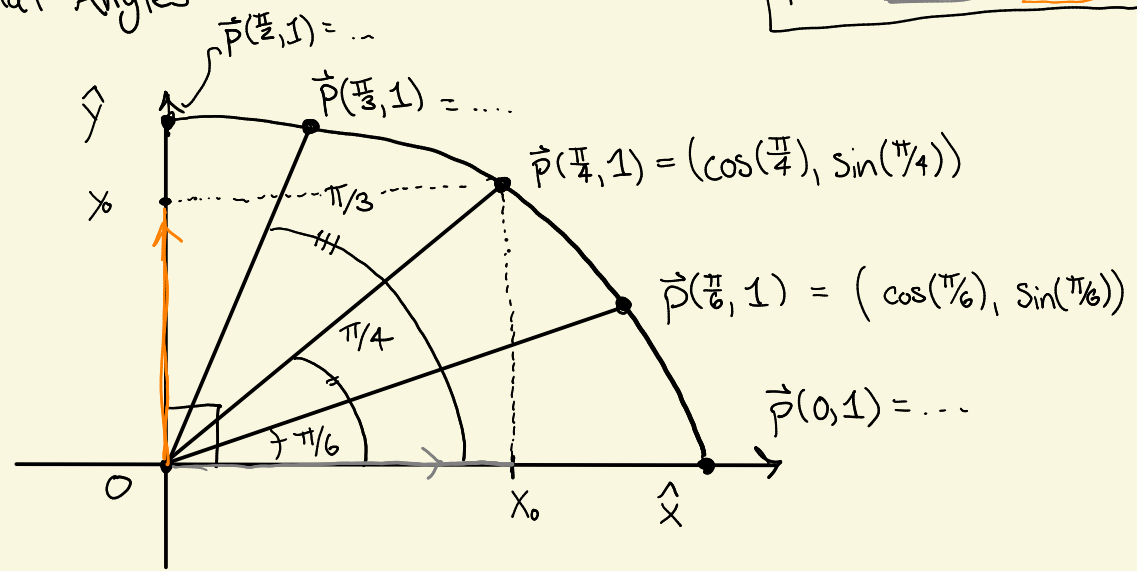
$A(2\pi, R) = \pi R^2$

$$\frac{\theta}{2\pi} = \frac{A(\theta,R)}{\pi R^2}$$

⚠ Common mistake: not drawing a picture!

$\vec{p}(\theta,R) = (R\cos(\theta), R\sin(\theta))$

- Special Angles

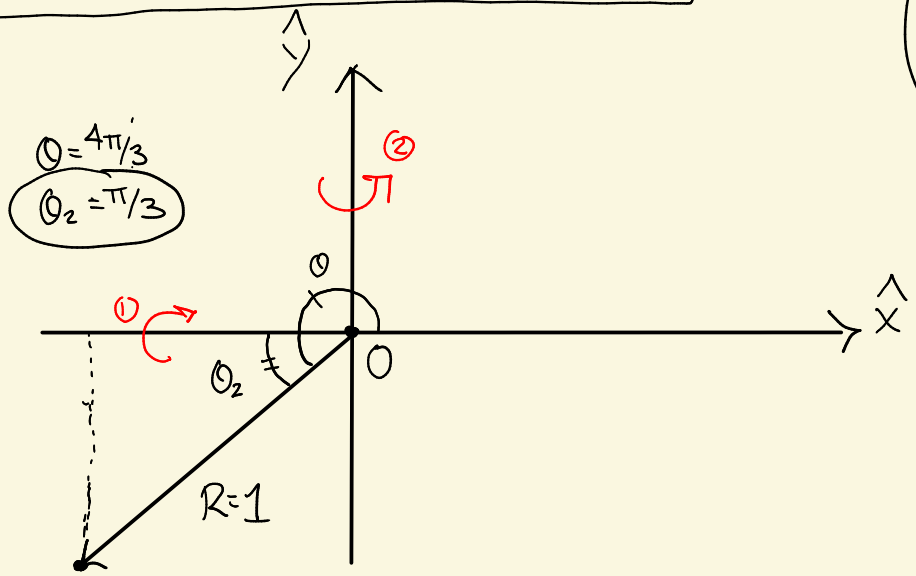


Mnemonic Device:

	Sin(θ) ↑	cos(θ) ↓
0	$\sqrt{0/4} = 0$	$\sqrt{4/4} = 1$
$\pi/6$	$\sqrt{1/4} = 1/2$	$\sqrt{3/4} = \sqrt{3}/2$
$\pi/4$	$\sqrt{2/4} = \sqrt{2}/2$	$\sqrt{2/4} = \sqrt{2}/2$
$\pi/3$	$\sqrt{3/4} = \sqrt{3}/2$	$\sqrt{1/4} = 1/2$
$\pi/2$	$\sqrt{4/4} = 1$	$\sqrt{0/4} = 0$

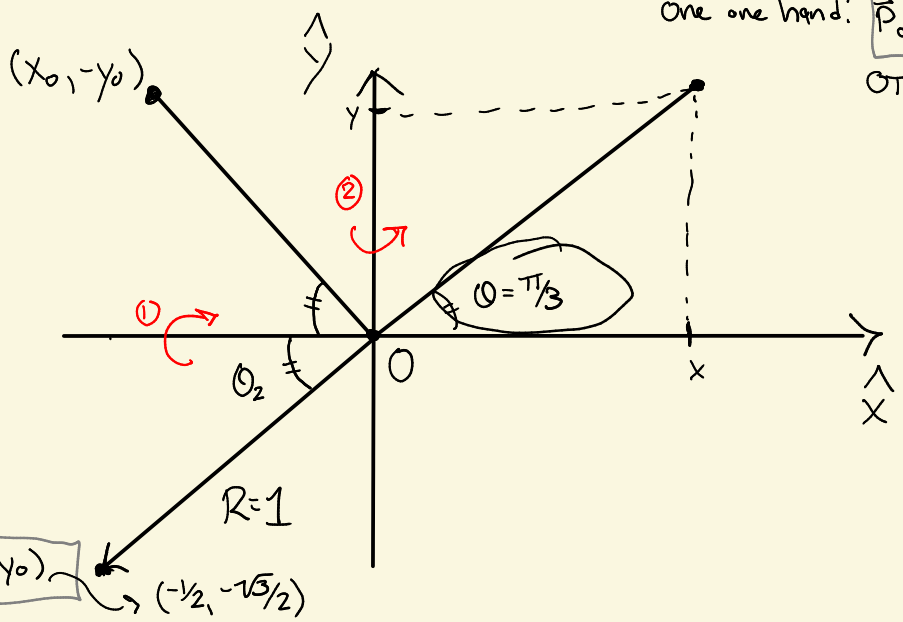
Ex

Given $\theta = 4\pi/3$, what are the (x,y)-coords on the unit circle?



$\vec{p}(\theta, R) = (R\cos(\theta), R\sin(\theta))$

$(x_0, y_0) = (\cos(4\pi/3), \sin(4\pi/3))$



One one hand: $\vec{p}_0 = (-x_0, -y_0)$ ☆

OTOH, $\vec{p}_0 = (R\cos(\theta), \sin(\theta))$

$= (\cos(\pi/3), \sin(\pi/3))$

$= (\sqrt{1}/4, \sqrt{3}/4)$

$= (1/2, \sqrt{3}/2)$ ☆

$(-x_0, -y_0) = (1/2, \sqrt{3}/2)$

$$\Rightarrow \begin{cases} -x_0 = 1/2 \\ -y_0 = \sqrt{3}/2 \end{cases} \Rightarrow \begin{cases} x_0 = -1/2 \\ y_0 = -\sqrt{3}/2 . \end{cases}$$

Project 3

Q: How much energy hits a leaf over 24h?