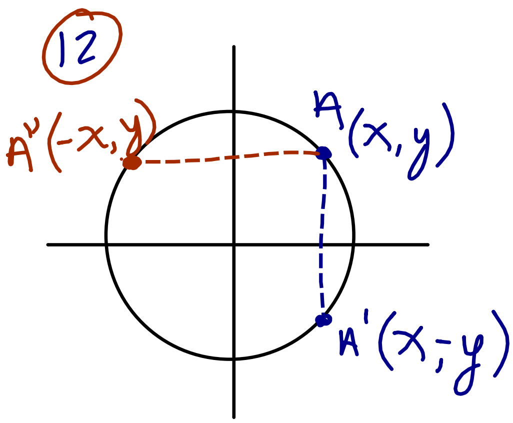
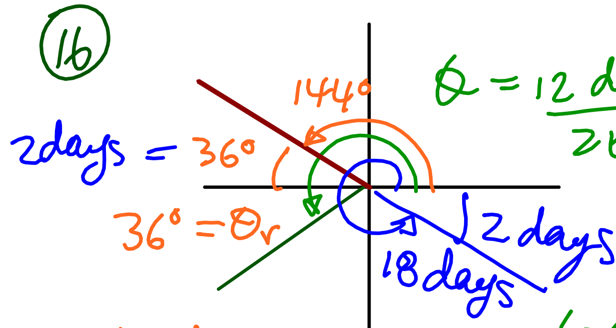
12



16



$\theta = \frac{12 \text{ days}}{20}$

$\theta = \frac{12}{20}(360°)$

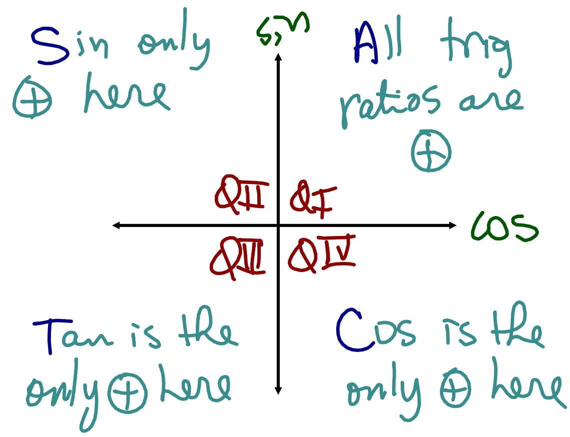
$\theta = 216°$

c) 8 days

$\frac{144}{360} \times 20$

2.2 Trig Ratios of any Angle

With much exploration, we notice that the sign for the three trig ratios follow a very predictable pattern. The mnemonic All Students Take Calculus can be useful to remember where these signs are positive or negative.

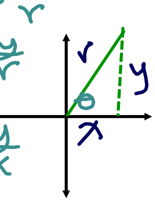


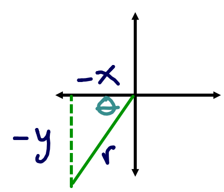
Once we know the sign of the trig ratio, all we have to do is use the reference angle to determine the numerical value of the ratio.

$\cos\theta = \frac{x}{r}$

$\sin\theta = \frac{y}{r}$

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

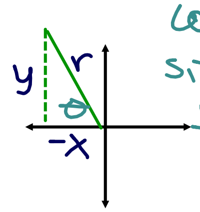




$\cos\theta = \frac{-x}{r}$

$\sin\theta = -y/r$

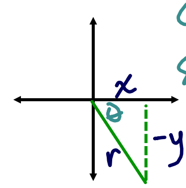
$\tan\theta = \frac{-y}{-x} = \frac{y}{x}$



$\cos\theta = \frac{-x}{r}$

$\sin\theta = \frac{y}{r}$

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



$\cos\theta = \frac{x}{r}$

$\sin\theta = \frac{-y}{r}$

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

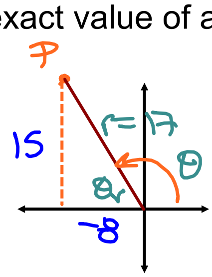
$\tan\theta = \frac{\sin\theta}{\cos\theta}$

$= \frac{y/r}{x/r}$

$= \frac{y}{\cancel{r}} \cdot \frac{\cancel{r}}{x}$

$= y/x$

Ex. The point P(-8, 15) lies on the terminal arm of an angle. Determine the exact value of all three trig ratios.



$r^2 = 15^2 + (-8)^2$

$r^2 = 225 + 64$

$r^2 = 289$

$\boxed{r = 17}$

$\sin\theta = \frac{15}{17}$

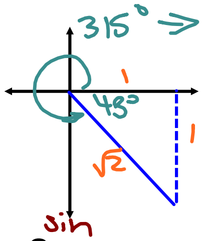
$\cos\theta = -\frac{8}{17}$

$\tan\theta = -\frac{15}{8}$

NO calculator

Ex. Determine the exact value of cos 315º and then sin 240º.

$315° \Rightarrow \theta_r = 45°$



$\cos 315° = \frac{1}{\sqrt{2}}$

$\sin 315° = -\frac{1}{\sqrt{2}}$

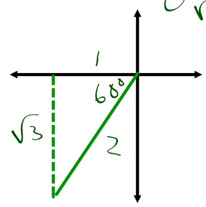
$\tan 315° = -1$

$\sin 240° = -\frac{\sqrt{3}}{2}$

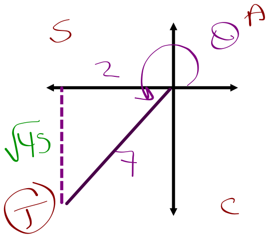
$\cos 240° = -\frac{1}{2}$

$\tan 240° = +\sqrt{3}$

$\theta_r = 60°$



Ex. Suppose θ is an angle in standard position with terminal angle in quadrant 3 and cos θ = -2/7. What are the exact values of sin θ and tan θ?



$7^2 = (-2)^2 + y^2$

$49 = 4 + y^2$

$\sqrt{45} = y$

$\sin\theta = -\frac{\sqrt{45}}{7}$

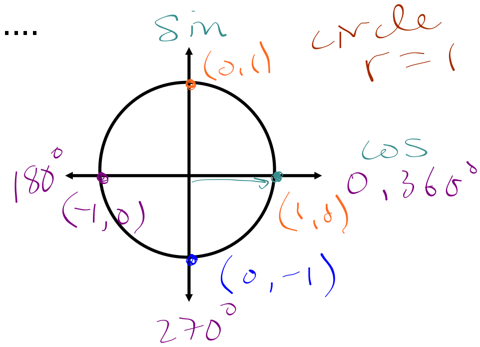
$\cos\theta = -\frac{2}{7}$

$\tan\theta = \frac{\sqrt{45}}{2}$

ASTC

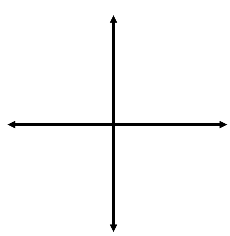
Quadrantal angles are angles whose terminal arm lie on one of the axes. They are therefore 0º, 90º, 180º, 270º, 360º, ...

	0	90	180	270
sin	0	1	0	-1
cos	1	0	-1	0
tan	$0/1 = 0$	$1/0 = \varnothing$	$\frac{0}{-1} = 0$	$\frac{-1}{0} = \varnothing$

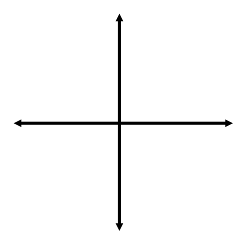


Ex. Solve for θ if 0 < θ <360

a) sin θ = - 0.5



b) cos θ = 1/√2



Ex. Solve for θ if 0<θ<360

a) tan θ = - 1.25

b) sin θ = - 0.31

Homefun: Pg. 96 #1-9, 12, 15, 16,18, 19, 22, 25, 29