Review

Evaluate the trigonometric expression:

$\sin(-120°) =$ $-\frac{\sqrt{3}}{2}$

$\sec 180° =$ $\frac{1}{-1} = -1$

$\cos 225° =$ $\frac{-1}{\sqrt{2}}$

$\csc 330° =$ $\frac{2}{-1} = -2$

$\tan(-270°) =$ $\frac{1}{0}$ undef.

$\cot 135° =$ $\frac{-1}{1} = -1$

Convert to degrees:

$\frac{3\pi}{4} \cdot \frac{180°}{\pi} = 135°$

$\frac{4\pi}{3} \cdot \frac{180°}{\pi} = 240°$

$\frac{11\pi}{6} \cdot \frac{180°}{\pi} = 330°$

$-\frac{5\pi}{2} \cdot \frac{180°}{\pi} = -450°$

Homework questions?

$\frac{\pi}{2} = -\frac{3\pi}{2}$

$\pi = -\pi$

$0 = 2\pi = 20\pi$

$\frac{3\pi}{2} = -\frac{\pi}{2}$

$0 < \frac{\pi}{6} < \frac{\pi}{2}$

$\frac{\pi}{6}$

Common angles:

(memorize!)

$\frac{\pi}{6} = 30°$

$\frac{\pi}{4} = 45°$

$\frac{\pi}{3} = 60°$

Note:

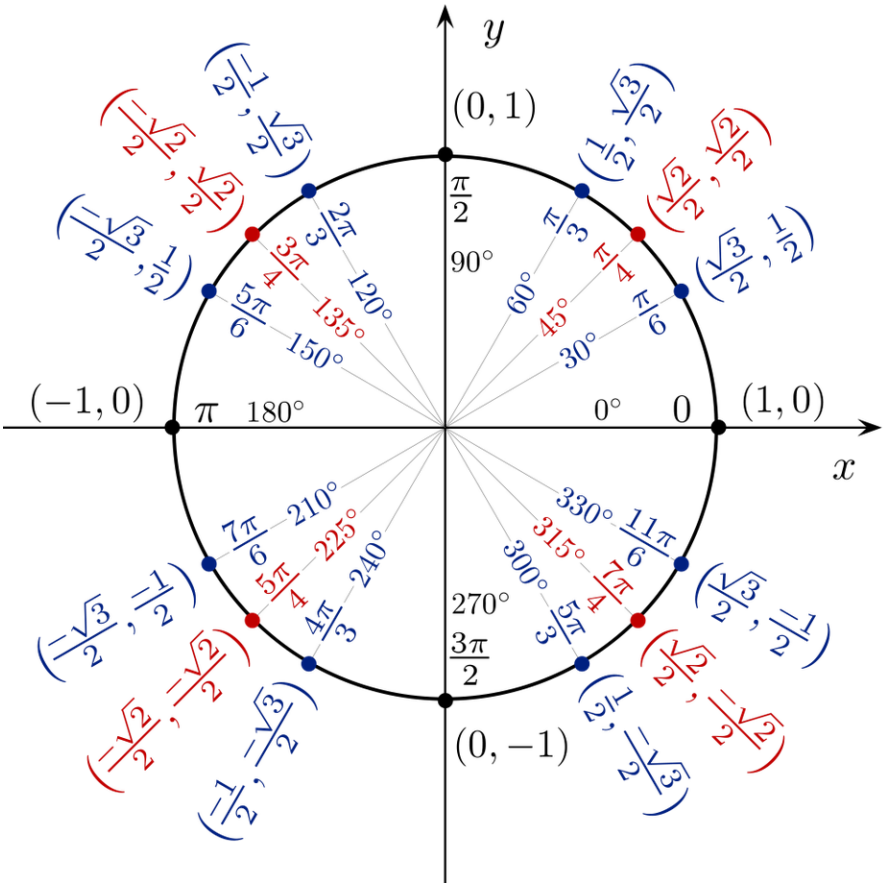
$\frac{k\pi}{6} \rightarrow 30° \; ref.\angle$

$\frac{k\pi}{4} \rightarrow 45° \; ref.\angle$

$\frac{k\pi}{3} \rightarrow 60° \; ref.\angle$

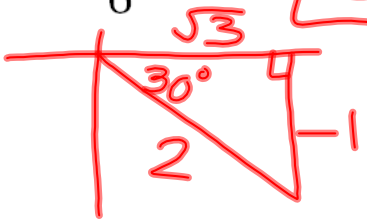
$\frac{k\pi}{2} \rightarrow 90° \; or \; 270°$

$k\pi \rightarrow 0° \; for \; k \; even;$
$180° \; for \; k \; odd$

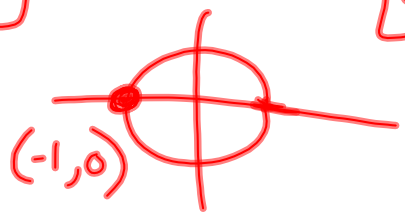


Evaluate the trigonometric function of an angle given in radians

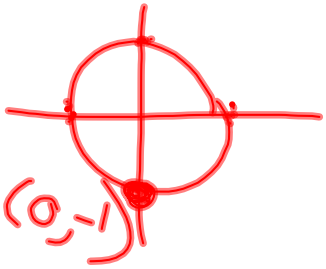
$\cos\frac{11\pi}{6} =$ $\frac{\sqrt{3}}{2}$



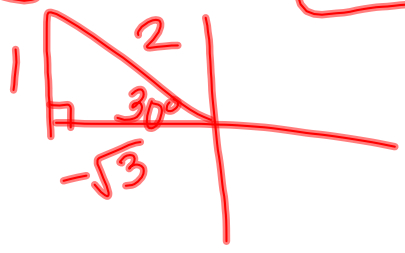
$\sin 329\pi =$ 0



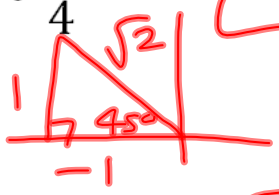
$\tan\frac{7\pi}{2} = \frac{-1}{0}$: undef.



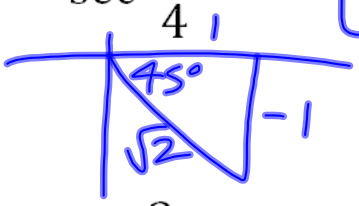
$\sec\frac{5\pi}{6} = -\frac{2}{\sqrt{3}}$



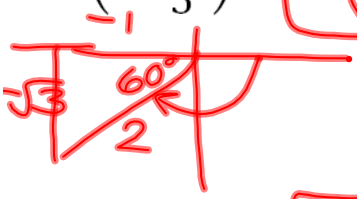
$\cot\frac{3\pi}{4} =$ -1



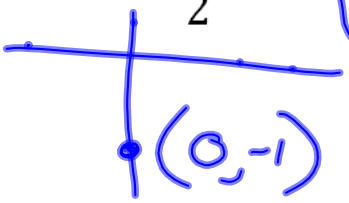
$\sec\frac{7\pi}{4} =$ $\sqrt{2}$



$\csc\left(-\frac{2\pi}{3}\right) =$ $-\frac{2}{\sqrt{3}}$

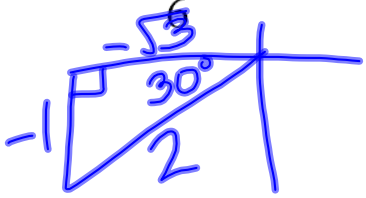


$\csc\frac{3\pi}{2} =$ -1

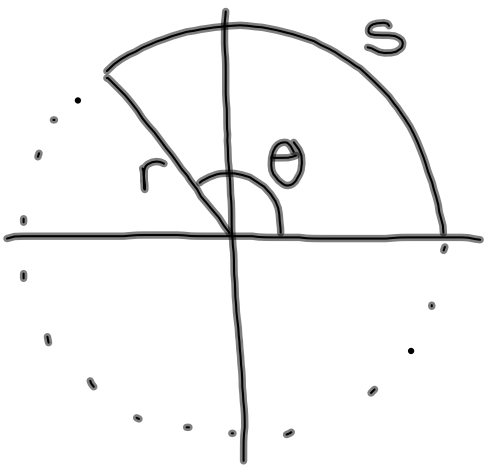


$\sin\frac{4\pi}{3} =$ $-\frac{\sqrt{3}}{2}$

$\tan\frac{7\pi}{6} =$ $\frac{1}{\sqrt{3}}$



5.4 Arc Length & Angular Speed



Arc Length

r = radius or distance from the center of rotation $(in, cm, km, etc.)$

s = arc length or distance traveled along the circumference of a circle $(in, cm, km, etc.)$

θ = angle or amount of rotation $(deg, rad, revolutions, etc.)$

$$\boxed{s = r\theta}$$

1. $r = 5in \;\; ; \;\; \theta = 45° \;\; ; \;\; s = ? \, in$

$s = r\theta$

$= \frac{5\,in}{1} \cdot \frac{45^{\circ}}{1} \cdot \frac{\pi}{180^{\circ}} = \boxed{\frac{5\pi}{4}\,in}$

4

2. $s = 16yards \;\; ; \;\; \theta = 5 \;\; ; \;\; r = ? \, yards$

$\frac{s}{\theta} = \frac{r\theta}{\theta}$

$r = \frac{s}{\theta} = \boxed{\frac{16\,yd}{5}}$

3. Find the measure of a rotation in radians when a point 2 meters from the center of rotation travels 4 meters.

$\theta = ?\,rad \;\; ; \;\; r = 2m \;\; ; \;\; s = 4m$

$\frac{s}{r} = \frac{r\theta}{r}$

$\theta = \frac{s}{r} = \frac{4m}{2m} = \boxed{2}$

2

Linear Speed

$$v = \frac{s}{t}$$

Angular Speed

$$\omega = \frac{\theta}{t}$$ ω = "omega"

Arc Length

$$s = r\theta$$

r = radius or distance from the center of rotation $(in, cm, km, etc.)$

s = arc length or linear distance along the circumference of a circle $(in, cm, km, etc.)$

θ = angle or amount of rotation $(deg, rad, revolutions, etc.)$

t = time $(sec, min, hours, years, etc.)$

$v = \frac{\text{linear distance}}{\text{time}}$ = linear speed $\left(\frac{km}{s}, \frac{mi}{h}, etc.\right)$

$\omega = \frac{\text{amount of rotation}}{\text{time}}$ = angular speed $\left(\frac{rev}{min}, \frac{deg}{s}, etc.\right)$

Relating Linear & Angular Speed

$$v = \frac{s}{t} = \frac{r\theta}{t} = r \cdot \frac{\theta}{t} = r\omega$$

$$\boxed{v = r\omega}$$

Handout Problems:

1. A wheel with a 15 inch diameter rotates at a rate of 6 radians per second. What is the linear speed of a point on its rim in feet per minute?

$r = \frac{15\,in}{2}$; $\omega = \frac{6\,rad}{s}$; $v = ?\ ft/min$

$$v = r\omega = \frac{15\,in}{2} \cdot \frac{6\,rad}{s} \cdot \frac{1\,ft}{12\,in} \cdot \frac{60\,s}{1\,min} = \boxed{225\,ft/min}$$

Homework:

Evaluating trig functions of angles in radians:

5.5 #7-24 all (**super mega-important hw section!)