Homework this week (11/11):

01: Sign up for Khan Academy with coach code 4CG5S2.

02: Read sections 5.1 and 5.2 in your textbook

03: Textbook problems

- 5.1 #1, 2, 7-18 all, 31-73 odd
- 5.2: #1-6 all; 15-41 odd; 59-75 odd (NO CALCULATOR!)
  See syllabus for proper formatting of written homework assignments.

Homework for next week (11/18):

01: Read sections 5.3 and 5.4 in your textbook

02: Textbook problems

- 5.3: #1-35 odd; 37-48 all (NO CALCULATOR!); 61-68 all (NO CALCULATOR!)
- 5.4: #13-22 all (NO CALCULATOR!)

A car travels at 60 miles per hour. Its wheels have a 24 inch diameter. What is the angular speed of a point on the rim of a wheel in revolutions per minute?

A weather balloon is directly west of two observing stations that are 10 miles apart. The angles of elevation of the balloon from the two stations are 17.6 degrees and 78.2 degrees. How high is the balloon?

A car travels at 60 miles per hour. Its wheels have a 24 inch diameter. What is the angular speed of a point on the rim of a wheel in revolutions per minute?

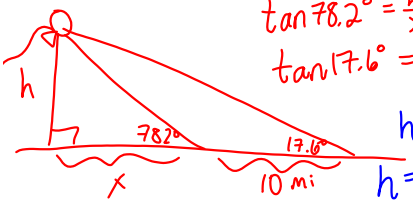
$V = \frac{60\text{ mi}}{\text{h}}$; $r = 12\text{ in}$; $\omega = ?\ \frac{\text{rev}}{\text{min}}$

$\frac{V}{r} = \frac{r\omega}{r}$ $\qquad \omega = V \cdot \frac{1}{r}$

$$\omega = \frac{60\text{ mi}}{\text{h}} \cdot \frac{1}{12\text{ in}} \cdot \frac{1\text{ h}}{60\text{ min}} \cdot \frac{1\text{ rev}}{2\pi} \cdot \frac{12\text{ in}}{1\text{ ft}} \cdot \frac{5280\text{ ft}}{1\text{ mi}}$$

$$= \frac{2640}{\pi}\ \frac{\text{rev}}{\text{min}}\ \text{rpm}$$

A weather balloon is directly west of two observing stations that are 10 miles apart. The angles of elevation of the balloon from the two stations are 17.6 degrees and 78.2 degrees. How high is the balloon?



$\tan 78.2^\circ = \frac{h}{x}$

$\tan 17.6^\circ = \frac{h}{x+10}$

$h = x\tan 78.2^\circ$

$h = (x+10)\tan 17.6^\circ$

$x\tan 78.2^\circ = (x+10)\tan 17.6^\circ$

$x\tan 78.2^\circ = x\tan 17.6^\circ + 10\tan 17.6^\circ$

$x\cdot 8 = (x+10)\cdot 7$

$8x = 7x + 70$

$8x - 7x = 70$

$x = 70$

$x\tan 78.2^\circ - x\tan 17.6^\circ = 10\tan 17.6^\circ$

$x(\tan 78.2^\circ - \tan 17.6^\circ) = 10\tan 17.6^\circ$

$$x = \frac{10\tan 17.6^\circ}{\tan 78.2^\circ - \tan 17.6^\circ}$$

$h = x\tan 78.2^\circ$

$$= \frac{10\tan 17.6^\circ \tan 78.2^\circ}{\tan 78.2^\circ - \tan 17.6^\circ} \approx 3.4\text{ mi}$$

$x = \frac{h}{\tan 78.2^\circ}$

$\tan 17.6^\circ = \left(\frac{h}{\tan 17.6^\circ} + 10\right)$

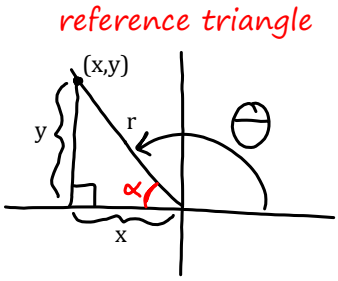
$\tan 78.2^\circ = \frac{h}{x}$

$x\tan 78.2^\circ = h$

$\frac{x\tan 78.2^\circ}{\tan 78.2^\circ} = \frac{h}{\tan 78.2^\circ}$

5.3 - Trigonometric Functions of Any Angle

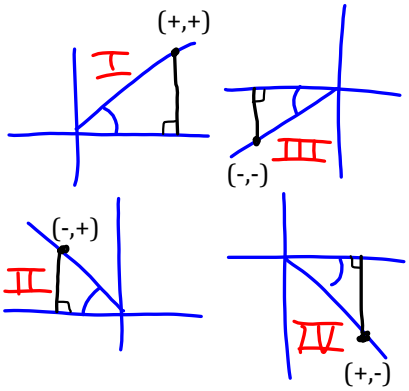
For an angle in standard position, the reference angle is the acute angle between the terminal side of the angle and the x-axis.



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

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

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



* note that the hypotenuse r is always positive, so that the x- and y-coordinates determine whether the trig function is positive or negative

Review:

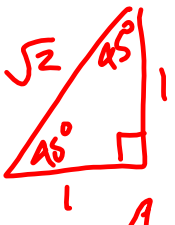
A reference angle for an angle whose initial side is on the positive x-axis and terminal side may lie in any of the four quadrants is the acute angle between the terminal side & the x-axis.

$\sin 45°$ $\frac{1}{\sqrt{2}}$

$\tan 60°$ $\sqrt{3}$

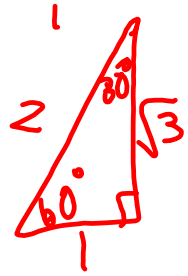
$\sec 45°$ $\sqrt{2}$

$\csc 30°$ 2

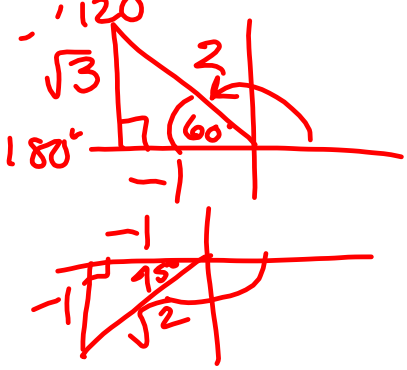


$\sec(-270°)$ $\frac{1}{0}$ undefined

$\cot(120°)$ $\frac{-1}{\sqrt{3}}$



$\csc(-135°)$ $-\sqrt{2}$



$\tan(540°)$ $\frac{-360}{180}$

$1 < 3 < 4$

$\sqrt{1} < \sqrt{3} < \sqrt{4}$

$1 < \sqrt{3} < 2$

$\frac{0}{-1} = 0$ $(-1,0)$