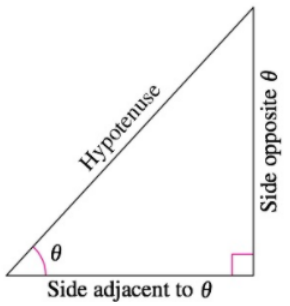
Sent an e-mail to everyone who was lagging on the homework, before class, this morning.



Right Triangle Definitions of Trigonometric Functions

Let θ be an *acute* angle of a right triangle. The six trigonometric functions of the angle θ are defined below. (Note that the functions in the second row are the *reciprocals* of the corresponding functions in the first row.)

$$\sin\theta = \frac{\text{opp}}{\text{hyp}} \quad \cos\theta = \frac{\text{adj}}{\text{hyp}} \quad \tan\theta = \frac{\text{opp}}{\text{adj}}$$

$$\csc\theta = \frac{\text{hyp}}{\text{opp}} \quad \sec\theta = \frac{\text{hyp}}{\text{adj}} \quad \cot\theta = \frac{\text{adj}}{\text{opp}}$$

The abbreviations

opp, *adj*, and *hyp*

represent the lengths of the three sides of a right triangle.

opp = the length of the side *opposite* θ

adj = the length of the side *adjacent to* θ

hyp = the length of the *hypotenuse*

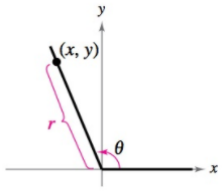
Definitions of Trigonometric Functions of Any Angle

Let θ be an angle in standard position with (x, y) a point on the terminal side of θ and $r = \sqrt{x^2 + y^2} \neq 0$.

$$\sin\theta = \frac{y}{r} \quad \cos\theta = \frac{x}{r}$$

$$\tan\theta = \frac{y}{x}, \; x \neq 0 \quad \cot\theta = \frac{x}{y}, \; y \neq 0$$

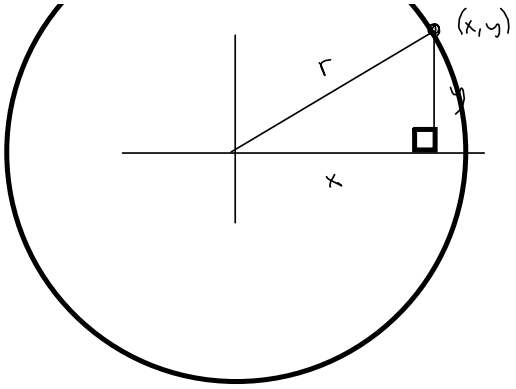
$$\sec\theta = \frac{r}{x}, \; x \neq 0 \quad \csc\theta = \frac{r}{y}, \; y \neq 0$$



sin θ csc θ

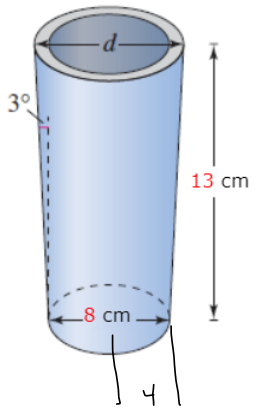
cos θ sec θ

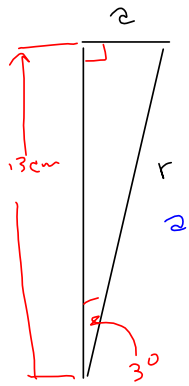
tan θ cot θ



–/1 points LarTrig10 1.3.070.MI.

A tapered shaft has a diameter of 8 centimeters at the small end and is 13 centimeters long (see figure). The taper is 3°. Find the diameter d of the large end of the shaft. (Round your answer to two decimal pla

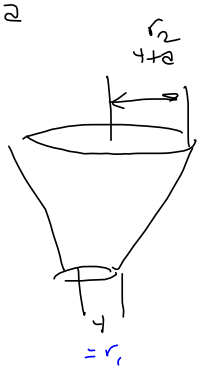




Want a

$\frac{a}{13} = \tan 3^\circ$

$a = 13\tan 3^\circ$



$r_2 = r_1 + a = 4 + .6813011307$

$\approx 4 + .6813011307$

$= 4.6813011307$

≈ 4.68 cm

Want diameter.

$= 2(r_2) \approx 2(4.68) = 9.36$ cm $\approx$ Diameter of the top.

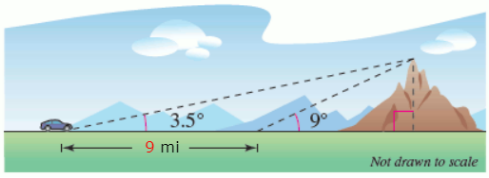
```
13tan(3
      .6813011307
13tan(3)
      .6813011307 ≈ a
```

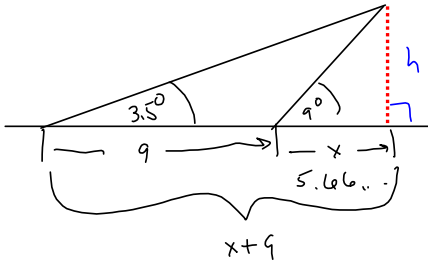
```
      .6813011307
Ans+4
      4.681301131
Ans*2
      9.362602261
2*4.68
           9.36
```

BAD! Using Rounded result in calculations! Don't round until the final step!

In traveling across flat land, you see a mountain directly in front of you. Its angle of elevation (to the peak) is 3.5°. After you drive 9 miles closer to the mountain, the angle of elevation is 9° (see figure). Approximate the height of the mountain. (Round your answer to one decimal place.)

1.5 ✖ mi





$\frac{h}{x+9} = \tan(3.5^\circ)$

$\frac{h}{x} = \tan(9^\circ)$

$h = (x+9)\tan(3.5^\circ) = x\tan(9^\circ) = h$

$x\tan(3.5^\circ) + 9\tan(3.5^\circ) = x\tan(9^\circ)$

$x\tan(3.5^\circ) - x\tan(9^\circ) = -9\tan(3.5^\circ)$

$x(\tan(3.5^\circ) - \tan(9^\circ)) = -9\tan(3.5^\circ)$

$x = \frac{-9\tan(3.5^\circ)}{\tan(3.5^\circ) - \tan(9^\circ)} \approx$

```
Ans*2
      9.362602261
2*4.68
                9.36
-9tan(3.5)/(tan(
3.5-tan(9))
     -9.427617061
```

Negative?!

missing Parentheses messed it all up! Be careful!

```
                9.36
-9tan(3.5)/(tan(
3.5-tan(9))
     -9.427617061
-9tan(3.5)/(tan(
3.5)-tan(9))
      5.661934537
```

Much better!

$x \approx 5.661934537$ mi ⇒

$h = x\tan 9^\circ \approx (5.661934537)\tan 9^\circ$

$\approx .8967623327$ mi

$\approx .9$ mi

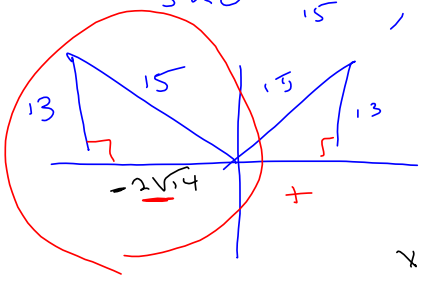
```
3.5-tan(9))
     -9.427617061
-9tan(3.5)/(tan(
3.5)-tan(9))
      5.661934537
Ans*tan(9)
      .8967623327
```

≈ h

x

I already emailed S1.4 class into lecture

$\sin\theta = \frac{13}{15}$, $\tan\theta < 0$



$15^2 - 13^2 = 225 - 169 = 56 = x^2$

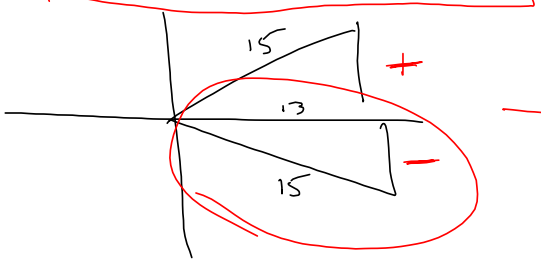
-169

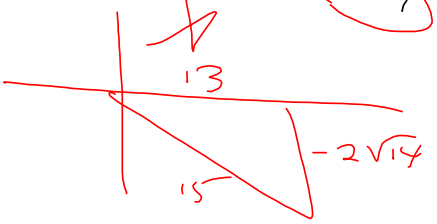
56

$x = \sqrt{56}$

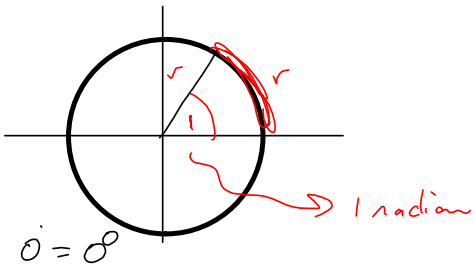
$x = \sqrt{56} = 2\sqrt{14}$

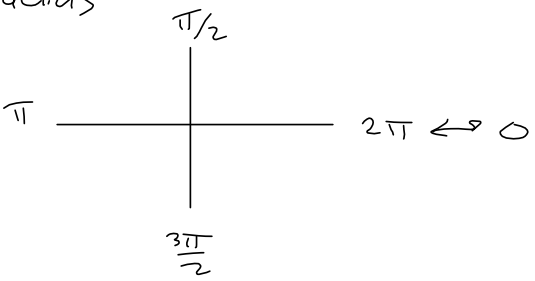
$\cos\theta = \frac{13}{15}$, $\tan\theta < 0$





Formally 1 radian is the angle corresponding to arc length = radius





$0 = 0^\circ$

$\frac{\pi}{6} = 30^\circ$

$\frac{\pi}{4} = 45^\circ$

$\frac{\pi}{3} = 60^\circ$

$\frac{\pi}{2} = 90^\circ$

$\frac{\pi}{180^\circ}$

$(30^\circ)\left(\frac{\pi}{180^\circ}\right) = \frac{\pi}{6}$

$\left(\frac{\pi}{6}\right)\left(\frac{180^\circ}{\pi}\right) = 30^\circ$

The 1.3 "new" doesn't look like it has as much as the original 1.3 videos and notes:

https://harryzaims.com/122/videos/chapter-01/1-3/

Dive in! Ask questions!

Be an adult learner!

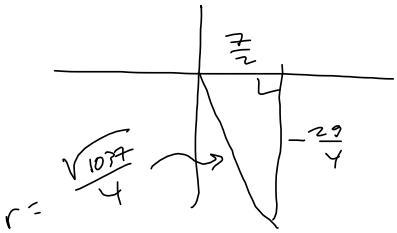
Next time Questions on 1.1 – 1.4

Take on §1.2 Homework

Rough in §1.5 in your notes

§1.4 #7 Inversion

$$\left(3\tfrac{1}{2}, -7\tfrac{1}{4}\right) = \left(\tfrac{7}{2}, -\tfrac{29}{4}\right)$$



Pythag Sez

$$\left(\tfrac{7}{2}\right)^2 + \left(\tfrac{29}{4}\right)^2$$

$$\tfrac{4}{4}\cdot\tfrac{49}{4} + \tfrac{841}{16} = \tfrac{1037}{16}$$

$$\Rightarrow r = \sqrt{\tfrac{1037}{16}} = \tfrac{\sqrt{1037}}{4}$$

$$\sin\theta = \frac{-\frac{29}{4}}{\frac{\sqrt{1037}}{4}} = -\tfrac{29}{4}\cdot\tfrac{4}{\sqrt{1037}} = -\frac{29}{\sqrt{1037}} = \frac{-29\sqrt{1037}}{1037} = \sin\theta$$

Rationalize for Denominators for WebAssign people. ↳ Fine 4 me ↳ Exact value for WebAssign

$$\cos\theta = \tfrac{7}{2}\cdot\tfrac{4}{\sqrt{1037}} = \left(\frac{14}{\sqrt{1037}}\right)\left(\frac{\sqrt{1037}}{\sqrt{1037}}\right) = \frac{14\sqrt{1037}}{1037} = \cos\theta$$