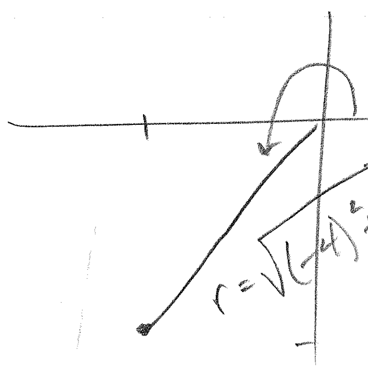
9/12/2012 – Sec 1.5 (cont.)
Sec 1.6

Math 1060

#9 $(-4,-6)$

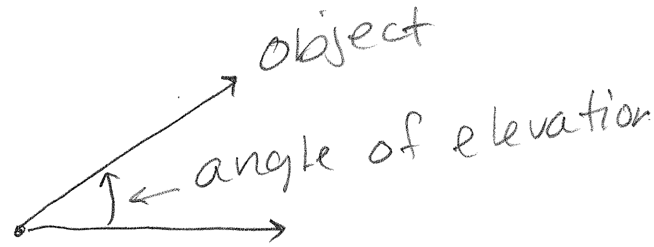


$r=\sqrt{(-4)^2+(-6)^2}=\sqrt{16+36}=\sqrt{52}$
$=2\sqrt{13}$

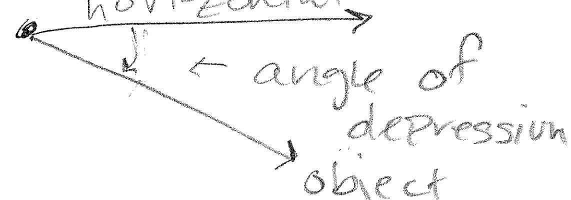
$\sin\theta=\frac{-6}{2\sqrt{13}}=\frac{-3}{\sqrt{13}}$

Sec 1.5 (cont.)

angle of elevation:



angle of depression:



both angles are always positive

$$x \cdot \tan 9 = \frac{m}{x} \cdot x$$

$$x \tan 9 = m$$

$$\tan 3.5 = \frac{x \tan 9}{x+13}$$

$$\tan 3.5(x+13) = x \tan 9$$

$$(\tan 3.5)x + 13\tan 3.5 = x\tan 9$$

$$13\tan 3.5 = x\tan 9 - x\tan 3.5$$

$$\frac{13\tan 3.5}{\tan 9 - \tan 3.5} = \frac{x(\tan 9 - \tan 3.5)}{\tan 9 - \tan 3.5}$$

$$\frac{13\tan 3.5}{(\tan 9 - \tan 3.5)} = x$$

$$8.178349886 = x$$

$$x \tan 9 = m$$

$$8.178349886(\tan 9) = m$$

$$m = 1.2953 \text{ mi}$$

$$4 = \frac{2x}{x+13}$$

$$4(x+13) = 2x$$

$$4x + 4(13) = 2x$$

$$-4x \qquad -4x$$

$$4(13) = 2x - 4x$$

$$= (2-4)x$$

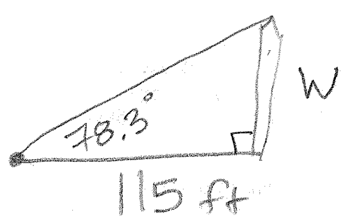
$$\frac{4(13)}{2-4} = \frac{(2-4)x}{2-4}$$

$$\frac{4(13)}{2-4} = x$$

Ex: Surveyer is Standing 115 ft from base of Washington Monument. The angle of elevation to top 78.3°

How tall is monument.

1st Draw A picture



2nd Set up a trig function

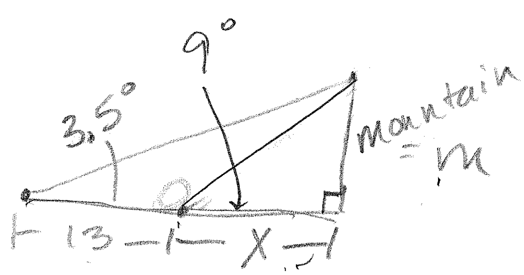
$$\tan\theta = \frac{opp}{adj}$$

$$115 \cdot \tan(78.3) = \frac{w}{115} \cdot 115$$

$$w = 115 \tan 78.3$$

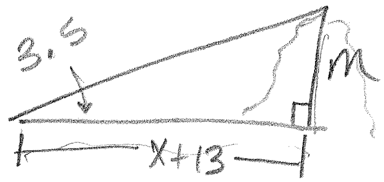
$$555.3140 \text{ ft}$$

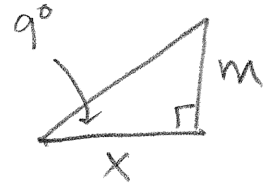
Ex:



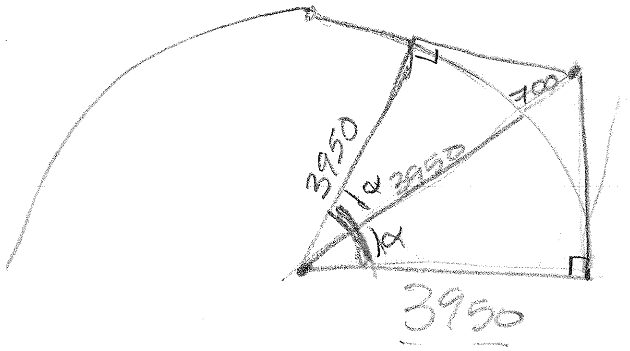
$$\tan 3.5 = \frac{m}{x+13}$$

$$\tan 9 = \frac{m}{x} \leftarrow$$





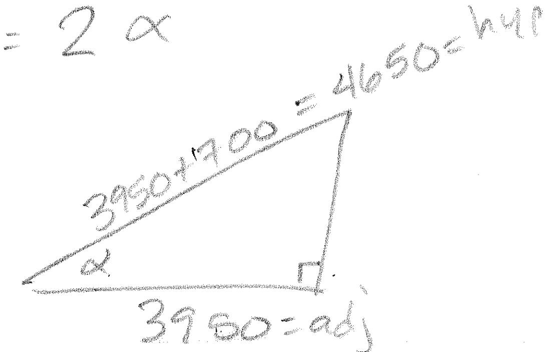
#50



arc length $= 3950\,\theta$

$\uparrow$ in Radians

$\theta = 2\alpha$



$\cos\theta = \frac{\text{adj}}{\text{hyp}}$

$\cos\alpha = \frac{3950}{4650}$

$\sin\theta = \frac{\text{opp}}{\text{hyp}} \le 1$

$\cos\theta = \frac{\text{adj}}{\text{hyp}} \le 1$

$\cos^{-1}\left(\frac{3950}{4650}\right) = \alpha$

$\alpha = .5558307942$

$\theta = 2\alpha = 1.111661588$

arc length $= 3950(1.111661588)$

$= 4391.06$

4391 mi

$s = r\theta$

Sec 1.6 The Fundamental Identity and Reference Angle

An identity is an equation that is satisfied for all values of the variable for which both sides are defined.

Fundamental Identity of Trigonometry

$$\sin^2\theta + \cos^2\theta = 1$$

means $(\sin\theta)^2 \neq \sin\theta^2$

$\sin^2\theta =$

$\sin\theta = \frac{y}{r}$ $\cos\theta = \frac{x}{r}$ $r = \sqrt{x^2+y^2}$

$r^2 = x^2+y^2$

$$\left(\frac{y}{r}\right)^2 + \left(\frac{x}{r}\right)^2 = 1$$

$$\frac{y^2}{r^2} + \frac{x^2}{r^2} = 1 \Rightarrow \frac{y^2+x^2}{r^2} = 1$$

$$1 = \frac{\cancel{r^2}}{\cancel{r^2}} = 1$$

I Know θ is in Quad III

$$\sin\theta = \frac{-5}{13}$$

find $\cos\theta$

$$\sin^2\theta + \cos^2\theta = 1$$

$$\left(\frac{-5}{13}\right)^2 + \cos^2\theta = 1$$

$$\frac{25}{169} + \cos^2\theta = \boxed{1 - \frac{25}{169}}$$

$$-\frac{25}{169}$$

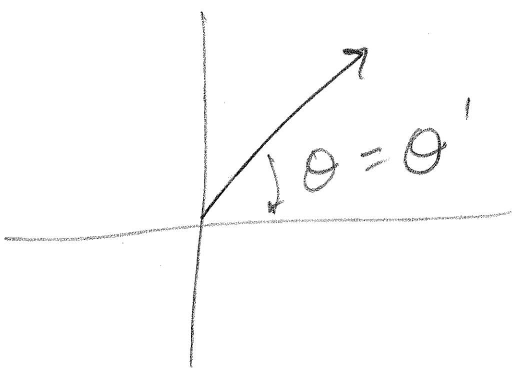
$$\sqrt{\cos^2\theta} = \pm\sqrt{\frac{144}{169}}$$

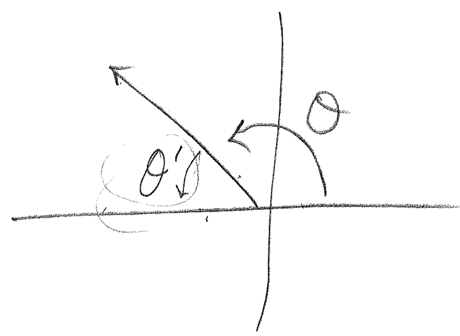
$$\cos\theta = \boxed{\pm}\,\frac{12}{13}$$

↑ which sign?

$$\cos\theta = -\frac{12}{13}$$

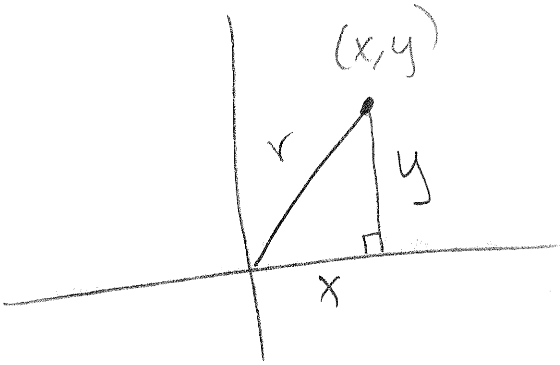
Defn: If θ is a non quadrantal angle in standard position, then the Reference Angle for θ is the positive acute angle θ' formed by the terminal side of θ and the closest x-axis





$\theta + \theta' = 180$

$\theta' = 180 - \theta$



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