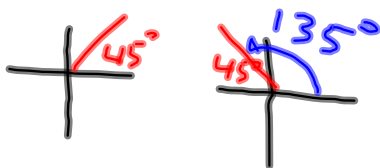


13.6- Inverses of Trigonometric Functions

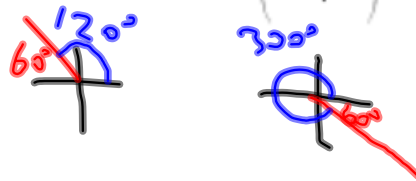
Find all possible values of:

a. $\sin^{-1} \frac{\sqrt{2}}{2}$



$$45^\circ + 360^\circ n$$
$$135^\circ + 360^\circ n$$

b. $\tan^{-1}(-\sqrt{3})$



$$120^\circ + 360^\circ n$$

$$300^\circ + 360^\circ n$$

Principle Values of Sin θ , Cos θ , and Tan θ

$$\text{Sin } \theta = \sin \theta \text{ for } -90^\circ \leq \theta \leq 90^\circ \quad \text{I, IV}$$

$$\text{Cos } \theta = \cos \theta \text{ for } 0^\circ \leq \theta \leq 180^\circ \quad \text{I, II}$$

$$\text{Tan } \theta = \tan \theta \text{ for } -90^\circ < \theta < 90^\circ \quad \text{I, IV}$$

Inverse Trigonometric Functions

If $y = \text{Sin } x$, then its inverse function is $y = \text{Sin}^{-1}x$.

If $y = \text{Cos } x$, then its inverse function is $y = \text{Cos}^{-1}x$.

If $y = \text{Tan } x$, then its inverse function is $y = \text{Tan}^{-1}x$.

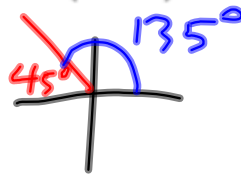
Evaluate each inverse trigonometric expression.

a. $\sin^{-1} \frac{\sqrt{3}}{2}$



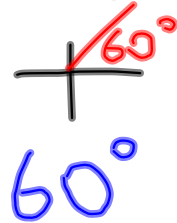
60°

b. $\cos^{-1} \left(-\frac{\sqrt{2}}{2} \right)$



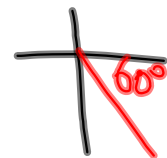
135°

c. $\tan^{-1} \sqrt{3}$



60°

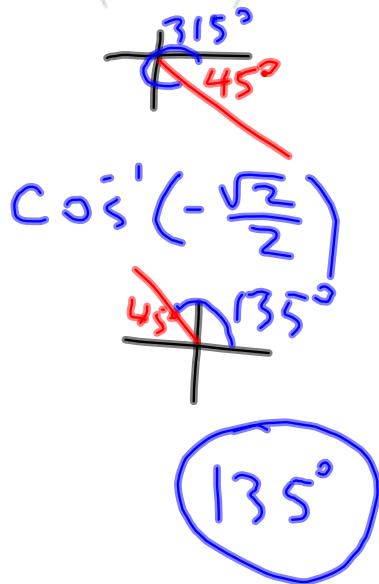
$\tan^{-1}(-\sqrt{3})$



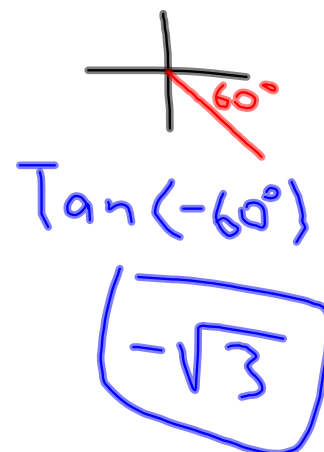
-60°

Evaluate each trigonometric expression.

a. $\cos^{-1}(\sin 315^\circ)$



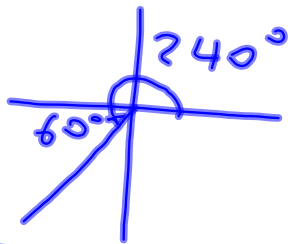
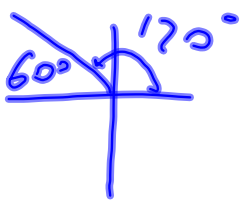
b. $\tan\left[\sin^{-1}\left(-\frac{\sqrt{3}}{2}\right)\right]$



Homework

Pg. 871-873 #12-52 even

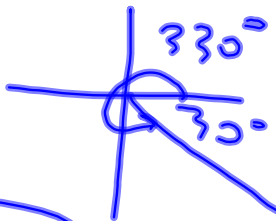
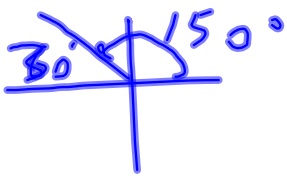
$$12) \cos^{-1}\left(-\frac{1}{2}\right)$$



$$120^\circ + 360^\circ n$$

$$240^\circ + 360^\circ n$$

$$14) \operatorname{Tan}^{-1}\left(-\frac{\sqrt{3}}{3}\right)$$



$$\frac{1}{\sqrt{3}} \cdot \frac{\sqrt{3}}{3} = \frac{\sqrt{3}}{3}$$

$$150^\circ + 360^\circ n$$

$$330^\circ + 360^\circ n$$

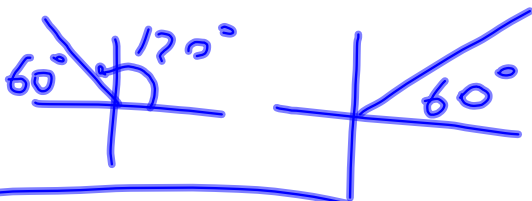
$$16) \sin^{-1}(1)$$

$$90^\circ + 360^\circ n$$



.

$$18) \sin^{-1}\left(\frac{\sqrt{3}}{2}\right)$$

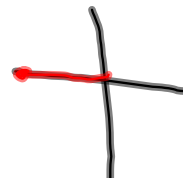
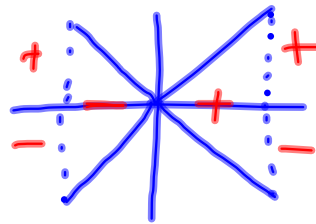


$$\begin{aligned} 60^\circ + 360^\circ n \\ 120^\circ + 360^\circ n \end{aligned}$$

20) $\tan^{-1} 0$

$$0^\circ + 360^\circ n$$


$$180^\circ + 360^\circ n$$



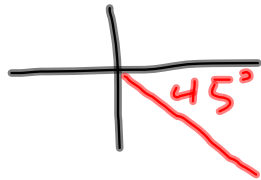
$$22) \sin^{-1} \frac{\sqrt{2}}{2}$$

$$45^\circ$$

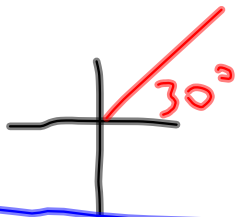
$$24) \cos^{-1} \left(-\frac{\sqrt{3}}{2}\right)$$


$$150^\circ$$

$$32) \operatorname{Tan}^{-1}(-1) = -45^\circ$$



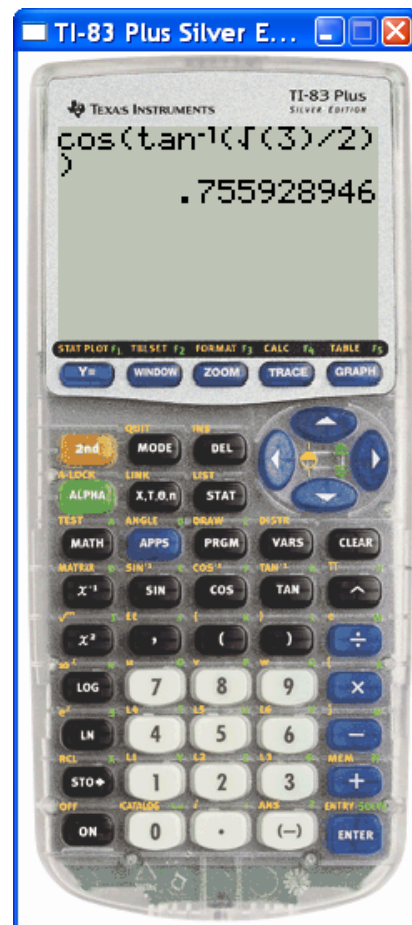
$$34) \cos(\sin^{-1}(\frac{1}{2}))$$



$$\cos 30^\circ = \frac{\sqrt{3}}{2}$$

$$36) \cos(\tan^{-1} \frac{\sqrt{3}}{2})$$

.7560



$$38) \tan(\cos^{-1} \frac{\sqrt{2}}{2})$$

$$\tan(45^\circ)$$

$$1$$

$$40) \operatorname{Tan}^{-1}(\cos 135^\circ)$$



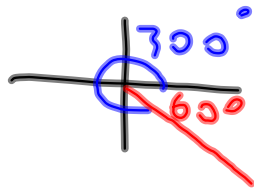
$$\operatorname{Tan}^{-1}\left(-\frac{\sqrt{2}}{2}\right) \approx \boxed{35.26^\circ}$$

$$42) \cos^{-1}(\sin 60^\circ)$$

$$\cos^{-1}\left(\frac{\sqrt{3}}{2}\right)$$

$$30^\circ$$

$$44) \sin^{-1}(\cos 300^\circ)$$



$$\sin^{-1}\left(\frac{1}{2}\right) = \boxed{30^\circ}$$

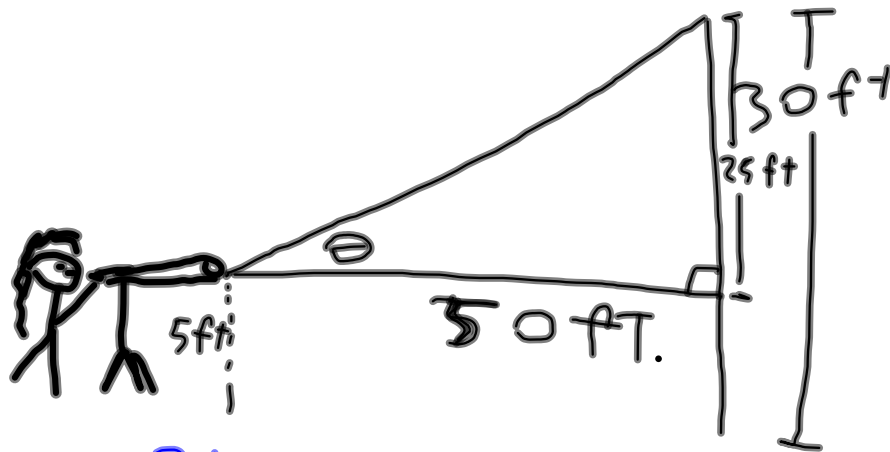
$$4b) \cos(\cos^{-1} x) = x$$

$$\cos(\cos^{-1} \frac{1}{2}) = \frac{1}{2}$$

$$\cos 60^\circ$$

$$\frac{1}{2} = \frac{1}{2}$$

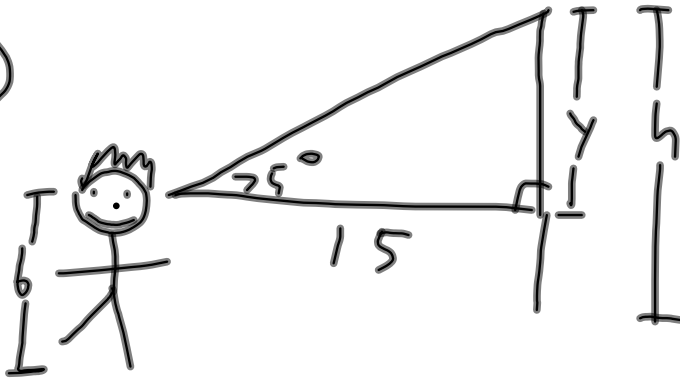
48)



$$\tan \theta = \frac{25}{50}$$

$$\theta = \tan^{-1} \frac{25}{50} \approx 26.6^\circ$$

50)



$$15 \left[\tan 75^\circ = \frac{y}{15} \right]$$

$$15 \tan 75^\circ = y = 56 \text{ ft}$$

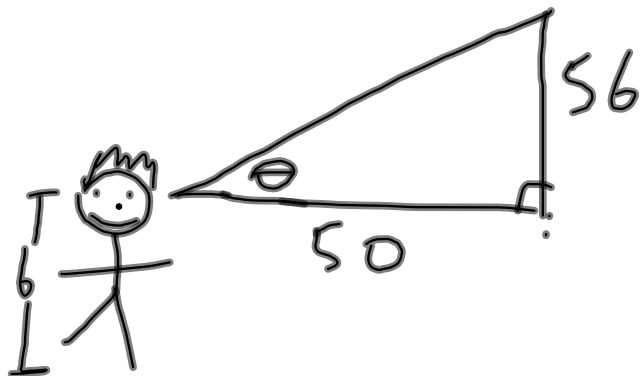
$$h = y + 6$$

$$= 56 + 6 = 62 \text{ ft.}$$

50 b)

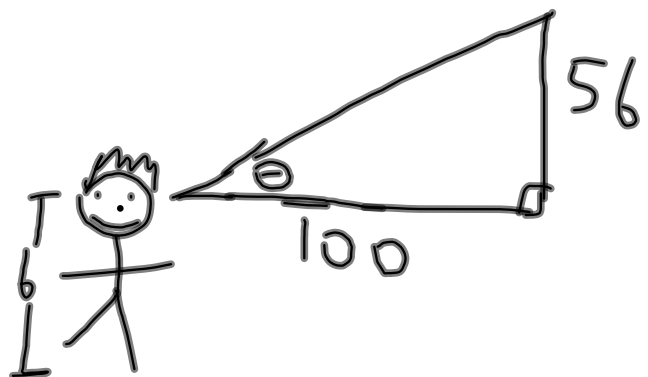
$$\tan \theta = \frac{56}{50}$$

$$\theta = \tan^{-1} \frac{56}{50} \approx 48^\circ$$



$$\tan \theta = \frac{56}{100}$$

$$\theta = \tan^{-1} \frac{56}{100} = 29^\circ$$



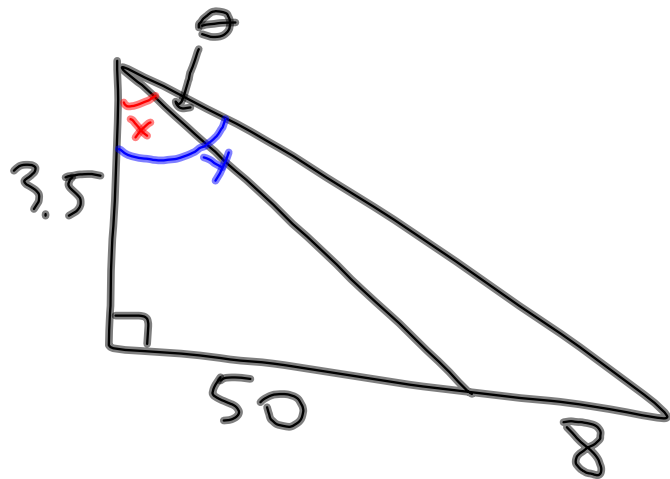
52)

$$\tan x = \frac{50}{3.5}$$

$$x = \tan^{-1} \frac{50}{3.5} = 86^\circ$$

$$\tan y = \frac{58}{3.5}$$

$$y = \tan^{-1} \frac{58}{3.5} = 86.5^\circ$$



$$\theta = 86.5^\circ - 86^\circ = .5^\circ$$