HW evens on lined paper

In Exercises 23–32, find the exact value without a calculator.

23. $\cos(\sin^{-1}(1/2))$
24. $\sin(\tan^{-1} 1)$
25. $\sin^{-1}(\cos(\pi/4))$
26. $\cos^{-1}(\cos(7\pi/4))$
27. $\cos(2\sin^{-1}(1/2))$
28. $\sin(\tan^{-1}(-1))$
29. $\arcsin(\cos(\pi/3))$
30. $\arccos(\tan(\pi/4))$
31. $\cos(\tan^{-1}\sqrt{3})$
32. $\tan^{-1}(\cos\pi)$

23) $\cos\left(\frac{\pi}{6}\right) = \frac{\sqrt{3}}{2}$

25) $\sin^{-1}\left(\frac{\sqrt{2}}{2}\right) = \frac{\pi}{4}$

27) $\cos\left(\frac{2}{1}\cdot\frac{\pi}{6}\right) = \cos\left(\frac{\pi}{3}\right) = \frac{1}{2}$

29) $\arcsin\left(\frac{1}{2}\right) = \frac{\pi}{6}$

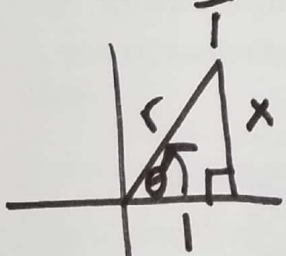
31) $\cos\left(\frac{\pi}{3}\right) = \frac{1}{2}$

In Exercises 47–52, find an algebraic expression equivalent to the given expression. (*Hint:* Form a right triangle as done in Example 5.)

47. $\sin(\tan^{-1} x)$
48. $\cos(\tan^{-1} x)$
49. $\tan(\arcsin x)$
50. $\cot(\arccos x)$
51. $\cos(\arctan 2x)$
52. $\sin(\arccos 3x)$

47) $\tan^{-1} x = \theta$

$\tan\theta = \frac{x}{1}$ $\quad -\frac{\pi}{2} < \theta < \frac{\pi}{2}$

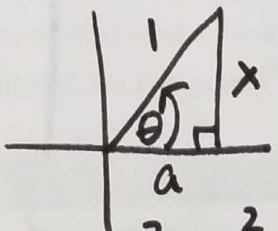


$\sqrt{r^2} = \sqrt{1^2 + x^2}$

$r = \sqrt{1+x^2}$

$\sin\theta = \frac{x}{\sqrt{1+x^2}}$

49) $\sin\theta = \frac{x}{1}$ $\quad -\frac{\pi}{2} \le \theta \le \frac{\pi}{2}$



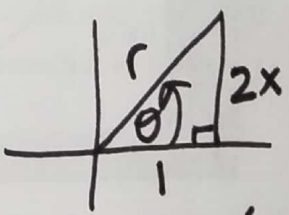
$a^2 + x^2 = 1^2$

$\sqrt{a^2} = \sqrt{1-x^2}$

$a = \sqrt{1-x^2}$

$\tan\theta = \frac{x}{\sqrt{1-x^2}}$

51) $\tan\theta = \frac{2x}{1}$ $\quad -\frac{\pi}{2} < \theta < \frac{\pi}{2}$



$r^2 = 1^2 + (2x)^2$

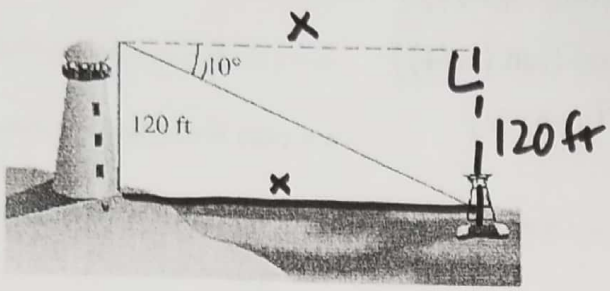
$r = \sqrt{1+4x^2}$

$\cos\theta = \frac{1}{\sqrt{1+4x^2}}$

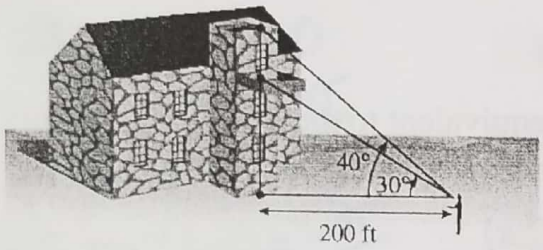
SOH-CAH-TOA

3. **Finding a Distance** The angle of depression from the top of the Smoketown Lighthouse 120 ft above the surface of the water to a buoy is 10°. How far is the buoy from the lighthouse?

$\tan 10 = \frac{120}{x}$



15. **Civil Engineering** The angle of elevation from an observer to the bottom edge of the Delaware River drawbridge observation deck located 200 ft from the observer is 30°. The angle of elevation from the observer to the top of the observation deck is 40°. What is the height of the observation deck?



16. **Traveling Car** From the top of a 100-ft building a man observes a car moving toward him. If the angle of depression of the car changes from 15° to 33° during the period of observation, how far does the car travel?