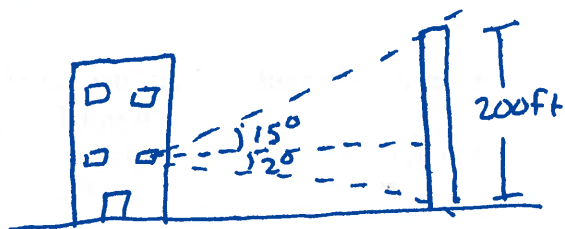


§7.2 #48



We know : $x_1 = x_2$
and $h_1 + h_2 = 200$.

Goal : find $x_1 = x_2$

From 1st triangle,

$$\tan(15^\circ) = \frac{h_1}{x_1}$$

⇓ solve for h_1

~~200~~

$$(*) \quad h_1 = \tan(15^\circ) x_1$$

From 2nd triangle,

$$\tan(20^\circ) = \frac{h_2}{x_2}$$

⇓

solve for h_2

⇓

$$(**) \quad h_2 = \tan(20^\circ) x_2$$

Since $x_1 = x_2$, call that common value x .

Using $h_1 + h_2 = 200$, we see from (*) and (**)

$$\tan(15^\circ)x + \tan(20^\circ)x = 200$$

⇓

$$(\tan(15^\circ) + \tan(20^\circ))x = 200$$

⇓

$$x = \frac{200}{\tan(15^\circ) + \tan(20^\circ)} \approx 660.3 \text{ ft}$$

#53

(2)



Soln:



Calculate

$$\sin(80^\circ) = \frac{\text{height}}{23}$$

$$\Rightarrow \text{height} = 23 \sin(80^\circ) \approx 22.65$$

§7.3

#10 | $\sin\left(\frac{\pi}{2}\right) = 1$

#19 | $\cos(\pi) = -1$

#30 |



$\frac{5\pi}{6}$ in QII \Rightarrow reference angle is

$$\text{ref } \angle = \pi - \frac{5\pi}{6} = \frac{\pi}{6}$$

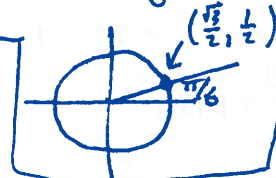
#43 |



$\frac{7\pi}{6}$ in QIII \Rightarrow

$$\text{ref } \angle = \frac{7\pi}{6} - \pi = \frac{7\pi}{6} - \frac{6\pi}{6} = \frac{\pi}{6}$$

\Downarrow
 $\sin\left(\frac{7\pi}{6}\right)$ negative
 $\cos\left(\frac{7\pi}{6}\right)$ positive



Therefore,

$$\sin\left(\frac{7\pi}{6}\right) = -\sin\left(\frac{\pi}{6}\right) = -\frac{1}{2}$$

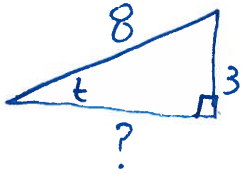
$$\cos\left(\frac{7\pi}{6}\right) = +\cos\left(\frac{\pi}{6}\right) = \frac{\sqrt{3}}{2}$$

#52] $\sin(t) = \frac{3}{8}$ and t in QII

(3)



$\cos(t)$ is negative



Pythagorean thm
 $\Rightarrow ?^2 + 3^2 = 8^2 \Rightarrow ?^2 = 64 - 9 = 55$

$\Rightarrow ? = \sqrt{55}$

Therefore

$\cos(t) = -\frac{\sqrt{55}}{8}$, $\tan(t) = \frac{\sin(t)}{\cos(t)} = \frac{3/8}{-\sqrt{55}/8} = -\frac{3}{8} \left(\frac{8}{\sqrt{55}}\right) = -\frac{3}{\sqrt{55}}$
 $\sec(t) = \frac{1}{\cos(t)} = -\frac{8}{\sqrt{55}}$, $\csc(t) = \frac{1}{\sin(t)} = \frac{8}{3}$, $\cot(t) = \frac{1}{\tan(t)} = -\frac{\sqrt{55}}{3}$

#70] $\sin(t) = 0.994$

$\cos(t) = 0.111$

#80] $\sin\left(\frac{5\pi}{9}\right) \approx 0.9848$ ^{calculator}

$\cos\left(\frac{5\pi}{9}\right) \approx -0.1736$

§ 7.4

#10] $\tan\left(\frac{\pi}{4}\right) = \frac{\sqrt{2}/2}{\sqrt{2}/2} = 1$

#11] $\sec\left(\frac{\pi}{4}\right) = \frac{1}{\sqrt{2}/2} = \frac{2}{\sqrt{2}}$

flip + multiply

#19] $\frac{7\pi}{6}$ is in QIII \Rightarrow $\text{ref } \angle = \frac{7\pi}{6} - \pi = \frac{7\pi}{6} - \frac{6\pi}{6} = \frac{\pi}{6}$

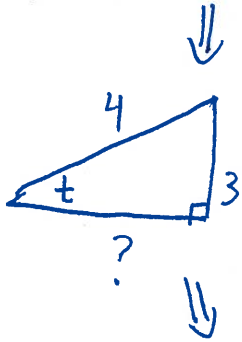


Secant is negative

Therefore, $\sec\left(\frac{7\pi}{6}\right) = \frac{-1}{\cos(\pi/6)} = \frac{-1}{\sqrt{3}/2} = -\frac{2}{\sqrt{3}}$

4

#38) $\sin(t) = \frac{3}{4}$, t in QII



Cosine negative,
Secant negative,
csc positive
tan negative
cot negative

$$?^2 + 3^2 = 4^2$$

$$?^2 = 16 - 9$$

$$?^2 = 7$$

$$? = \sqrt{7}$$

⇒

$$\begin{aligned} \cos(t) &= -\frac{\sqrt{7}}{4} & \tan(t) &= \frac{-3}{\sqrt{7}} \\ \sec(t) &= -\frac{4}{\sqrt{7}} & \cot(t) &= -\frac{\sqrt{7}}{3} \\ \csc(t) &= +\frac{4}{\sqrt{7}} \end{aligned}$$

#72) if $d = 72$, then

$$h = 15 \cos\left(\frac{1}{600} \cdot 72\right) = 15 \cos\left(\frac{72}{600}\right) \approx 14.8921 \text{ hours}$$

The period is $\frac{2\pi}{\frac{1}{600}} = 1200\pi$

#75) if $x = 55^\circ$, then

$$y = 2 \cos(55^\circ) + 6 \approx 7.147 \text{ inches}$$