

Wksht 23 solns

1. a. $\frac{17\pi}{6} - 2\pi = \frac{17\pi}{6} - \frac{12\pi}{6} = \frac{5\pi}{6}$

$\sin\left(\frac{17\pi}{6}\right) = \sin\left(\frac{5\pi}{6}\right) = \boxed{\frac{1}{2}}$

b. $-\frac{16\pi}{3} + 6\pi = -\frac{16\pi}{3} + \frac{18\pi}{3} = \frac{2\pi}{3}$

$\cot\left(-\frac{16\pi}{3}\right) = \cot\left(\frac{2\pi}{3}\right) = \frac{\cos\left(\frac{2\pi}{3}\right)}{\sin\left(\frac{2\pi}{3}\right)} = \frac{-\frac{1}{2}}{\frac{\sqrt{3}}{2}} = -\frac{1}{\sqrt{3}} = \boxed{-\frac{\sqrt{3}}{3}}$

c. ~~2~~ $-\frac{8\pi}{3} + 4\pi = -\frac{8\pi}{3} + \frac{12\pi}{3} = \frac{4\pi}{3}$

$\csc\left(-\frac{8\pi}{3}\right) = \csc\left(\frac{4\pi}{3}\right) = \frac{1}{\sin\left(\frac{4\pi}{3}\right)} = \frac{1}{-\frac{\sqrt{3}}{2}} = -\frac{2}{\sqrt{3}} = \boxed{-\frac{2\sqrt{3}}{3}}$

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

$\sin^2 0 + \cos^2 0 = 0^2 + 1^2 = 1 \checkmark$

b. $\sin^2 \frac{4\pi}{3} + \cos^2 \frac{4\pi}{3}$

$= \left(-\frac{\sqrt{3}}{2}\right)^2 + \left(-\frac{1}{2}\right)^2 = \frac{3}{4} + \frac{1}{4} = \frac{4}{4} = 1 \checkmark$

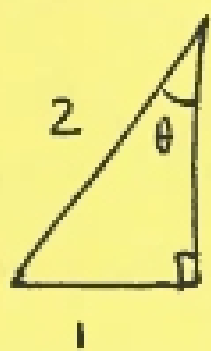
c. $\sin^2\left(-\frac{5\pi}{6}\right) + \cos^2\left(-\frac{5\pi}{6}\right)$

$= \left(-\frac{1}{2}\right)^2 + \left(-\frac{\sqrt{3}}{2}\right)^2 = \frac{1}{4} + \frac{3}{4} = 1 \checkmark$

d. $\sin^2\left(\frac{7\pi}{4}\right) + \cos^2\left(\frac{7\pi}{4}\right)$

$= \left(-\frac{\sqrt{2}}{2}\right)^2 + \left(\frac{\sqrt{2}}{2}\right)^2 = \frac{2}{4} + \frac{2}{4} = \frac{4}{4} = 1 \checkmark$

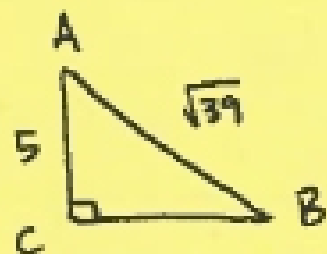
3.



find other side: $1^2 + b^2 = 2^2$
 $b^2 = 3$
 $b = \sqrt{3}$

$\sin \theta = \frac{\text{opp}}{\text{hyp}} = \frac{1}{2}$
 $\cos \theta = \frac{\text{adj}}{\text{hyp}} = \frac{\sqrt{3}}{2}$
 $\tan \theta = \frac{\text{opp}}{\text{adj}} = \frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$

4.



$\cos A = \frac{\text{adj}}{\text{hyp}} = \frac{5}{\sqrt{39}} = \frac{5\sqrt{39}}{39}$

$\tan B = \frac{\text{opp}}{\text{adj}} = \frac{5}{\sqrt{14}} = \frac{5\sqrt{14}}{14}$

$5^2 + x^2 = 39$
 $x^2 = 14 \quad x = \sqrt{14}$

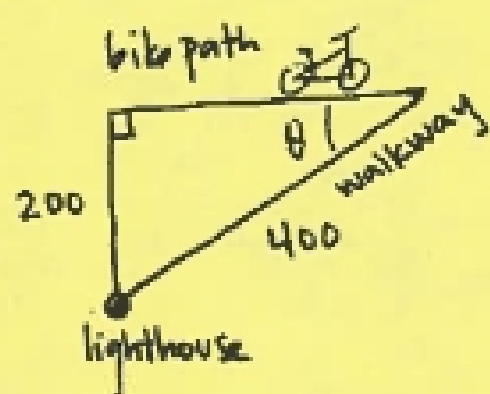
5. a. $\cos \theta \sec \theta$

$= \cos \theta \cdot \frac{1}{\cos \theta} = 1 \checkmark$

b. $(1 + \sin \theta)(1 - \sin \theta)$

$= 1 - \sin^2 \theta$
 $= (\cos^2 \theta + \sin^2 \theta) - \sin^2 \theta$ since $\sin^2 \theta + \cos^2 \theta = 1$.
 $= \cos^2 \theta \checkmark$

6. this question is ambiguous. let's pretend it looks like this:



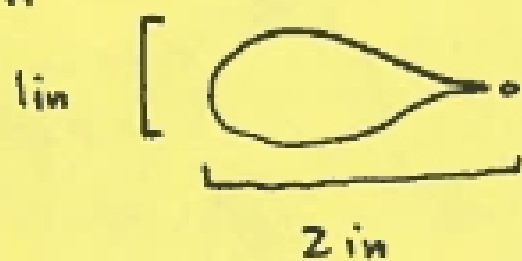
know opposite side and hypotenuse,

$$\text{so know } \sin \theta = \frac{\text{opp}}{\text{hyp}} = \frac{200}{400} = \frac{1}{2}$$

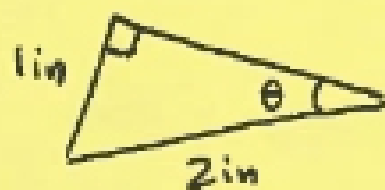
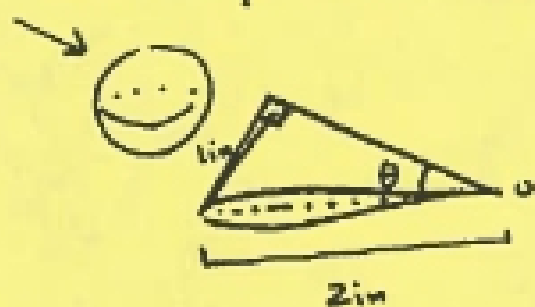
$\sin \theta = \frac{1}{2}$ so
and θ is acute

$$\boxed{\theta = \frac{\pi}{6}}$$

7.



so droplet had diameter = 1 in want θ :



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

so

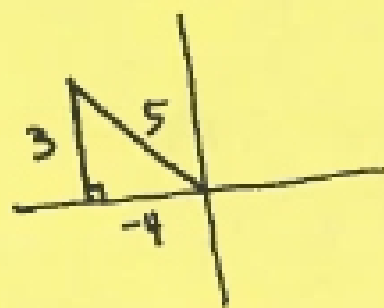
$$\boxed{\theta = \frac{\pi}{6}}$$

8.

$$\tan \theta = -\frac{4}{3} \quad \sec \theta < 0$$

find $\sin \theta$, $\cos \theta$

$\tan \theta$ is negative when θ in Q2 or Q4 $\Rightarrow \theta$ in Q2
 $\sec \theta$ is negative when θ in Q2 or Q3



$$\begin{aligned} 3^2 + (-4)^2 &= h^2 \\ 9 + 16 &= h^2 \\ 25 &= h^2 \\ h &= 5 \end{aligned}$$

$$\sin \theta = \frac{3}{5}$$

$$\cos \theta = -\frac{4}{5}$$