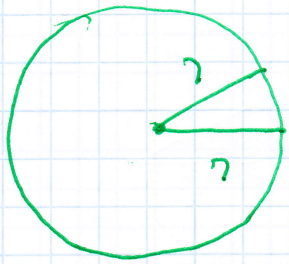
(note: I use 3.14159 for $\pi$)

1

#10)



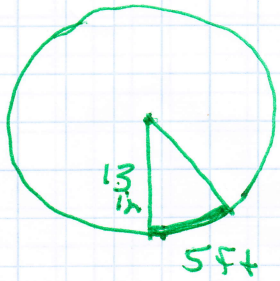

$$5 \text{ minutes} = \frac{\overset{\text{minutes}}{5}}{60} \cdot 360^\circ = 30^\circ$$

$$s = r\theta$$

$$s = 7 \cdot \frac{30^\circ}{180^\circ} \cdot \pi \text{ rad}$$

$$= 3.67 \text{ rad}$$

#11)




5ft = 60 inches

$$s = r\theta$$

$$60 = 13 \cdot \theta$$

keep lots of accuracy; round at the end

$$\theta = 4.6154 \text{ rad}$$

$$\frac{4.6154}{2\pi} \cdot 360^\circ = 264.4^\circ$$

#12) $$46 \frac{\cancel{mi}}{\cancel{hour}} \cdot \frac{1 \cancel{hour}}{60 \text{ min}} \cdot \frac{5{,}280 \cancel{ft}}{1 \cancel{mi}} \cdot \frac{12 \text{ in}}{1 \cancel{ft}} = 48{,}576 \frac{\text{in}}{\text{min}}$$

How many inches in a revolution?

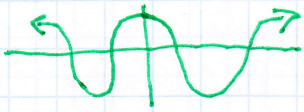
$r = 12''$ $\quad 1 \text{ rev} = 2 \cdot \pi \cdot 12'' = 75.398 \text{ in}$

So, $$48{,}576 \frac{\cancel{in}}{min} \cdot \frac{1 \text{ rev}}{75.398 \cancel{in}} = 644.26 \frac{\text{rev}}{\text{min}}$$

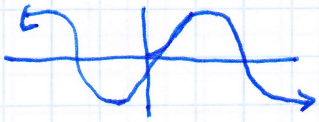
#13) $\tan t = \dfrac{\sin t}{\cos t} = \dfrac{\frac{\sqrt{21}}{5}}{\frac{2}{5}} = \dfrac{\sqrt{21}}{2}$

#14) $\sec t = \dfrac{1}{\cos t} = \dfrac{1}{\frac{\sqrt{55}}{8}} = \dfrac{8}{\sqrt{55}}$

$\dfrac{8}{\sqrt{55}} \cdot \dfrac{\sqrt{55}}{\sqrt{55}} = \dfrac{8\sqrt{55}}{55}$

#15) cosine: 

Domain is all $\mathbb{R}$ numbers

#16) sin : 

show range as "y" values. $\Longrightarrow$

Range is $-1 \le y \le 1$

#17) $\csc t = \dfrac{1}{\sin t} = -\dfrac{7}{5}$ (just flip the sine value)

#18) $\cot t = \dfrac{\cos t}{\sin t} = \dfrac{\frac{3}{4}}{-\frac{\sqrt{7}}{4}} = \dfrac{3}{-\sqrt{7}}$

$-\dfrac{3}{\sqrt{7}} \cdot \dfrac{\sqrt{7}}{\sqrt{7}} = -\dfrac{3\sqrt{7}}{7}$

#19)

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

$$\left(\frac{2\sqrt{2}}{3}\right)^2 + \cos^2 t = 1$$

$$\frac{8}{9} + \cos^2 t = 1$$

$$-\frac{8}{9} \qquad\qquad -\frac{8}{9}$$

$$\cos^2 t = \frac{1}{9}$$

$$\cos t = \pm\frac{1}{3}$$

Note: could be $\pm\frac{1}{3}$. Depends on quadrant.

In quadrant 1, $\cos t = \frac{1}{3}$

#20)

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

$$\sin^2 t + \left(\frac{\sqrt{77}}{9}\right)^2 = 1$$

$$\sin^2 t + \frac{77}{81} = 1$$

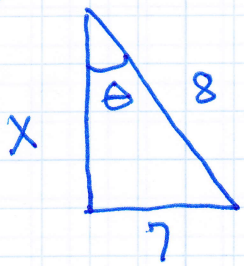
$$-\frac{77}{81} \qquad -\frac{77}{81}$$

$$\sin^2 t = \frac{4}{81}$$

$$\sin t = \pm\frac{2}{9}$$

In Q I, $\sin t = \frac{2}{9}$

#21)

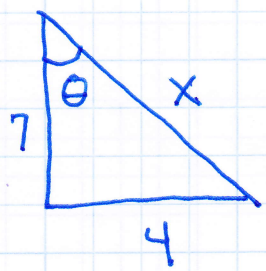



$$x^2 + 7^2 = 8^2$$
$$x^2 + 49 = 64$$
$$-49 \quad -49$$
$$x^2 = 15$$
$$x = \sqrt{15}$$

Note: must be a "+" value because it is the length of a side.

$$\sin\theta = \frac{opp}{hyp} = \frac{7}{8}$$

#22)




$$4^2 + 7^2 = x^2$$
$$16 + 49 = x^2$$
$$65 = x^2$$
$$\sqrt{65} = x$$

$$\csc\theta = \frac{1}{\sin\theta} = \frac{1}{\frac{opp}{hyp}} = \frac{1}{\frac{4}{\sqrt{65}}}$$

$$\csc\theta = \frac{\sqrt{65}}{4}$$

#23) $\frac{\pi}{4}$ is $45°$

$$\tan\frac{\pi}{4} - \sin\frac{\pi}{4}$$

$$= 1 - \frac{1}{\sqrt{2}}\cdot\left(\frac{\sqrt{2}}{\sqrt{2}}\right)$$

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

#24) $\cot \frac{\pi}{3} - \cos \frac{\pi}{6}$

$\frac{\pi}{3} = 60^\circ \quad \frac{\pi}{6} = 30^\circ$

$\cot 60^\circ - \cos 30^\circ$

$\frac{1}{\tan 60^\circ} - \cos 30^\circ$

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

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

$\left(\frac{\sqrt{3}}{\sqrt{3}}\right) \cdot \frac{1}{\sqrt{3}} - \frac{\sqrt{3}}{2} = \frac{\sqrt{3}}{3} - \frac{\sqrt{3}}{2}$

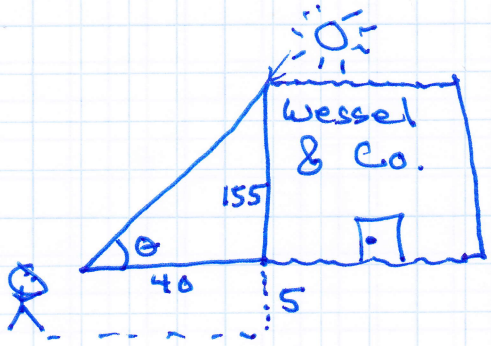
$= \frac{2\sqrt{3}}{6} - \frac{3\sqrt{3}}{6}$

$= -\frac{\sqrt{3}}{6}$

#25) $\sin 33^\circ = \cos (90^\circ - 33^\circ)$

$= \cos (57^\circ)$

#26)



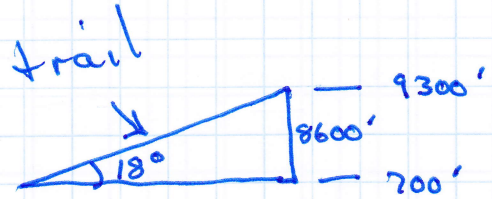

$\tan \theta = \frac{155}{40}$

$\tan \theta = 3.875$

use $\tan^{-1} \theta$ function on calculator

$\theta = \tan^{-1} 3.875 = 75.53^\circ$

# 27)



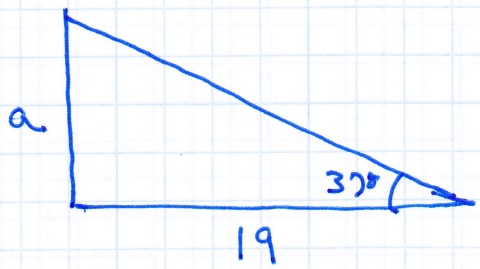

$$\sin 18° = \frac{8600}{x}$$

$$x = \frac{8600}{\sin 18°}$$

using the old switcheroo!

$$x = 27{,}830'$$

# 28)



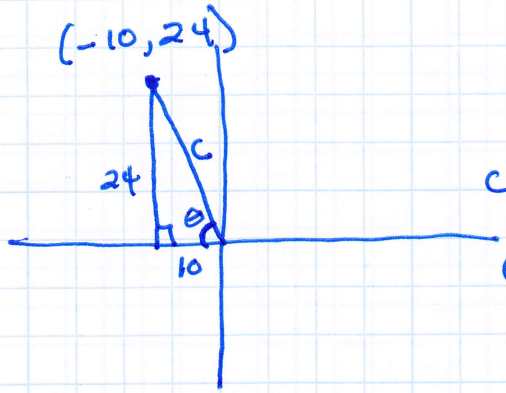

$$\tan 37° = \frac{a}{19}$$

$$a = 19 \tan 37°$$

$$a = 14$$

(no units are given)

# 29)




Q II

$$c^2 = 10^2 + 24^2$$

$$c^2 = 100 + 576$$

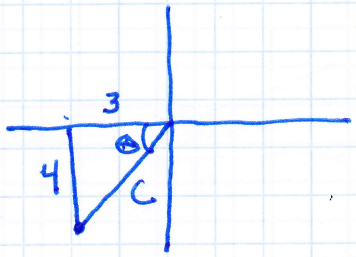
$$c^2 = 676$$

$$c = 26$$

$$\sin\theta = \frac{24}{26} = \frac{12}{13}$$

$\sin\theta > 0$ in Q II

# 30)




Q III

$c^2 = 3^2 + 4^2$

$c^2 = 9 + 16$

$c^2 = 25$

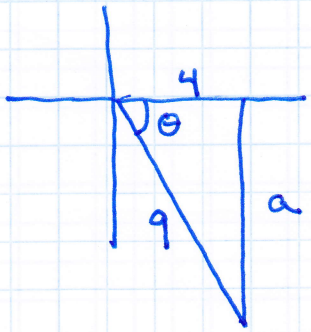
$c = 5$

$\sec\theta = \frac{1}{\cos\theta} = \frac{1}{-\frac{3}{5}} = -\frac{5}{3}$

$\cos\theta < 0$ in Q III

# 31)

$\sec\theta = \frac{9}{4}$ $\theta$ in Q IV




$\cos\theta = \frac{4}{9} = \frac{x}{r}$

$a^2 + 4^2 = 9^2$

$a^2 + 16 = 81$

$-16 \quad -16$

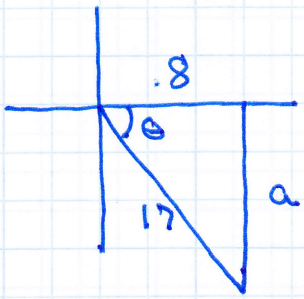
$a^2 = 65$

$a = -\sqrt{65}$

$\tan\theta = \frac{opp}{adj} = \frac{-\sqrt{65}}{4}$

$\tan\theta < 0$ in Q IV

#32) $\cos\theta = \frac{8}{17}$ Q IV




$\cos\theta = \frac{8}{17} = \frac{x}{r}$

$a^2 + 8^2 = 17^2$

$a^2 + 64 = 289$

$-64 \quad -64$

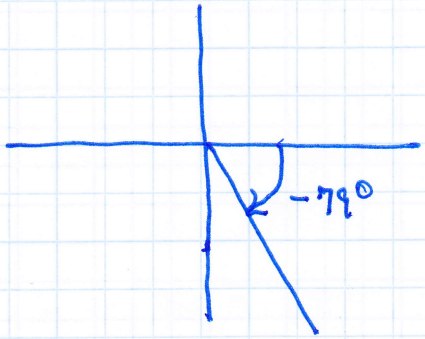
$a^2 = 225$

$a = -15$ (in Q4)

$\cot\theta = \frac{1}{\tan\theta} = \frac{1}{\frac{opp}{adj}} = \frac{adj}{opp} = -\frac{8}{15}$

$\tan\theta < 0$ in Q IV

#33)



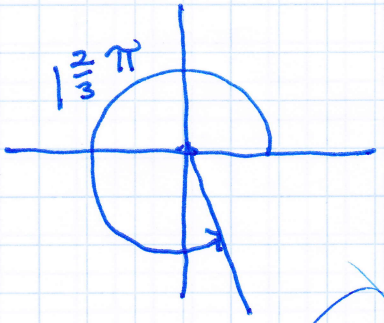

ref $\angle = 79°$

always between the terminal line and the x-axis

#34) $\frac{23\pi}{3} = 7\frac{2}{3}\pi$

$-6\pi$

$1\frac{2}{3}\pi$




$2\pi - 1\frac{2}{3}\pi = \frac{\pi}{3}$