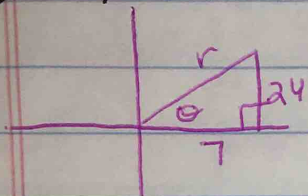


HM3 Trig Values in the Coordinate Plane

① (7, 24)



$$r^2 = 7^2 + 24^2$$

$$r^2 = 49 + 576$$

$$r^2 = 625$$

$$r = 25$$

$$\sin \theta = 24/25$$

$$\csc \theta = 25/24$$

$$\cos \theta = 7/25$$

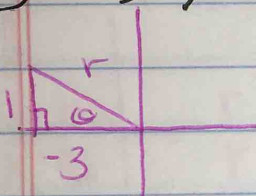
$$\sec \theta = 25/7$$

$$\tan \theta = 24/7$$

$$\cot \theta = 7/24$$

7, 24, 25 is a PYTHAGOREAN TRIPLE!!!

② (-3, 1)



$$r^2 = 1^2 + (-3)^2$$

$$r^2 = 1 + 9$$

$$r^2 = 10$$

$$r = \sqrt{10}$$

$$\sin \theta = \frac{1}{\sqrt{10}} \cdot \frac{\sqrt{10}}{\sqrt{10}} \rightarrow \sin \theta = \frac{\sqrt{10}}{10}$$

$$\csc \theta = \sqrt{10}$$

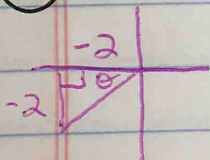
$$\cos \theta = \frac{-3}{\sqrt{10}} \cdot \frac{\sqrt{10}}{\sqrt{10}} \rightarrow \cos \theta = \frac{-3\sqrt{10}}{10}$$

$$\sec \theta = \frac{-\sqrt{10}}{3}$$

$$\tan \theta = 1/3 \rightarrow \tan \theta = -1/3$$

$$\cot \theta = -3$$

③ (-2, -2)



$$r^2 = (-2)^2 + (-2)^2 \quad \sin \theta = \frac{-2}{2\sqrt{2}}$$

$$r^2 = 8$$

$$r = 2\sqrt{2}$$

reduce & rationalize

$$\cos \theta = \frac{-2}{2\sqrt{2}}$$

$$\tan \theta = \frac{-2}{-2}$$

$$\sin \theta = \frac{-\sqrt{2}}{2}$$

$$\csc \theta = -\sqrt{2}$$

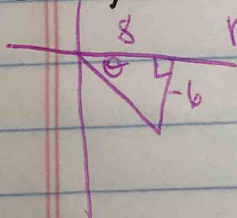
$$\cos \theta = \frac{-\sqrt{2}}{2}$$

$$\sec \theta = -\sqrt{2}$$

$$\tan \theta = 1$$

$$\cot \theta = 1$$

④ (8, -6)



$$r^2 = (-6)^2 + (8)^2$$

$$r^2 = 36 + 64$$

$$r^2 = 100$$

$$r = 10$$

$$\sin \theta = -6/10$$

reduce

$$\cos \theta = 8/10$$

$$\tan \theta = -6/8$$

$$\sin \theta = -3/5$$

$$\csc \theta = 5/3$$

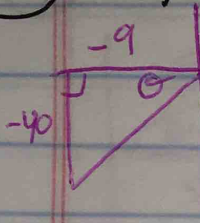
$$\cos \theta = 4/5$$

$$\sec \theta = 5/4$$

$$\tan \theta = -3/4$$

$$\cot \theta = -4/3$$

⑤ $(-9, -40)$ $r^2 = (-9)^2 + (-40)^2$



$$r^2 = 81 + 1600$$

$$r^2 = 1681$$

$$r = 41$$

$$\sin \theta = -40/41$$

$$\csc \theta = -41/40$$

$$\cos \theta = -9/41$$

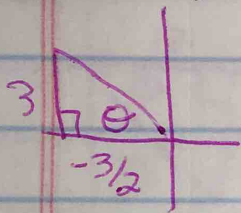
$$\sec \theta = -41/9$$

$$\tan \theta = 40/9$$

$$\cot \theta = 9/40$$

is a PYTHAGOREAN TRIPLE!

⑥ $(-\frac{3}{2}, 3)$ $r^2 = (-\frac{3}{2})^2 + (3)^2$



$$r^2 = 9/4 + 9$$

$$r^2 = 45/4$$

$$r = \sqrt{45/4}$$

$$r = \sqrt{45}/2$$

$$r = \frac{3\sqrt{5}}{2}$$

we will have to do a lot of reducing & rationalizing here

$$\sin \theta = \frac{3}{\frac{3\sqrt{5}}{2}} \rightarrow \cancel{3} \cdot \frac{2}{\cancel{3}\sqrt{5}} \rightarrow \frac{2}{\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}}$$

$$\sin \theta = \frac{2\sqrt{5}}{5}$$

$$\csc \theta = \frac{\sqrt{5}}{2}$$

$$\cos \theta = \frac{-3/2}{\frac{3\sqrt{5}}{2}} \rightarrow \frac{-\cancel{3}}{\cancel{2}} \cdot \frac{2}{\cancel{3}\sqrt{5}} \rightarrow \frac{-1}{\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}}$$

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

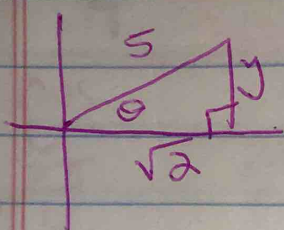
$$\sec \theta = -\sqrt{5}$$

$$\tan \theta = \frac{3}{-3/2} \rightarrow \cancel{3} \cdot \frac{2}{-\cancel{3}} = -2$$

$$\tan \theta = -2$$

$$\cot \theta = -1/2$$

⑦ $\cos \theta = \frac{\sqrt{2}}{5}$, Q1



$$5^2 = (\sqrt{2})^2 + y^2$$

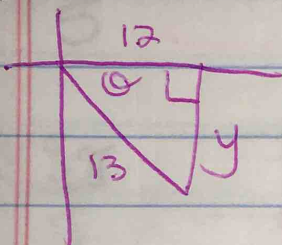
$$25 = 2 + y^2$$

$$23 = y^2$$

$$\sqrt{23} = y$$

$$\sin \theta = \frac{\sqrt{23}}{5}$$

⑧ $\cos \theta = \frac{12}{13}$, Q4



$$13^2 = 12^2 + y^2$$

$$169 = 144 + y^2$$

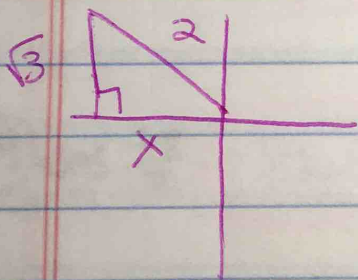
$$25 = y^2$$

$$5 = y$$

$$\csc \theta = \frac{-13}{5}$$

*Make it negative b/c Q4

⑨ $\sin \theta = \frac{\sqrt{3}}{2}$, Q2



$$2^2 = (\sqrt{3})^2 + x^2$$

$$4 = 3 + x^2$$

$$1 = x^2$$

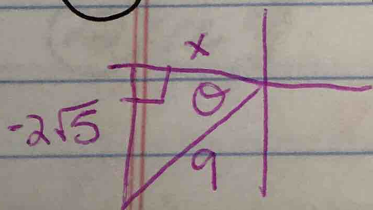
$$1 = x$$

$$\tan \theta = \frac{\sqrt{3}}{-1}$$

$$\tan \theta = -\sqrt{3}$$

*Make it negative b/c Q2

⑩ $\sin \theta = \frac{-2\sqrt{5}}{9}$, Q3



$$9^2 = x^2 + (-2\sqrt{5})^2$$

$$81 = x^2 + 20$$

$$61 = x^2$$

$$\sqrt{61} = x$$

$$\cos \theta = \frac{-\sqrt{61}}{9}$$

*Make it negative b/c Q3

11 $-\frac{3\pi}{4}$ Q3

12 $\frac{\pi}{15}$ Q1

13 $-\frac{9\pi}{7}$ Q2

pos $\frac{5\pi}{4}$ neg $-\frac{11\pi}{4}$

pos $\frac{31\pi}{15}$ neg $-\frac{29\pi}{15}$

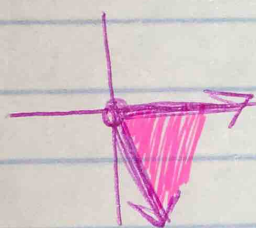
pos $\frac{5\pi}{7}$ neg $-\frac{23\pi}{7}$

14 $\frac{7\pi}{5}$ 252°

15 -225° $-\frac{5\pi}{4}$

16 $-\frac{11\pi}{9}$ -220°

17 $\frac{8\pi}{5}$

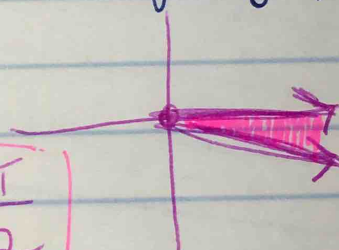


$2\pi - \frac{8\pi}{5} = \frac{2\pi}{5}$

18 $-\pi/12$ find a positive coterminal angle to help you graph

$\frac{23\pi}{12}$

$2\pi - \frac{23\pi}{12} = \frac{\pi}{12}$



19 $\cos \frac{2\pi}{3}$ $-\frac{1}{2}$

20 $\sin \frac{\pi}{4}$ $\frac{\sqrt{2}}{2}$

21 $\csc \frac{4\pi}{3}$ $\frac{1}{-\frac{\sqrt{3}}{2}} \rightarrow -\frac{2}{\sqrt{3}}$

goes w/ sin $\csc \frac{4\pi}{3} = \frac{-2\sqrt{3}}{3}$

22 $\sec \frac{2\pi}{3}$ $\frac{1}{-\frac{\sqrt{3}}{2}}$
↑ $\sec \frac{2\pi}{3} = -2$
goes w/ cos

23 $\cot \frac{\pi}{2}$ $\frac{0}{1} = 0$
↑ goes w/ tan