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Date _____
Algebra II

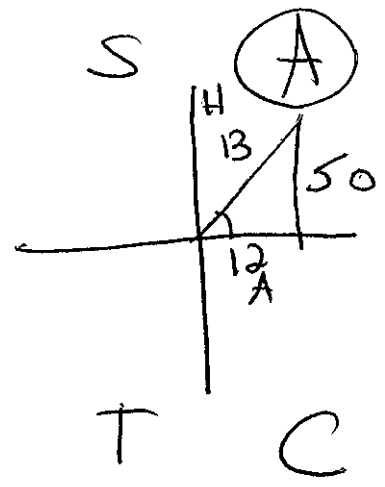
Advanced Trig Ratios

1. If $\cos \theta = \frac{12A}{13H}$ and θ is in Quadrant I, find:

a) $\cos \theta$
 $\frac{A}{H} + \frac{12}{13}$

b) $\sin \theta$
 $\frac{O}{H} + \frac{5}{13}$

c) $\tan \theta$
 $\frac{O}{A} + \frac{5}{12}$



d) $\sec \theta$
 $+\frac{13}{12}$

e) $\csc \theta$
 $+\frac{13}{5}$

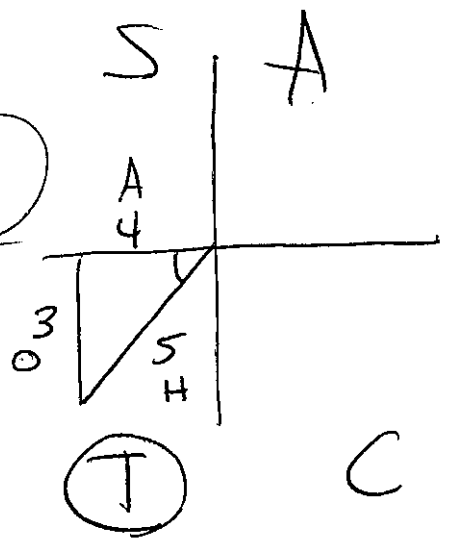
f) $\cot \theta$
 $+\frac{12}{5}$

2. If $\sin \theta = -\frac{3O}{5H}$ and θ is in Quadrant III, find:

a) $\cos \theta$
 $\frac{A}{H} - \frac{4}{5}$

b) $\sin \theta$
 $\frac{O}{H} - \frac{3}{5}$

c) $\tan \theta$
 $\frac{O}{A} + \frac{3}{4}$



d) $\sec \theta$
 $-\frac{5}{4}$

e) $\csc \theta$
 $-\frac{5}{3}$

f) $\cot \theta$
 $+\frac{4}{3}$

3. If $\tan \theta = \frac{24}{7}$ and θ is in Quadrant III, find:

a) $\cos \theta$

$$\frac{A}{H} = -\frac{7}{25}$$

b) $\sin \theta$

$$\frac{O}{H} = -\frac{24}{25}$$

c) $\tan \theta$

$$\frac{O}{A} = +\frac{24}{7}$$

d) $\sec \theta$

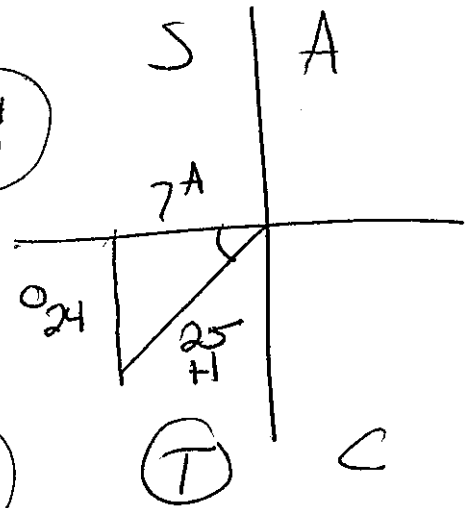
$$-\frac{25}{7}$$

e) $\csc \theta$

$$-\frac{25}{24}$$

f) $\cot \theta$

$$+\frac{7}{24}$$



4. If $\sin \theta = \frac{5}{8}$ and θ is in Quadrant II, find:

a) $\cos \theta$

$$\frac{A}{H} = -\frac{\sqrt{39}}{8}$$

b) $\sin \theta$

$$\frac{O}{H} = +\frac{5}{8}$$

c) $\tan \theta$

$$\frac{O}{A} = \frac{5\sqrt{39}}{\sqrt{39}\sqrt{39}}$$

d) $\sec \theta$

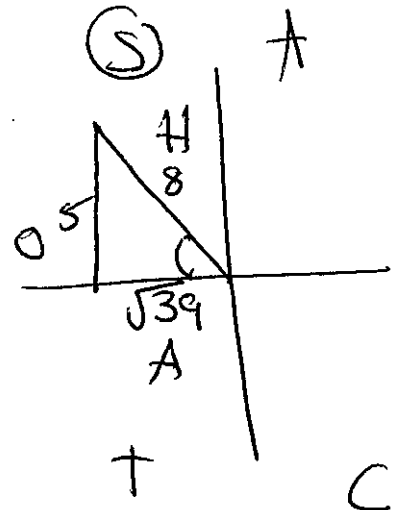
$$\frac{8\sqrt{39}}{\sqrt{39}\sqrt{39}}$$

e) $\csc \theta$

$$+\frac{8}{5}$$

f) $\cot \theta$

$$-\frac{\sqrt{39}}{5}$$



$$\begin{aligned} a^2 + b^2 &= c^2 \\ 5^2 + b^2 &= 8^2 \\ 25 + b^2 &= 64 \\ -25 & \quad -25 \\ \hline b^2 &= \sqrt{39} \\ b &= \sqrt{39} \end{aligned}$$

Use graph paper

5. Angle θ is in standard position and $(3, 4)$ is a point on the terminal side of θ . Find:

a) $\cos \theta$

$$\frac{A}{H} + \frac{3}{5}$$

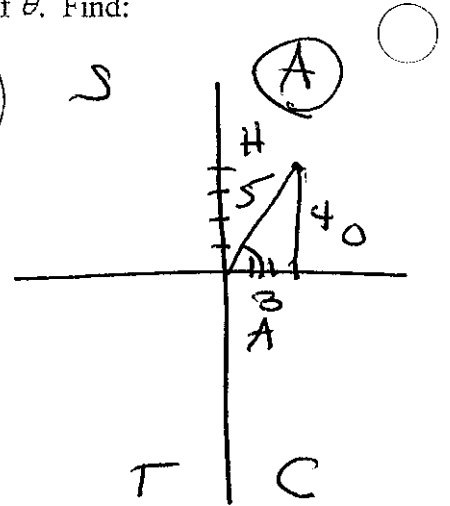
b) $\sin \theta$

$$\frac{O}{H} + \frac{4}{5}$$

c) $\tan \theta$

$$\frac{O}{A} + \frac{4}{3}$$

S



d) $\sec \theta$

$$+ \frac{5}{3}$$

e) $\csc \theta$

$$+ \frac{5}{4}$$

f) $\cot \theta$

$$+ \frac{3}{4}$$

6. Angle θ is in standard position and $(4, -7)$ is a point on the terminal side of θ . Find:

a) $\cos \theta$

$$\frac{A}{H} \frac{4\sqrt{65}}{\sqrt{65}\sqrt{65}}$$

$$+ \frac{4\sqrt{65}}{65}$$

b) $\sin \theta$

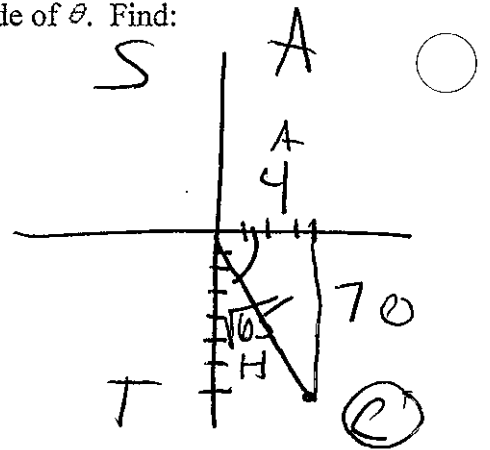
$$\frac{O}{H} \frac{7\sqrt{65}}{\sqrt{65}\sqrt{65}}$$

$$- \frac{7\sqrt{65}}{65}$$

c) $\tan \theta$

$$\frac{O}{A} - \frac{7}{4}$$

S



d) $\sec \theta$

$$+ \frac{\sqrt{65}}{4}$$

e) $\csc \theta$

$$- \frac{\sqrt{65}}{7}$$

f) $\cot \theta$

$$- \frac{4}{7}$$

$$\begin{aligned} a^2 + b^2 &= c^2 \\ 4^2 + 7^2 &= c^2 \\ 16 + 49 &= c^2 \\ \sqrt{65} &= \sqrt{c^2} \\ \sqrt{65} &= c \end{aligned}$$

7. Angle θ is in standard position and $(-5, -12)$ is a point on the terminal side of θ . Find:

a) $\cos \theta$

$$\frac{A}{H} = \frac{5}{13}$$

b) $\sin \theta$

$$\frac{O}{H} = \frac{12}{13}$$

c) $\tan \theta$

$$\frac{O}{A} = \frac{12}{5}$$

d) $\sec \theta$

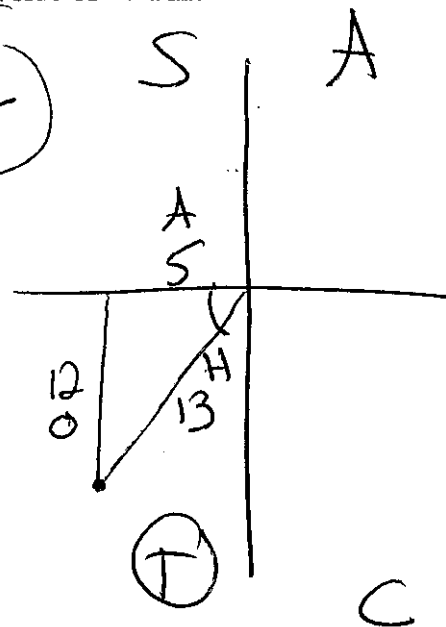
$$-\frac{13}{5}$$

e) $\csc \theta$

$$-\frac{13}{12}$$

f) $\cot \theta$

$$+\frac{5}{12}$$



8. Angle θ is in standard position and $(-2, 3)$ is a point on the terminal side of θ . Find:

a) $\cos \theta$

$$\frac{A}{H} = \frac{2}{\sqrt{13}}$$

b) $\sin \theta$

$$\frac{O}{H} = \frac{3}{\sqrt{13}}$$

c) $\tan \theta$

$$\frac{O}{A} = \frac{3}{2}$$

d) $\sec \theta$

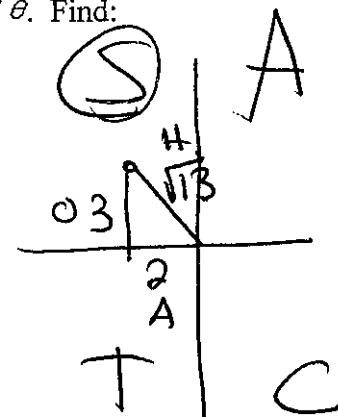
$$-\frac{\sqrt{13}}{2}$$

e) $\csc \theta$

$$+\frac{\sqrt{13}}{3}$$

f) $\cot \theta$

$$-\frac{2}{3}$$



$$\begin{aligned} a^2 + b^2 &= c^2 \\ 2^2 + 3^2 &= c^2 \\ 4 + 9 &= c^2 \\ \sqrt{13} &= \sqrt{c^2} \\ \sqrt{13} &= c \end{aligned}$$

9. A circle centered at the origin has a radius of 10 units. The terminal side of an angle, θ , intercepts the circle in Quadrant I at point C. The y-coordinate of point C is 8. Find:

a) $\cos \theta$

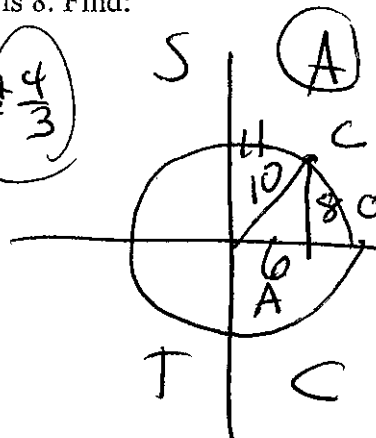
$$\frac{A}{H} = \frac{6}{10} = \frac{+3}{5}$$

b) $\sin \theta$

$$\frac{O}{H} = \frac{8}{10} = \frac{+4}{5}$$

c) $\tan \theta$

$$\frac{O}{A} = \frac{8}{6} = \frac{+4}{3}$$



d) $\sec \theta$

$$\frac{10}{6} = \frac{+5}{3}$$

e) $\csc \theta$

$$\frac{10}{8} = \frac{+5}{4}$$

f) $\cot \theta$

$$\frac{6}{8} = \frac{+3}{4}$$

$$\begin{aligned} a^2 + b^2 &= c^2 \\ a^2 + 8^2 &= 10^2 \\ a^2 + 64 &= 100 \\ -64 &-64 \\ \hline \sqrt{a^2} &= \sqrt{36} \\ a &= 6 \end{aligned}$$

10. A circle centered at the origin has a radius of 4 units. The terminal side of an angle, θ , intercepts the circle in Quadrant II at point P. The x-coordinate of point P is 2. Find:

a) $\cos \theta$

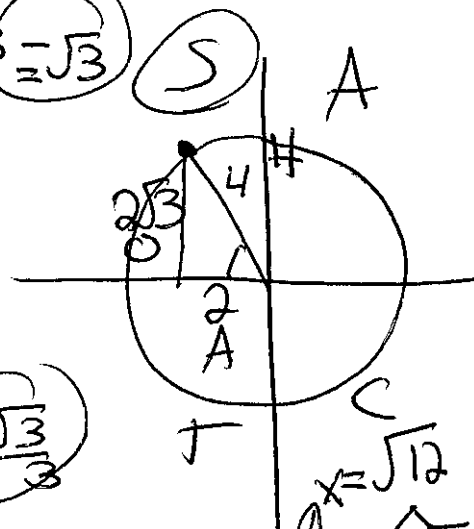
$$\frac{A}{H} = \frac{2}{4} = \frac{-1}{2}$$

b) $\sin \theta$

$$\frac{O}{H} = \frac{2\sqrt{3}}{4} = \frac{+\sqrt{3}}{2}$$

c) $\tan \theta$

$$\frac{O}{A} = \frac{2\sqrt{3}}{2} = \frac{-\sqrt{3}}{1}$$



d) $\sec \theta$

$$\frac{4}{2} = \frac{-2}{1}$$

e) $\csc \theta$

$$\frac{4}{2\sqrt{3}} = \frac{+2\sqrt{3}}{3}$$

f) $\cot \theta$

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

$$\begin{aligned} a^2 + b^2 &= c^2 \\ 2^2 + x^2 &= 4^2 \\ 4 + x^2 &= 16 \\ -4 &-4 \\ \hline \sqrt{x^2} &= \sqrt{12} \\ &= \sqrt{4 \cdot 3} \\ &= 2\sqrt{3} \end{aligned}$$

11. A circle centered at the origin has a radius of 6 units. The terminal side of an angle, θ , intercepts the circle in Quadrant VI at point P . The x -coordinate of point P is 2. Find:

a) $\cos \theta$

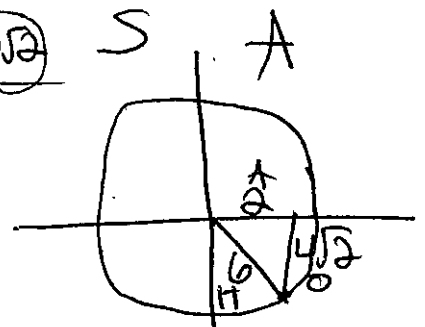
$$\frac{A}{H} = \frac{2}{6} = \frac{1}{3}$$

b) $\sin \theta$

$$\frac{O}{H} = \frac{4\sqrt{2}}{6} = \frac{2\sqrt{2}}{3}$$

c) $\tan \theta$

$$\frac{O}{A} = \frac{4\sqrt{2}}{2} = 2\sqrt{2}$$



d) $\sec \theta$

$$+\frac{3}{1}$$

e) $\csc \theta$

$$\frac{3\sqrt{2}}{2\sqrt{2}\sqrt{2}} = -\frac{3\sqrt{2}}{4}$$

f) $\cot \theta$

$$\frac{1}{2\sqrt{2}\sqrt{2}} = -\frac{\sqrt{2}}{4}$$

5 A
C
 $a^2 + b^2 = c^2$
 $a^2 + 2^2 = 6^2$
 $a^2 + 4 = 36$
 $-4 -4$
 $\sqrt{a^2} = \sqrt{32}$
 $\sqrt{16} \sqrt{2}$
 $4\sqrt{2}$

12. A circle centered at the origin has a radius of 9 units. The terminal side of an angle, θ , intercepts the circle in Quadrant II at point P . The x -coordinate of point P is 7. Find:

a) $\cos \theta$

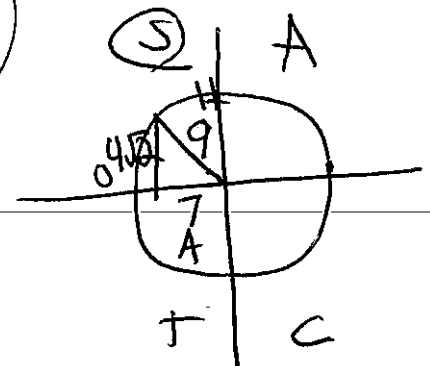
$$\frac{A}{H} = -\frac{7}{9}$$

b) $\sin \theta$

$$\frac{O}{H} = +\frac{4\sqrt{2}}{9}$$

c) $\tan \theta$

$$\frac{O}{A} = -\frac{4\sqrt{2}}{7}$$



d) $\sec \theta$

$$-\frac{9}{7}$$

e) $\csc \theta$

$$\frac{9\sqrt{2}}{4\sqrt{2}\sqrt{2}} = +\frac{9\sqrt{2}}{8}$$

f) $\cot \theta$

$$\frac{7\sqrt{2}}{4\sqrt{2}\sqrt{2}} = -\frac{7\sqrt{2}}{8}$$

5 A
C
 $a^2 + b^2 = c^2$
 $a^2 + 7^2 = 9^2$
 $a^2 + 49 = 81$
 $-49 -49$
 $\sqrt{a^2} = \sqrt{32}$
 $\sqrt{16} \sqrt{2}$
 $4\sqrt{2}$
 $a = 4\sqrt{2}$