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Date _____
Algebra II

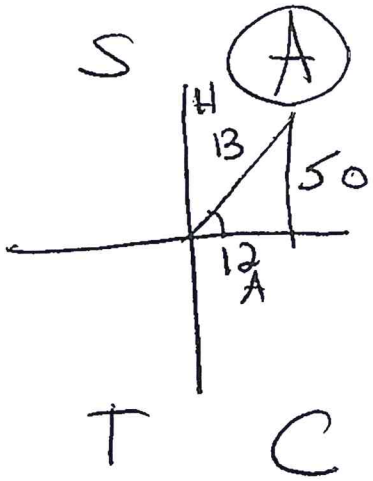
Advanced Trig Ratios

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

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

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

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



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

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

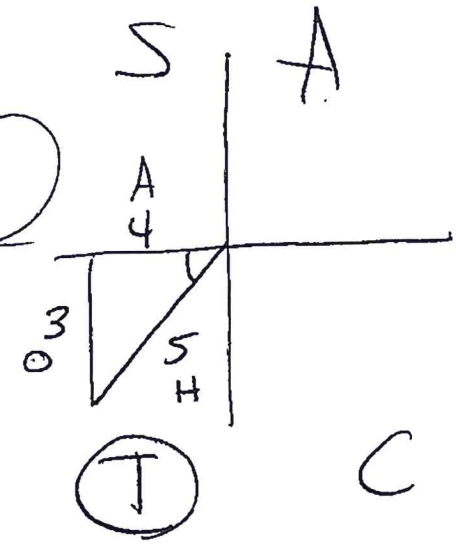
f) $\cot\theta$: $+\frac{12}{5}$

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

a) $\cos\theta$ — A/H: $-\frac{4}{5}$

b) $\sin\theta$ — O/H: $-\frac{3}{5}$

c) $\tan\theta$ — O/A: $+\frac{3}{4}$



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

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

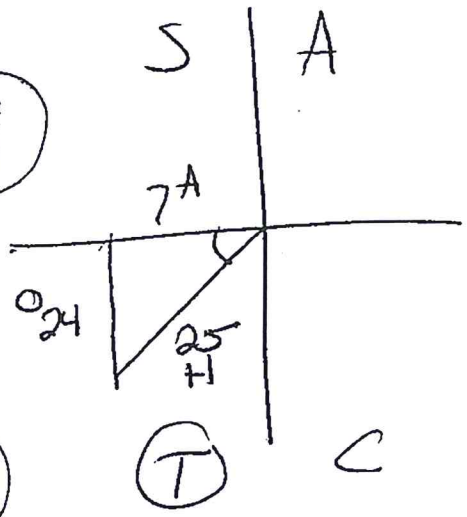
f) $\cot\theta$: $+\frac{4}{3}$

3. If $\tan\theta = \frac{24}{7}$ ($\frac{O}{A}$) 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) $\csc\theta$ $-\frac{25}{24}$

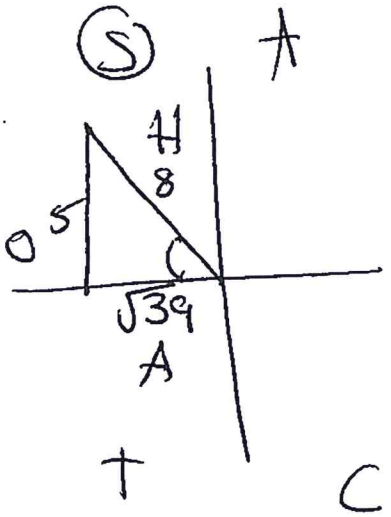
f) $\cot\theta$ $+\frac{7}{24}$

4. If $\sin\theta = \frac{5}{8}$ ($\frac{O}{H}$) 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) $\tan\theta$ $\frac{5}{\sqrt{39}}\frac{\sqrt{39}}{\sqrt{39}}$ $\frac{\emptyset}{A}$ $-\frac{5\sqrt{39}}{39}$



d) $\sec\theta$ $\frac{8\sqrt{39}}{\sqrt{39}\sqrt{39}}$ $-\frac{8\sqrt{39}}{39}$

e) $\csc\theta$ $+\frac{8}{5}$

f) $\cot\theta$ $-\frac{\sqrt{39}}{5}$

$a^2+b^2=c^2$

$5^2+b^2=8^2$

$25+b^2=64$

$-25 \quad -25$

$\sqrt{b^2}=\sqrt{39}$

$b=\sqrt{39}$

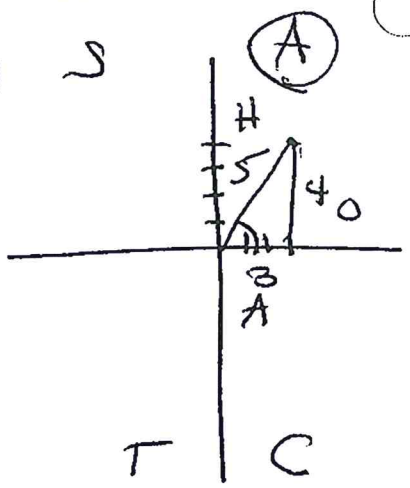
Use graph paper

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



d) $\sec\theta$ $+\frac{5}{3}$

e) $\csc\theta$ $+\frac{5}{4}$

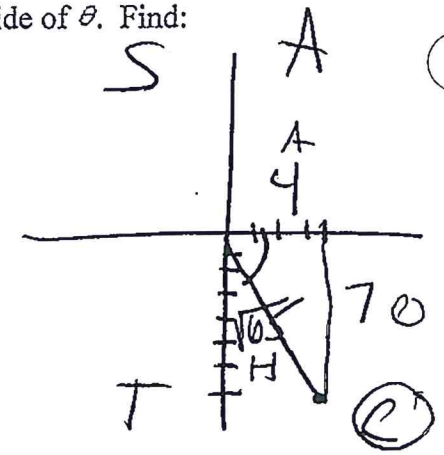
f) $\cot\theta$ $+\frac{3}{4}$

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

a) $\cos\theta$ $\frac{A}{H}$ $\frac{4}{\sqrt{65}} \cdot \frac{\sqrt{65}}{\sqrt{65}}$ $+\frac{4\sqrt{65}}{65}$

b) $\sin\theta$ $\frac{O}{H}$ $\frac{7}{\sqrt{65}} \cdot \frac{\sqrt{65}}{\sqrt{65}}$ $-\frac{7\sqrt{65}}{65}$

c) $\tan\theta$ $\frac{O}{A}$ $-\frac{7}{4}$



d) $\sec\theta$ $+\frac{\sqrt{65}}{4}$

e) $\csc\theta$ $-\frac{\sqrt{65}}{7}$

f) $\cot\theta$ $-\frac{4}{7}$

$a^2+b^2=c^2$

$4^2+7^2=c^2$

$16+49=c^2$

$\sqrt{65}=\sqrt{c^2}$

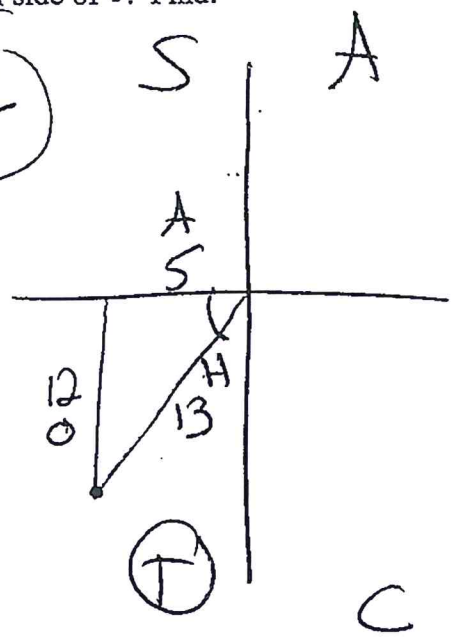
$\sqrt{65}=c$

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) $\csc\theta$ $-\frac{13}{12}$

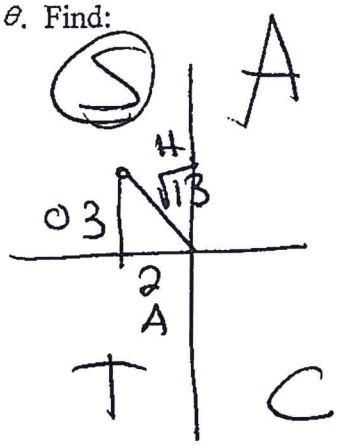
f) $\cot\theta$ $+\frac{5}{12}$

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) $\cot\theta$ $-\frac{2}{3}$

$a^2+b^2=c^2$

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

$4+9=c^2$

$\sqrt{13}=\sqrt{c^2}$

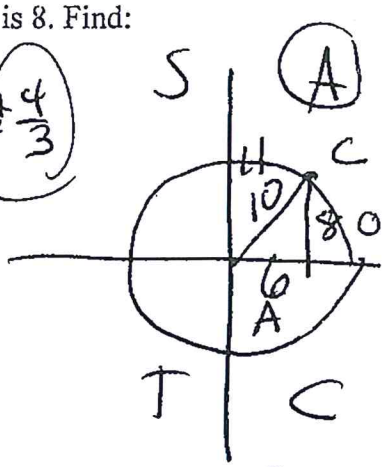
$\sqrt{13}=c$

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) $\cot\theta$ $\frac{6}{8} = \frac{+3}{4}$

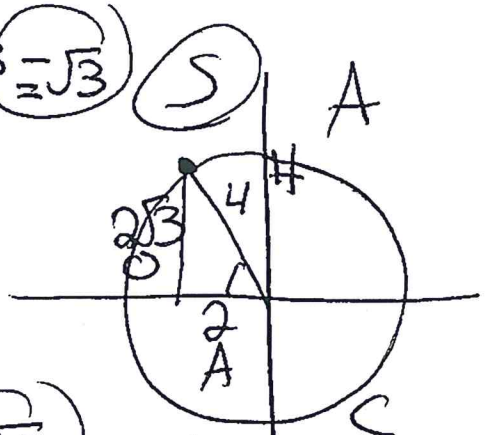
$a^2+b^2=c^2$
$a^2+8^2=10^2$
$a^2+64=100$
$-64 \quad -64$
$\sqrt{a^2}=\sqrt{36}$
$a=6$

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) $\tan\theta$ $\frac{O}{A}$ $\frac{2\sqrt{3}}{2} = \sqrt{3}$



d) $\sec\theta$ $\frac{2}{1} = 2$

e) $\csc\theta$ $\frac{2\sqrt{3}}{\sqrt{3}\sqrt{3}} \frac{+2\sqrt{3}}{3}$

f) $\cot\theta$ $\frac{1}{\sqrt{3}} \frac{\sqrt{3}}{\sqrt{3}} = \frac{-\sqrt{3}}{3}$

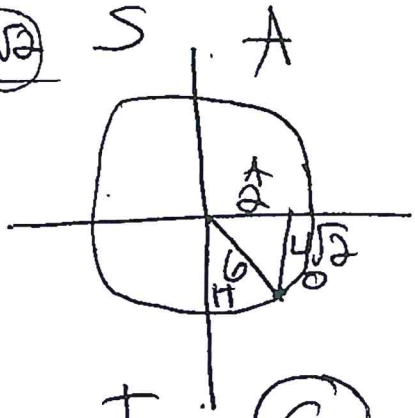
$a^2+b^2=c^2$
$2^2+x^2=4^2$
$4+x^2=16$
$-4 \quad -4$
$\sqrt{x^2}=\sqrt{12}$
$x=\sqrt{12}$
$\sqrt{4}\sqrt{3}$
$x=2\sqrt{3}$

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) $\cos\theta$ $\frac{A}{H}$ $\frac{2}{6}$ $= \pm\frac{1}{3}$

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) $\cot\theta$ $\frac{1}{2\sqrt{2}}\frac{\sqrt{2}}{\sqrt{2}}$ $-\frac{\sqrt{2}}{4}$

$a^2+b^2=c^2$

$a^2+2^2=6^2$

$a^2+4=36$

$-4 \quad -4$

$\sqrt{a^2}=\sqrt{32}$

$\sqrt{16}\sqrt{2}$

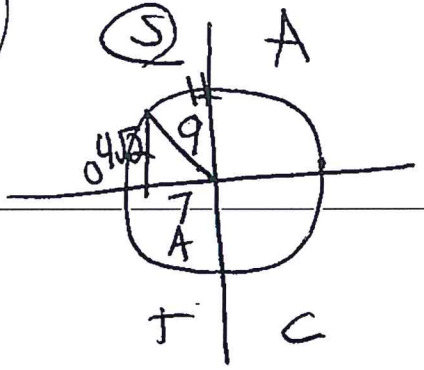
$4\sqrt{2}$

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) $\cot\theta$ $\frac{7\sqrt{2}}{4\sqrt{2}\sqrt{2}}$ $-\frac{7\sqrt{2}}{8}$

$a^2+b^2=c^2$

$a^2+7^2=9^2$

$a^2+49=81$

$-49 \quad -49$

$\sqrt{a^2}=\sqrt{32}$

$\sqrt{16}\sqrt{2}$

$a=4\sqrt{2}$

$\cos\theta = \frac{3}{5}$ $\sin\theta = -\frac{4}{5}$

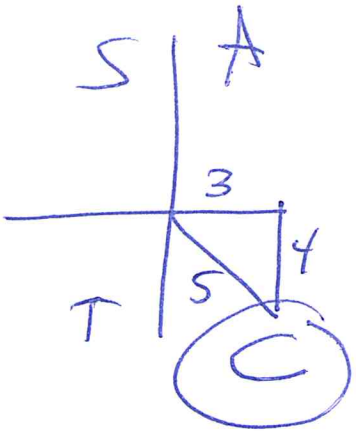
$\cos\theta, \sin\theta$

13. The point $\left(\frac{3}{5}, -\frac{4}{5}\right)$ lines on the unit circle. Find:

a) $\cos\theta$ $\frac{3}{5}$

b) $\sin\theta$ $-\frac{4}{5}$

c) $\tan\theta$ $-\frac{4}{3}$



d) $\sec\theta$ $\frac{5}{3}$

e) $\csc\theta$ $-\frac{5}{4}$

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

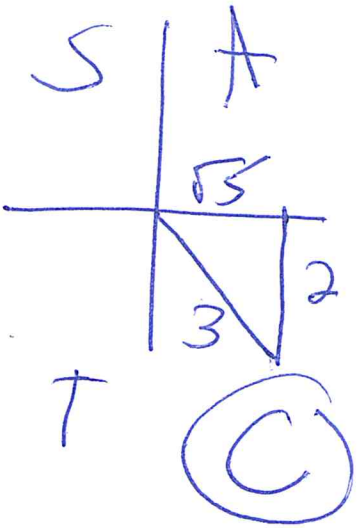
$\cos\theta, \sin\theta$ $\sin\theta = -\frac{2}{3}$

14. The point $\left(x, -\frac{2}{3}\right)$ lines on the unit circle where $x > 0$. Find:

a) $\cos\theta$ $\frac{\sqrt{5}}{3}$

b) $\sin\theta$ $-\frac{2}{3}$

c) $\tan\theta$ $-\frac{2\sqrt{5}}{\sqrt{5}\sqrt{5}}$ $-\frac{2\sqrt{5}}{5}$



d) $\sec\theta$ $\frac{3\sqrt{5}}{\sqrt{5}\sqrt{5}}$ $\frac{3\sqrt{5}}{5}$

e) $\csc\theta$ $-\frac{3}{2}$

f) $\cot\theta$ $-\frac{\sqrt{5}}{2}$

$2^2 + b^2 = 3^2$

$4 + b^2 = 9$

$-4 \quad -4$

$\sqrt{b^2} = \sqrt{5}$

$b = \sqrt{5}$