Geometry

$\sin\theta = \frac{y}{r}$ $\cos\theta = \frac{x}{r}$ $\tan\theta = \frac{y}{x}$

II (−,+) | I (+,+)
III (−,−) | IV (+,−)

Exact Value Trig

Homework – Trig & Coordinate Points

Name: _____

Identify in which quadrants each trig ratio is positive or negative.

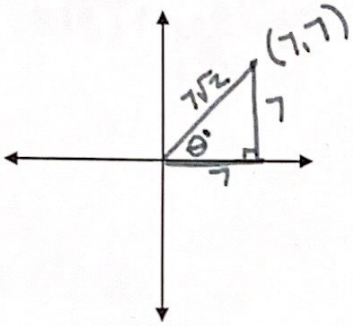
1. sine — Pos: I II Neg: III IV

2. cosine — Pos: I IV Neg: II III

3. tangent — Pos: I III Neg: II IV

Find the length of the hypotenuse, the reference angle, and the value of each trigonometric ratio if the terminal side includes the given point.

4. $(7, 7)$



H = $7\sqrt{2}$

θ' = 45°

θ = 45°

$\sin(\theta)$ = $\frac{\sqrt{2}}{2}$

$\cos(\theta)$ = $\frac{\sqrt{2}}{2}$

$\tan(\theta)$ = 1

$\sin\theta = \frac{7}{7\sqrt{2}} = \frac{\sqrt{2}}{2}$

$\cos\theta = \frac{7}{7\sqrt{2}} = \frac{\sqrt{2}}{2}$

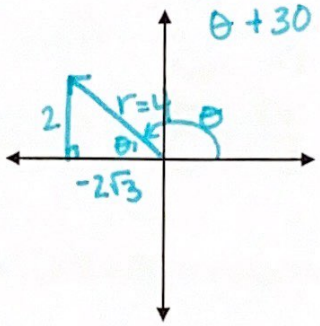
$\tan\theta = \frac{7}{7} = 1$

5. $(-2\sqrt{3}, 2)$

$\theta' \Rightarrow \sin^{-1}\left(\frac{2}{4}\right)$

$\theta + \theta' = 180^\circ$

$\theta + 30 = 180$



H = 4

θ' = 30°

θ = 150°

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

$\cos(\theta)$ = $-\frac{\sqrt{3}}{2}$

$\tan(\theta)$ = $-\frac{\sqrt{3}}{3}$

ID as a $30^\circ\ 60^\circ\ 90^\circ$ or Pyth. thm to find H(r)

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

$4 + 4 \cdot 3 = r^2$

$16 = r^2$

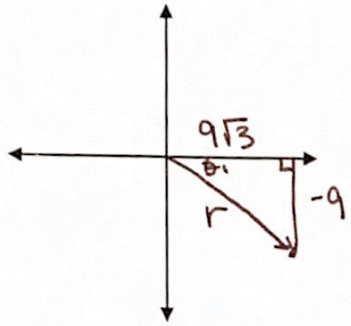
$4 = r$

$\sin\theta = \frac{2}{4}$

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

$\tan\theta = \frac{2}{-2\sqrt{3}} = -\frac{\sqrt{3}}{3}$

6. $(9\sqrt{3}, -9)$



H = 18

θ' = 30°

θ = 330°

sin(θ) = $-\frac{1}{2}$

cos(θ) = $\frac{\sqrt{3}}{2}$

tan(θ) = $-\frac{\sqrt{3}}{3}$

30° 60° 90° or Pyth

$(9\sqrt{3})^2 + (-9)^2 = r^2$

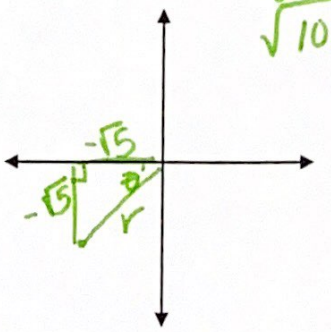
$18 = r$

7. $(-\sqrt{5}, -\sqrt{5})$

$\sqrt{5}^2 + \sqrt{5}^2 = H^2$

$5+5 = H^2$

$\sqrt{10} = H$



H = $\sqrt{10}$

θ' = 45°

θ = 225°

sin(θ) = $-\frac{\sqrt{2}}{2}$

cos(θ) = $-\frac{\sqrt{2}}{2}$

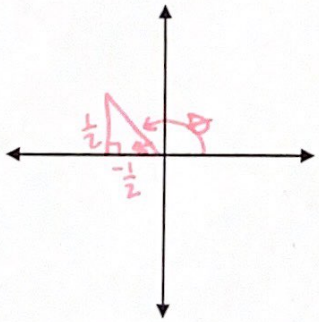
tan(θ) = 1

180 + 45 = 225°

$\sin\theta = \frac{-\sqrt{5}}{\sqrt{10}} = \frac{-1}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}}$

$\cos\theta = \frac{-\sqrt{5}}{\sqrt{10}} = -\frac{\sqrt{2}}{2}$

8. $\left(-\frac{1}{2}, \frac{1}{2}\right)$



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

θ' = 45°

θ = 135°

sin(θ) = $\frac{\sqrt{2}}{2}$

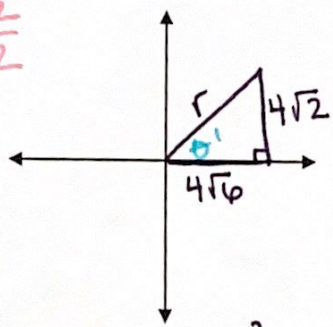
cos(θ) = $\frac{-\sqrt{2}}{2}$

tan(θ) = -1

$\sin\theta = \frac{1/2}{1/\sqrt{2}} = \frac{1}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}}$

$\cos\theta = \frac{-1/2}{1/\sqrt{2}} = \frac{-1}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = -\frac{\sqrt{2}}{2}$

9. $(4\sqrt{6}, 4\sqrt{2})$ *Challenge Problem*



H = $8\sqrt{2}$

θ' = 30°

θ = 30°

sin(θ) = $\frac{1}{2}$

cos(θ) = $\frac{\sqrt{3}}{2}$

tan(θ) = $\frac{\sqrt{3}}{3}$

$(4\sqrt{6})^2 + (4\sqrt{2})^2 = r^2$

$16 \cdot 6 + 16 \cdot 2 = r^2$

$\sqrt{128} = \sqrt{r^2}$

$\sqrt{64} \cdot \sqrt{2} = r$

$8\sqrt{2} = r$

$\sin\theta = \frac{4\sqrt{2}}{8\sqrt{2}} = \frac{1}{2}$

$\cos\theta = \frac{4\sqrt{6}}{8\sqrt{2}} = \frac{\sqrt{3}}{2}$

$\tan\theta = \frac{4\sqrt{2}}{4\sqrt{6}} = \frac{1}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}}$ (3)

Find θ'

$\tan^{-1}\left(\frac{4\sqrt{2}}{4\sqrt{6}}\right)$

Put in ( )

θ' = 30°