

Pre-Calculus Math II

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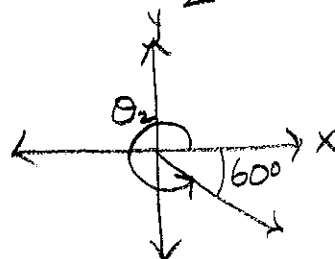
9. a) $\cos \theta = \frac{1}{2}$, $0^\circ \leq \theta < 360^\circ$

\cos is positive so terminal arm is in quadrant I or IV

reference angle for \cos and $\frac{1}{2}$ is 60°



$$\theta_1 = 60^\circ$$

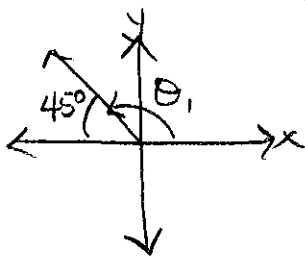


$$\begin{aligned}\theta_2 &= 360^\circ - 60^\circ \\ \theta_2 &= 300^\circ\end{aligned}$$

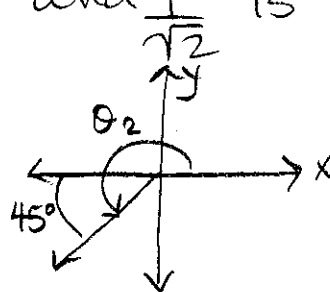
b) $\cos \theta = -\frac{1}{\sqrt{2}}$, $0^\circ \leq \theta < 360^\circ$

\cos is negative so terminal arm is in quad II or III

reference angle for \cos and $\frac{1}{\sqrt{2}}$ is 45°



$$\begin{aligned}\theta_1 &= 180^\circ - 45^\circ \\ \theta_1 &= 135^\circ\end{aligned}$$



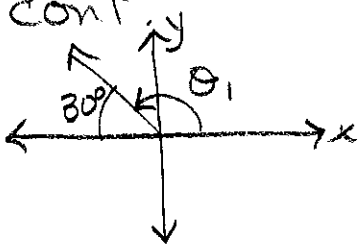
$$\begin{aligned}\theta_2 &= 180^\circ + 45^\circ \\ \theta_2 &= 225^\circ\end{aligned}$$

c) $\tan \theta = -\frac{1}{\sqrt{3}}$, $0^\circ \leq \theta < 360^\circ$

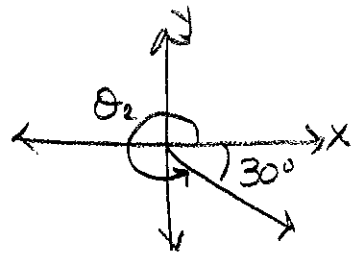
\tan is negative so terminal arm is in quad II or IV

reference angle for \tan and $\frac{1}{\sqrt{3}}$ is 30°

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9. c) cont.



$$\theta_1 = 180^\circ - 30^\circ$$
$$\theta_1 = 150^\circ$$

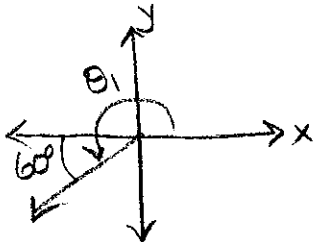


$$\theta_2 = 360^\circ - 30^\circ$$
$$\theta_2 = 330^\circ$$

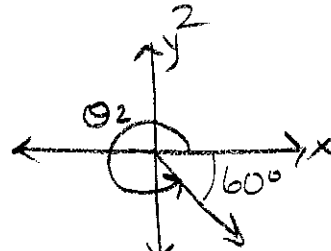
d) $\sin \theta = -\frac{\sqrt{3}}{2}$, $0^\circ \leq \theta < 360^\circ$

Sin is negative so the terminal arm is in quad III or IV

reference angle for sin and $\frac{\sqrt{3}}{2}$ is 60°



$$\theta_1 = 180^\circ + 60^\circ$$
$$\theta_1 = 240^\circ$$

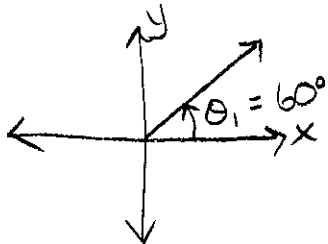


$$\theta_2 = 360^\circ - 60^\circ$$
$$\theta_2 = 300^\circ$$

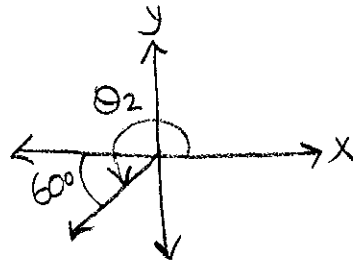
e) $\tan \theta = \sqrt{3}$, $0^\circ \leq \theta < 360^\circ$

tan is positive so the terminal arm is in quad I or III

reference angle for tan and $\sqrt{3}$ is 60°



$$\theta_1 = 60^\circ$$

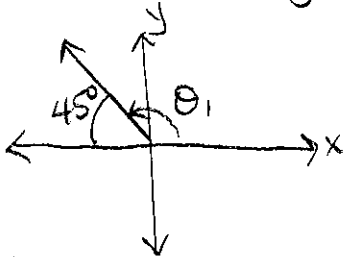


$$\theta_2 = 180^\circ + 60^\circ$$
$$\theta_2 = 240^\circ$$

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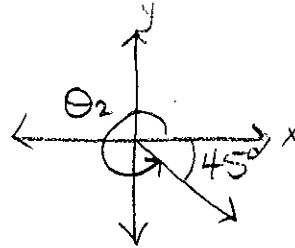
9. f) $\tan \theta = -1$, $0^\circ \leq \theta < 360^\circ$
 tan is negative so the terminal arm is in quad II or IV

reference angle for tan and 1 is 45°



$$\theta_1 = 180^\circ - 45^\circ$$

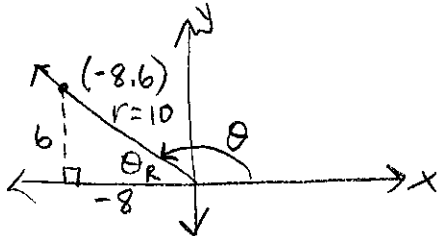
$$\theta_1 = 135^\circ$$



$$\theta_2 = 360^\circ - 45^\circ$$

$$\theta_2 = 315^\circ$$

11. a)



$$x = -8$$

$$y = 6$$

$$r = 10$$

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

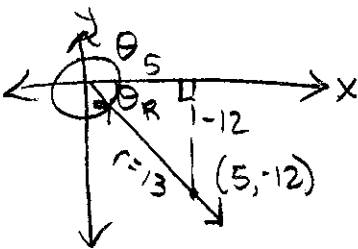
$$64 + 36 = r^2$$

$$100 = r^2$$

$$10 = r$$

$$\sin \theta = \frac{6}{10} = \frac{3}{5}, \quad \cos \theta = \frac{-8}{10} = -\frac{4}{5}, \quad \tan \theta = \frac{6}{-8} = -\frac{3}{4}$$

b)



$$x = 5$$

$$y = -12$$

$$r = 13$$

$$5^2 + (-12)^2 = r^2$$

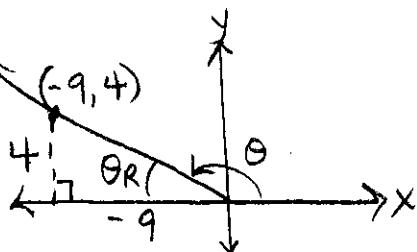
$$25 + 144 = r^2$$

$$169 = r^2$$

$$13 = r$$

$$\sin \theta = \frac{-12}{13}, \quad \cos \theta = \frac{5}{13}, \quad \tan \theta = -\frac{12}{5}$$

12. a)



$$\tan \theta_R = \frac{4}{9}$$

$$\tan \theta_R = 0.4444$$

$$\theta_R = 24^\circ \quad (\text{use } \tan^{-1})$$

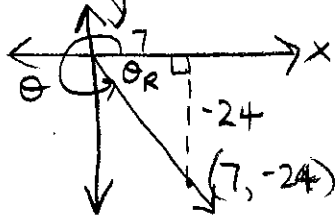
$$c) \theta = 180^\circ - 24^\circ$$

$$\theta = 156^\circ$$

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13.

a)



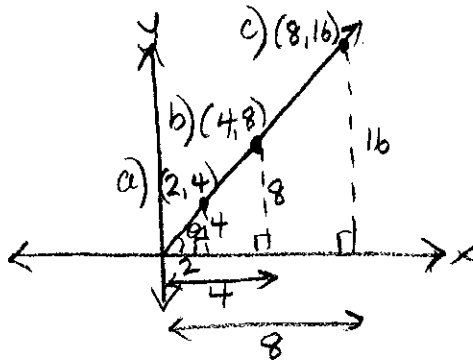
b) $\tan \theta_R = \frac{-24}{7}$

$\tan \theta_R = 3.4257$

$\theta_R = 74^\circ$ (use \tan^{-1})

c) $\theta = 360^\circ - 74^\circ$
 $\theta = 286^\circ$

14.



a) $2^2 + 4^2 = r^2$

$4 + 16 = r^2$

$20 = r^2$

$\sqrt{20} = r$

$2\sqrt{5} = r$

$\sqrt{20} =$
 $\sqrt{4 \cdot 5} =$
 $\sqrt{4} \cdot \sqrt{5} =$
 $2\sqrt{5}$

$\sin \theta = \frac{4}{2\sqrt{5}} = \frac{2}{\sqrt{5}}$

b) $4^2 + 8^2 = r^2$

$16 + 64 = r^2$

$80 = r^2$

$\sqrt{80} = r$

$4\sqrt{5}$

$\sin \theta = \frac{8}{4\sqrt{5}} = \frac{2}{\sqrt{5}}$

$\sqrt{80} =$
 $\sqrt{16 \cdot 5} =$
 $\sqrt{16} \cdot \sqrt{5} =$
 $4\sqrt{5}$

c) $16^2 + 8^2 = r^2$

$256 + 64 = r^2$

$320 = r^2$

$\sqrt{320} = r$

$8\sqrt{5} = r$

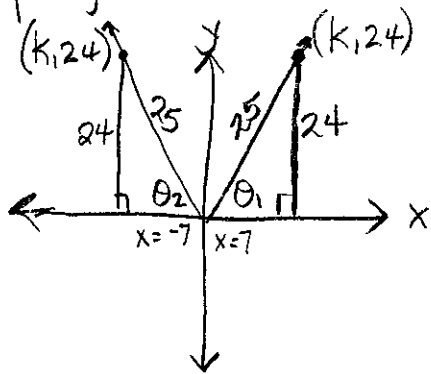
$\sqrt{320} =$
 $\sqrt{64 \cdot 5} =$
 $\sqrt{64} \cdot \sqrt{5} =$
 $8\sqrt{5}$

$\sin \theta = \frac{16}{8\sqrt{5}} = \frac{2}{\sqrt{5}}$

d) The sine for each triangle is the same. This is because the angle is the same size in each triangle. Because the angle is the same, the ratio of the sides is the same in each triangle. Sine, cosine and tangent values are ratios between sides!

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15.



$$a) \quad \sin \theta_1 = \frac{24}{25}$$
$$\sin \theta_1 = 0.96$$
$$\theta_1 = 73.7^\circ \quad (\text{use } \sin^{-1})$$

$$\theta_2 = 180^\circ - 73.7^\circ$$
$$\theta_2 = 106.3^\circ$$

$$b) \quad x^2 + 24^2 = 25^2$$
$$x^2 + 576 = 625$$
$$x^2 = 49$$
$$x = 7$$

$$\sin \theta_1 = \frac{24}{25}$$

$$\sin \theta_2 = \frac{24}{25}$$

$$\cos \theta_1 = \frac{7}{25}$$

$$\cos \theta_2 = \frac{-7}{25}$$

$$\tan \theta_1 = \frac{24}{7}$$

$$\tan \theta_2 = -\frac{24}{7}$$