

Graph each of the following. Label the axes where the critical points occur. Complete the blanks for the missing information.

1. $y = 2 \cos\left(\frac{\theta}{3} + \frac{\pi}{3}\right) + 3 \rightarrow y = 2 \cos \frac{1}{3}(\theta + \pi) + 3$

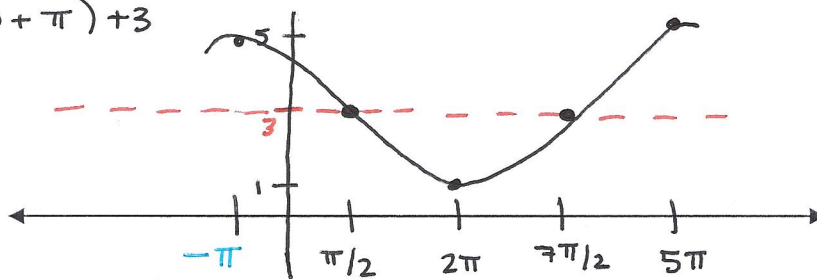
amplitude = 2

period = $\frac{2\pi}{B} = \frac{2\pi}{1/3} = 6\pi$

phase shift = $-\pi$

vert. shift = $\uparrow 3$

inc. = $\frac{\text{per}}{4} = \frac{6\pi}{4} = \frac{3\pi}{2}$



2. $y = 1 - \sin\left(\frac{\pi}{12}\theta + \frac{\pi}{6}\right) \rightarrow y = -\sin \frac{\pi}{12}(\theta + 2) + 1$

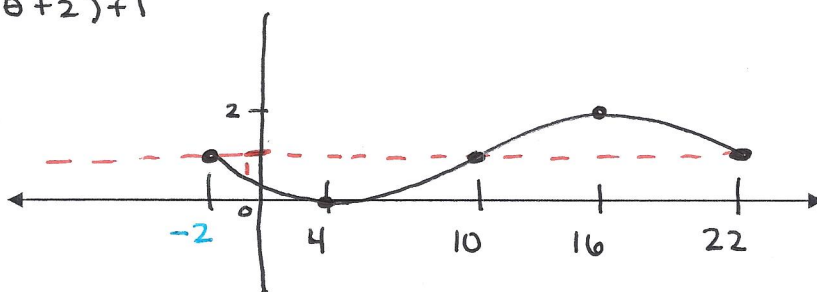
amplitude = 1 (flip)

period = $\frac{2\pi}{B} = \frac{2\pi}{\pi/12} = 24$

phase shift = -2

vert. shift = $\uparrow 1$

inc. = $\frac{\text{per}}{4} = \frac{24}{4} = 6$



Use the Pythagorean Identity to find the 5 missing trigonometric functions.

3. $\cos \theta = \frac{-5}{6}; \pi < \theta < \frac{3\pi}{2} \rightarrow \tan \theta + \cot \theta$ (positive) $\sin \theta = \frac{-\sqrt{11}}{6}$ $\csc \theta = \frac{-6\sqrt{11}}{11}$

$\cos^2 \theta + \sin^2 \theta = 1$

$\frac{25}{36} + \sin^2 \theta = 1$

$\sin^2 \theta = \frac{11}{36}$

$\sin \theta = \frac{\sqrt{11}}{6}$

$\cos \theta = \frac{-5}{6}$ $\sec \theta = \frac{-6}{5}$

$\tan \theta = \frac{\sqrt{11}}{5}$ $\cot \theta = \frac{5\sqrt{11}}{11}$

$\sin \theta = \frac{-4}{5}$ $\csc \theta = \frac{-5}{4}$

$\cos \theta = \frac{3}{5}$ $\sec \theta = \frac{5}{3}$

$\tan \theta = \frac{-4}{3}$ $\cot \theta = \frac{-3}{4}$

4. $\sin \theta = \frac{-4}{5}; \frac{3\pi}{2} < \theta < 2\pi \rightarrow \cos \theta + \sec \theta$ (positive)

$\cos^2 \theta + \sin^2 \theta = 1$

$\cos^2 \theta + \frac{16}{25} = 1$

$\cos^2 \theta = \frac{9}{25}$

$\cos \theta = \frac{3}{5}$

Find the measures of a positive angle and a negative angle that are coterminal with each given angle.

5. $\theta = \frac{20\pi}{9} (\pm 2\pi)$

6. $\theta = -360^\circ (\pm 360^\circ)$

7. $\theta = 1010^\circ (\pm 360^\circ)$

$\frac{38\pi}{9} + \frac{-16\pi}{9}$

$360^\circ + -720^\circ$

$1370^\circ + -70^\circ$

Find the measure of the reference angle for each given angle. *start from positive!!

8. $\theta = 504^\circ - 360 = 144^\circ$

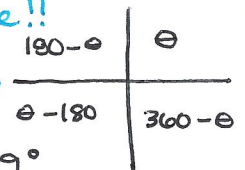
9. $\theta = \frac{-\pi}{3} + 2\pi = \frac{5\pi}{3}$

10. $\theta = 991^\circ = 271^\circ$

$180 - 144 = 36^\circ$

$2\pi - \frac{5\pi}{3} = \frac{\pi}{3}$

$360 - 271 = 89^\circ$



*Reference \angle has to be between 0 + 90!

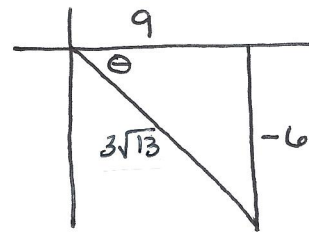
P is a point on the terminal side of θ in standard position. Find the exact value of the six trigonometric functions for θ .

11. $P(9, -6)$

$\sin \theta = \frac{-2\sqrt{13}}{13}$ $\csc \theta = \frac{-\sqrt{13}}{2}$

$\cos \theta = \frac{3\sqrt{13}}{13}$ $\sec \theta = \frac{\sqrt{13}}{3}$

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



Convert each measure from degrees to radians or from radians to degrees.

12. $\frac{5\pi}{12} \cdot \frac{180}{\pi}$

13. $215^\circ \cdot \frac{\pi}{180}$

14. $-\frac{29\pi}{18} \cdot \frac{180}{\pi}$

15. $-180^\circ \cdot \frac{\pi}{180}$

75°

$\frac{43\pi}{36}$

-290°

$-\pi$

Find the complement and supplement of each angle.

16. $\theta = 103^\circ$

17. $\theta = \frac{7\pi}{15}$

complement none

complement $\frac{\pi}{30}$

supplement 77°

supplement $\frac{8\pi}{15}$