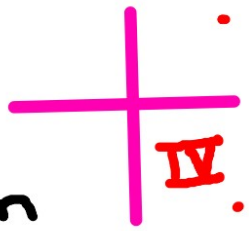
45 60 90

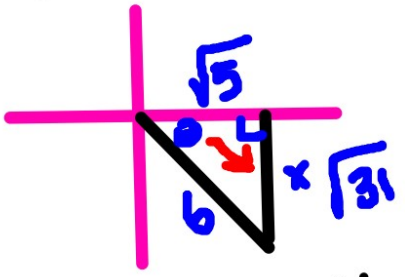
$\frac{\sqrt{2}}{2}$ $\frac{\sqrt{3}}{2}$ 1

DRILL



① If $\cos\theta = \frac{\sqrt{5}}{6}$ and $\csc\theta < 0$, then what is the value of $\tan\theta$?

(sin)



$\sqrt{5}^2 + x^2 = 6^2$

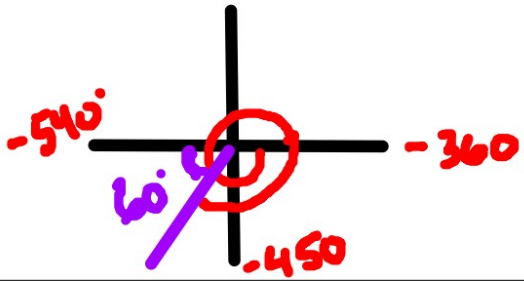
$5 + x^2 = 36$

$x^2 = 31$

$x = \sqrt{31}$

$\tan\theta = \frac{\sqrt{31}}{\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}} = \frac{\sqrt{155}}{5}$

② What is the sin, cos, and tan of an angle of -480°?

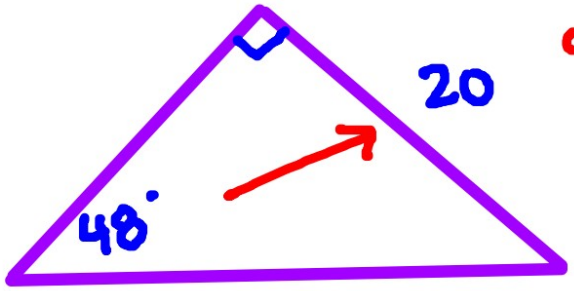


$\sin -480^\circ = -\frac{\sqrt{3}}{2}$

$\cos -480^\circ = -\frac{1}{2}$

$\tan -480^\circ = \sqrt{3}$

1

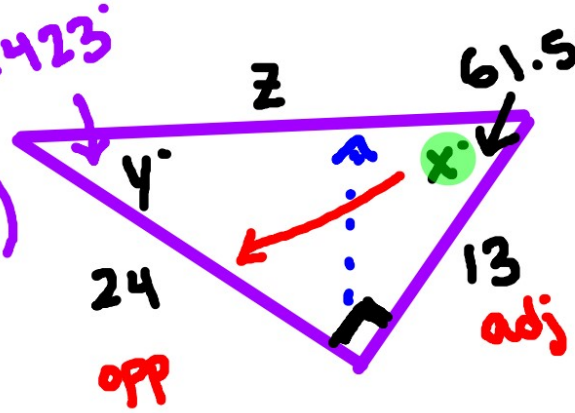


$$\sin\theta = \frac{\text{opp}}{\text{hyp}}$$

$$x \cdot \sin 48^\circ = \frac{20}{x} \cdot x$$

$$\frac{x \sin 48^\circ}{\sin 48^\circ} = \frac{20}{\sin 48^\circ}$$

$$x \approx 26.91$$

② 

(90-61.577)

$13^2 + 24^2 = z^2$

$169 + 576 = z^2$

$\sqrt{745} = \sqrt{z^2}$

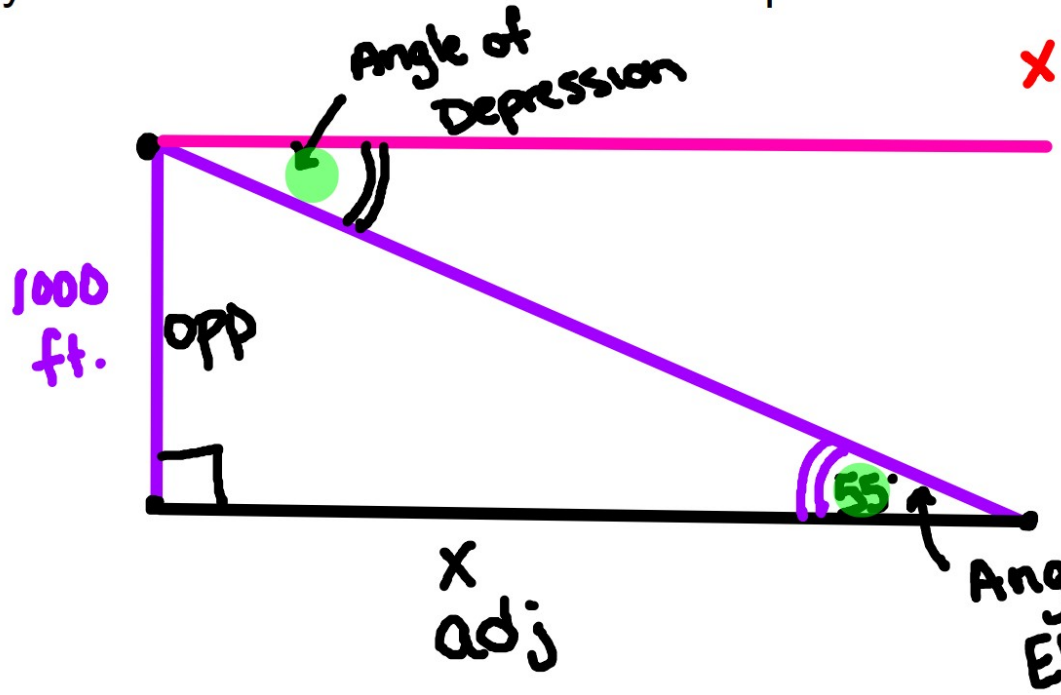
$z = \sqrt{745}$

$\tan x^\circ = \frac{24}{13}$

$x = \tan^{-1}\left(\frac{24}{13}\right)$

$x \approx 61.557^\circ$

An observer sights the top of a radio tower, which he knows is 1000 feet tall. The angle of elevation between the line of sight and the ground is 55°. How far from the tower is the observer? Draw a diagram to support your answer. Round to two decimal places.



$x \cdot \tan 55° = \frac{1000}{x} \cdot x$

$\frac{x \tan 55°}{\tan 55°} = \frac{1000}{\tan 55°}$

$x \approx 700.2$ ft.

The radius of a carousel is 8 meters. If you traveled 900°, what is the total arc length you traveled?

$r = 8m$

$\theta = 900^\circ$

$S = r\theta$

(θ must be in radians)

$\theta = 900^\circ \cdot \frac{\pi}{180^\circ} = \frac{900\pi}{180} = 5\pi$

$\frac{10\pi}{2}$

$S = (8m)(5\pi)$

$S = 40\pi\ m$

You baked a delicious chocolate cake that has a diameter of 9 inches. If the slice of cake you gave your sister has an angle of 15°, what is the area of the sector of cake your sister ate?

$D = 9\text{in}$

$r = 4.5\text{ in}$

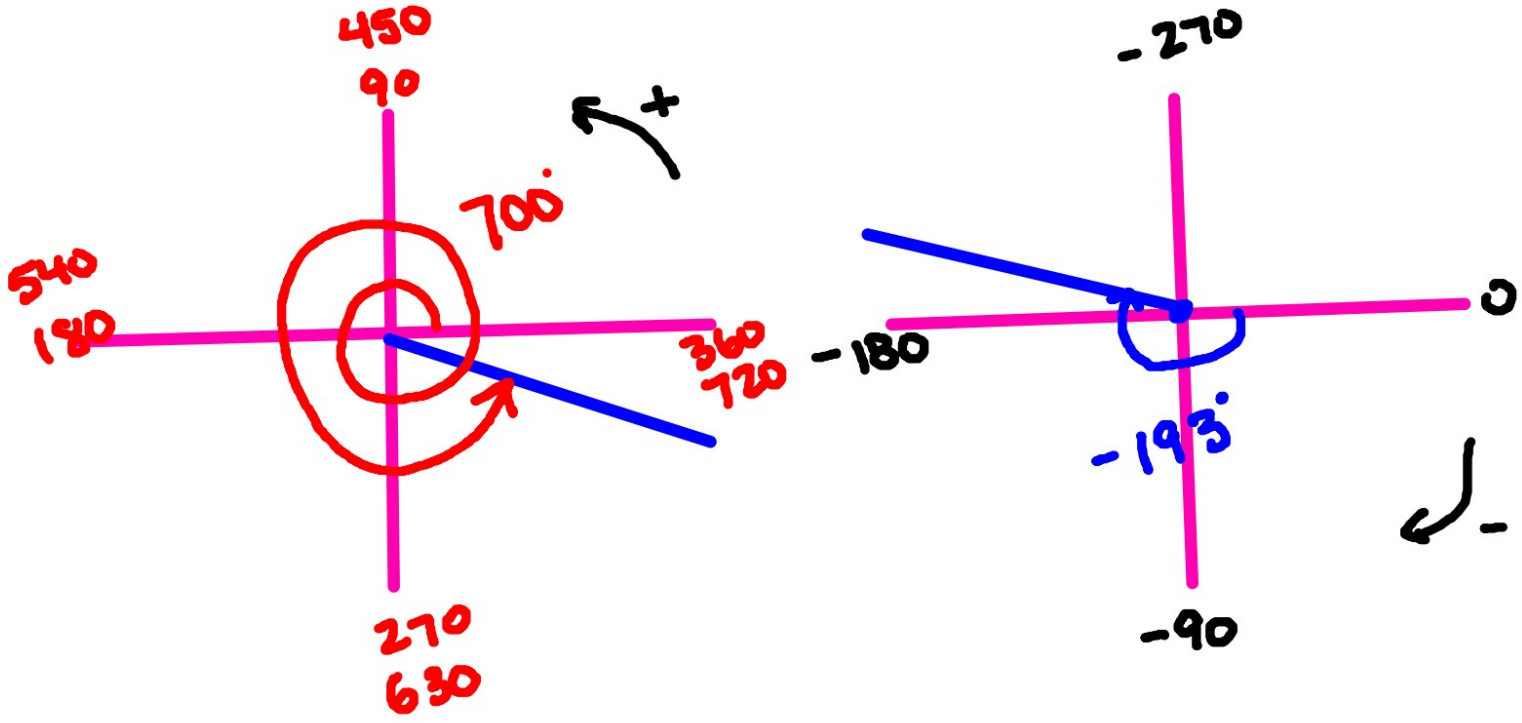
$\theta = 15^\circ = 15^\circ\left(\frac{\pi}{180^\circ}\right) = \frac{15\pi}{180} = \frac{\pi}{12}$

$A = \frac{1}{2} r^2 \theta$ (in radians)

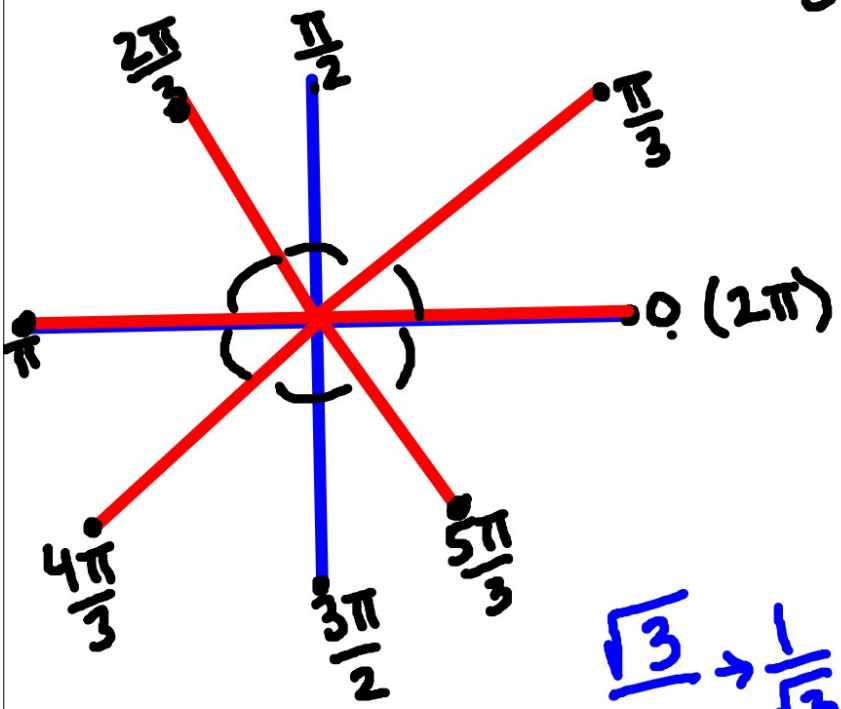
$A = \frac{1}{2}(4.5^2)\left(\frac{\pi}{12}\right)$

$A = \frac{27\pi}{32} \approx 2.65\text{ in}^2$

Sketch the angles: -193° and 700° Then find the reference angle.



Find the 6 trig ratios of $\frac{11\pi}{3}$



Ref $\angle = \frac{\pi}{3}$

$\sin\frac{\pi}{3} = \frac{\sqrt{3}}{2}$

$\cos\frac{\pi}{3} = \frac{1}{2}$

$\tan\frac{\pi}{3} = \sqrt{3}$

$\frac{\sqrt{3}}{1} \to \frac{1}{\sqrt{3}}$

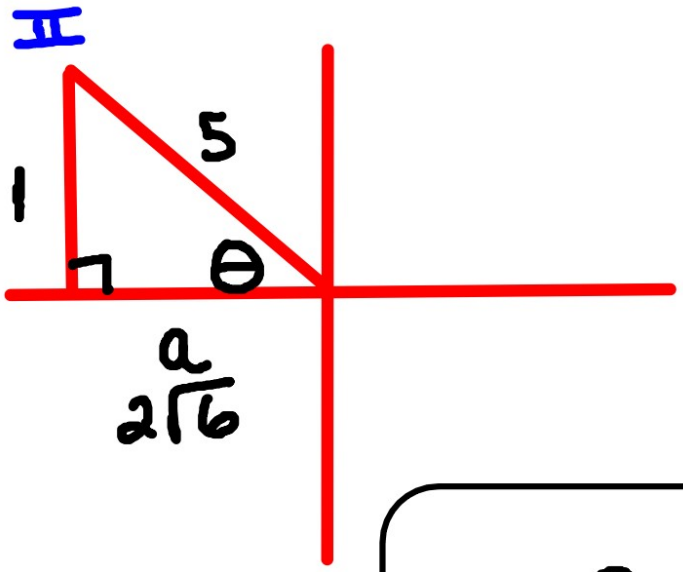
$\csc\frac{\pi}{3} = \frac{2}{\sqrt{3}}\cdot\frac{\sqrt{3}}{\sqrt{3}} = \frac{2\sqrt{3}}{3}$

$\sec\frac{\pi}{3} = 2$

$\cot\frac{\pi}{3} = \frac{1}{\sqrt{3}}\cdot\frac{\sqrt{3}}{\sqrt{3}} = \frac{\sqrt{3}}{3}$

Given $\sin\theta = \frac{1}{5}$, $\tan\theta < 0$

Find $\cos\theta$



$1^2 + a^2 = 5^2$

$\sqrt{a^2} = \sqrt{24}$

$a = \sqrt{24}$

$a = \sqrt{4}\sqrt{6}$

$a = 2\sqrt{6}$

$\cos\theta = \frac{2\sqrt{6}}{5}$