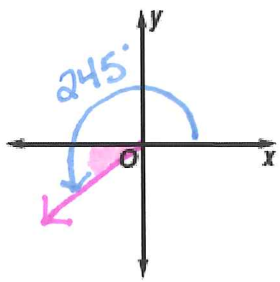
Name: Key

# Trig Functions Unit Test Review

**Directions:** Sketch the following angles in degrees, then find and indicate the reference angle in degrees.

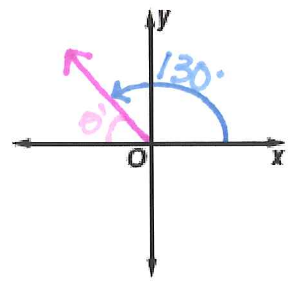
1. 245°




Reference Angle: $\theta' = 65°$

$245 - 180°$

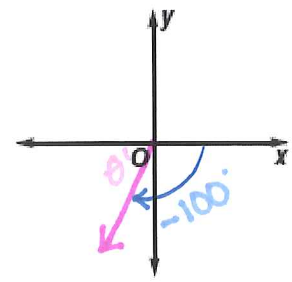
2. 130°




Reference Angle: $\theta' = 50°$

$180° - 130°$

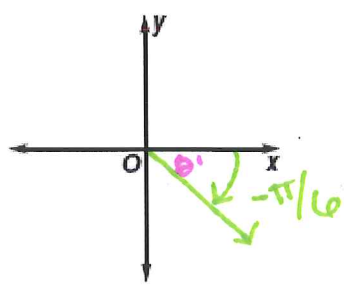
3. -100°




Reference Angle: $80° = \theta'$

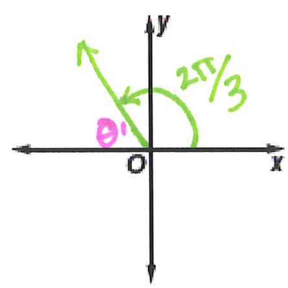
**Directions:** Sketch the following angles in radians, then find and indicate the reference angle in radians.

4. $\frac{-\pi}{6}$



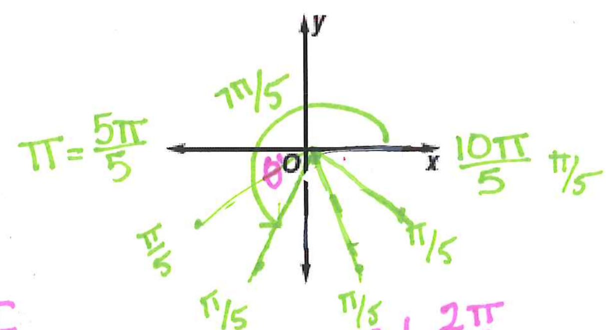

Reference Angle: $\theta' = \frac{\pi}{6}$

5. $\frac{2\pi}{3}$




Reference Angle: $\theta' = \frac{\pi}{3}$

6. $\frac{7\pi}{5}$




Reference Angle: $\theta' = \frac{2\pi}{5}$

**Directions:** Find the positive and negative coterminal angles in <u>**DEGREES**</u> and then convert the following from degrees to radians.

7. 245°

Positive: 605°

Negative: -115°

Radians: $\frac{245}{360} = \frac{b}{2\pi}$

$\boxed{b = 49\pi/36}$

8. 130°

Positive: 490°

Negative: -230°

Radians: $\frac{130}{360} = \frac{b}{2\pi}$

$\boxed{b = \frac{13\pi}{18}}$

9. -100°

Positive: 260°

Negative: -460

Radians: $\frac{-100}{360} = \frac{b}{2\pi}$

$\boxed{b = -\frac{5\pi}{9} \text{ radians}}$

**Directions:** Find the positive and negative coterminal angles in ***radians*** and then convert the following from radians to degrees.

10. $\frac{-\pi}{6}$

Positive: $\frac{-\pi}{6} + \frac{12\pi}{6} = \frac{11\pi}{6}$

Negative: $\frac{-\pi}{6} - \frac{12\pi}{6} = \frac{-13\pi}{6}$

Degrees: $\frac{-\pi}{6} \cdot \frac{360}{2\pi} \boxed{= -30^\circ}$

11. $\frac{2\pi}{3}$

Positive: $\frac{2\pi}{3} + \frac{6\pi}{3} = \frac{8\pi}{3}$

Negative: $\frac{2\pi}{3} - \frac{6\pi}{3} = \frac{-4\pi}{3}$

Degrees: $\frac{2\pi}{3} \cdot \frac{360}{2\pi} = 120^\circ$

12. $\frac{7\pi}{5}$

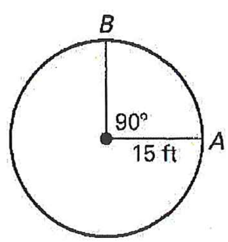
Positive: $\frac{7\pi}{5} + \frac{10\pi}{5} = \frac{17\pi}{5}$

Negative: $\frac{7\pi}{5} - \frac{10\pi}{5} = \frac{-3\pi}{5}$

Degrees: $\frac{7\pi}{5} \cdot \frac{360}{2\pi} = 252^\circ$

**Directions:** Find the circumference of the circle and find the length of $\widehat{AB}$ in terms of $\pi$.

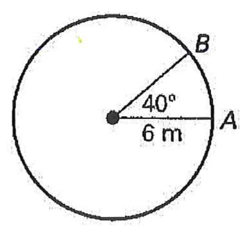
13.




Circumference: $C = 30\pi\, ft$

Arc Length: $l = \frac{90}{360} \cdot 30\pi = \frac{2700\pi}{360} \boxed{= 15\pi/2\ ft}$

14.



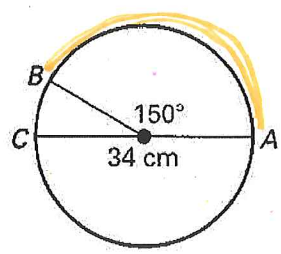

Circumference: $C = 12\pi m$

$l = \frac{40}{360} \cdot 12\pi$

Arc Length: $\frac{480\pi}{360}$

$\boxed{l = \frac{4\pi}{3} m}$

15.




Circumference: $\boxed{C = 34\pi cm}$

$l = \frac{150}{360} 34\pi$

Arc Length: $\frac{5100\pi}{360}$

$\boxed{l = \frac{85\pi}{6} cm}$

16. If point H($\frac{\sqrt{5}}{7}$, $-\frac{\sqrt{44}}{7}$) lies on the unit circle, find *sinH, cosH,* and *tanH.*

$\sin H = -\frac{\sqrt{44}}{7}$

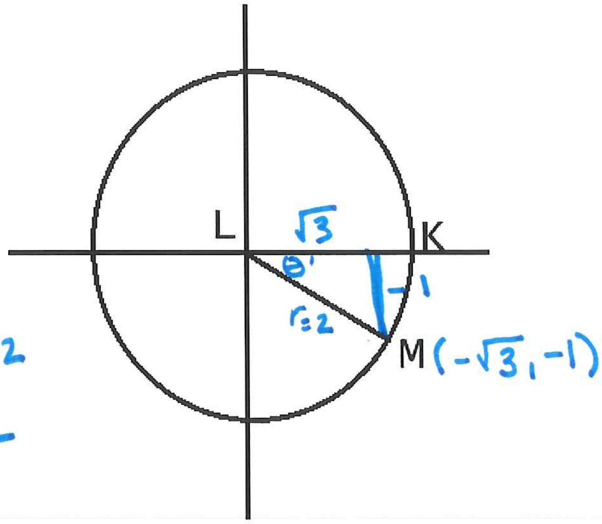
$\cos H = \frac{\sqrt{5}}{7}$

$\tan H = \frac{y}{x} = \frac{\frac{-\sqrt{44}}{7}}{\frac{\sqrt{5}}{7}} = \frac{-\sqrt{44}}{7} \cdot \frac{7}{\sqrt{5}}$

$-\frac{\sqrt{44}}{\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}} = \frac{\sqrt{220}}{5}$ $\boxed{\tan H = -\frac{\sqrt{220}}{5}}$

17. Graph the point, label the lengths of the right triangle with right angle C, find the length of the hypotenuse (radius) then find the exact trig ratio value. Simplify all radicals, simplify all fractions and make sure there is no adical in the denominator.

$(\sqrt{3}, -1)$




$\sqrt{3}^2 + (1)^2 = r^2$

$3 + 1 = r^2$

$4 = r^2$

$2 = r$

r = $2$

θ' = $30° = \pi/6$

sin θ' = $-\frac{1}{2}$

cos θ' = $\frac{\sqrt{3}}{2}$

tan θ' = $-\frac{\sqrt{3}}{3}$

$\tan\theta = \frac{-1}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}}$

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

If θ' = $30°$ (in degrees) then the actual θ= $330°$ (in degrees) rotated from the positive x-axis.

Find θ and θ' in radians. $\theta' = \frac{\pi}{6}$ $\theta = \frac{11\pi}{6}$

18. Graph the point, label the lengths of the right triangle with right angle C, find the length of the hypotenuse (radius) then find the exact trig ratio value. Simplify all radicals, simplify all fractions and make sure there is no radical in the denominator.

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

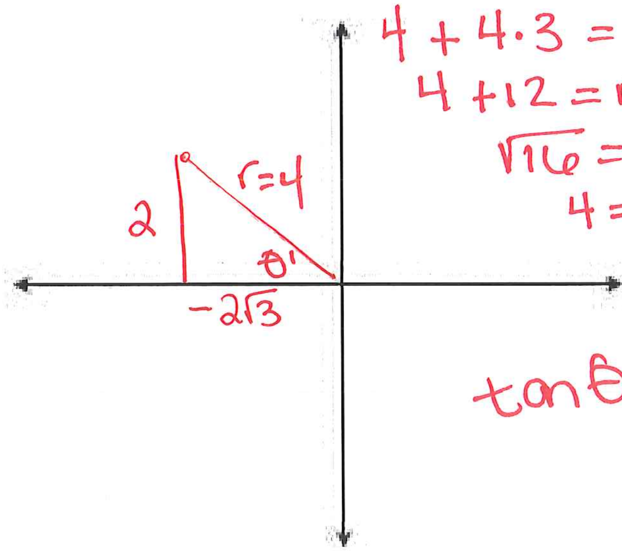
$2^2 + (-2\sqrt{3})^2 = r^2$

$4 + 4 \cdot 3 = r$

$4 + 12 = r^2$

$\sqrt{16} = r$

$4 = r$




r = $4$

θ' = $30° = \pi/6$

sin θ' = $\frac{2}{4} = \frac{1}{2}$

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

tan θ' = $-\frac{\sqrt{3}}{3}$

$\tan\theta' = \frac{2}{-2\sqrt{3}} = \frac{1}{-\sqrt{3}} = \frac{\sqrt{3}}{-3}$

If θ' = $30°$ (in degrees) then the actual θ= $150°$ (in degrees) rotated from the positive x-axis.

Find θ and θ' in radians. $\theta' = \pi/6$ $\theta = \frac{5\pi}{6}$

19. If $cos\theta = \frac{\sqrt{3}}{2}$ and in quadrant I, complete the following:

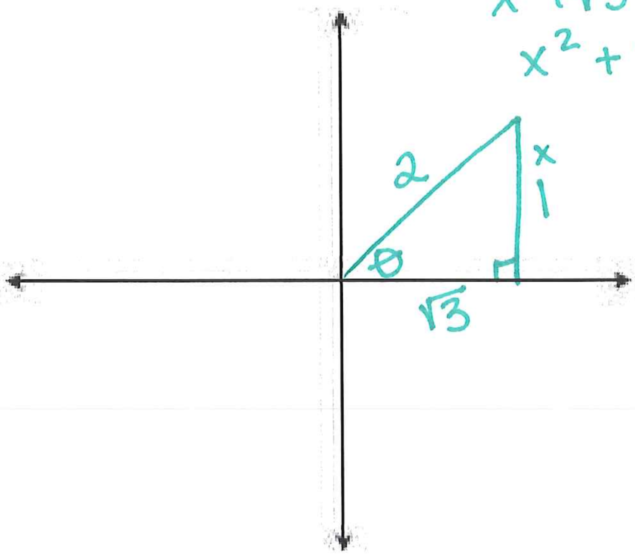
a.) Construct the triangle on the coordinate plane.

b.) Find the value of the reference angle in degrees.

c.) Find the length of the missing side.

d.) Find the value of sin θ.

a.)




$x^2 + \sqrt{3}^2 = 2^2$

$x^2 + 3 = 4$

$x^2 = 1$

$\boxed{x = 1}$

b.) Reference angle θ`= 30°

c.) missing side length = 1

d.) sin θ= $\frac{1}{2}$

20. If $sin\theta = -\frac{1}{2}$ and in quadrant IV, complete the following:

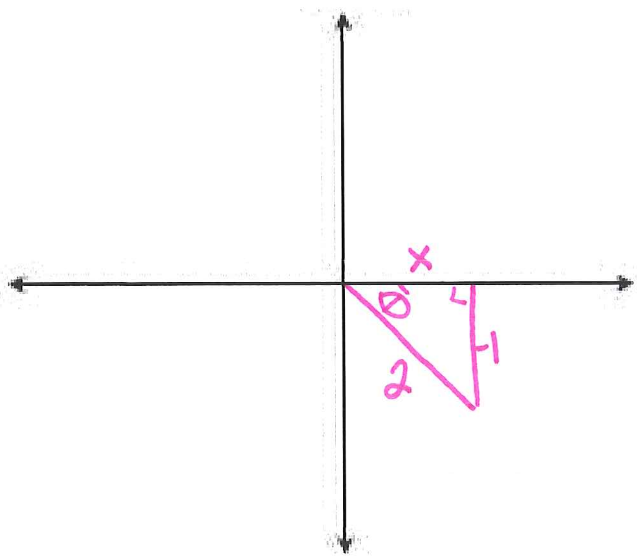
a.) Construct the triangle on the coordinate plane.

b.) Find the value of the reference angle in ~~degrees~~. Radians

c.) Find the length of the missing side.

d.) Find the value of cos θ.

a.)




b.) Reference angle θ`= 30°

c.) missing side length = $\sqrt{3}$

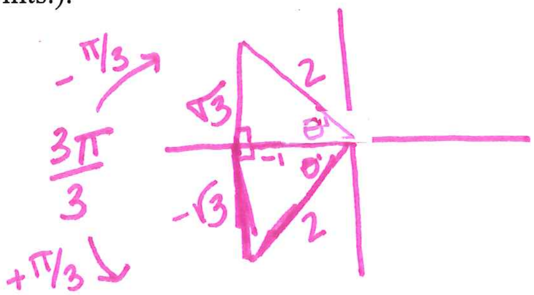
d.) cos θ= $\frac{\sqrt{3}}{2}$

$(-1)^2 + x^2 = 2^2$

$1 + x^2 = 4$

$x = \sqrt{3}$

21. If $cos\theta = -\frac{1}{2}$ and $\theta = \frac{k\pi}{6}$ on the unit circle, give at least one possible value for k. (For the test- Providing two correct values will earn one extra credit point, however, any incorrect answers will result in a loss of two points.).




$\theta' = \frac{\pi}{3}$

$\theta = \frac{2\pi}{3}$ OR $\frac{4\pi}{3}$ $\boxed{k = 2 \text{ or } 4}$

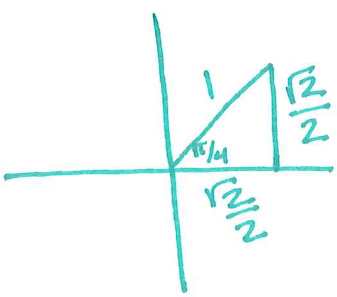
Directions:
Explain how you arrived at your answer by use of the Unit Circle or by using the triangle method.

The triangle method must show the following:

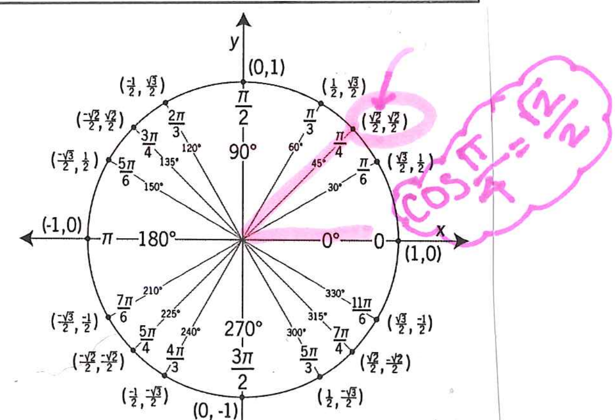
A.) Sketch the triangle
B.) Show the reference angle
C.) Right angle
D.) Side lengths

**When using the unit circle you must show the following:**
Sketch the full quadrant of the unit circle including points, degrees/radians, and both axis.

22. $\cos\frac{\pi}{4}$

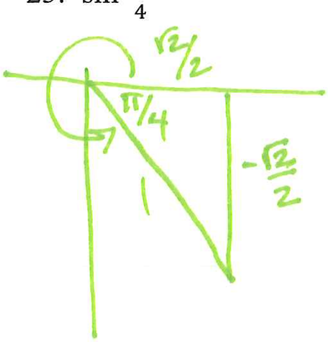



$\boxed{\cos\frac{\pi}{4} = \frac{\sqrt{2}}{2}}$

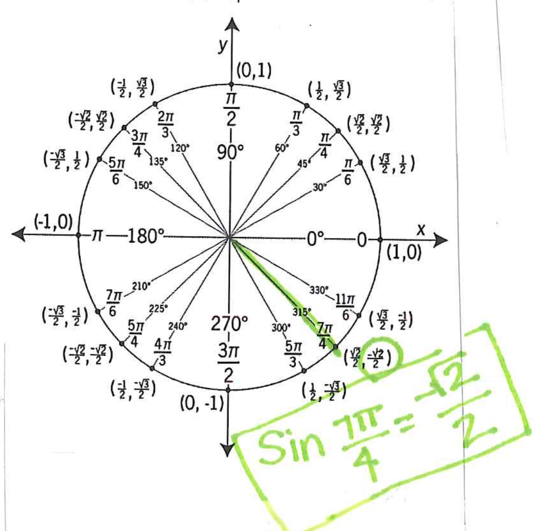



23. $\sin\frac{7\pi}{4}$

$\sin\frac{7\pi}{4} = -\frac{\sqrt{2}}{2}$

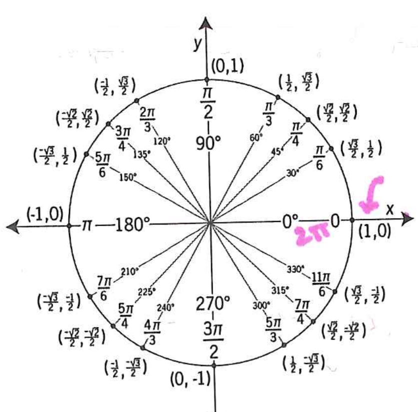



$\frac{8\pi}{4} = 2\pi$



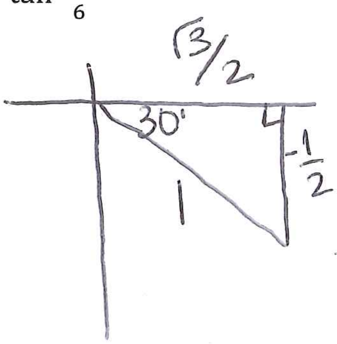

24. $\cos 2\pi$




$\cos 2\pi = 1$

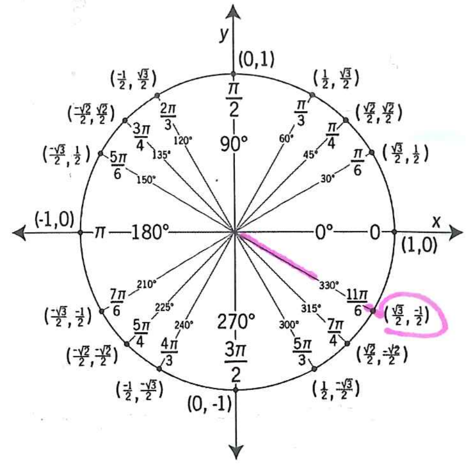
25. $\tan\frac{11\pi}{6}$




$\tan\frac{11\pi}{6} = \frac{-\frac{1}{2}}{\frac{\sqrt{3}}{2}}$

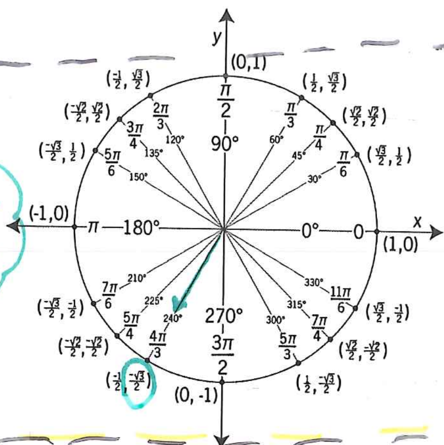
$\tan\frac{11\pi}{6} = -\frac{1}{2}\cdot\frac{2}{\sqrt{3}}$

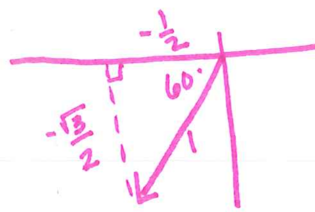
$\tan\frac{11\pi}{6} = -\frac{\sqrt{3}}{3}$



26. $\sin 240°$

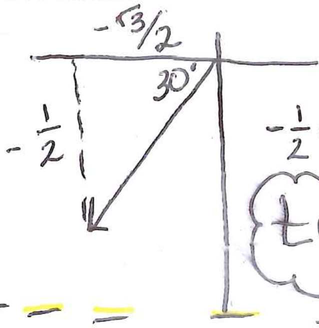
$\sin 240° = -\frac{\sqrt{3}}{2}$






$\sin 240° = -\frac{\sqrt{3}}{2}$

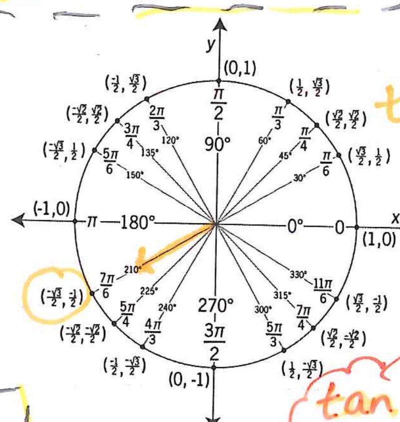
27. $\tan 210°$




$\tan 210° = \frac{-\frac{1}{2}}{-\frac{\sqrt{3}}{2}}$

$-\frac{1}{2}\cdot -\frac{2}{\sqrt{3}} = \frac{1}{\sqrt{3}}\cdot\frac{\sqrt{3}}{\sqrt{3}}$

$\tan 210° = \frac{\sqrt{3}}{3}$



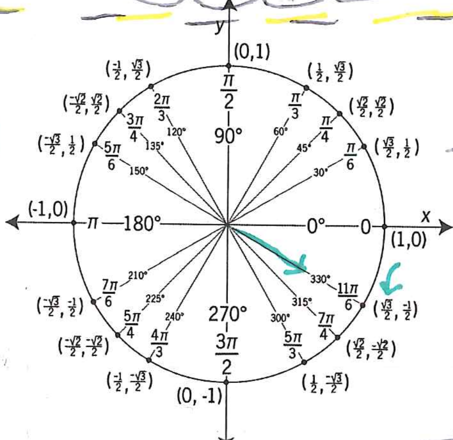
$\tan 210° = \frac{-\frac{1}{2}}{-\frac{\sqrt{3}}{2}}$

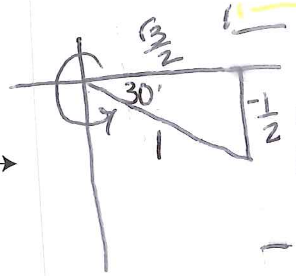
$-\frac{1}{2}\cdot -\frac{2}{\sqrt{3}} = \frac{1}{\sqrt{3}}$

$\tan 210° = \frac{\sqrt{3}}{3}$

28. $\cos 330°$

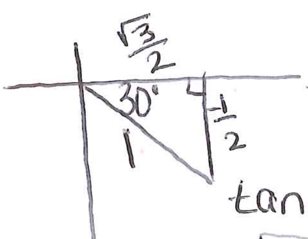
$\cos 330° = \frac{\sqrt{3}}{2}$






$\cos 330° = \frac{\sqrt{3}}{2}$

29. $\tan 330°$

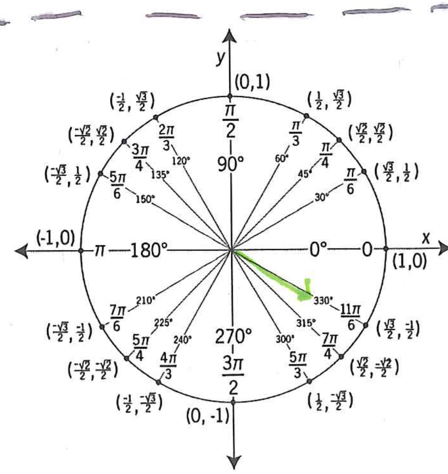



$\tan 330° = \frac{-\frac{1}{2}}{\frac{\sqrt{3}}{2}}$

$\tan 330° = -\frac{1}{2}\cdot\frac{2}{\sqrt{3}} = -\frac{\sqrt{3}}{3}$

$\boxed{\tan 330° = -\frac{\sqrt{3}}{3}}$

$\tan 330° = -\frac{\sqrt{3}}{3}$



30. Below indicates the quadrants in a coordinate plane. Determine whether sine, cosine, and tangent is positive or negative in each quadrant.

$y$

II
cos is negative
sin is positive
tan is negative

I
cos is positive
sin is positive
tan is positive

$x$

III
cos is negative
sin is negative
tan is positive

IV
cos is positive
sin is negative
tan is negative

31. Explain how arc length is used to convert degrees to radians on the unit circle with a radius of 1. Use the conversion of 330° to $\frac{11\pi}{6}$ to help you explain your work.

Arc Length on the unit circle would be

$r=1,\ d=2,\quad C=2\pi$

$l = \frac{a}{360} \cdot C \qquad l = \frac{330}{360} \cdot 2\pi$

Conversion

$330 \cdot \frac{2\pi}{360} = \frac{660\pi}{360} = \frac{11\pi}{6} \qquad l = \frac{660\pi}{360} = \frac{11\pi}{6}$

∴ Arc length of the unit circle is the measure of the angle in RADIANS.