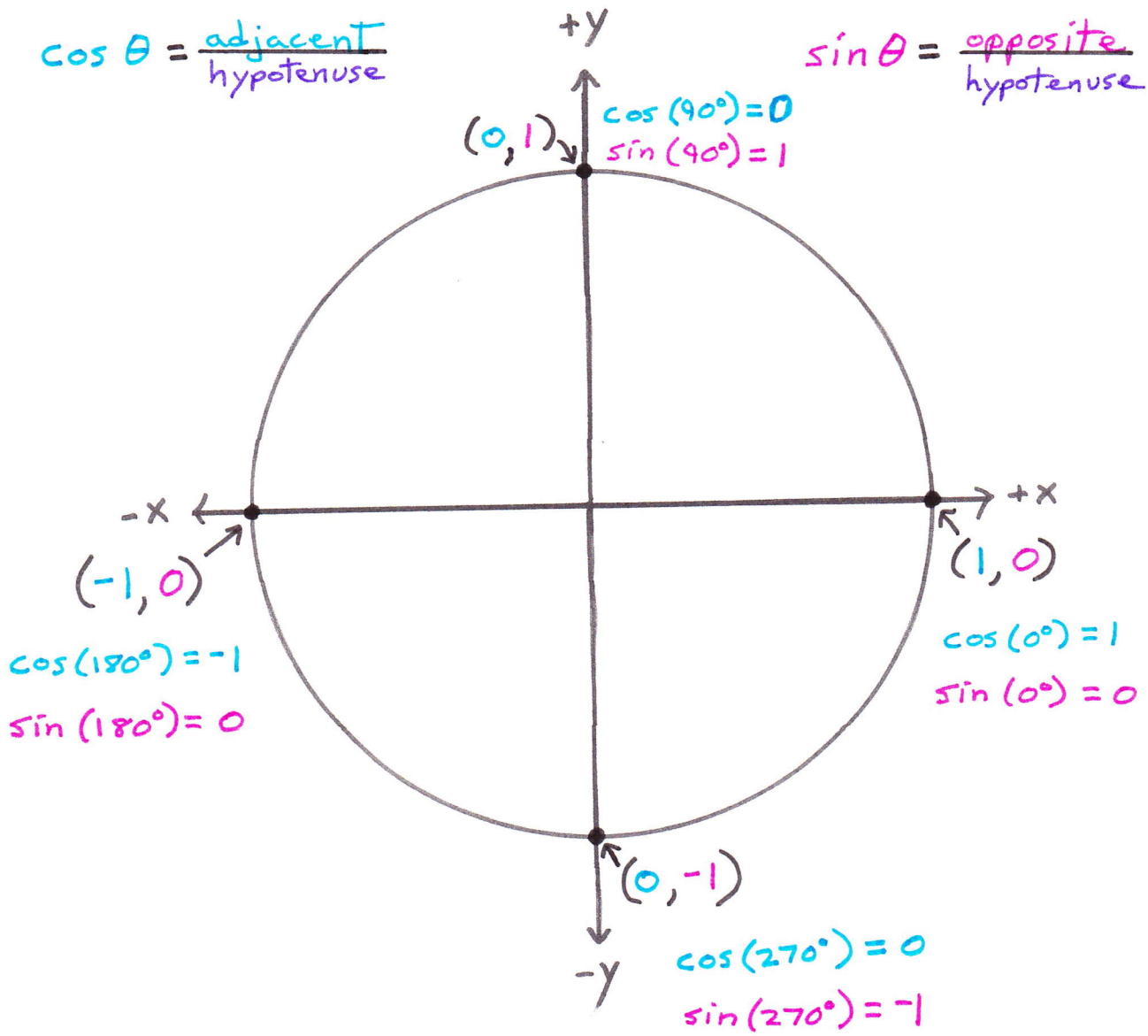
The Unit Circle

(x, y) coordinates of a point on the unit circle are

$$(\cos\theta, \sin\theta)$$

$\cos\theta = \frac{\text{adjacent}}{\text{hypotenuse}}$

$\sin\theta = \frac{\text{opposite}}{\text{hypotenuse}}$



Additional Information:

tangent: $\tan\theta = \frac{\text{opposite}}{\text{adjacent}} = \frac{\sin\theta}{\cos\theta}$

The Unit Circle

for angles that are multiples of 45°

To find a & b, use the Pythagorean Theorem

$a^2 + b^2 = c^2$

but $c = 1$ so $c^2 = 1$

and $a = b$, so we can write

$a^2 + a^2 = 1$

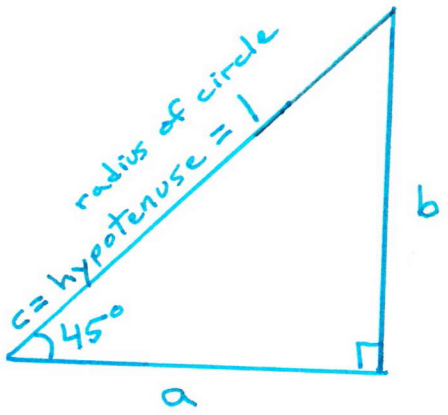
$\frac{2a^2}{2} = \frac{1}{2}$

$\sqrt{a^2} = \sqrt{\frac{1}{2}}$

$a = \frac{1}{\sqrt{2}}$ but we can't leave a root in the denominator

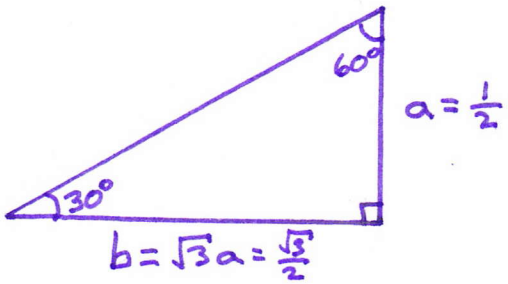
$a = \frac{1}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{2}}{2}$

so: $\boxed{a = b = \frac{\sqrt{2}}{2}}$



---

for angles that are multiples of 30° & 60°



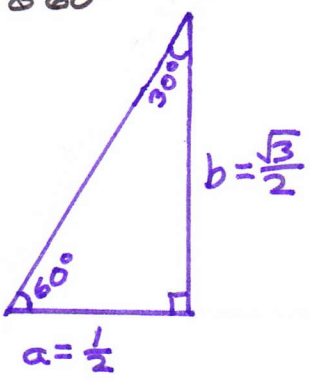
We can find **a** because we know the hypotenuse = 1 and we know in a 30°-60°-90° triangle, the hypotenuse = 2a.

$\frac{2a}{2} = \frac{1}{2}$

$a = \frac{1}{2}$

Once we know **a**, $b = \sqrt{3}a = \sqrt{3}\left(\frac{1}{2}\right)$

so $b = \frac{\sqrt{3}}{2}$

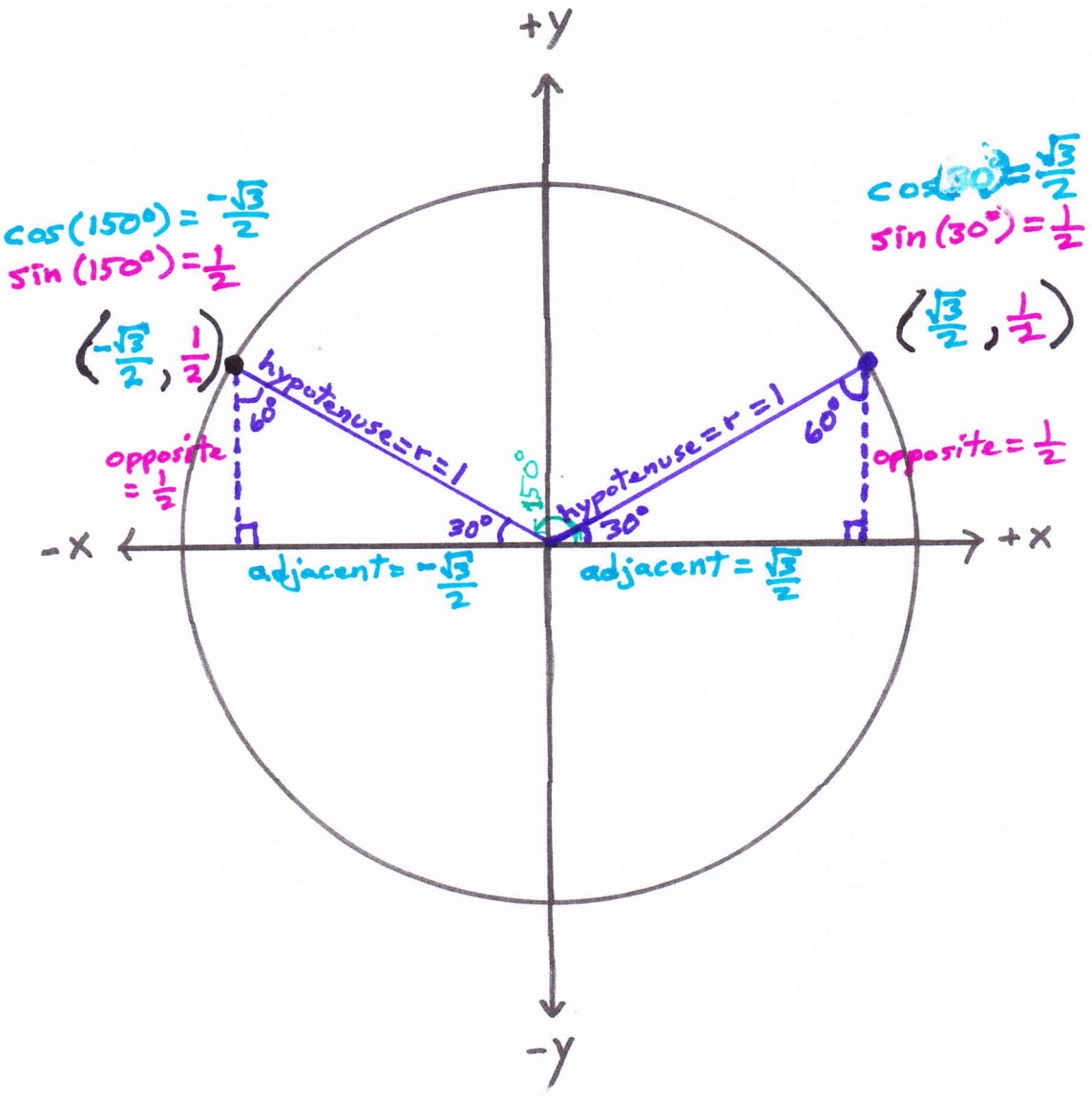


because **a** is the side opposite to the 30° angle and **b** is the side opposite to the 60° angle,

the same calculations apply because it is still a 30°-60°-90° triangle.

Unit Circle: 1st Quadrant, 30°, & 2nd Quadrant, 150°

(+x, +y) (−x, +y)

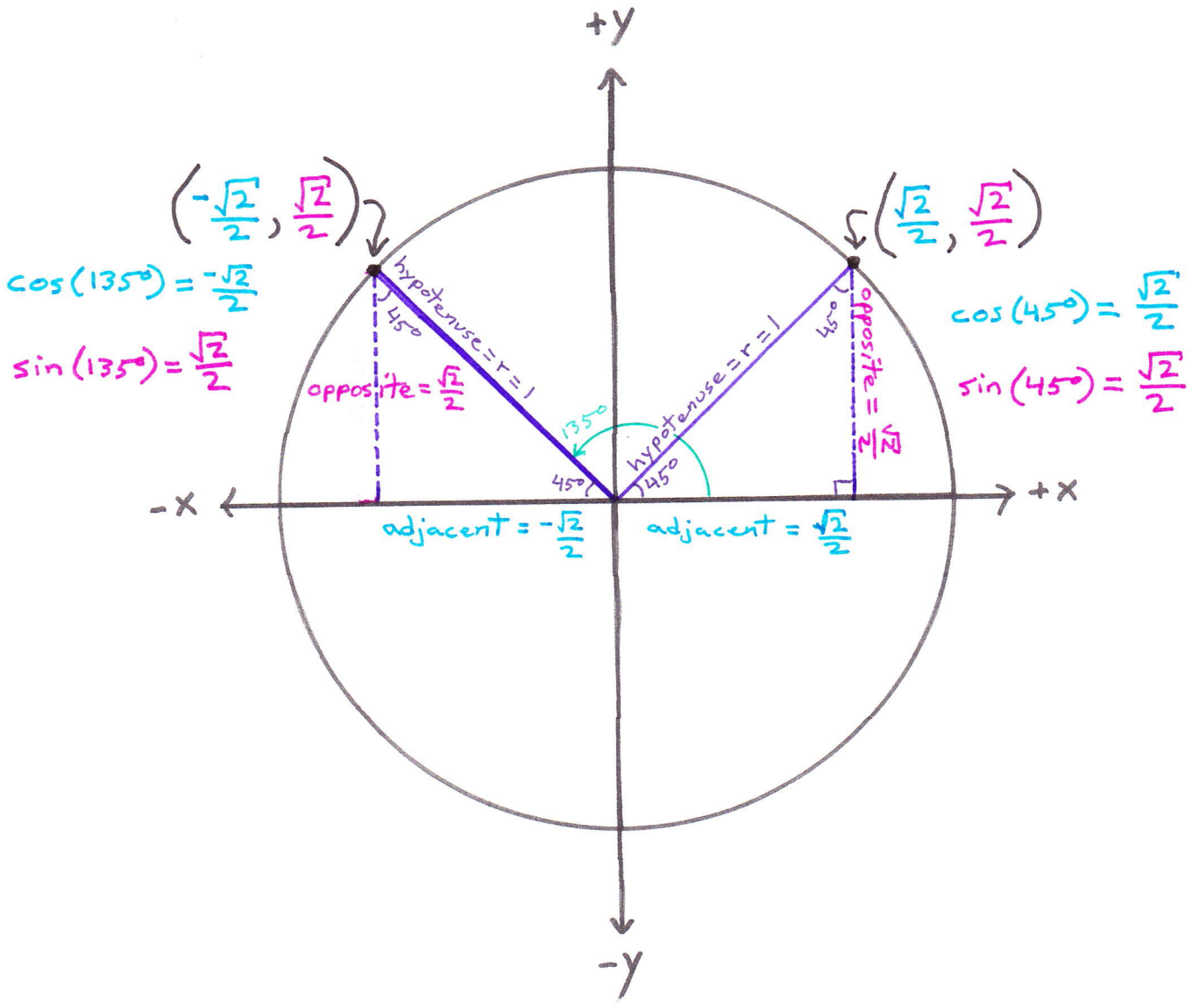


Did you notice that you can also use symmetry to get the coordinates in quadrant 2 from those in quadrant 1?

Tip: Make sure you measure the angles from the x-axis.

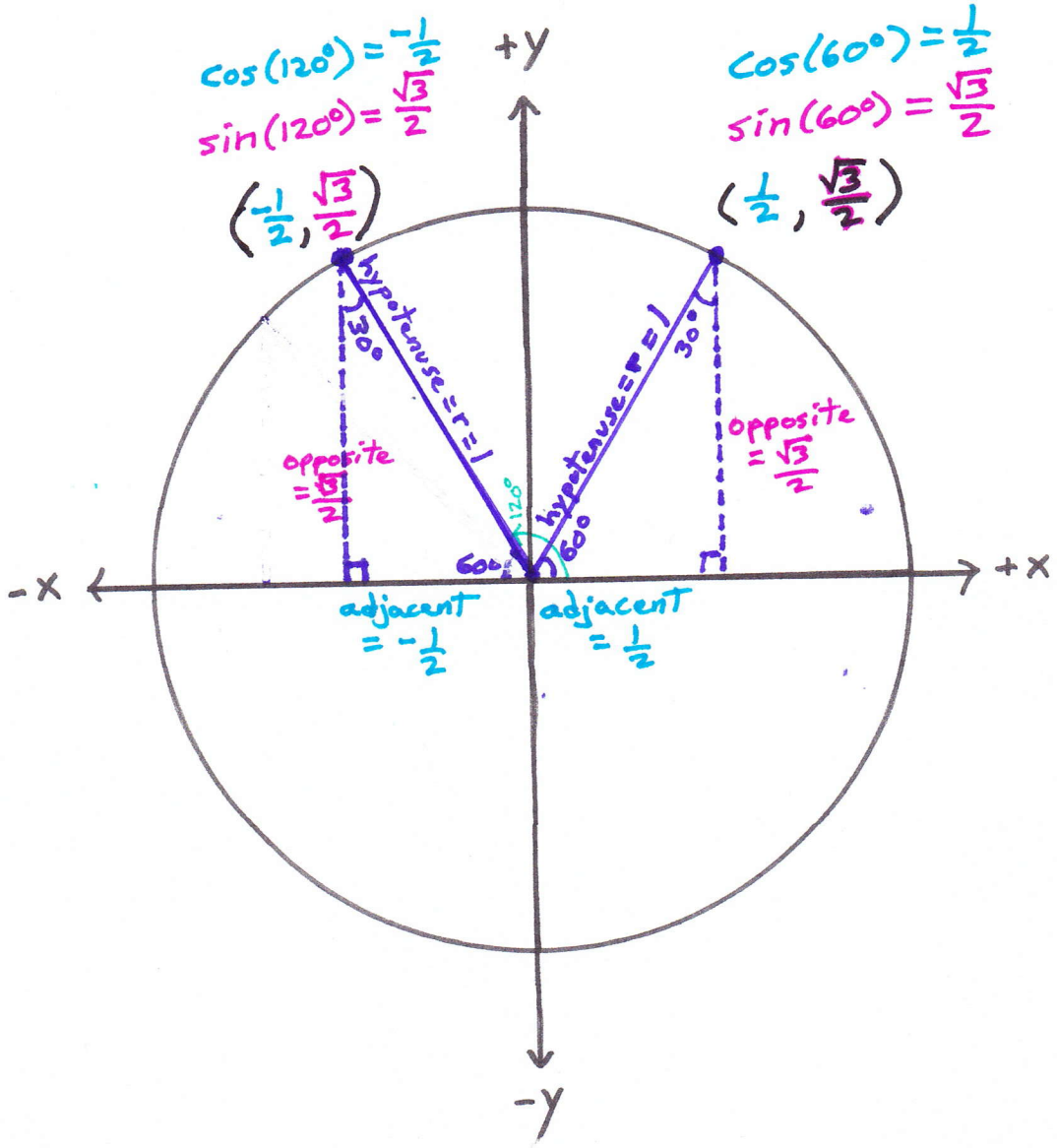
Unit Circle: 1st Quadrant, 45°, & 2nd Quadrant, 135°

(+x, +y) (-x, +y)



Unit Circle: 1st Quadrant, 60°; & 2nd Quadrant, 120°

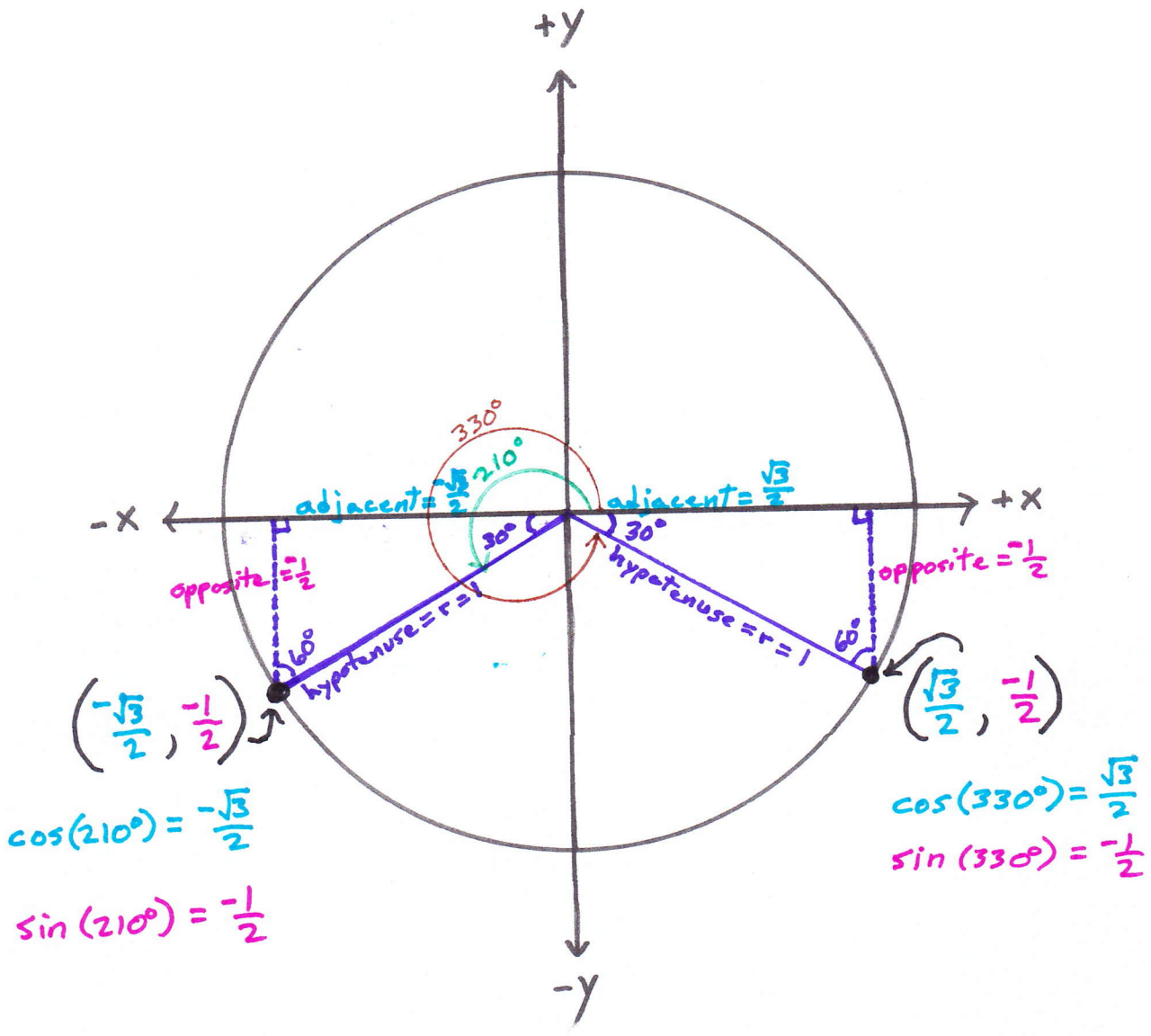
(+x, +y) (−x, +y)



Tip: Use symmetry to cut your work in half.

Unit Circle: 3rd Quadrant, 210°, & 4th Quadrant, 330°

(-x, -y) (+x, -y)



$\cos(210°) = \frac{-\sqrt{3}}{2}$

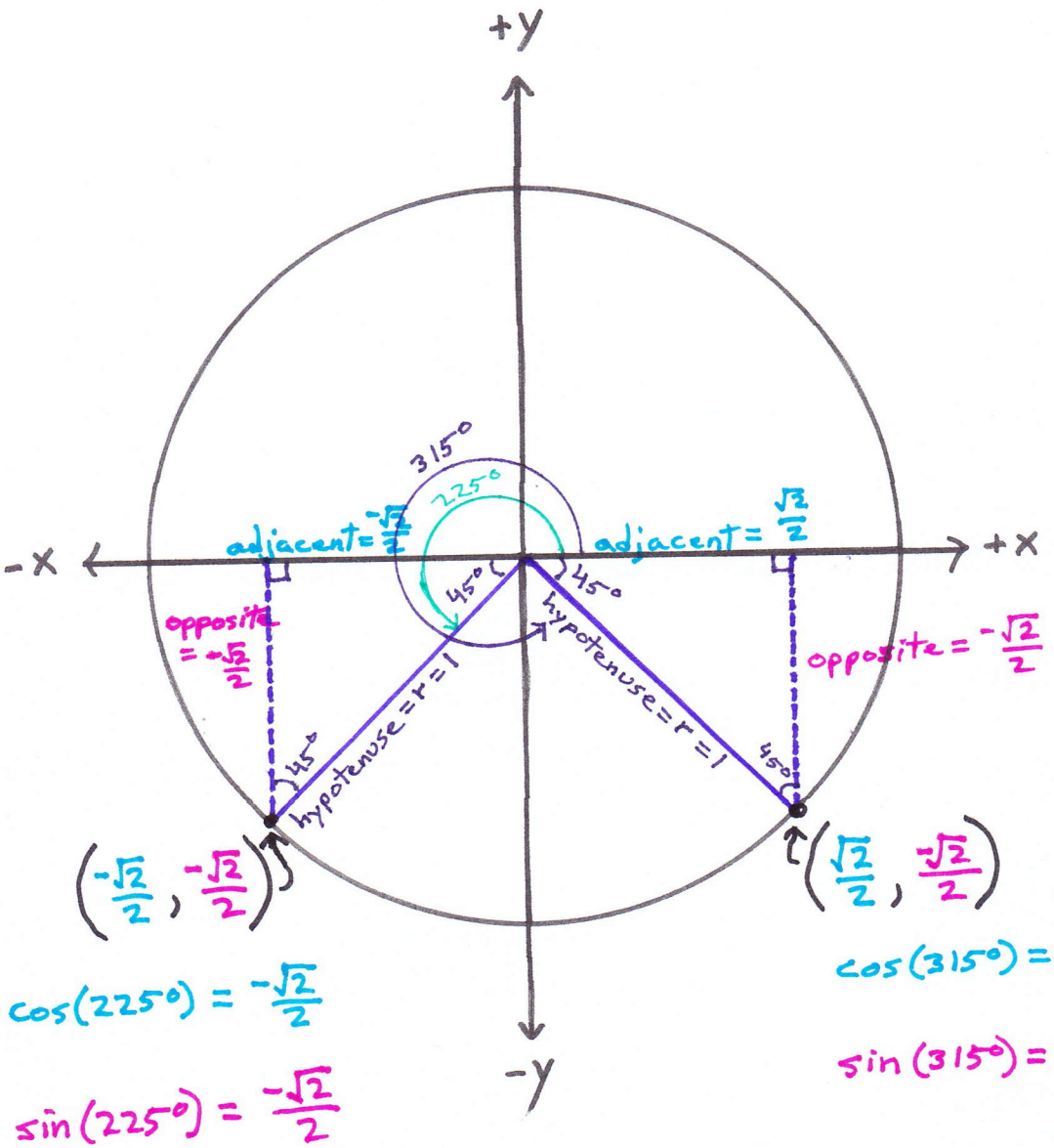
$\sin(210°) = \frac{-1}{2}$

$\cos(330°) = \frac{\sqrt{3}}{2}$

$\sin(330°) = \frac{-1}{2}$

Unit Circle: 3rd Quadrant, 225°; & 4th Quadrant, 315°

(-x, -y) (+x, -y)



$\cos(225°) = \frac{-\sqrt{2}}{2}$

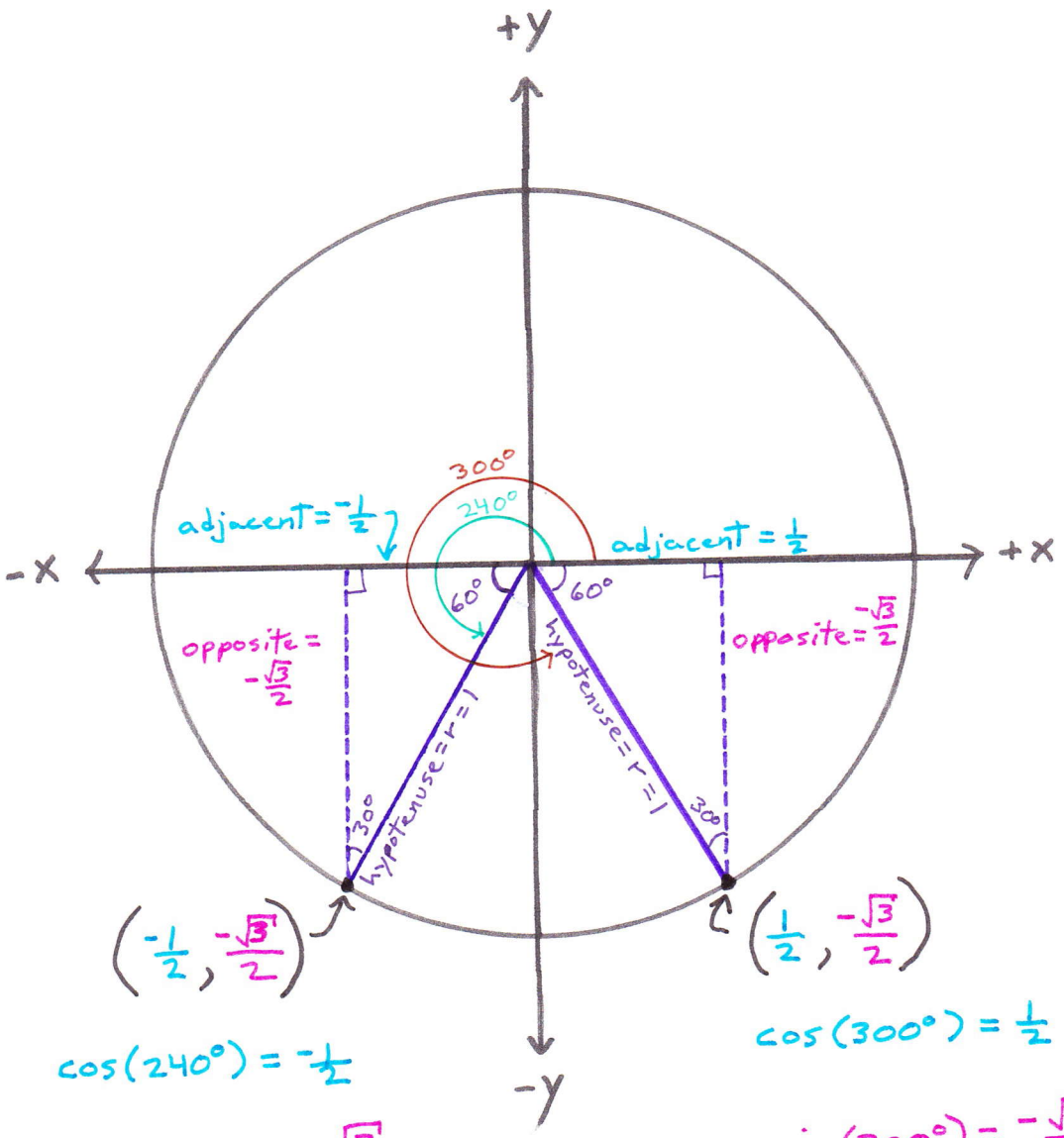
$\sin(225°) = \frac{-\sqrt{2}}{2}$

$\cos(315°) = \frac{\sqrt{2}}{2}$

$\sin(315°) = \frac{-\sqrt{2}}{2}$

Unit Circle: 3rd Quadrant, 240°; & 4th Quadrant, 300°

(-x, -y) (+x, -y)



$\cos(240°) = -\frac{1}{2}$

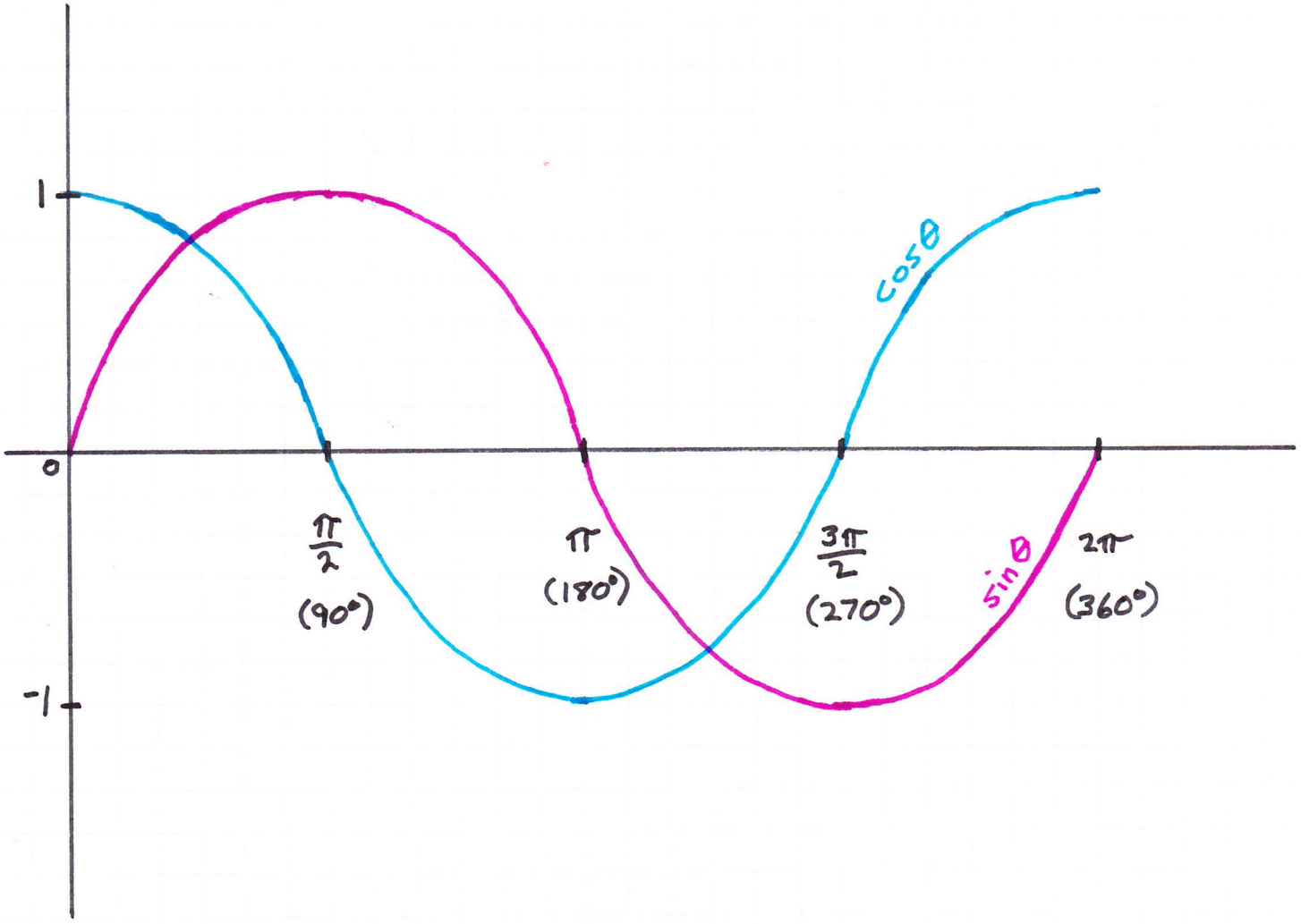
$\sin(240°) = -\frac{\sqrt{3}}{2}$

$\cos(300°) = \frac{1}{2}$

$\sin(300°) = -\frac{\sqrt{3}}{2}$

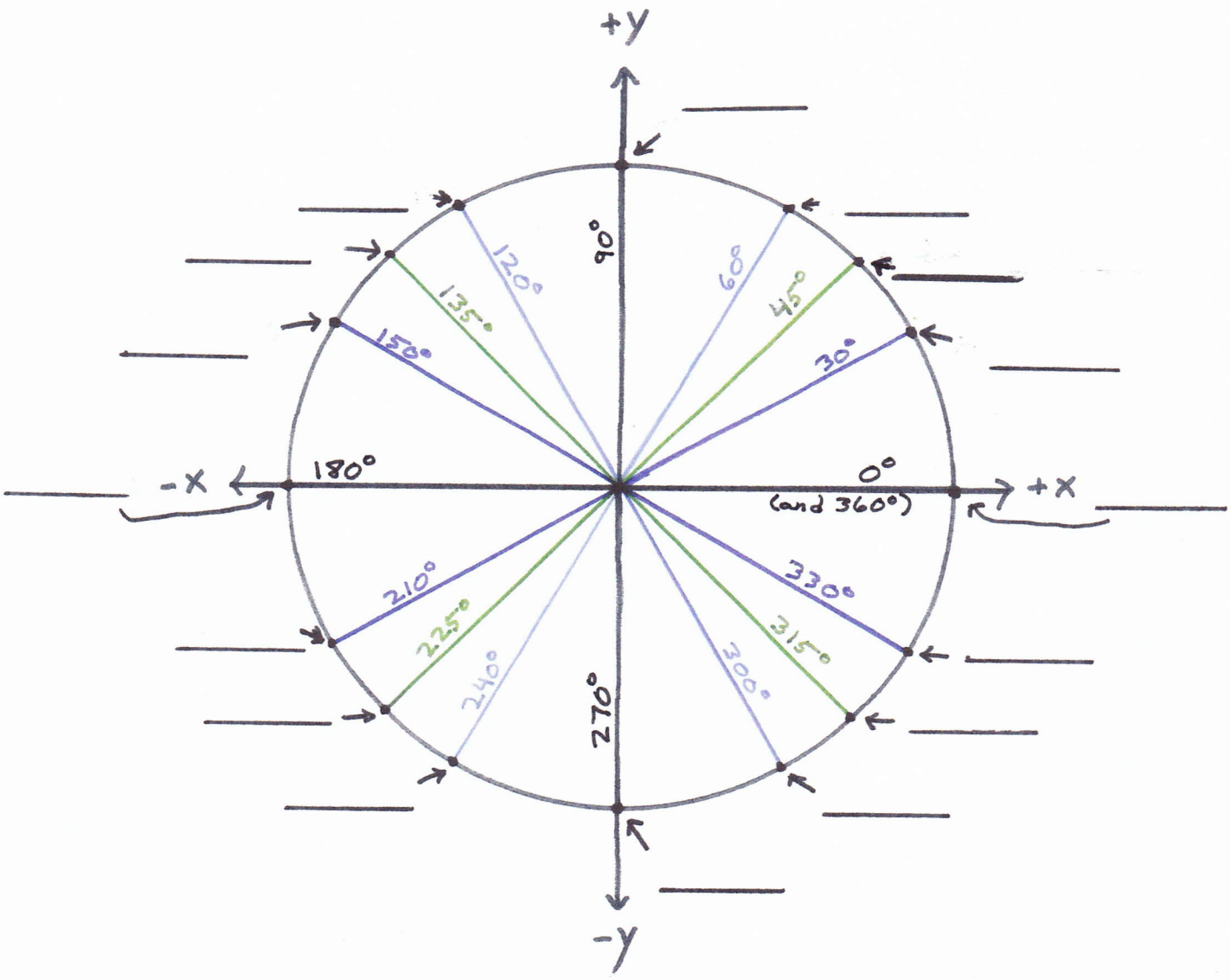
The Unit Circle

"Unrolled"



The Unit Circle: Degrees

Fill in the missing information.
(ordered pairs)

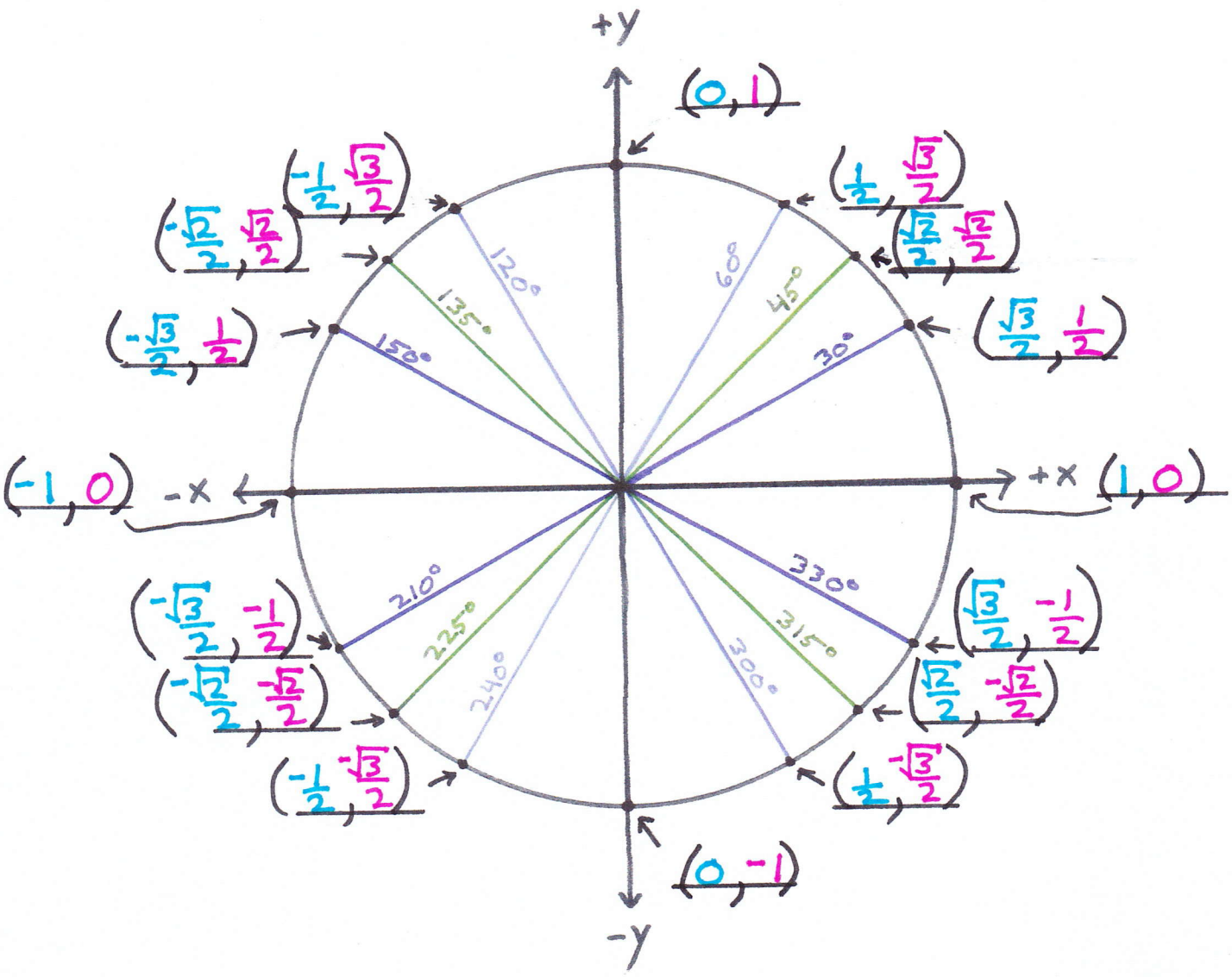


The Unit Circle

Degrees

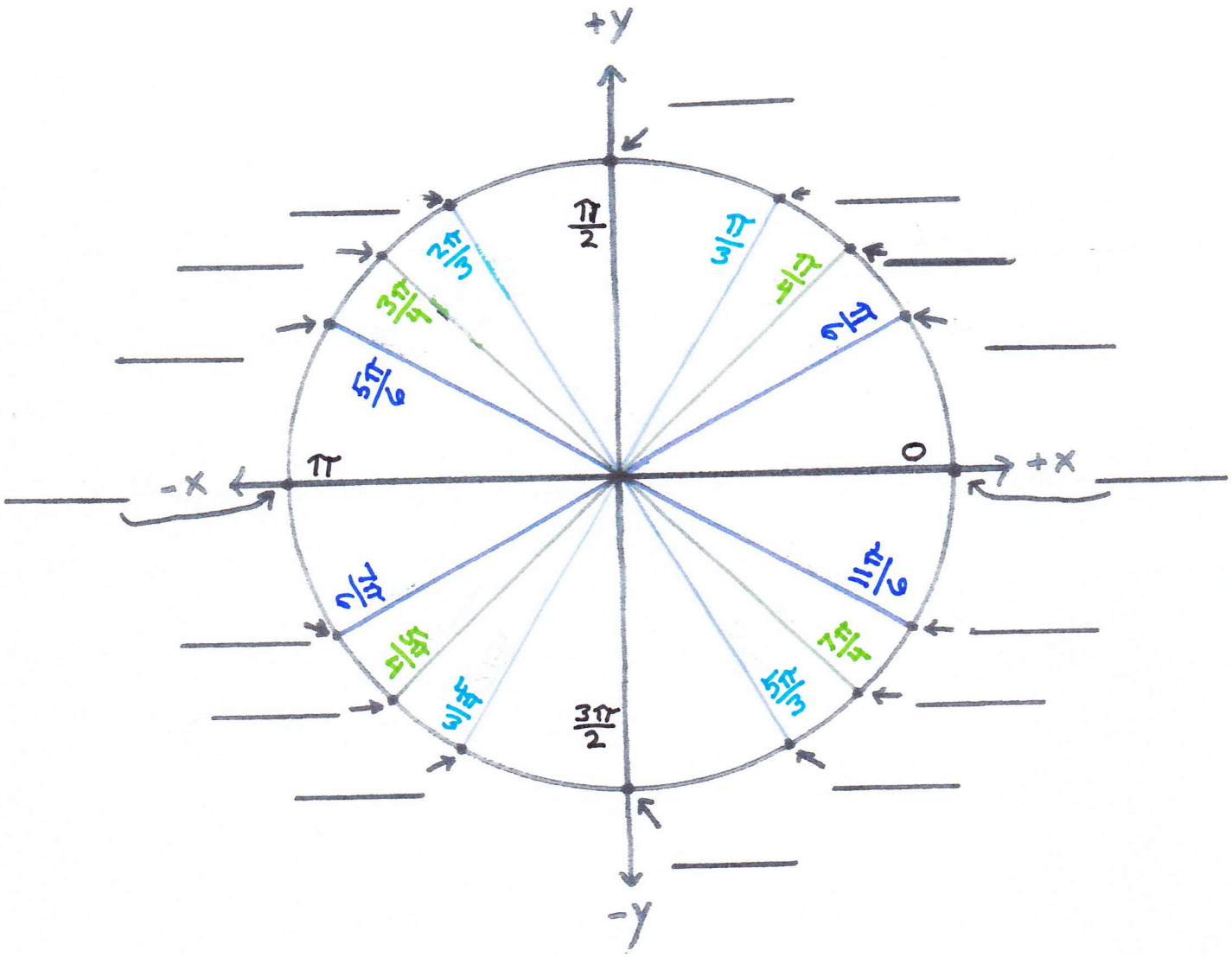
Fill in the missing information.

KEY



The Unit Circle: Radians

Fill in the missing information. (ordered pairs)

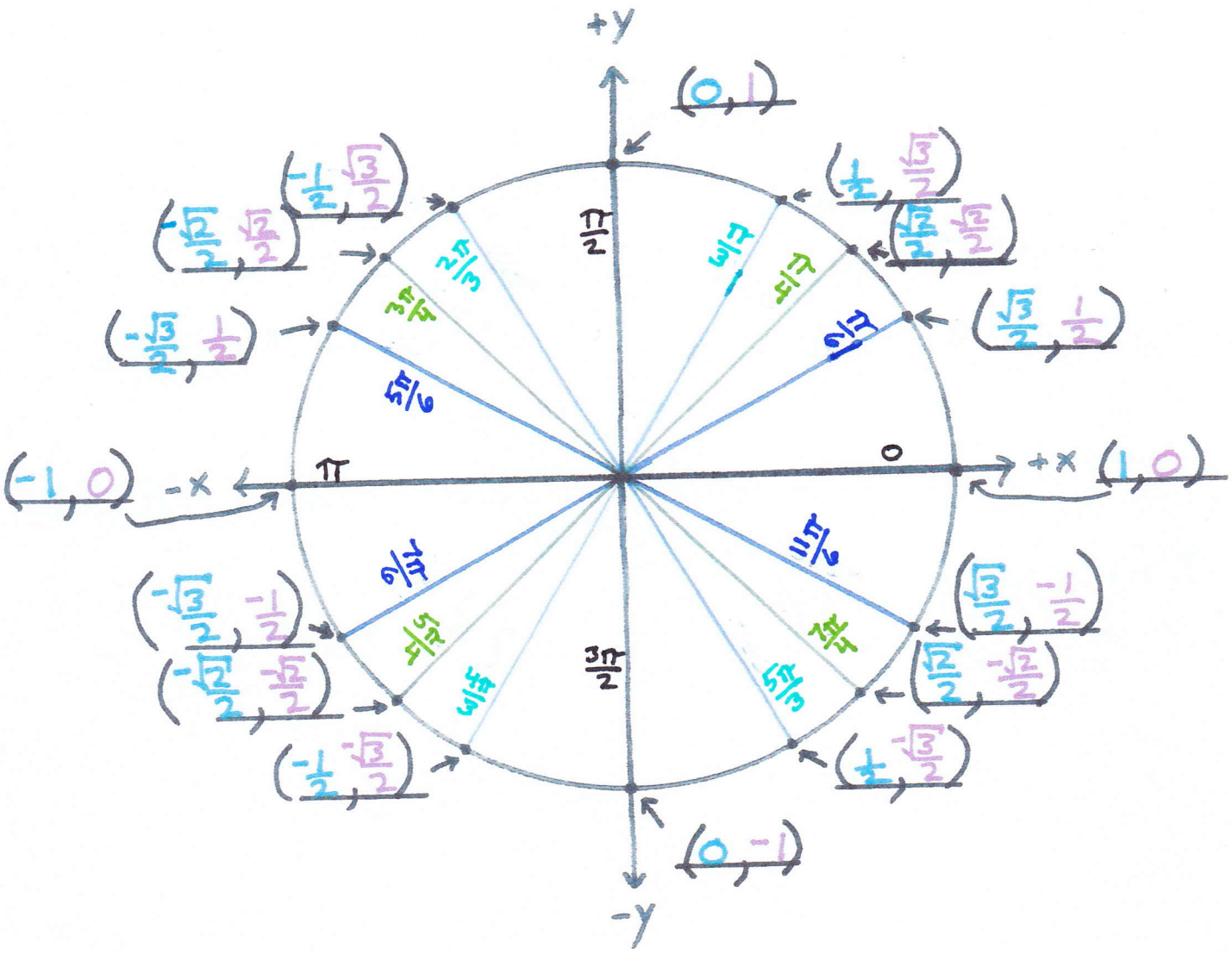


The Unit Circle

Radians

Fill in the missing information.

KEY



Convert From Degrees to Radians

$0° = 0$ radians

$30° = 30° \cdot \frac{2\pi}{360°} = \frac{1}{6}\pi$ or $\frac{\pi}{6}$

$45° = 45 \cdot \frac{2\pi}{360°} = \frac{1}{4}\pi$ or $\frac{\pi}{4}$

$60° =$

$90° =$

$120° =$

$135° =$

$150° =$

$180° =$

$210° =$

$225° =$

$240° =$

$270° =$

$300° =$

$315° =$

$330° =$

$360° =$

Convert From Degrees to Radians

KEY

$0° = 0$ radians

$30° = 30° \cdot \frac{2\pi}{360°} = \frac{1}{6}\pi$ or $\frac{\pi}{6}$

$45° = 45 \cdot \frac{2\pi}{360°} = \frac{1}{4}\pi$ or $\frac{\pi}{4}$

$60° = \frac{1}{3}\pi$ or $\frac{\pi}{3}$

$90° = \frac{1}{2}\pi$ or $\frac{\pi}{2}$

$120° = \frac{2}{3}\pi$ or $\frac{2\pi}{3}$

$135° = \frac{3}{4}\pi$ or $\frac{3\pi}{4}$

$150° = \frac{5}{6}\pi$ or $\frac{5\pi}{6}$

$180° = \pi$ ← just π ☺

$210° = \frac{7}{6}\pi$ or $\frac{7\pi}{6}$

$225° = \frac{5}{4}\pi$ or $\frac{5\pi}{4}$

$240° = \frac{4}{3}\pi$ or $\frac{4\pi}{3}$

$270° = \frac{3}{2}\pi$ or $\frac{3\pi}{2}$

$300° = \frac{5}{3}\pi$ or $\frac{5\pi}{3}$

$315° = \frac{7}{4}\pi$ or $\frac{7\pi}{4}$

$330° = \frac{11}{6}\pi$ or $\frac{11\pi}{6}$

$360° = 2\pi$ ← full circle ☺

The Unit Circle

Degrees

Fill in the following using your unit circle worksheet as a reference.

$\sin(0°) =$ _____	$\cos(0°) =$ _____	$\tan(0°) =$ _____
$\sin(90°) =$ _____	$\cos(90°) =$ _____	$\tan(90°) =$ _____
$\sin(180°) =$ _____	$\cos(180°) =$ _____	$\tan(180°) =$ _____
$\sin(270°) =$ _____	$\cos(270°) =$ _____	$\tan(270°) =$ _____
$\sin(30°) =$ _____	$\cos(30°) =$ _____	$\tan(30°) =$ _____
$\sin(150°) =$ _____	$\cos(150°) =$ _____	$\tan(150°) =$ _____
$\sin(210°) =$ _____	$\cos(210°) =$ _____	$\tan(210°) =$ _____
$\sin(330°) =$ _____	$\cos(330°) =$ _____	$\tan(330°) =$ _____
$\sin(45°) =$ _____	$\cos(45°) =$ _____	$\tan(45°) =$ _____
$\sin(135°) =$ _____	$\cos(135°) =$ _____	$\tan(135°) =$ _____
$\sin(225°) =$ _____	$\cos(225°) =$ _____	$\tan(225°) =$ _____
$\sin(315°) =$ _____	$\cos(315°) =$ _____	$\tan(315°) =$ _____
$\sin(60°) =$ _____	$\cos(60°) =$ _____	$\tan(60°) =$ _____
$\sin(120°) =$ _____	$\cos(120°) =$ _____	$\tan(120°) =$ _____
$\sin(240°) =$ _____	$\cos(240°) =$ _____	$\tan(240°) =$ _____
$\sin(300°) =$ _____	$\cos(300°) =$ _____	$\tan(300°) =$ _____

What patterns do you see?

The Unit Circle: Degrees

KEY

Fill in the following using your unit circle worksheet as a reference.

$\sin(0°) = 0$	$\cos(0°) = 1$	$\tan(0°) = \frac{0}{1} = 0$
$\sin(90°) = 1$	$\cos(90°) = 0$	$\tan(90°) = \frac{1}{0} =$ undefined
$\sin(180°) = 0$	$\cos(180°) = -1$	$\tan(180°) = \frac{0}{-1} = 0$
$\sin(270°) = -1$	$\cos(270°) = 0$	$\tan(270°) = \frac{-1}{0} =$ undefined
$\sin(30°) = \frac{1}{2}$	$\cos(30°) = \frac{\sqrt{3}}{2}$	$\tan(30°) = \frac{\frac{1}{2}}{\frac{\sqrt{3}}{2}} = \frac{1}{2} \cdot \frac{2}{\sqrt{3}} = \frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$
$\sin(150°) = \frac{1}{2}$	$\cos(150°) = -\frac{\sqrt{3}}{2}$	$\tan(150°) = \frac{\frac{1}{2}}{-\frac{\sqrt{3}}{2}} = \frac{1}{2} \cdot \frac{-2}{\sqrt{3}} = \frac{-1}{\sqrt{3}} = \frac{-\sqrt{3}}{3}$
$\sin(210°) = -\frac{1}{2}$	$\cos(210°) = -\frac{\sqrt{3}}{2}$	$\tan(210°) = \frac{-\frac{1}{2}}{-\frac{\sqrt{3}}{2}} = \frac{-1}{2} \cdot \frac{-2}{\sqrt{3}} = \frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$
$\sin(330°) = -\frac{1}{2}$	$\cos(330°) = \frac{\sqrt{3}}{2}$	$\tan(330°) = \frac{-\frac{1}{2}}{\frac{\sqrt{3}}{2}} = \frac{-1}{2} \cdot \frac{2}{\sqrt{3}} = \frac{-1}{\sqrt{3}} = \frac{-\sqrt{3}}{3}$
$\sin(45°) = \frac{\sqrt{2}}{2}$	$\cos(45°) = \frac{\sqrt{2}}{2}$	$\tan(45°) = \frac{\frac{\sqrt{2}}{2}}{\frac{\sqrt{2}}{2}} = 1$
$\sin(135°) = \frac{\sqrt{2}}{2}$	$\cos(135°) = -\frac{\sqrt{2}}{2}$	$\tan(135°) = \frac{\frac{\sqrt{2}}{2}}{-\frac{\sqrt{2}}{2}} = -1$
$\sin(225°) = -\frac{\sqrt{2}}{2}$	$\cos(225°) = -\frac{\sqrt{2}}{2}$	$\tan(225°) = \frac{-\frac{\sqrt{2}}{2}}{-\frac{\sqrt{2}}{2}} = 1$
$\sin(315°) = -\frac{\sqrt{2}}{2}$	$\cos(315°) = \frac{\sqrt{2}}{2}$	$\tan(315°) = \frac{-\frac{\sqrt{2}}{2}}{\frac{\sqrt{2}}{2}} = -1$
$\sin(60°) = \frac{\sqrt{3}}{2}$	$\cos(60°) = \frac{1}{2}$	$\tan(60°) = \frac{\frac{\sqrt{3}}{2}}{\frac{1}{2}} = \frac{\sqrt{3}}{2} \cdot \frac{2}{1} = \frac{2\sqrt{3}}{2} = \sqrt{3}$
$\sin(120°) = \frac{\sqrt{3}}{2}$	$\cos(120°) = -\frac{1}{2}$	$\tan(120°) = \frac{\frac{\sqrt{3}}{2}}{-\frac{1}{2}} = \frac{\sqrt{3}}{2} \cdot \frac{-2}{1} = -\sqrt{3}$
$\sin(240°) = -\frac{\sqrt{3}}{2}$	$\cos(240°) = -\frac{1}{2}$	$\tan(240°) = \frac{-\frac{\sqrt{3}}{2}}{-\frac{1}{2}} = \frac{-\sqrt{3}}{2} \cdot \frac{-2}{1} = \sqrt{3}$
$\sin(300°) = -\frac{\sqrt{3}}{2}$	$\cos(300°) = \frac{1}{2}$	$\tan(300°) = \frac{-\frac{\sqrt{3}}{2}}{\frac{1}{2}} = \frac{-\sqrt{3}}{2} \cdot \frac{2}{1} = -\sqrt{3}$

The Unit Circle

Radians

Fill in the following using your unit circle worksheet as a reference. (The order of the given angles is not the same as the "degrees" worksheet.)

$\sin(0) =$ _____	$\cos(0) =$ _____	$\tan(0) =$ _____
$\sin\left(\frac{\pi}{6}\right) =$ _____	$\cos\left(\frac{\pi}{6}\right) =$ _____	$\tan\left(\frac{\pi}{6}\right) =$ _____
$\sin\left(\frac{\pi}{4}\right) =$ _____	$\cos\left(\frac{\pi}{4}\right) =$ _____	$\tan\left(\frac{\pi}{4}\right) =$ _____
$\sin\left(\frac{\pi}{3}\right) =$ _____	$\cos\left(\frac{\pi}{3}\right) =$ _____	$\tan\left(\frac{\pi}{3}\right) =$ _____
$\sin\left(\frac{\pi}{2}\right) =$ _____	$\cos\left(\frac{\pi}{2}\right) =$ _____	$\tan\left(\frac{\pi}{2}\right) =$ _____
$\sin\left(\frac{2\pi}{3}\right) =$ _____	$\cos\left(\frac{2\pi}{3}\right) =$ _____	$\tan\left(\frac{2\pi}{3}\right) =$ _____
$\sin\left(\frac{3\pi}{4}\right) =$ _____	$\cos\left(\frac{3\pi}{4}\right) =$ _____	$\tan\left(\frac{3\pi}{4}\right) =$ _____
$\sin\left(\frac{5\pi}{6}\right) =$ _____	$\cos\left(\frac{5\pi}{6}\right) =$ _____	$\tan\left(\frac{5\pi}{6}\right) =$ _____
$\sin(\pi) =$ _____	$\cos(\pi) =$ _____	$\tan(\pi) =$ _____
$\sin\left(\frac{7\pi}{6}\right) =$ _____	$\cos\left(\frac{7\pi}{6}\right) =$ _____	$\tan\left(\frac{7\pi}{6}\right) =$ _____
$\sin\left(\frac{5\pi}{4}\right) =$ _____	$\cos\left(\frac{5\pi}{4}\right) =$ _____	$\tan\left(\frac{5\pi}{4}\right) =$ _____
$\sin\left(\frac{4\pi}{3}\right) =$ _____	$\cos\left(\frac{4\pi}{3}\right) =$ _____	$\tan\left(\frac{4\pi}{3}\right) =$ _____
$\sin\left(\frac{3\pi}{2}\right) =$ _____	$\cos\left(\frac{3\pi}{2}\right) =$ _____	$\tan\left(\frac{3\pi}{2}\right) =$ _____
$\sin\left(\frac{5\pi}{3}\right) =$ _____	$\cos\left(\frac{5\pi}{3}\right) =$ _____	$\tan\left(\frac{5\pi}{3}\right) =$ _____
$\sin\left(\frac{7\pi}{4}\right) =$ _____	$\cos\left(\frac{7\pi}{4}\right) =$ _____	$\tan\left(\frac{7\pi}{4}\right) =$ _____
$\sin\left(\frac{11\pi}{6}\right) =$ _____	$\cos\left(\frac{11\pi}{6}\right) =$ _____	$\tan\left(\frac{11\pi}{6}\right) =$ _____

What patterns do you see?

The Unit Circle

Radians

KEY

Fill in the following using your unit circle worksheet as a reference. (The order of the given angles is not the same as the "degrees" worksheet.)

$\sin(0) = 0$ $\quad \cos(0) = 1$ $\quad \tan(0) = \frac{0}{1} = 0$

$\sin\left(\frac{\pi}{6}\right) = \frac{1}{2}$ $\quad \cos\left(\frac{\pi}{6}\right) = \frac{\sqrt{3}}{2}$ $\quad \tan\left(\frac{\pi}{6}\right) = \frac{\frac{1}{2}}{\frac{\sqrt{3}}{2}} = \frac{1}{2}\cdot\frac{2}{\sqrt{3}} = \frac{1}{\sqrt{3}}\cdot\frac{\sqrt{3}}{\sqrt{3}} = \frac{\sqrt{3}}{3}$

$\sin\left(\frac{\pi}{4}\right) = \frac{\sqrt{2}}{2}$ $\quad \cos\left(\frac{\pi}{4}\right) = \frac{\sqrt{2}}{2}$ $\quad \tan\left(\frac{\pi}{4}\right) = \frac{\frac{\sqrt{2}}{2}}{\frac{\sqrt{2}}{2}} = \frac{\sqrt{2}}{2}\cdot\frac{2}{\sqrt{2}} = 1$

$\sin\left(\frac{\pi}{3}\right) = \frac{\sqrt{3}}{2}$ $\quad \cos\left(\frac{\pi}{3}\right) = \frac{1}{2}$ $\quad \tan\left(\frac{\pi}{3}\right) = \frac{\frac{\sqrt{3}}{2}}{\frac{1}{2}} = \frac{\sqrt{3}}{2}\cdot\frac{2}{1} = \sqrt{3}$

$\sin\left(\frac{\pi}{2}\right) = 1$ $\quad \cos\left(\frac{\pi}{2}\right) = 0$ $\quad \tan\left(\frac{\pi}{2}\right) = \frac{1}{0} \rightarrow$ undefined

$\sin\left(\frac{2\pi}{3}\right) = \frac{\sqrt{3}}{2}$ $\quad \cos\left(\frac{2\pi}{3}\right) = -\frac{1}{2}$ $\quad \tan\left(\frac{2\pi}{3}\right) = \frac{\frac{\sqrt{3}}{2}}{-\frac{1}{2}} = \frac{\sqrt{3}}{2}\cdot\frac{-2}{1} = -\sqrt{3}$

$\sin\left(\frac{3\pi}{4}\right) = \frac{\sqrt{2}}{2}$ $\quad \cos\left(\frac{3\pi}{4}\right) = -\frac{\sqrt{2}}{2}$ $\quad \tan\left(\frac{3\pi}{4}\right) = \frac{\frac{\sqrt{2}}{2}}{-\frac{\sqrt{2}}{2}} = -1$

$\sin\left(\frac{5\pi}{6}\right) = \frac{1}{2}$ $\quad \cos\left(\frac{5\pi}{6}\right) = -\frac{\sqrt{3}}{2}$ $\quad \tan\left(\frac{5\pi}{6}\right) = \frac{\frac{1}{2}}{-\frac{\sqrt{3}}{2}} = \frac{1}{2}\cdot\frac{-2}{\sqrt{3}} = \frac{-1}{\sqrt{3}} = \frac{-\sqrt{3}}{3}$

$\sin(\pi) = 0$ $\quad \cos(\pi) = -1$ $\quad \tan(\pi) = \frac{0}{-1} = 0$

$\sin\left(\frac{7\pi}{6}\right) = -\frac{1}{2}$ $\quad \cos\left(\frac{7\pi}{6}\right) = -\frac{\sqrt{3}}{2}$ $\quad \tan\left(\frac{7\pi}{6}\right) = \frac{-\frac{1}{2}}{-\frac{\sqrt{3}}{2}} = \frac{1}{2}\cdot\frac{-2}{\sqrt{3}} = \frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$

$\sin\left(\frac{5\pi}{4}\right) = -\frac{\sqrt{2}}{2}$ $\quad \cos\left(\frac{5\pi}{4}\right) = -\frac{\sqrt{2}}{2}$ $\quad \tan\left(\frac{5\pi}{4}\right) = \frac{-\frac{\sqrt{2}}{2}}{-\frac{\sqrt{2}}{2}} = 1$

$\sin\left(\frac{4\pi}{3}\right) = -\frac{\sqrt{3}}{2}$ $\quad \cos\left(\frac{4\pi}{3}\right) = -\frac{1}{2}$ $\quad \tan\left(\frac{4\pi}{3}\right) = \frac{-\frac{\sqrt{3}}{2}}{-\frac{1}{2}} = \frac{\sqrt{3}}{2}\cdot\frac{2}{1} = \sqrt{3}$

$\sin\left(\frac{3\pi}{2}\right) = -1$ $\quad \cos\left(\frac{3\pi}{2}\right) = 0$ $\quad \tan\left(\frac{3\pi}{2}\right) = \frac{-1}{0} \rightarrow$ undefined

$\sin\left(\frac{5\pi}{3}\right) = -\frac{\sqrt{3}}{2}$ $\quad \cos\left(\frac{5\pi}{3}\right) = \frac{1}{2}$ $\quad \tan\left(\frac{5\pi}{3}\right) = \frac{-\frac{\sqrt{3}}{2}}{\frac{1}{2}} = \frac{\sqrt{3}}{2}\cdot\frac{2}{1} = -\sqrt{3}$

$\sin\left(\frac{7\pi}{4}\right) = -\frac{\sqrt{2}}{2}$ $\quad \cos\left(\frac{7\pi}{4}\right) = \frac{\sqrt{2}}{2}$ $\quad \tan\left(\frac{7\pi}{4}\right) = \frac{-\frac{\sqrt{2}}{2}}{\frac{\sqrt{2}}{2}} = -1$

$\sin\left(\frac{11\pi}{6}\right) = -\frac{1}{2}$ $\quad \cos\left(\frac{11\pi}{6}\right) = \frac{\sqrt{3}}{2}$ $\quad \tan\left(\frac{11\pi}{6}\right) = \frac{-\frac{1}{2}}{\frac{\sqrt{3}}{2}} = -\frac{1}{2}\cdot\frac{2}{\sqrt{3}} = \frac{-1}{\sqrt{3}} = \frac{-\sqrt{3}}{3}$

What patterns do you see?

Inverse Trig Functions

Secant: $\sec\theta = \cos^{-1}\theta = \frac{1}{\cos\theta}$

Cosecant: $\csc\theta = \sin^{-1}\theta = \frac{1}{\sin\theta}$

Cotangent $\cot\theta = \tan^{-1}\theta = \frac{1}{\tan\theta}$

Find the following:

1. $\sec\left(\frac{\pi}{3}\right)$
2. $\csc\left(\frac{5\pi}{6}\right)$
3. $\cot\left(\frac{5\pi}{6}\right)$
4. $\sec\left(\frac{11\pi}{6}\right)$
5. $\csc\left(\frac{2\pi}{3}\right)$
6. $\cot\left(\frac{4\pi}{3}\right)$
7. $\sec(210°)$
8. $\csc(120°)$
9. $\cot(330°)$
10. $\sec(30°)$
11. $\csc(135°)$
12. $\cot(270°)$

KEY

Inverse Trig Functions

Secant: $\sec\theta = \cos^{-1}\theta = \frac{1}{\cos\theta}$

Cosecant: $\csc\theta = \sin^{-1}\theta = \frac{1}{\sin\theta}$

Cotangent $\cot\theta = \tan^{-1}\theta = \frac{1}{\tan\theta}$

Find the following:

1. $\sec\left(\frac{\pi}{3}\right) = \frac{1}{\cos\left(\frac{\pi}{3}\right)} = \frac{1}{\left(\frac{1}{2}\right)} = 1 \cdot \frac{2}{1} = \boxed{2}$

2. $\csc\left(\frac{5\pi}{6}\right) = \frac{1}{\sin\left(\frac{5\pi}{6}\right)} = \frac{1}{\left(\frac{1}{2}\right)} = 1 \cdot \left(\frac{2}{1}\right) = \boxed{2}$

3. $\cot\left(\frac{5\pi}{6}\right) = \frac{1}{\tan\left(\frac{5\pi}{6}\right)} = \frac{1}{\left(\frac{-\sqrt{3}}{3}\right)} = 1 \cdot \left(\frac{-\sqrt{3}}{3}\right) = \boxed{\frac{-\sqrt{3}}{3}}$

4. $\sec\left(\frac{11\pi}{6}\right) = \frac{1}{\cos\left(\frac{11\pi}{6}\right)} = \frac{1}{\left(\frac{\sqrt{3}}{2}\right)} = 1 \cdot \left(\frac{2}{\sqrt{3}}\right) = \frac{2}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \boxed{\frac{2\sqrt{3}}{3}}$

5. $\csc\left(\frac{2\pi}{3}\right) = \frac{1}{\sin\left(\frac{2\pi}{3}\right)} = \frac{1}{\left(\frac{\sqrt{3}}{2}\right)} = 1 \cdot \left(\frac{2}{\sqrt{3}}\right) = \frac{2}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \boxed{\frac{2\sqrt{3}}{3}}$

6. $\cot\left(\frac{4\pi}{3}\right) = \frac{1}{\tan\left(\frac{4\pi}{3}\right)} = \frac{1}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \boxed{\frac{\sqrt{3}}{3}}$

7. $\sec(210°) = \frac{1}{\cos(210°)} = \frac{1}{\left(\frac{-\sqrt{3}}{2}\right)} = 1 \cdot \left(\frac{-2}{\sqrt{3}}\right) = \frac{-2}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \boxed{\frac{-2\sqrt{3}}{3}}$

8. $\csc(120°) = \frac{1}{\sin(120°)} = \frac{1}{\left(\frac{\sqrt{3}}{2}\right)} = 1 \cdot \frac{2}{\sqrt{3}} = \frac{2}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \boxed{\frac{2\sqrt{3}}{3}}$

9. $\cot(330°) = \frac{1}{\tan(330°)} = \frac{1}{\left(\frac{-1}{\sqrt{3}}\right)} = 1 \cdot \frac{-\sqrt{3}}{1} = \boxed{-\sqrt{3}}$

10. $\sec(30°) = \frac{1}{\cos(30°)} = \frac{1}{\left(\frac{\sqrt{3}}{2}\right)} = 1 \cdot \frac{2}{\sqrt{3}} = \frac{2}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \boxed{\frac{2\sqrt{3}}{3}}$

11. $\csc(135°) = \frac{1}{\sin(135°)} = \frac{1}{\left(\frac{\sqrt{2}}{2}\right)} = 1 \cdot \left(\frac{2}{\sqrt{2}}\right) = \frac{2}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{2\sqrt{2}}{2} = \boxed{\sqrt{2}}$

12. $\cot(270°) = \frac{1}{\tan(270°)} = \frac{1}{\left(\frac{-1}{0}\right)} = 1 \cdot \frac{0}{-1} = 1 \cdot 0 = \boxed{0}$

or $\cot(270°) = \frac{\cos\theta}{\sin\theta} = \frac{0}{-1} = 0$