

Do Now:

Find the exact value of each of the following trigonometric functions:

1. $\cot \frac{5\pi}{6}$
 $-\cot \frac{\pi}{6}$
 $-\frac{3}{\sqrt{3}}$ or $-\frac{2\sqrt{3}}{3} = -\sqrt{3}$

2. $\csc \frac{4\pi}{3}$
 $-\csc \frac{\pi}{3}$
 $-\frac{2}{\sqrt{3}}$ or $-\frac{2\sqrt{3}}{3}$

3. $\sec -\frac{7\pi}{4} + 2\pi$
 $\sec \frac{\pi}{4}$
 $\frac{2}{\sqrt{2}}$ or $\frac{2\sqrt{2}}{2} = \sqrt{2}$

Examples:

1. Solve for θ in the interval $0^\circ \leq \theta \leq 360^\circ$.

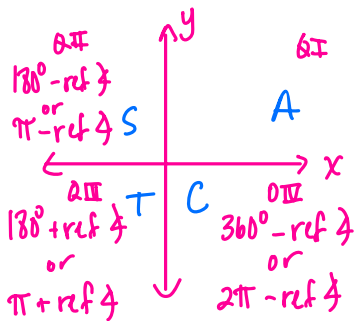
$$2 \cos \theta - 3\sqrt{2} = -2\sqrt{2}$$

$$2 \cos \theta = \sqrt{2}$$

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

$$\text{QI } \theta: 45^\circ$$

$$\text{QIV } \theta: 360^\circ - 45^\circ = 315^\circ$$



2. Solve for θ in the interval $0 \leq \theta \leq 2\pi$.

$$2 \sin \theta - 1 = 0$$

$$2 \sin \theta = 1$$

$$\sin \theta = \frac{1}{2}$$

$$\text{QI } \theta = \frac{\pi}{6}$$

$$\text{QII } \theta = \pi - \frac{\pi}{6} = \frac{5\pi}{6}$$

3. Solve for θ , in the interval $0^\circ \leq \theta \leq 360^\circ$.

$$3 \cos \theta + \sqrt{3} = 5 \cos \theta + 2\sqrt{3}$$

$$-2 \cos \theta = \sqrt{3}$$

$$\cos \theta = -\frac{\sqrt{3}}{2}$$

ref $\angle 30^\circ$

$$\text{QII } \theta = 180^\circ - 30^\circ = 150^\circ$$

$$\text{QIII } \theta = 180^\circ + 30^\circ = 210^\circ$$

4. Solve for θ in the interval $0^\circ \leq \theta \leq 360^\circ$

$$8 \sec \theta - 2 = 10 + 2 \sec \theta$$

$$6 \sec \theta = 12$$

$$\sec \theta = 2$$

$$\cos \theta = \frac{1}{2}$$

$$\text{QI } \theta = 60^\circ$$

$$\text{QIV } \theta = 360^\circ - 60^\circ = 300^\circ$$

5. Solve for θ , to the nearest degree in the interval $0^\circ \leq \theta \leq 360^\circ$.

$$3 \tan \theta + 4 = 5 \tan \theta - 1$$

$$-2 \tan \theta = -5$$

$$\tan \theta = \frac{5}{2}$$

$$\tan^{-1}\left(\frac{5}{2}\right) = 68.19\dots^\circ$$

$$\text{QI } \theta = 68^\circ$$

$$\text{QIII } \theta = 180^\circ + 68.19\dots = 248.19\dots$$

248°

6. Solve for θ to the nearest degree in the interval $0^\circ \leq \theta \leq 360^\circ$

$$3(\sin \theta - 1) = -4$$

$$\sin \theta - 1 = -\frac{4}{3}$$

$$\sin \theta = -\frac{1}{3}$$

$$\left\{ 199^\circ, \right. \\ \left. 341^\circ \right\}$$

$$\text{ref } \theta \quad \sin^{-1}\left(+\frac{1}{3}\right) = 19.471\dots^\circ$$

$$\text{QIII } \theta = 180^\circ + 19.47\dots^\circ = 199.47\dots$$

$$\text{QIV } \theta = 360^\circ - 19.47\dots^\circ = 340.52\dots$$

7. Solve for θ to the nearest degree in the interval $0^\circ \leq \theta \leq 360^\circ$

$$4 \cos \theta = \cos \theta + 2$$

$$3 \cos \theta = 2$$

$$\cos \theta = \frac{2}{3}$$

$$\text{ref } \angle: \cos^{-1}\left(\frac{2}{3}\right) = 48.18\dots^\circ$$

$$\text{Q I } \theta = 48.18\dots^\circ$$

$$\text{Q IV } \theta = 360^\circ - 48.18\dots^\circ = 311.81\dots^\circ$$

$$\{48^\circ, 312^\circ\}$$

8. For $0 \leq \theta \leq \pi$, solve:

$$\tan \theta \cos \theta - \tan \theta = 0$$

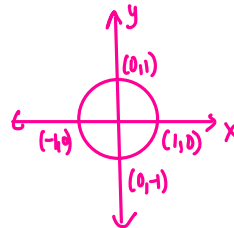
$$\tan \theta (\cos \theta - 1) = 0$$

$$\tan \theta = 0 \quad \cos \theta = 1$$

$$\theta = 0, \pi \quad \theta = 0$$

$$\{0, \pi\}$$

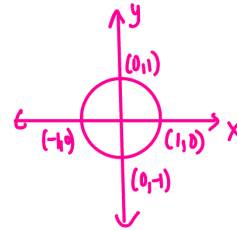
Whenever $\sin \theta$ or $\cos \theta = \pm 1, 0$
and
whenever $\tan \theta = 0$, θ is a
quadrantal \angle . Go to your
unit circle.



9. For $0^\circ \leq \theta \leq 360^\circ$, solve: $|2 \cos \theta - 3| = 5$

$$\begin{array}{l} 2 \cos \theta - 3 = 5 \\ 2 \cos \theta - 3 = 5 \\ 2 \cos \theta = 8 \\ \cos \theta = 4 \\ \text{---} \end{array} \quad \begin{array}{l} 2 \cos \theta - 3 = -5 \\ -2 \cos \theta + 3 = 5 \\ -2 \cos \theta = 2 \\ \cos \theta = -1 \\ \theta = 180^\circ \end{array}$$

$\{180^\circ\}$



* $-1 \leq \cos \theta \leq 1$
 $-1 \leq \sin \theta \leq 1$
not true for
tangent

HOMEWORK SECTION IS ON NEXT PAGE.

Name: _____

Classwork/Homework 04-11

Exact Trig Values

Find the exact value of each trigonometric functions then color all the boxes with the indicated color.

<p>1. COLOR: LIGHT BLUE</p> $\cot -\frac{5\pi}{3}$ $\cot \frac{\pi}{3} = \frac{\sqrt{3}}{3}$	<p>2. COLOR: LIGHT BLUE</p> $\csc \frac{8\pi}{3}$ $\csc \frac{\pi}{3} = \frac{2\sqrt{3}}{3}$	<p>3. COLOR: LIGHT GREEN</p> $\tan \frac{\pi}{3}$ $\sqrt{3}$
<p>4. COLOR: HOT PINK</p> $\tan \frac{11\pi}{3}$ $-\tan \frac{\pi}{3} = -\sqrt{3}$	<p>5. COLOR: LIGHT BLUE</p> $\cos \frac{4\pi}{3}$ $-\cos \frac{\pi}{3} = -\frac{1}{2}$	<p>6. COLOR: LIGHT BLUE</p> $\cot \frac{2\pi}{3}$ $-\cot \frac{\pi}{3} = -\frac{\sqrt{3}}{3}$
<p>7. COLOR: DARK GREEN</p> $\sin -315^\circ$ $\sin 45^\circ = \frac{\sqrt{2}}{2}$	<p>8. COLOR: DARK BROWN</p> $\csc 960^\circ$ <p style="text-align: center;">720</p> $\csc 240^\circ$ $-\csc 60^\circ = -\frac{2\sqrt{3}}{3}$	<p>9. COLOR: ORANGE</p> $\tan -2\pi$ $\tan 0 = 0$
<p>10. COLOR: DARK GREEN</p> $\cos -945^\circ$ $\cos 225^\circ$ $-\cos 45^\circ = -\frac{\sqrt{2}}{2}$	<p>11. COLOR: YELLOW</p> $\sec \frac{7\pi}{4}$ $\sec \frac{\pi}{4} = \sqrt{2}$	<p>12. COLOR: LIGHT BLUE</p> $\sec -600^\circ$ <p style="text-align: center;">-720</p> $-\sec 60^\circ = -2$
<p>13. COLOR: LIGHT GREEN</p> $\sin -840^\circ$ $\sin 240^\circ$ $-\sin 60^\circ = -\frac{\sqrt{3}}{2}$	<p>14. COLOR: LIGHT GREEN</p> $\cos -540^\circ$ $\cos -180^\circ$ -1	<p>15. COLOR: RED</p> $\sin \frac{25\pi}{6}$ $\sin \frac{\pi}{6} = \frac{1}{2}$

EVALUATING TRIG FUNCTIONS

Find the value of each of the following:

1. $\sin \frac{3\pi}{4} = \frac{\sqrt{2}}{2}$
 $\sin \frac{\pi}{4} = \frac{\sqrt{2}}{2}$

2. $\cos 2\pi = 1$
 $\tan \frac{7\pi}{6} = \frac{\sqrt{3}}{3}$

3. $\tan \frac{\pi}{6} = \frac{\sqrt{3}}{3}$
 $\sin(-3\pi) = 0$

4. $\sin \pi = 0$
 $\cos \frac{5\pi}{3} = \frac{1}{2}$

5. $+ \cos \frac{\pi}{3} = \frac{1}{2}$
 $\tan \frac{5\pi}{4} = 1$

6. $\tan \frac{\pi}{4} = 1$
 $\sin 8\pi = 0$

7. $\sin 0 = 0$
 $\cos \frac{11\pi}{3} = \frac{1}{2}$

8. $\cos \frac{11\pi}{3} = \frac{1}{2}$
 $\cos \frac{5\pi}{3} = \cos \frac{\pi}{3} = \frac{1}{2}$

9. $\tan \frac{\pi}{4} = 1$
 $\sin \frac{2\pi}{3} = \frac{\sqrt{3}}{2}$

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

11. $\cos(-\frac{5\pi}{6}) = -\frac{\sqrt{3}}{2}$
 $-\cos \frac{\pi}{6} = -\cos \frac{\pi}{6} = -\frac{\sqrt{3}}{2}$

12. $\tan(-\frac{2\pi}{3}) = -\frac{\sqrt{3}}{2}$
 $\tan \frac{4\pi}{3} = \tan \frac{\pi}{3} = \sqrt{3}$

13. $\sin(-\frac{\pi}{6}) = -\frac{1}{2}$
 $-\sin \frac{\pi}{6} = -\sin \frac{\pi}{6} = -\frac{1}{2}$

14. $\cos \frac{12\pi}{3} = 1$
 $\cos 4\pi = \cos 0 = 1$

15. $\tan \frac{7\pi}{3} = \sqrt{3}$
 $\tan \frac{\pi}{3} = \sqrt{3}$

16. $\sin(-\frac{11\pi}{6}) = \frac{1}{2}$
 $\sin \frac{\pi}{6} = \frac{1}{2}$

17. $\cos(-\frac{15\pi}{4}) = \frac{\sqrt{2}}{2}$
 $\cos -\frac{\pi}{4} = \cos \frac{\pi}{4} = \frac{\sqrt{2}}{2}$

18. $\tan(-\frac{5\pi}{3}) = \sqrt{3}$
 $\tan \frac{\pi}{3} = \sqrt{3}$

19. $\sin(-\frac{\pi}{4}) = -\frac{\sqrt{2}}{2}$
 $-\sin \frac{\pi}{4} = -\frac{\sqrt{2}}{2}$

20. $\cos 0 = 1$

21. $\csc \frac{5\pi}{6} = 2$
 $\csc \frac{\pi}{6} = \frac{1}{\sin \frac{\pi}{6}} = \frac{1}{\frac{1}{2}} = 2$

22. $\sec \frac{7\pi}{3} = 2$
 $\sec \frac{\pi}{3} = \frac{1}{\cos \frac{\pi}{3}} = \frac{1}{\frac{1}{2}} = 2$

23. $\cot \frac{2\pi}{3} = -\frac{\sqrt{3}}{3}$
 $\cot \frac{\pi}{3} = \frac{\cos \frac{\pi}{3}}{\sin \frac{\pi}{3}} = \frac{\frac{1}{2}}{\frac{\sqrt{3}}{2}} = \frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$

24. $\csc \frac{11\pi}{3} = -\frac{2\sqrt{3}}{3}$
 $\csc \frac{5\pi}{3} = \frac{1}{\sin \frac{5\pi}{3}} = \frac{1}{-\frac{\sqrt{3}}{2}} = -\frac{2}{\sqrt{3}} = -\frac{2\sqrt{3}}{3}$

25. $\sec(-\frac{\pi}{6}) = \frac{2\sqrt{3}}{3}$
 $\sec \frac{\pi}{6} = \frac{1}{\cos \frac{\pi}{6}} = \frac{1}{\frac{\sqrt{3}}{2}} = \frac{2}{\sqrt{3}} = \frac{2\sqrt{3}}{3}$

26. $\cot \frac{3\pi}{4} = -1$
 $\cot \frac{\pi}{4} = \frac{\cos \frac{\pi}{4}}{\sin \frac{\pi}{4}} = \frac{\frac{\sqrt{2}}{2}}{\frac{\sqrt{2}}{2}} = 1$

27. $\csc(-\frac{7\pi}{4}) = \sqrt{2}$
 $\csc \frac{\pi}{4} = \frac{1}{\sin \frac{\pi}{4}} = \frac{1}{\frac{\sqrt{2}}{2}} = \frac{2}{\sqrt{2}} = \sqrt{2}$

28. $\sec(-\frac{2\pi}{3}) = -2$
 $\sec \frac{2\pi}{3} = \frac{1}{\cos \frac{2\pi}{3}} = \frac{1}{-\frac{1}{2}} = -2$

29. $\cot \frac{11\pi}{6} = -\sqrt{3}$
 $\cot \frac{5\pi}{6} = \frac{\cos \frac{5\pi}{6}}{\sin \frac{5\pi}{6}} = \frac{-\frac{\sqrt{3}}{2}}{\frac{1}{2}} = -\sqrt{3}$

30. $\csc(-\frac{7\pi}{3}) = -\frac{2\sqrt{3}}{3}$
 $\csc \frac{2\pi}{3} = \frac{1}{\sin \frac{2\pi}{3}} = \frac{1}{\frac{\sqrt{3}}{2}} = \frac{2}{\sqrt{3}} = \frac{2\sqrt{3}}{3}$

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

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

31. $\sec \frac{3\pi}{4} = -\sqrt{2}$
 $-\sec \frac{\pi}{4} = -\sqrt{2}$

32. $\cot(-\frac{11\pi}{4}) = 1$
 $\cot \frac{\pi}{4} = 1$

33. $\csc(-\frac{\pi}{3}) = -\frac{2\sqrt{3}}{3}$
 $-\csc \frac{\pi}{3} = -\frac{2\sqrt{3}}{3}$

34. $\sec(-\frac{21\pi}{3}) = -1$
 $\sec -7\pi = \sec \pi = -1$

35. $\cot(-\frac{10\pi}{5}) = \text{undefined}$
 $\cot -2\pi = \cot 0 = \text{undefined}$

36. $\sin \frac{5\pi}{3} = -\frac{\sqrt{3}}{2}$
 $-\sin \frac{\pi}{3} = -\frac{\sqrt{3}}{2}$

37. $\sec \frac{\pi}{2} = \text{undefined}$

38. $\cot \pi = \text{undefined}$

39. $\csc \frac{11\pi}{2} = -1$
 $\csc \frac{3\pi}{2} = -1$

40. $\csc(-\frac{\pi}{6}) = -2$
 $-\csc \frac{\pi}{6} = -2$

41. $\tan(-\frac{3\pi}{2}) = \text{undefined}$
 $\tan \frac{\pi}{2} = \text{undefined}$

42. $\cos \frac{7\pi}{6} = -\frac{\sqrt{3}}{2}$
 $-\cos \frac{\pi}{6} = -\frac{\sqrt{3}}{2}$

43. $\cot(-\frac{5\pi}{4}) = -1$
 $\cot \frac{3\pi}{4} = -1$

44. $\sin \frac{11\pi}{4} = \frac{\sqrt{2}}{2}$
 $\sin \frac{3\pi}{4} = \frac{\sqrt{2}}{2}$

45. $\sec 2\pi = 1$
 $\cos 2\pi = 1$