

Agenda

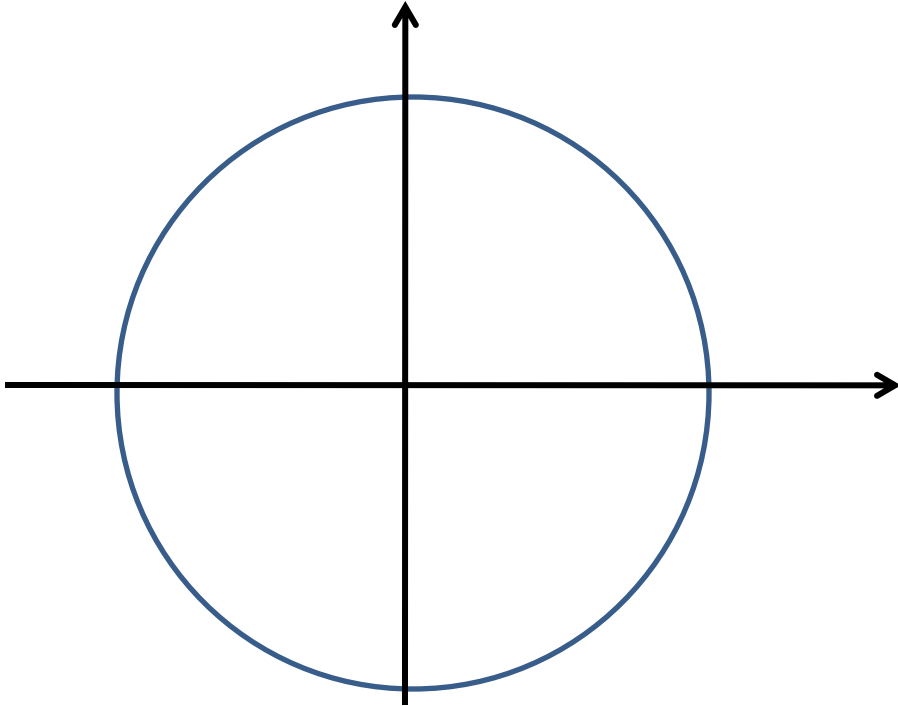
- Return tests
- Extra credit
- Review special angles
- Addition and Subtraction Identities for sine, cosine and tangent

EXTRA CREDIT

- You can earn up to **15 bonus tests points**
- **Sign up and attend a tutoring session “Solving Trigonometric Equations” before or after school .**
- **Take a mini test over solving trigonometric equations(only after attending the tutoring session).**

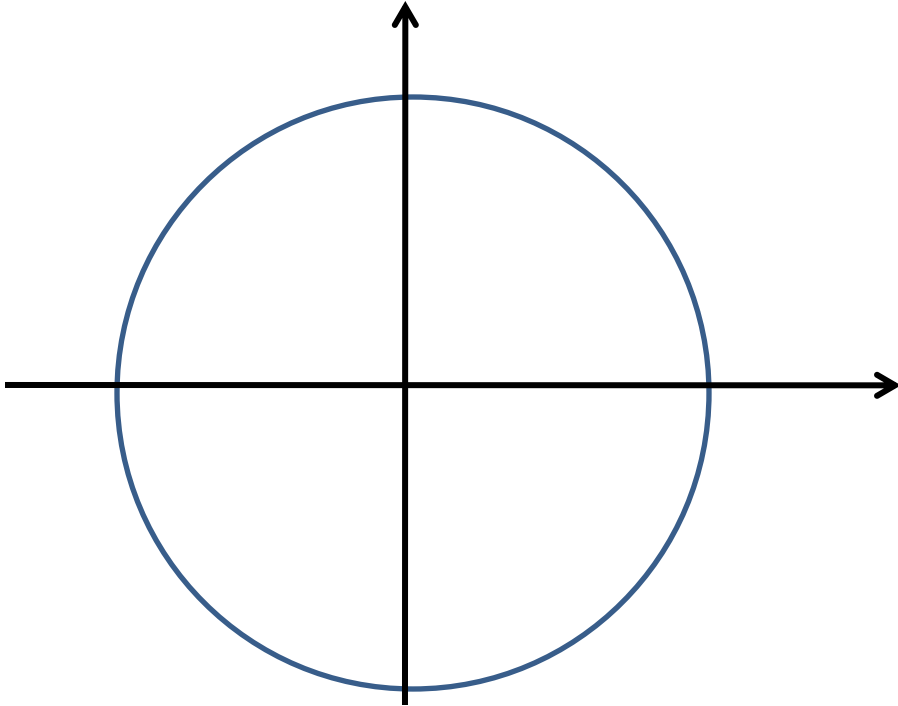
Special Angles

- Reference angle **30° or $\pi/6$**



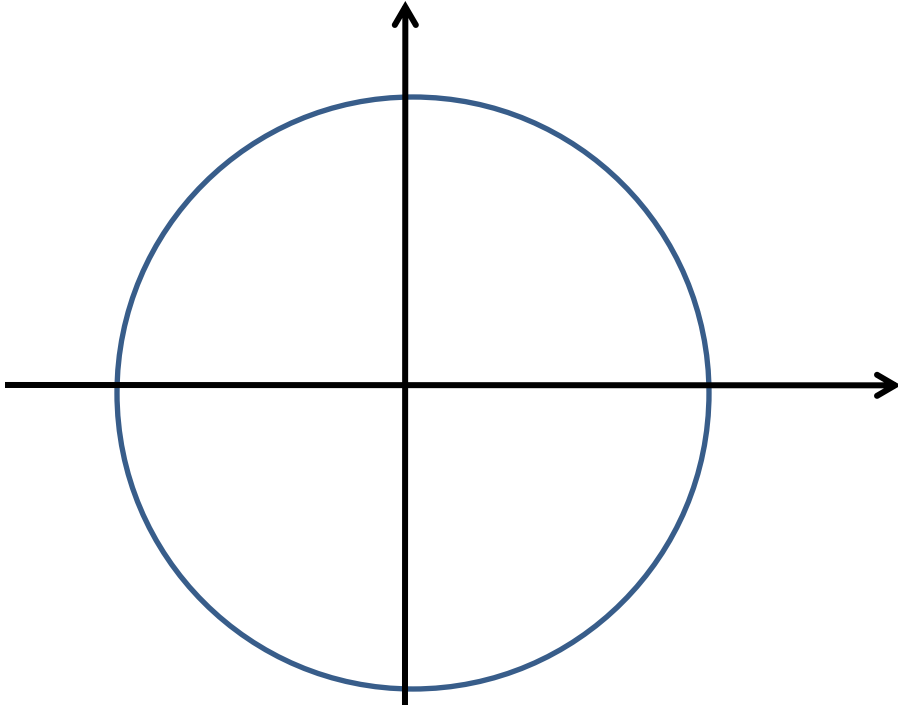
Special Angles

- Reference angle 45° or $\pi/4$



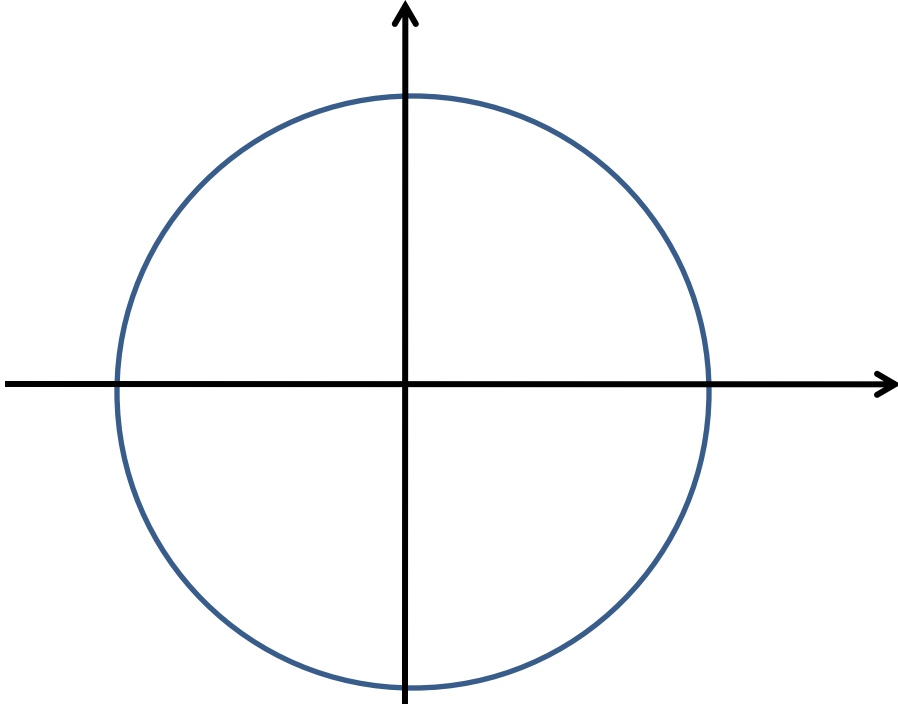
Special Angles

- Reference angle **60° or $\pi/3$**



Special Angles

- 90° or $\pi/2$



Addition and Subtraction Identities

- In sine signs are the same, different things go together.

$$\sin(x + y) = \sin x \cos y + \cos x \sin y$$

$$\sin(x - y) = \sin x \cos y - \cos x \sin y$$

Example: Find the exact value:

$$\begin{aligned} \sin 75^\circ &= \sin(45^\circ + 30^\circ) = \sin 45^\circ \cos 30^\circ + \cos 45^\circ \sin 30^\circ \\ &= \frac{\sqrt{2}}{2} \cdot \frac{\sqrt{3}}{2} + \frac{\sqrt{2}}{2} \cdot \frac{1}{2} = \frac{\sqrt{6}}{4} + \frac{\sqrt{2}}{4} = \frac{\sqrt{6} + \sqrt{2}}{4} \end{aligned}$$

Some for you to try:

$\sin(105^\circ)$
|
 $\sin(135^\circ)$

$$\sin(x + y) = \sin x \cos y + \cos x \sin y$$

$$\sin(x - y) = \sin x \cos y - \cos x \sin y$$

- Solutions:

$$\sin(105^\circ) = \sin(45 + 60) = \sin 45^\circ \cos 60^\circ + \cos 45^\circ \sin 60^\circ$$

$$= \frac{\sqrt{2}}{2} \cdot \frac{1}{2} + \frac{\sqrt{2}}{2} \cdot \frac{\sqrt{3}}{2} = \frac{\sqrt{2}}{4} + \frac{\sqrt{6}}{4} = \frac{\sqrt{2} + \sqrt{6}}{4}$$

$$\sin(135^\circ) = \sin(45 + 90) = \sin 45 \cos 90 + \cos 45 \sin 90$$

$$= \frac{\sqrt{2}}{2} \cdot 0 + \frac{\sqrt{2}}{2} \cdot 1 = \frac{\sqrt{2}}{2}$$

Addition and Subtraction Identities

$$\cos(x + y) = \cos x \cos y - \sin x \sin y$$

$$\cos(x - y) = \cos x \cos y + \sin x \sin y$$

Example:

Find the exact value :

$$\cos 15^\circ = \cos (45^\circ - 30^\circ) = \cos 45^\circ \cos 30^\circ + \sin 45^\circ \sin 30^\circ$$

$$\begin{aligned} &= \frac{\sqrt{2}}{2} \cdot \frac{\sqrt{3}}{2} + \frac{\sqrt{2}}{2} \cdot \frac{1}{2} \\ &= \frac{\sqrt{6}}{4} + \frac{\sqrt{2}}{4} = \frac{\sqrt{6} + \sqrt{2}}{4} \end{aligned}$$

Addition and Subtraction Identities

$$\cos(x + y) = \cos x \cos y - \sin x \sin y$$

$$\cos(x - y) = \cos x \cos y + \sin x \sin y$$

One for you to try

$$\cos 105^\circ$$

Addition and Subtraction Identities

$$\tan(x + y) = \frac{\tan x + \tan y}{1 - \tan x \tan y}$$

$$\tan(x - y) = \frac{\tan x - \tan y}{1 + \tan x \tan y}$$

Example: $\tan(75^\circ) = \tan(45^\circ + 30^\circ) = \frac{\tan 45^\circ - \tan 30^\circ}{1 + \tan 45^\circ \tan 30^\circ}$

$$= \frac{1 - \frac{\sqrt{3}}{3}}{1 + 1 \cdot \frac{\sqrt{3}}{3}} = \frac{\frac{3}{3} - \frac{\sqrt{3}}{3}}{\frac{3}{3} + \frac{\sqrt{3}}{3}} = \frac{\frac{3 - \sqrt{3}}{3}}{\frac{3 + \sqrt{3}}{3}} = \frac{3 - \sqrt{3}}{3 + \sqrt{3}} = \frac{(3 - \sqrt{3}) \cdot (3 - \sqrt{3})}{(3 + \sqrt{3}) \cdot (3 - \sqrt{3})}$$
$$= \frac{9 - 2\sqrt{3} + 3}{9 - 3} = \frac{12 - 2\sqrt{3}}{6} = \frac{2(6 - \sqrt{3})}{6} = \frac{6 - \sqrt{3}}{3}$$

Daily Practice

A. Given $\sin a = -.9980$; $\cos a = .1543$ and $\sin b = -.2624$, $\cos b = .9650$

find $\sin(a + b) =$

$$\cos(a - b) =$$

$$\tan(a + b) =$$

Daily Practice

B. Find the exact value:

1. $\sin 15^\circ$

4. $\cos 75^\circ$

2. $\sin 285^\circ$

5. $\tan 105^\circ$

3. $\cos 135^\circ$

6. $\tan 195^\circ$

Daily Practice

C. Simplify the given expression:

7. $\sin 20^\circ \cos 25^\circ + \cos 20^\circ \sin 25^\circ =$

8. $\cos 70^\circ \cos 10^\circ + \sin 70^\circ \sin 10^\circ =$

9. $\sin 20^\circ \cos 70^\circ - \cos 20^\circ \sin 70^\circ =$

10. $\frac{\tan 20^\circ + \tan 10^\circ}{1 - \tan 20^\circ \tan 10^\circ} =$