

## 4.4 Sum and Difference Properties (2)

Name: \_\_\_\_\_

Angles A and B are in standard position. Let  $\sin A = \frac{2}{3}$ ,  $\cos A > 0$  and  $\tan B = \frac{4}{3}$ ,  $\cos B < 0$ .

QI

QIII

Draw angles A and B in the appropriate quadrants and find the following:

1.  $\cos(A - B)$

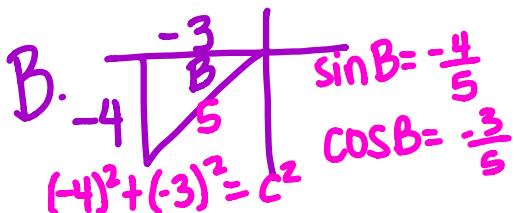
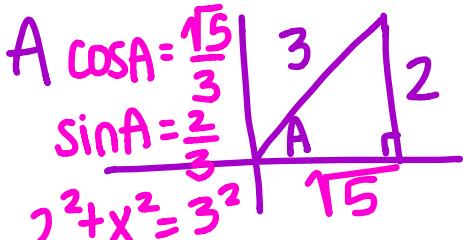
$$\begin{aligned} \cos A \cos B + \sin A \sin B \\ \left(\frac{2}{3}\right)\left(-\frac{3}{5}\right) + \left(\frac{2}{3}\right)\left(-\frac{4}{5}\right) \\ -\frac{6}{15} + -\frac{8}{15} = \boxed{-\frac{14}{15}} \end{aligned}$$

2.  $\sin(A - B)$

$$\frac{-6+4\sqrt{5}}{15}$$

3.  $\tan(A - B)$

$$\frac{6-4\sqrt{5}}{3\sqrt{5}+8}$$



Angles A and B are in standard position. Let  $\sin A = \frac{1}{3}$ ,  $\cos A < 0$  and  $\tan B = -\frac{2}{3}$ ,  $\cos B > 0$ .

QII

QIV

Draw angles A and B in the appropriate quadrants and find the following:

4.  $\sin(A + B)$

$$\frac{3+4\sqrt{2}}{3\sqrt{3}}$$

5.  $\cos(A + B)$

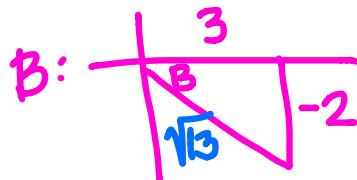
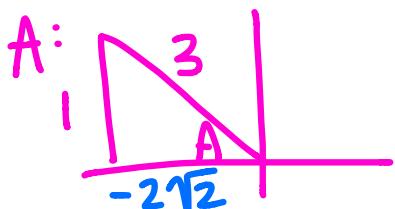
$$\frac{-6\sqrt{2}+2}{3\sqrt{3}}$$

6.  $\tan(A + B)$   $\tan = \frac{\sin}{\cos}$

$$\frac{\sin(A+B)}{\cos(A+B)}$$

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

$$\boxed{\frac{3+4\sqrt{2}}{-6\sqrt{2}+2}}$$



$$\begin{aligned} 1^2 + x^2 &= 3^2 \\ x^2 &= 8 \end{aligned}$$

$$\begin{aligned} (-2)^2 + 3^2 &= c^2 \\ 4+9 &= c^2 \end{aligned}$$

Find the exact value. Don't make it harder than it needs to be!

7.  $\cos 15^\circ$

$$\begin{aligned} &\cos(45^\circ - 30^\circ) \\ &\cos 45 \cos 30 + \sin 45 \sin 30 \\ &\frac{1}{\sqrt{2}} \cdot \frac{\sqrt{3}}{2} + \frac{1}{\sqrt{2}} \cdot \frac{1}{2} \\ &\boxed{\frac{1+\sqrt{3}}{2\sqrt{2}}} \end{aligned}$$

8.  $\tan 15^\circ$

$$\begin{aligned} &\tan(45^\circ - 30^\circ) \\ &\frac{\sqrt{3}-1}{\sqrt{3}+1} \end{aligned}$$

9.  $\cot 15^\circ$

$$\begin{aligned} &\frac{1}{\tan 15^\circ} \\ &\frac{\sqrt{3}+1}{\sqrt{3}-1} \end{aligned}$$

10.  $\sec 15^\circ$

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

11.  $\sin 75^\circ$

$$\begin{aligned} &\sin(30^\circ + 45^\circ) \\ &\text{OR} \\ &\text{cofunction} \\ &\sin 75^\circ = \cos(90^\circ - 75^\circ) \\ &= \cos 15^\circ \end{aligned}$$

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

12.  $\cot 75^\circ$

$$\frac{\sqrt{3}-1}{\sqrt{3}+1}$$

13.  $\tan 75^\circ$

$$\frac{\sqrt{3}+1}{\sqrt{3}-1}$$

14.  $\csc 75^\circ$

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

15.  $\sec 75^\circ$

$$\begin{aligned} \tan x &= \frac{\sec x}{\csc x} \\ \sec x &= \tan x \csc x \\ \sec 75^\circ &= \tan 75^\circ \csc 75^\circ \\ \frac{\sqrt{3}+1}{\sqrt{3}-1} &\cdot \frac{2\sqrt{2}}{\sqrt{3}+1} \\ \boxed{\frac{2\sqrt{2}}{\sqrt{3}-1}} \end{aligned}$$