Sum and Difference Properties (2) Name: Key

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

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

1. $\cos(A-B)$ $\frac{-8-3\sqrt{5}}{15}$

2. $\sin(A-B)$ $\frac{-6+4\sqrt{5}}{15}$

3. $\tan(A-B)$ $\frac{6-4\sqrt{5}}{3\sqrt{5}+8}$

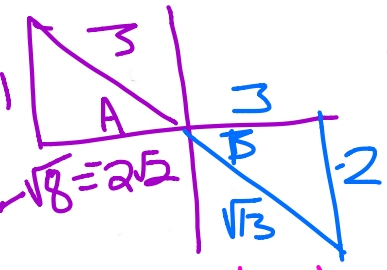
Angles A and B are in standard position. Let $\sin A = \frac{1}{3}$, $\cos A < 0$ *and* $\tan B = -\frac{2}{3}$, $\cos B > 0$.

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

4. $\sin(A+B)$ $\frac{3+4\sqrt{2}}{3\sqrt{13}}$

5. $\cos(A+B)$ $\frac{-6\sqrt{2}+2}{3\sqrt{13}}$

6. $\tan(A+B)$ $\frac{3+4\sqrt{2}}{2-6\sqrt{2}}$



#4 $\sin A\cos B + \cos A\sin B$

$\frac{1}{3}\left(\frac{3}{\sqrt{13}}\right) + \frac{-2\sqrt{2}}{3}\left(\frac{-2}{\sqrt{13}}\right)$

$\frac{3}{3\sqrt{13}} + \frac{4\sqrt{2}}{3\sqrt{13}} = \boxed{\frac{3+4\sqrt{2}}{3\sqrt{13}}}$

#5 $\cos A\cos B - \sin A\sin B$

$-\frac{2\sqrt{2}}{3}\left(\frac{3}{\sqrt{13}}\right) - \frac{1}{3}\left(\frac{-2}{\sqrt{13}}\right)$

$\frac{-6\sqrt{2}}{3\sqrt{13}} + \frac{2}{3\sqrt{13}}$

$\boxed{\frac{-6\sqrt{2}+2}{3\sqrt{13}}}$

#6 $\frac{\sin(A+B)}{\cos(A+B)}$

$\frac{3+4\sqrt{2}}{3\sqrt{13}} \cdot \frac{3\sqrt{13}}{-6\sqrt{2}+2} = \boxed{\frac{3+4\sqrt{2}}{-6\sqrt{2}+2}}$

7. $\cos 15^\circ = \cos(\overset{A}{45^\circ} - \overset{B}{30^\circ})$

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

$\cos 45 \cos 30 + \sin 45 \sin 30$

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

8. $\tan 15^\circ$

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

9. $\cot 15^\circ$

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

10. $\sec 15^\circ$

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

11. $\sin 75^\circ$

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

12. $\cot 75^\circ$

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

13. $\tan 75^\circ$

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

14. $\csc 75^\circ$

$\frac{4}{\sqrt{6}+\sqrt{2}}$

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

15. $\sec 75^\circ$

$\frac{4}{\sqrt{6}-\sqrt{2}}$ or $\frac{2\sqrt{2}}{\sqrt{3}-1}$

Prove: