$\frac{\pi}{2}=\frac{6\pi}{12}$ $\frac{\pi}{3}=\frac{4\pi}{12}$ $\frac{\pi}{6}=\frac{2\pi}{12}$ $\frac{\pi}{4}=\frac{3\pi}{12}$

$\sin\frac{11\pi}{12}=$ $\frac{8\pi}{12}+\frac{3\pi}{12}=\frac{11\pi}{12}$

5. $\sin\left(\frac{2\pi}{3}+\frac{\pi}{4}\right)=\sin\frac{2\pi}{3}\cos\frac{\pi}{4}+\cos\frac{2\pi}{3}\sin\frac{\pi}{4}$

$\tan\frac{7\pi}{12}=$

6. $\tan\left(\text{——}+\text{——}\right)=$ _____

$\cos\frac{17\pi}{12}=$ $\frac{20\pi}{12}-\frac{3\pi}{12}$

7. $\cos\left(\frac{5\pi}{3}-\frac{\pi}{4}\right)=\cos\frac{5\pi}{3}\cos\frac{\pi}{4}+\sin\frac{5\pi}{3}\sin\frac{\pi}{4}$

$\tan-\frac{\pi}{12}=$

8. $\tan\left(\text{——}-\text{——}\right)=$ _____

Determine whether the identity represents a SUM or DIFFERENCE and of which trig function. Then give the expression as a sum or difference of two angles and as a single angle.

9. $\cos$ 40° $=$

$\cos(25+15)=\cos 25^\circ\cos 15^\circ-\sin 25^\circ\sin 15^\circ$

10. $\sin$_____ $=$

$\sin(\_\_\_+\_\_\_)=\sin 140^\circ\cos 50^\circ+\cos 140^\circ\sin 50^\circ$

11. $\sin 200^\circ=$

$\sin(230^\circ-30^\circ)=\sin 230^\circ\cos 30^\circ-\cos 230^\circ\sin 30^\circ$

12. _____ $=$

_____$(___+___)=\dfrac{\tan 325^\circ-\tan 86^\circ}{1+\tan 325^\circ\tan 86^\circ}$

13. $\cos\frac{8\pi}{15}=$ $\frac{\pi}{3}+\frac{\pi}{5}$ $\frac{5\pi}{15}+\frac{3\pi}{15}$

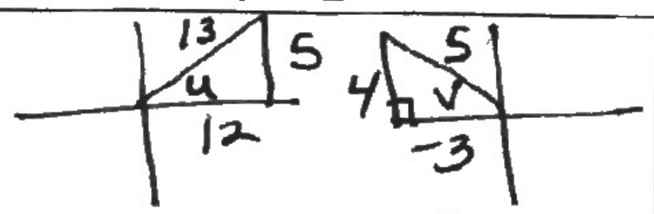
$\cos\left(\frac{\pi}{3}+\frac{\pi}{5}\right)=\cos\frac{\pi}{3}\cos\frac{\pi}{5}-\sin\frac{\pi}{3}\sin\frac{\pi}{5}$

14. _____ $=$

_____$(___+___)=\cos 3x\cos 2y+\sin 3x\sin 2y$

Find the exact value. Hint: Sketch a triangle for u and v, then use the sum/diff trig identities. SOLVE $\sin u=\frac{5}{13}, 0<u<\frac{\pi}{2}$ and $\cos v=\frac{-3}{5}, \frac{\pi}{2}<u<\pi$

15. $\sin(u+v)$



$\sin(u+v)=\sin u\cos v+\cos u\sin v$

$=\left(\frac{5}{13}\right)\left(\frac{-3}{5}\right)+\left(\frac{12}{13}\right)\left(\frac{4}{5}\right)$

$=\frac{-15}{65}+\frac{48}{65}$

$=\frac{33}{65}$

16. $\cos(u+v)$

$-\frac{56}{65}$

17. $\tan(u+v)$

$$\tan(u+v)=\frac{\tan u+\tan v}{1-\tan u\cdot\tan v}$$

$$=\frac{\frac{5}{12}+\frac{-4}{3}}{1-\left(\frac{5}{12}\right)\left(\frac{-4}{3}\right)}$$

$$=\frac{\frac{-11}{12}}{1+\frac{5}{9}}=\frac{-11}{12}\cdot\frac{3}{14}=\boxed{\frac{-33}{56}}$$

18. $\cos(u-v)$

$$-\frac{5}{13}$$

Solve EACH equation for **ALL** values of x in radians.

19. $4\sin^2 x-3=0$

$$\sin^2 x=\frac{3}{4}$$

$$\sin x=\pm\frac{\sqrt{3}}{2}$$

$$x=\frac{\pi}{3}+2\pi N,\ \frac{2\pi}{3}+2\pi N,\ \frac{4\pi}{3}+2\pi N,\ \frac{5\pi}{3}+2\pi N$$

OR

$$x=\frac{\pi}{3}+\pi N,\ \frac{2\pi}{3}+\pi N$$

20. $\cos\frac{x}{2}=\frac{\sqrt{2}}{2}$

$$x=\pi+4\pi N \text{ OR } -\pi+4\pi N$$

21. $\sin 2x=\frac{-\sqrt{3}}{2}$

$$2x=\frac{4\pi}{3}+2\pi N \quad \text{OR} \quad 2x=\frac{5\pi}{3}+2\pi N$$

mult by $\frac{1}{2}$

$$x=\frac{2\pi}{3}+\pi N \quad \text{OR} \quad x=\frac{5\pi}{6}+\pi N$$

22. $\tan 3x=1$

$$x=\frac{\pi}{12}+\frac{\pi}{3}N$$

Pre-Calculus #3C Double Angles Identities

Name_____

Write each using Double-Angle Identities: DO NOT SOLVE!!!

1. $\sin 100°=$

$\sin(2\cdot(50))=2\sin 50°\cos 50°$

2. $\cos 120°=$

$\cos(2\cdot(\quad))=$_____

pick 1 of the 3.

3. $\cos\frac{2\pi}{3}=$

$\cos\left(2\cdot\left(\frac{\pi}{3}\right)\right)=\cos^2\left(\frac{\pi}{3}\right)-\sin^2\left(\frac{\pi}{3}\right)$

4. $\tan\frac{3\pi}{2}=$

$\tan\left(2\cdot\left(\quad\right)\right)=$_____