Key

Math 4 Name ____________________

4-7 Practice Date________

I can, without a calculator, use trigonometric identities such as angle addition/subtraction and double angle formulas, to express values of trigonometric functions in terms of rational numbers and radicals.

Simplify. ***Exact values only.***

1. $\dfrac{\tan(20^\circ)+\tan(10^\circ)}{1-\tan(20^\circ)\tan(10^\circ)}$

$= \tan(20+10) = \tan(30) = \boxed{\dfrac{1}{\sqrt{3}}}$

2. $\sin(160^\circ)\cos(50^\circ)+\cos(160^\circ)\sin(50^\circ) =$

$= \sin(160+50) = \sin(210) = \boxed{-\dfrac{1}{2}}$

3. $\sin(80^\circ)\cos(20^\circ)-\cos(80^\circ)\sin(20^\circ) =$

$= \sin(80-20) = \sin 60^\circ = \boxed{\dfrac{\sqrt{3}}{2}}$

4. $\tan(195^\circ)$

$= \tan(150^\circ + 45^\circ)$

$= \dfrac{\tan(150)+\tan(45)}{1-\tan(150)\tan(45)} = \dfrac{-\frac{1}{\sqrt{3}}+1}{1-\frac{-1}{\sqrt{3}}\cdot 1}$

$= \boxed{\dfrac{-\frac{1}{\sqrt{3}}+1}{1+\frac{1}{\sqrt{3}}}}$

5. $\sin(105^\circ)$

$= \sin(60+45)$

$= \sin(60)\cdot\cos(45)+\cos(60)\cdot\sin 45$

$= \dfrac{\sqrt{3}}{2}\cdot\dfrac{\sqrt{2}}{2}+\dfrac{1}{2}\cdot\dfrac{\sqrt{2}}{2}$

$= \dfrac{\sqrt{6}}{4}+\dfrac{\sqrt{2}}{4} = \boxed{\dfrac{\sqrt{6}+\sqrt{2}}{4}}$

6. $\sin\left(\dfrac{17\pi}{12}\right) =$

$= \sin\left(\dfrac{9\pi}{12}+\dfrac{8\pi}{12}\right)$

$= \sin\left(\dfrac{3\pi}{4}+\dfrac{2\pi}{3}\right)$

$= \sin\dfrac{3\pi}{4}\cdot\cos\dfrac{2\pi}{3}+\cos\dfrac{3\pi}{4}\cdot\sin\dfrac{2\pi}{3}$

$= \dfrac{\sqrt{2}}{2}\cdot -\dfrac{1}{2} + -\dfrac{\sqrt{2}}{2}\cdot\dfrac{\sqrt{3}}{2}$

$= \dfrac{-\sqrt{2}}{4} - \dfrac{\sqrt{2\cdot 3}}{4}$

$= \boxed{\dfrac{-\sqrt{2}-\sqrt{6}}{4}}$

7. $\sin(\alpha+\beta)-\sin(\alpha-\beta) =$

$= \cancel{\sin\alpha\cdot\cos\beta} + \cos\alpha\cdot\sin\beta - (\cancel{\sin\alpha\cdot\cos\beta} - \cos\alpha\cdot\sin\beta)$

$= \boxed{2\cos\alpha\sin\beta}$

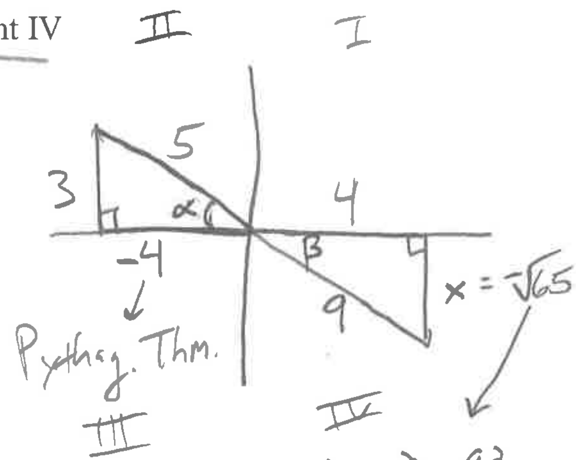
8. Given: $\sin\alpha = \frac{3}{5}, \cos\beta = \frac{4}{9}$, α in quadrant II, β in quadrant IV

Find the following:

a. $\sin(\alpha+\beta)$

b. $\cos(\alpha+\beta)$

c. $\tan(\alpha+\beta)$



$4^2 + x^2 = 9^2$

$x^2 = 65$

$x = \sqrt{65}$

$\sin\alpha = \frac{3}{5}, \cos\alpha = \frac{-4}{5}$

$\sin\beta = \frac{-\sqrt{65}}{9}, \cos\beta = \frac{4}{9}$

a) $\sin(\alpha+\beta)$

$= \frac{3}{5}\cdot\frac{4}{9} + \frac{-4}{5}\cdot\frac{-\sqrt{65}}{9}$

$= \frac{12}{45} + \frac{4\sqrt{65}}{45}$

$= \boxed{\frac{12+4\sqrt{65}}{45}}$

b) $\cos(\alpha+\beta)$

$= \frac{-4}{5}\cdot\frac{4}{9} - \frac{3}{5}\cdot\frac{-\sqrt{65}}{9}$

$= \frac{-16}{45} + \frac{3\sqrt{65}}{45}$

$= \boxed{\frac{-16+3\sqrt{65}}{45}}$

c) $\tan(\alpha+\beta) = \frac{\sin(\alpha+\beta)}{\cos(\alpha+\beta)}$

$= \frac{\frac{12+4\sqrt{65}}{\cancel{45}}}{\frac{-16+3\sqrt{65}}{\cancel{45}}}$

$= \boxed{\frac{12+4\sqrt{65}}{-16+3\sqrt{65}}}$

9. $\sin\left(\frac{\pi}{2}+x\right) = \cos x$

$= \sin\frac{\pi}{2}\cdot\cos x + \cos\frac{\pi}{2}\cdot\sin x$

$= (1)\cdot\cos x + \cancel{(0)\cdot\sin x}$

$= \boxed{\cos x}$

10. $\sin(\pi - x) = \sin x$

$= \sin(\pi)\cdot\cos x - \cos\pi\cdot\sin x$

$= \cancel{(0)\cdot\cos x} - (-1)\cdot\sin x$

$= \boxed{\sin x}$