Name: Answer Key Per: _____ Date: _____

Serafino ▪ Precalculus

2.1 Evaluating & Simplifying Trig Expressions

Classwork / Homework

Be calm and patient with these !!

Directions: Fully simplify and rationalize all denominators. If your final answer contains several unlike terms that are fractions, give both answers (as separate fractions and one expression with a common denominator).

1) $4 \sin 30°$

$4\left(\frac{1}{2}\right) = \boxed{2}$

2) $(\tan 240°)(\csc 225°)$

$(\sqrt{3})(-\sqrt{2}) = \boxed{-\sqrt{6}}$

3) $\sin^2 60° + \cos^2 60° + \tan 225°$

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

$\frac{3}{4} + \frac{1}{4} + 1\left(\frac{4}{4}\right) = \boxed{2}$

4) $\cos 45° + 2 \csc 315°$

$\frac{\sqrt{2}}{2} + 2(-\sqrt{2})$

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

$\frac{\sqrt{2}}{2} - \frac{4\sqrt{2}}{2}$

$= \boxed{\frac{-3\sqrt{2}}{2}}$

5) $\dfrac{(\cot 150)(\sec 45)}{\csc 45}$

$\dfrac{(-\sqrt{3})(\sqrt{2})}{(\sqrt{2})} = \boxed{-\sqrt{3}}$

6) $\sin 45° + \tan 30°$

$\left(\frac{3}{3}\right)\frac{\sqrt{2}}{2} + \frac{\sqrt{3}}{3}\left(\frac{2}{2}\right) = \boxed{\frac{\sqrt{2}}{2} + \frac{\sqrt{3}}{3} \text{ or } \frac{3\sqrt{2} + 2\sqrt{3}}{6}}$

7) $\sec 330° - \tan 120°$

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

$\frac{2\sqrt{3}}{3} + \sqrt{3}\left(\frac{3}{3}\right) = \boxed{\frac{5\sqrt{3}}{3}}$

8) $\left(\sec 45° - \cot 210°\right)^2$

$(\sqrt{2} - \sqrt{3})^2$

$(\sqrt{2} - \sqrt{3})(\sqrt{2} - \sqrt{3})$

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

$\boxed{5 - 2\sqrt{6}}$

9) $\csc 45° (\sec 30° + \cot 150°)$

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

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

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

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

$= \boxed{\frac{-\sqrt{6}}{3}}$

10) $2 \sin 270° (\tan 45° - \sin 30°)$

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

$(-2)(1/2) = \boxed{-1}$

11) $\sin^2 45° - 2\sin 135° \cos 315° + \cos^2 45°$

$\left(\frac{\sqrt{2}}{2}\right)^2 - 2\left(\frac{\sqrt{2}}{2}\right)\left(\frac{\sqrt{2}}{2}\right) + \left(\frac{\sqrt{2}}{2}\right)^2$

$\frac{2}{4} - \frac{4}{4} + \frac{2}{4} = \boxed{0}$

12) $(\cos 45°)(\tan 330°)(2 \sin 90°)(\sec 330°)$

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

$-2\frac{\sqrt{18}}{9} = -\frac{6\sqrt{2}}{9} = \boxed{\frac{-2\sqrt{2}}{3}}$

13) $\sin 30 (\csc 30° + \tan 300°)^2$

$\frac{1}{2}(2-\sqrt{3})^2 \quad \frac{1}{2}(7-4\sqrt{3})$

$\frac{1}{2}(2-\sqrt{3})(2-\sqrt{3}) \quad = \frac{7-4\sqrt{3}}{2}$

$\frac{1}{2}(4-4\sqrt{3}+3) \quad$ or $\frac{7}{2}-2\sqrt{3}$

14) $5(\cot 210° - \sec 225°)^2$

$5(\sqrt{3}+\sqrt{2})^2$

$5(3+2\sqrt{6}+2)$ $\quad 25+10\sqrt{6}$

$5(5+2\sqrt{6})$

15) $-\frac{\sec 240}{\tan 60}$

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

16) $\frac{\cos 30}{\tan 30}$

$\frac{\left(\frac{\sqrt{3}}{2}\right)}{\left(\frac{\sqrt{3}}{3}\right)} = \frac{\sqrt{3}}{2}\cdot\frac{3}{\sqrt{3}} = \frac{3}{2}$

17) $2(4\sin 60°)^2 + \tan 225°$

$2\left(4\cdot\frac{\sqrt{3}}{2}\right)^2 + 1 \quad = 25$

$2(2\sqrt{3})^2$

$2(4\cdot 3)+1$

24

18) $(2\cos 225°)^3$

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

$(-\sqrt{2})^3 \quad = -2\sqrt{2}$

19) $\left(\frac{3\csc 30}{2}\right)^2$

$\frac{3^2(2)^2}{(2^2)} = 9$

20) $\left(\frac{\csc 45}{\tan 240}\right)^{-1}$

$= \left(\frac{\sqrt{2}}{\sqrt{3}}\right)^{-1} = \frac{(\sqrt{2})^{-1}}{(\sqrt{3})^{-1}} = \frac{\sqrt{3}}{\sqrt{2}}\left(\frac{\sqrt{2}}{\sqrt{2}}\right) = \frac{\sqrt{6}}{2}$

21) $(\cos 90°)(\cos 225°)(\tan 315°)(\sin 270°)(\sec 330°)$

$(0)\left(-\frac{\sqrt{2}}{2}\right)(-1)(-1)\left(\frac{2\sqrt{3}}{3}\right)$

Yay!! $\quad = 0$

Answers (...maybe? I rushed. I'll check and let you know if they're wrong).

1) 2 2) $-\sqrt{6}$ 3) 2 4) $-\frac{3\sqrt{2}}{2}$ 5) $-\sqrt{3}$ 6) $\frac{\sqrt{2}}{2}+\frac{\sqrt{3}}{3}$ or $\frac{3\sqrt{2}+2\sqrt{3}}{6}$ 7) $\frac{5\sqrt{3}}{3}$ 8) $5-2\sqrt{6}$

9) $\frac{-\sqrt{6}}{3}$ 10) -1 11) 0 12) $-\frac{2\sqrt{2}}{3}$ 13) $\frac{7}{2}-2\sqrt{3}$ or $\frac{7-4\sqrt{3}}{2}$ 14) $25+10\sqrt{6}$ 15) $\frac{-2\sqrt{3}}{3}$

16) $\frac{3}{2}$ 17) 25 18) $-2\sqrt{2}$ 19) 9 20) $\frac{\sqrt{6}}{2}$ 21) 0