PreCalculus Name _____

Double and Half Angle Identities
Review WS

Use a double angle identity to find the exact value of each expression.

1. $\tan 450°$
2. $\cos\frac{8\pi}{3}$
3. $\csc 600°$

Use a half angle identity to find the exact value of each expression.

4. $\sin 165°$
5. $\cos\frac{7\pi}{8}$
6. $\sec\frac{5\pi}{12}$

Use a double or half angle identity to find the exact value of each expression.

7. Given $\sin\theta = -\frac{7}{25}$ and $270° < \theta < 360°$, find $\cos\frac{\theta}{2}$.

8. Given $\cos\theta = \frac{1}{3}$ and $0° < \theta < 90°$, find $\sin 2\theta$.

9. Given $\cos\theta = \frac{4}{5}$ and $270° < \theta < 360°$, find $\sin 2\theta$.

10. Given $\cos\theta = \frac{2\sqrt{5}}{5}$ and $0° < \theta < 90°$, find $\sin\frac{\theta}{2}$.

11. Given $\cos\theta = -\frac{4}{5}$ and $90° < \theta < 180°$, find $\sin\frac{\theta}{2}$.

12. Given $\cos\theta = -\frac{15}{17}$ and $180° < \theta < 270°$, find $\tan\frac{\theta}{2}$.

13. Given $\tan x = -\frac{7}{24}$ and $\frac{3\pi}{2} < x < 2\pi$, find $\cot\frac{x}{2}$.

14. Given $\cot x = \frac{4}{3}$ and $\pi < x < \frac{3\pi}{2}$, find $\sin 2x$.

15. Given $\cot x = \frac{4}{3}$ and $\pi < x < \frac{3\pi}{2}$, find $\cot 2x$.

16. Given $\tan x = 2$ and $0 < x < \frac{\pi}{2}$, find $\sin\frac{x}{2}$.

17. Given $\sin x = -\frac{3}{5}$ and $\frac{3\pi}{2} < x < 2\pi$, find $\tan\frac{x}{2}$.

18. Given $\cot x = -\frac{3\sqrt{91}}{91}$ and $\frac{3\pi}{2} < x < 2\pi$, find $\sin\frac{x}{2}$.

Solve over the interval $[0, 2\pi)$.

19. $\cos 2x + \sin x = -2$

20. $\cos 2x - \sin 2x = -2\sin x \cos x$

21. $\cos^2 x - \frac{3}{2}\cos 2x = 0$

22. $2\sin\frac{x}{2} = \sin x$

23. $\sin^2\frac{x}{2} = \cos^2\frac{x}{2}$

24. $\cos 2x - 11\cos x = 5$

Write as a single trig function of a single angle.

25. $\cos^2\frac{3\pi}{7} - \sin^2\frac{3\pi}{7}$

26. $\frac{2\tan 31^0}{1-\tan^2 31^0}$

27. $\sqrt{\frac{1-\cos\frac{\pi}{9}}{2}}$

28. $\frac{1-\cos 80^0}{\sin 80^0}$

Verify each identity.

29. $\sin 2x = \tan x(1+\cos 2x)$

30. $\cos 2x = \frac{1-\tan^2 x}{1+\tan^2 x}$

Answers:

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

7) $-\frac{7\sqrt{2}}{10}$ 8) $\frac{4\sqrt{2}}{9}$ 9) $-\frac{24}{25}$ 10) $\frac{\sqrt{50-20\sqrt{5}}}{10}$ 11) $\frac{3\sqrt{10}}{10}$ 12) -4 13) -7 14) $\frac{24}{25}$ 15) $\frac{7}{24}$

16) $\frac{\sqrt{50-10\sqrt{5}}}{10}$ 17) $-\frac{1}{3}$ 18) $\frac{\sqrt{35}}{10}$ 19) $\frac{3\pi}{2}$ 20) $\frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$ 21) $\frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6}$

22) 0 23) $\frac{\pi}{2}, \frac{3\pi}{2}$ 24) $\frac{2\pi}{3}, \frac{4\pi}{3}$ 25) $\cos\frac{6\pi}{7}$ 26) $\tan 62^0$ 27) $\sin\frac{\pi}{18}$ 28) $\tan 40^0$