

Write each expression in terms of sine or cosine only.

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| 1. $\tan \theta \cos \theta$ | 2. $\cot \theta \cos \theta$ | 3. $\frac{\cot \theta}{\cos \theta}$ | 4. $\tan \theta \sin \theta$ |
| 5. $\frac{\sec \theta}{\cos \theta}$ | 6. $\frac{\csc \theta}{\sin \theta}$ | 7. $\frac{\cot \theta}{\sin \theta}$ | 8. $\frac{\tan \theta}{\cos \theta}$ |

PRACTICE EXERCISES

Convert the first expression to the second expression.

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| 1. $(1 - \sin \theta)(1 + \sin \theta); \cos^2 \theta$ | 2. $(\csc \alpha + 1)(\csc \alpha - 1); \cot^2 \alpha$ |
| 3. $(\sec \beta + 1)(\sec \beta - 1); \tan^2 \beta$ | 4. $(1 + \tan \alpha)(1 - \cot \alpha); \tan \alpha - \cot \alpha$ |
| 5. $\frac{\sin^2 \alpha - 25}{\sin^2 \alpha + 10 \sin \alpha + 25}; \frac{\sin \alpha - 5}{\sin \alpha + 5}$ | 6. $\frac{\sin^2 \alpha - 36}{\sin^2 \alpha + 12 \sin \alpha + 36}; \frac{\sin \alpha - 6}{\sin \alpha + 6}$ |
| 7. $\frac{\cos^2 \alpha - 14 \cos \alpha + 49}{\cos^2 \alpha - 49}; \frac{\cos \alpha - 7}{\cos \alpha + 7}$ | 8. $\frac{\cos^2 \alpha + 16 \cos \alpha + 64}{\cos^2 \alpha - 64}; \frac{\cos \alpha + 8}{\cos \alpha - 8}$ |

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| 9. $\frac{\tan^3 \theta - 27}{\tan^2 \theta - 9}; \frac{\tan^2 \theta + 3 \tan \theta + 9}{\tan \theta + 3}$ | |
| 10. $\frac{\tan^3 \theta - 64}{\tan^2 \theta - 16}; \frac{\tan^2 \theta + 4 \tan \theta + 16}{\tan \theta + 4}$ | |
| 11. $\frac{\cot^3 \theta + 8}{\cot^2 \theta - 4}; \frac{\cot^2 \theta - 2 \cot \theta + 4}{\cot \theta - 2}$ | |
| 12. $\frac{\cot^3 \theta + 125}{\cot^2 \theta - 25}; \frac{\cot^2 \theta - 5 \cot \theta + 25}{\cot \theta - 5}$ | |
| 13. $\frac{1}{\sin^2 \theta} - \frac{1}{\tan^2 \theta}; 1$ | 14. $\frac{1}{\cos^2 \theta} - \frac{1}{\cot^2 \theta}; 1$ |
| 15. $\frac{1 - \cos^2 \theta}{\cos^2 \theta}; \tan^2 \theta$ | 16. $\frac{1 - \sin^2 \theta}{\sin^2 \theta}; \cot^2 \theta$ |

Write each expression in terms of $\sin \theta$.

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| 17. $\tan \theta \sec \theta$ | 18. $(\tan^2 \theta) \left(\frac{1}{\sec^2 \theta} \right) + \frac{1}{\sin \theta}$ |
| 19. $\frac{1 + \cos \theta}{\sin \theta} + \frac{\sin \theta}{1 + \cos \theta}$ | 20. $\frac{1}{1 - \cos \theta} + \frac{1}{1 + \cos \theta}$ |

Write each expression in terms of $\cos \theta$.

21. $\frac{\sin^2 \theta}{\sec^2 \theta - 1}$

22. $\frac{\sin^2 \theta}{\cos \theta} + \cos \theta$

23. $\frac{1}{\sec \theta - \tan \theta} + \frac{1}{\sec \theta + \tan \theta}$

24. $(1 - \tan^2 \theta)(\sec^2 \theta)$

Write each expression in terms of $\tan \theta$.

25. $\frac{\sec \theta}{\csc \theta}$

26. $\frac{1 + \tan^2 \theta}{\csc^2 \theta}$

27. $\frac{\sec \theta}{\sin \theta} - \frac{\sec \theta}{\csc \theta}$

28. $\frac{\sec \theta - \cos \theta}{\sin \theta}$

29. Convert $\frac{\sin^3 \theta - \cos^3 \theta}{\sin \theta - \cos \theta}$ to $\sin \theta \cos \theta + 1$.

30. Convert $\frac{\sin^3 \theta + \cos^3 \theta}{\sin \theta + \cos \theta}$ to $1 - \sin \theta \cos \theta$.

31. If $s = a \sec \theta - b \tan \theta$ and $t = b \sec \theta - a \tan \theta$, find $s^2 - t^2$.

32. If $\sin \alpha = \frac{(a + b)^2}{a - b}$ and $\cos \alpha = \frac{a^2 + b^2}{a^2 - b^2}$, find $\tan \alpha$.