4. *Math Journal* **Create** your own trigonometric identity that contains at least three different trigonometric functions. Explain how you created it. Give it to one of your classmates to verify. Compare and contrast your classmate's approach with your approach.

Verify that each equation is an identity.

5. $\cos x = \dfrac{\cot x}{\csc x}$

6. $\dfrac{1}{\tan x + \sec x} = \dfrac{\cos x}{\sin x + 1}$

7. $\csc \theta - \cot \theta = \dfrac{1}{\csc \theta + \cot \theta}$

8. $\sin \theta \tan \theta = \sec \theta - \cos \theta$

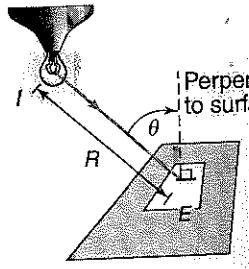
9. $(\sin A - \cos A)^2 = 1 - 2 \sin^2 A \cot A$

Find a numerical value of one trigonometric function of *x*.

10. $\tan x = \dfrac{1}{4} \sec x$

11. $\cot x + \sin x = -\cos x \cot x$

12. **Optics** The amount of light that a source provides to a surface is called the *illuminance*. The illuminance E in foot candles on a surface that is R feet from a source of light with intensity I candelas is $E = \dfrac{I \cos \theta}{R^2}$, where θ is the measure of the angle between the direction of the light and a line perpendicular to the surface being illuminated. Verify that $E = \dfrac{I \cot \theta}{R^2 \csc \theta}$ is an equivalent formula.



EXERCISES

Verify that each equation is an identity.

13. $\tan A = \dfrac{\sec A}{\csc A}$

14. $\cos \theta = \sin \theta \cot \theta$

15. $\sec x - \tan x = \dfrac{1 - \sin x}{\cos x}$

16. $\dfrac{1 + \tan x}{\sin x + \cos x} = \sec x$

17. $\sec x \csc x = \tan x + \cot x$

18. $\sin \theta + \cos \theta = \dfrac{2 \sin^2 \theta - 1}{\sin \theta - \cos \theta}$

19. $(\sin A + \cos A)^2 = \dfrac{2 + \sec A \csc A}{\sec A \csc A}$

20. $(\sin \theta - 1)(\tan \theta + \sec \theta) = -\cos \theta$

21. $\dfrac{\cos y}{1 - \sin y} = \dfrac{1 + \sin y}{\cos y}$

22. $\cos \theta \cos(-\theta) - \sin \theta \sin(-\theta) = 1$

23. $\csc x - 1 = \dfrac{\cot^2 x}{\csc x + 1}$

24. $\cos B \cot B = \csc B - \sin B$

25. $\sin \theta \cos \theta \tan \theta + \cos^2 \theta = 1$

26. $(\csc x - \cot x)^2 = \dfrac{1 - \cos x}{1 + \cos x}$

27. $\sin x + \cos x = \dfrac{\cos x}{1 - \tan x} + \dfrac{\sin x}{1 - \cot x}$

28. Show that $\sin \theta + \cos \theta + \tan \theta \sin \theta = \sec \theta + \cos \theta \tan \theta$.

Find a numerical v

29. $\dfrac{\csc x}{\cot x} = \sqrt{2}$

31. $\dfrac{1}{\cot x} - \dfrac{\sec x}{\csc x} =$

33. $\cos^2 x + 2 \sin$

35. If $\dfrac{\tan^3 \theta - 1}{\tan \theta - 1} =$

Graphing Calculator

Use a graphing c identity.

36. $\dfrac{1}{\sin^2 x} + \dfrac{1}{\cos^2}$

38. $2 \sin A + (1 +$

Applications and Problem Solving

Real World Application

40. **Electronics** passes throu time t secon

a. Write an e

b. Write an

41. **Critical Thin** in terms of

42. **Spherical G** geometry t sphere. A li is measure of the sphe triangle on opposite t respectivel

$\sin a =$

$\cos b$

$\cos c$

Show that

43. **Physics** displacen

the initial is the acc only trig

β is the Greek letter beta and γ is the Greek letter gamma.