Pages 433-434

6. $\frac{1}{\tan x + \sec x} \stackrel{?}{=} \frac{\cos x}{\sin x + 1}$

$\frac{1}{\frac{\sin x}{\cos x} + \frac{1}{\cos x}} \stackrel{?}{=} \frac{\cos x}{\sin x + 1}$

$\frac{1}{\frac{\sin x + 1}{\cos x}} \stackrel{?}{=} \frac{\cos x}{\sin x + 1}$

$\frac{\cos x}{\sin x + 1} = \frac{\cos x}{\sin x + 1}$

7. $\csc\theta - \cot\theta \stackrel{?}{=} \frac{1}{\csc\theta + \cot\theta}$

$\csc\theta - \cot\theta \stackrel{?}{=} \frac{1}{\csc\theta + \cot\theta} \cdot \frac{\csc\theta - \cot\theta}{\csc\theta - \cot\theta}$

$\csc\theta - \cot\theta \stackrel{?}{=} \frac{\csc\theta - \cot\theta}{\csc^2\theta - \cot^2\theta}$

$\csc\theta - \cot\theta \stackrel{?}{=} \frac{\csc\theta - \cot\theta}{(1 + \cot^2\theta) - \cot^2\theta}$

$\csc\theta - \cot\theta \stackrel{?}{=} \frac{\csc\theta - \cot\theta}{1}$

$\csc\theta - \cot\theta = \csc\theta - \cot\theta$

8. $\sin\theta\tan\theta \stackrel{?}{=} \sec\theta - \cos\theta$

$\sin\theta\tan\theta \stackrel{?}{=} \frac{1}{\cos\theta} - \cos\theta$

$\sin\theta\tan\theta \stackrel{?}{=} \frac{1}{\cos\theta} - \frac{\cos^2\theta}{\cos\theta}$

$\sin\theta\tan\theta \stackrel{?}{=} \frac{1 - \cos^2\theta}{\cos\theta}$

$\sin\theta\tan\theta \stackrel{?}{=} \frac{\sin^2\theta}{\cos\theta}$

$\sin\theta\tan\theta \stackrel{?}{=} \sin\theta\frac{\sin\theta}{\cos\theta}$

$\sin\theta\tan\theta = \sin\theta\tan\theta$

9. $(\sin A - \cos A)^2 \stackrel{?}{=} 1 - 2\sin^2 A\cot A$

$\sin^2 A - 2\sin A\cos A + \cos^2 A \stackrel{?}{=} 1 - 2\sin^2 A\cot A$

$1 - 2\sin A\cos A \stackrel{?}{=} 1 - 2\sin^2 A\cot A$

$1 - 2\sin A\cos A\frac{\sin A}{\sin A} \stackrel{?}{=} 1 - 2\sin^2 A\cot A$

$1 - 2\sin^2 A\frac{\cos A}{\sin A} \stackrel{?}{=} 1 - 2\sin^2 A\cot A$

$1 - 2\sin^2 A\cot A = 1 - 2\sin^2 A\cot A$

10. Sample answer: $\sin x = \frac{1}{4}$

$\tan x = \frac{1}{4}\sec x$

$\frac{\tan x}{\sec x} = \frac{1}{4}$

$\frac{\frac{\sin x}{\cos x}}{\frac{1}{\cos x}} = \frac{1}{4}$

$\sin x = \frac{1}{4}$

11. Sample answer: $\cos x = -1$

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

$\frac{\cos x}{\sin x} + \sin x = -\cos x\frac{\cos x}{\sin x}$

$\cos x + \sin^2 x = -\cos^2 x$

$\cos^2 x + \sin^2 x = -\cos x$

$1 = -\cos x$

$\cos x = -1$

12. $\frac{I\cos\theta}{R^2} \stackrel{?}{=} \frac{I\cot\theta}{R^2\csc\theta}$

$\frac{I\cos\theta}{R^2} \stackrel{?}{=} \frac{I\frac{\cos\theta}{\sin\theta}}{R^2\frac{1}{\sin\theta}}$

$\frac{I\cos\theta}{R^2} \stackrel{?}{=} \frac{I\frac{\cos\theta}{\sin\theta}}{R^2\frac{1}{\sin\theta}} \cdot \frac{\sin\theta}{\sin\theta}$

$\frac{I\cos\theta}{R^2} = \frac{I\cos\theta}{R^2}$

Pages 434–436 Exercises

13. $\tan A \stackrel{?}{=} \frac{\sec A}{\csc A}$

$\tan A \stackrel{?}{=} \frac{\frac{1}{\cos A}}{\frac{1}{\sin A}}$

$\tan A \stackrel{?}{=} \frac{\sin A}{\cos A}$

$\tan A = \tan A$

14. $\cos\theta \stackrel{?}{=} \sin\theta\cot\theta$

$\cos\theta \stackrel{?}{=} \sin\theta\frac{\cos\theta}{\sin\theta}$

$\cos\theta = \cos\theta$

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

$\sec x - \tan x \stackrel{?}{=} \frac{1}{\cos x} - \frac{\sin x}{\cos x}$

$\sec x - \tan x = \sec x - \tan x$

16. $\frac{1 + \tan x}{\sin x + \cos x} \stackrel{?}{=} \sec x$

$\frac{1 + \frac{\sin x}{\cos x}}{\sin x + \cos x} \stackrel{?}{=} \sec x$

$\frac{\cos x}{\cos x} \cdot \frac{1 + \frac{\sin x}{\cos x}}{\sin x + \cos x} \stackrel{?}{=} \sec x$

$\frac{\cos x + \sin x}{\cos x(\sin x + \cos x)} \stackrel{?}{=} \sec x$

$\frac{1}{\cos x} \stackrel{?}{=} \sec x$

$\sec x = \sec x$

17. $\sec x\csc x \stackrel{?}{=} \tan x + \cot x$

$\sec x\csc x \stackrel{?}{=} \frac{\sin x}{\cos x} + \frac{\cos x}{\sin x}$

$\sec x\csc x \stackrel{?}{=} \frac{\sin x}{\cos x} \cdot \frac{\sin x}{\sin x} + \frac{\cos x}{\sin x} \cdot \frac{\cos x}{\cos x}$

$\sec x\csc x \stackrel{?}{=} \frac{\sin^2 x}{\cos x\sin x} + \frac{\cos^2 x}{\sin x\cos x}$

$\sec x\csc x \stackrel{?}{=} \frac{\sin^2 x + \cos^2 x}{\cos x\sin x}$

$\sec x\csc x \stackrel{?}{=} \frac{1}{\cos x\sin x}$

$\sec x\csc x \stackrel{?}{=} \frac{1}{\cos x} \cdot \frac{1}{\sin x}$

$\sec x\csc x = \sec x\csc x$

18. $\sin\theta + \cos\theta \stackrel{?}{=} \frac{2\sin^2\theta - 1}{\sin\theta - \cos\theta}$

$\sin\theta + \cos\theta \stackrel{?}{=} \frac{2\sin^2\theta - (\sin^2\theta + \cos^2\theta)}{\sin\theta - \cos\theta}$

$\sin\theta + \cos\theta \stackrel{?}{=} \frac{\sin^2\theta - \cos^2\theta}{\sin\theta - \cos\theta}$

$\sin\theta + \cos\theta \stackrel{?}{=} \frac{(\sin\theta - \cos\theta)(\sin\theta + \cos\theta)}{\sin\theta - \cos\theta}$

$\sin\theta + \cos\theta = \sin\theta + \cos\theta$

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

$(\sin A + \cos A)^2 \stackrel{?}{=} \frac{2}{\sec A\csc A} + \frac{\sec A\csc A}{\sec A\csc A}$

$(\sin A + \cos A)^2 \stackrel{?}{=} 2\frac{1}{\sec A} \cdot \frac{1}{\csc A} + 1$

$(\sin A + \cos A)^2 \stackrel{?}{=} 2\cos A\sin A + 1$

$(\sin A + \cos A)^2 \stackrel{?}{=} 2\cos A\sin A + \sin^2 A + \cos^2 A$

$(\sin A + \cos A)^2 = (\sin A + \cos A)^2$

20. $(\sin\theta - 1)(\tan\theta + \sec\theta) \stackrel{?}{=} -\cos\theta$

$\sin\theta\tan\theta - \tan\theta + \sin\theta\sec\theta - \sec\theta \stackrel{?}{=} -\cos\theta$

$\sin\theta\frac{\sin\theta}{\cos\theta} - \frac{\sin\theta}{\cos\theta} + \sin\theta\frac{1}{\cos\theta} - \frac{1}{\cos\theta} \stackrel{?}{=} -\cos\theta$

$\frac{\sin^2\theta - \sin\theta + \sin\theta - 1}{\cos\theta} \stackrel{?}{=} -\cos\theta$

$\frac{\sin^2\theta - 1}{\cos\theta} \stackrel{?}{=} -\cos\theta$

$\frac{-\cos^2\theta}{\cos\theta} \stackrel{?}{=} -\cos\theta$

$-\cos\theta = -\cos\theta$

21. $\frac{\cos y}{1-\sin y} \stackrel{?}{=} \frac{1+\sin y}{\cos y}$

$\frac{\cos y}{1-\sin y}\cdot\frac{1+\sin y}{1+\sin y} \stackrel{?}{=} \frac{1+\sin y}{\cos y}$

$\frac{\cos y(1-\sin y)}{1-\sin^2 y} \stackrel{?}{=} \frac{1+\sin y}{\cos y}$

$\frac{\cos y(1+\sin y)}{\cos^2 y} \stackrel{?}{=} \frac{1+\sin y}{\cos y}$

$\frac{1+\sin y}{\cos y} = \frac{1+\sin y}{\cos y}$

22. $\cos\theta\cos(-\theta) - \sin\theta\sin(-\theta) \stackrel{?}{=} 1$

$\cos\theta\cos\theta - \sin\theta(-\sin\theta) \stackrel{?}{=} 1$

$\cos^2\theta + \sin^2\theta \stackrel{?}{=} 1$

$1 = 1$

23. $\csc x - 1 \stackrel{?}{=} \frac{\cot^2 x}{\csc x + 1}$

$\csc x - 1 \stackrel{?}{=} \frac{\csc^2 x - 1}{\csc x + 1}$

$\csc x - 1 \stackrel{?}{=} \frac{(\csc x + 1)(\csc x - 1)}{\csc x + 1}$

$\csc x - 1 = \csc x - 1$

24. $\cos B\cot B \stackrel{?}{=} \csc B - \sin B$

$\cos B\cot B \stackrel{?}{=} \frac{1}{\sin B} - \sin B$

$\cos B\cot B \stackrel{?}{=} \frac{1}{\sin B} - \frac{\sin^2 B}{\sin B}$

$\cos B\cot B \stackrel{?}{=} \frac{1-\sin^2 B}{\sin B}$

$\cos B\cot B \stackrel{?}{=} \frac{\cos^2 B}{\sin B}$

$\cos B\cot B \stackrel{?}{=} \cos B\frac{\cos B}{\sin B}$

$\cos B\cot B = \cos B\cot B$

25. $\sin\theta\cos\theta\tan\theta + \cos^2\theta \stackrel{?}{=} 1$

$\sin\theta\cos\theta\frac{\sin\theta}{\cos\theta} + \cos^2\theta \stackrel{?}{=} 1$

$\sin^2\theta + \cos^2\theta \stackrel{?}{=} 1$

$1 = 1$

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

$\csc^2 x - 2\csc x\cot x + \cot^2 x \stackrel{?}{=} \frac{1-\cos x}{1+\cos x}$

$\frac{1}{\sin^2 x} - 2\frac{1}{\sin x}\cdot\frac{\cos x}{\sin x} + \frac{\cos^2 x}{\sin^2 x} \stackrel{?}{=} \frac{1-\cos x}{1+\cos x}$

$\frac{1-2\cos x+\cos^2 x}{\sin^2 x} \stackrel{?}{=} \frac{1-\cos x}{1+\cos x}$

$\frac{(1-\cos x)^2}{1-\cos^2 x} \stackrel{?}{=} \frac{1-\cos x}{1+\cos x}$

$\frac{(1-\cos x)^2}{(1-\cos x)(1+\cos x)} \stackrel{?}{=} \frac{1-\cos x}{1+\cos x}$

$\frac{1-\cos x}{1+\cos x} = \frac{1-\cos x}{1+\cos x}$

27. $\sin x + \cos x \stackrel{?}{=} \frac{\cos x}{1-\tan x} + \frac{\sin x}{1-\cot x}$

$\sin x + \cos x \stackrel{?}{=} \frac{\cos x}{1-\frac{\sin x}{\cos x}} + \frac{\sin x}{1-\frac{\cos x}{\sin x}}$

$\sin x + \cos x \stackrel{?}{=} \frac{\cos x}{1-\frac{\sin x}{\cos x}}\cdot\frac{\cos x}{\cos x} + \frac{\sin x}{1-\frac{\cos x}{\sin x}}\cdot\frac{\sin x}{\sin x}$

$\sin x + \cos x \stackrel{?}{=} \frac{\cos^2 x}{\cos x - \sin x} + \frac{\sin^2 x}{\sin x - \cos x}$

$\sin x + \cos x \stackrel{?}{=} -\frac{\cos^2 x}{\sin x - \cos x} + \frac{\sin^2 x}{\sin x - \cos x}$

$\sin x + \cos x \stackrel{?}{=} \frac{\sin^2 x - \cos^2 x}{\sin x - \cos x}$

$\sin x + \cos x \stackrel{?}{=} \frac{(\sin x + \cos x)(\sin x - \cos x)}{\sin x - \cos x}$

$\sin x + \cos x = \sin x + \cos x$

Pages 433–434 Check for Understanding

1. Answers will vary.
2. Sample answer: Squaring each side can turn two unequal quantities into equal quantities. For example, $-1 \neq 1$, but $(-1)^2 = 1^2$.
3. Sample answer: They are the trigonometric functions with which most people are most familiar.
4. Answers will vary.
5. $\cos x \stackrel{?}{=} \frac{\cot x}{\csc x}$

$\cos x \stackrel{?}{=} \frac{\frac{\cos x}{\sin x}}{\frac{1}{\sin x}}$

$\cos x \stackrel{?}{=} \frac{\cos x}{1}$

$\cos x = \cos x$