

The Weekly Rigor

No. 374

“A mathematician is a machine for turning coffee into theorems.”

August 21, 2021

Verifying Trigonometric Identities with Simple Arguments Involving the Product of Two Trigonometric Functions: Problems with Solutions (Part 8)

$$31. \sin \theta \cdot \cos \theta = \frac{\cos \theta \cdot \tan \theta}{\tan \theta \cdot \csc \theta}.$$

$$32. \cos \theta \cdot \sin \theta = \frac{\sin \theta \cdot \cot \theta}{\cot \theta \cdot \sec \theta}.$$

SOLUTIONS

$$1. \sin \theta \cdot \sec \theta = \sin \theta \cdot \frac{1}{\cos \theta} = \frac{\sin \theta}{\cos \theta} = \tan \theta.$$

$$2. \cos \theta \cdot \csc \theta = \cos \theta \cdot \frac{1}{\sin \theta} = \frac{\cos \theta}{\sin \theta} = \cot \theta.$$

$$3. \sin \theta \cdot \cot \theta = \sin \theta \cdot \frac{\cos \theta}{\sin \theta} = \cos \theta.$$

$$4. \cos \theta \cdot \tan \theta = \cos \theta \cdot \frac{\sin \theta}{\cos \theta} = \sin \theta.$$

$$5. \tan \theta \cdot \csc \theta = \frac{\sin \theta}{\cos \theta} \cdot \frac{1}{\sin \theta} = \frac{1}{\cos \theta} = \sec \theta.$$

$$6. \cot \theta \cdot \sec \theta = \frac{\cos \theta}{\sin \theta} \cdot \frac{1}{\cos \theta} = \frac{1}{\sin \theta} = \csc \theta.$$

$$7. \sin \theta \cdot \csc \theta = \sin \theta \cdot \frac{1}{\sin \theta} = 1.$$

$$8. \cos \theta \cdot \sec \theta = \cos \theta \cdot \frac{1}{\cos \theta} = 1.$$

$$9. \tan \theta \cdot \cot \theta = \frac{\sin \theta}{\cos \theta} \cdot \frac{\cos \theta}{\sin \theta} = 1.$$

$$10. \sin \theta \cdot \cos \theta = \frac{1}{\csc \theta} \cdot \frac{1}{\sec \theta} = \frac{1}{\csc \theta \cdot \sec \theta}.$$

$$11. \sec \theta \cdot \csc \theta = \frac{1}{\cos \theta} \cdot \frac{1}{\sin \theta} = \frac{1}{\cos \theta \cdot \sin \theta}.$$

$$12. \sin \theta \cdot \csc \theta = \sin \theta \cdot \frac{1}{\sin \theta} = 1 = \sin^2 \theta + \cos^2 \theta.$$

$$13. \cos \theta \cdot \sec \theta = \cos \theta \cdot \frac{1}{\cos \theta} = 1 = \sin^2 \theta + \cos^2 \theta.$$

$$14. \tan \theta \cdot \cot \theta = \frac{\sin \theta}{\cos \theta} \cdot \frac{\cos \theta}{\sin \theta} = 1 = \sin^2 \theta + \cos^2 \theta.$$

$$15. \tan \theta \cdot \sec \theta = \frac{\sin \theta}{\cos \theta} \cdot \frac{1}{\cos \theta} = \frac{\sin \theta}{\cos^2 \theta} = \frac{\sin \theta}{1 - \sin^2 \theta}.$$

$$16. \cot \theta \cdot \csc \theta = \frac{\cos \theta}{\sin \theta} \cdot \frac{1}{\sin \theta} = \frac{\cos \theta}{\sin^2 \theta} = \frac{\cos \theta}{1 - \cos^2 \theta}.$$

“Only he who never plays, never loses.”

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