

Honors Algebra 3-4

5.1 Worksheet

Name _____

Key

Period _____

Simplify.

1. $\tan \theta \cdot \csc \theta$

$$\frac{\sin \theta}{\cos \theta} \cdot \frac{1}{\sin \theta}$$

$$\frac{1}{\cos \theta}$$

$$\boxed{\sec \theta}$$

2. $\tan^2 \theta \cdot \cos^2 \theta$

$$\frac{\sin^2 \theta \cdot \cos^2 \theta}{\cos^2 \theta}$$

$$\boxed{\sin^2 \theta}$$

3. $\sin^2 \theta \cdot \cot^2 \theta$

$$\sin^2 \theta \cdot \frac{\cos^2 \theta}{\sin^2 \theta}$$

$$\boxed{\cos^2 \theta}$$

4. $\sin \theta \cdot \tan \theta \cdot \cot \theta \cdot \csc \theta$

$$\sin \theta \cdot \frac{\sin \theta}{\cos \theta} \cdot \frac{\cos \theta}{\sin \theta} \cdot \frac{1}{\sin \theta}$$

$$\boxed{1}$$

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

$$\frac{1}{\cos^2 \theta}$$

$$\boxed{\sec^2 \theta}$$

6. $\sin \theta (\csc \theta - \sin \theta)$

$$\sin \theta \csc \theta - \sin^2 \theta$$

$$\sin \theta \cdot \frac{1}{\sin \theta} - \sin^2 \theta$$

$$1 - \sin^2 \theta$$

$$\boxed{\cos^2 \theta}$$

7. $\sec \theta - \sin \theta \tan \theta$

$$\frac{1}{\cos \theta} - \sin \theta \cdot \frac{\sin \theta}{\cos \theta}$$

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

$$\frac{\cos^2 \theta}{\cos \theta}$$

$$\boxed{\cos \theta}$$

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

$$\frac{1}{\tan^2 \theta} + 1$$

$$\cot^2 \theta + 1$$

$$\boxed{\csc^2 \theta}$$

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

$$\frac{\sec^2 \theta}{\sec^2 \theta} - \frac{1}{\sec^2 \theta}$$

$$1 - \cos^2 \theta$$

$$\boxed{\sin^2 \theta}$$

10. $\frac{\csc \theta}{\sin \theta} - \frac{\cot \theta}{\tan \theta}$

$$\frac{1}{\sin \theta} \cdot \frac{1}{\sin \theta} - \frac{\cos \theta}{\sin \theta} \cdot \frac{\cos \theta}{\sin \theta}$$

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

$$\frac{\sin^2 \theta}{\sin^2 \theta}$$

$$\boxed{1}$$

11. $\frac{\tan^2 \theta}{\sec^2 \theta} + \frac{\cot^2 \theta}{\csc^2 \theta}$

$$\frac{\sin^2 \theta \cdot \cos^2 \theta}{\cos^2 \theta \cdot 1} + \frac{\cos^2 \theta \cdot \sin^2 \theta}{\sin^2 \theta \cdot 1}$$

$$\sin^2 \theta + \cos^2 \theta$$

$$\boxed{1}$$

12. $\sin^2 \theta + \cos^2 \theta + \tan^2 \theta$

$$1 + \tan^2 \theta$$

$$\boxed{\sec^2 \theta}$$

$$13. \csc^2 \theta - \cot^2 \theta + \tan^2 \theta$$

$$\frac{1 + \cot^2 \theta - \cot^2 \theta + \tan^2 \theta}{1 + \tan^2 \theta}$$

$$\frac{1 + \tan^2 \theta}{\sec^2 \theta}$$

$$14. \sin \theta \csc \theta + \tan \theta \cot \theta$$

$$\frac{\sin \theta}{\sin \theta} + \frac{\tan \theta}{\tan \theta}$$

$$1 + 1$$

$$2$$

$$15. \cos \theta \sec \theta - \frac{\cos \theta}{\sec \theta}$$

$$\frac{\cos \theta}{\cos \theta} - \frac{\cos \theta \cdot \cos \theta}{1}$$

$$1 - \cos^2 \theta$$

$$\sin^2 \theta$$

$$16. \frac{1 - \sin^2 \theta}{1 - \cos^2 \theta}$$

$$\frac{\cos^2 \theta}{\sin^2 \theta}$$

$$\cot^2 \theta$$

$$17. \tan \theta \cot \theta - \cos^2 \theta$$

$$\frac{\tan \theta}{\tan \theta} - \cos^2 \theta$$

$$1 - \cos^2 \theta$$

$$\sin^2 \theta$$

$$18. \frac{\sin \theta + \tan \theta}{1 + \sec \theta}$$

$$\frac{(\sin \theta + \frac{\sin \theta}{\cos \theta}) \cos \theta}{(1 + \frac{1}{\cos \theta}) \cos \theta}$$

$$\frac{(\sin \theta \cos \theta + \sin \theta)(1 - \cos \theta)}{(\cos \theta + 1)(1 - \cos \theta)}$$

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

$$\frac{\sin \theta (1 - \cos^2 \theta)}{\sin^2 \theta}$$

$$\frac{\sin \theta}{\sin \theta}$$

$$\sin \theta$$

$$19. \frac{\sec \theta - \cos \theta}{\tan^2 \theta}$$

$$\frac{\frac{\sec \theta}{\tan^2 \theta} - \frac{\cos \theta}{\tan^2 \theta}}{\frac{1 + \cot^2 \theta}{\cos \theta \sin^2 \theta} - \frac{\cos \theta \cdot \cos^2 \theta}{\sin^2 \theta}}$$

$$\frac{\frac{\cos \theta}{\sin^2 \theta} - \frac{\cos^3 \theta}{\sin^2 \theta}}{\frac{\cos \theta (1 - \cos^2 \theta)}{\sin^2 \theta}}$$

$$\frac{\cos \theta \sin^2 \theta}{\sin^2 \theta}$$

$$\cos \theta$$

$$20. (1 + \cos \theta)(\csc \theta - \cot \theta)$$

$$\csc \theta - \cot \theta + \csc \theta \cos \theta - \cot \theta \cos \theta$$

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

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

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

$$\frac{\sin^2 \theta}{\sin \theta}$$

$$\sin \theta$$

$$21. \frac{\cot^2 \theta}{\csc \theta + 1} + 1$$

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

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

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

$$-(1 - \csc \theta) + 1$$

$$-1 + \csc \theta + 1$$

$$\csc \theta$$

Honors Algebra 3-4

5.2 Worksheet

Name

Key

Period

Prove that each equation is an identity.

1. $\tan x \cdot \frac{1}{\cot x} = \tan^2 x$

$$\tan x \tan x = \tan^2 x$$

$$\tan^2 x = \tan^2 x \checkmark$$

2. $(1 - \cos x)(1 + \cos x) = \sin^2 x$

$$1 - \cos^2 x = \sin^2 x$$

$$\sin^2 x = \sin^2 x \checkmark$$

3. $\cos^2 x \csc x \sec x = \cot x$

$$\frac{\cos^2 x}{1} \frac{1}{\sin x} \frac{1}{\cos x} = \cot x$$

$$\frac{\cos x}{\sin x} = \cot x$$

$$\cot x = \cot x \checkmark$$

4. $(1 - \cos^2 x)(\cot x) = \sin x \cos x$

$$\frac{\sin^2 x}{1} \frac{\cos x}{\sin x} = \sin x \cos x$$

$$\sin x \cos x = \sin x \cos x \checkmark$$

5. $\frac{\sin x}{\cos x} + \frac{\cos x}{\sin x} = \frac{\csc x}{\cos x}$

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

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

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

$$\frac{\csc x}{\cos x} = \frac{\csc x}{\cos x} \checkmark$$

6. $\tan x \csc x \cos x = 1$

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

$$1 = 1 \checkmark$$

7. $(\sin x - \cos x)^2 = 1 - 2 \sin x \cos x$

$$\sin^2 x - 2 \sin x \cos x + \cos^2 x = 1 - 2 \sin x \cos x$$

$$1 - 2 \sin x \cos x = 1 - 2 \sin x \cos x \checkmark$$

8. $\frac{\csc x}{\cos x} - \frac{\cos x}{\sin x} = \tan x$

$$\frac{\csc x \sin x}{\sin x \cos x} - \frac{\cos^2 x}{\sin x \cos x} = \tan x$$

$$\frac{1 - \cos^2 x}{\sin x \cos x} = \tan x$$

$$\frac{\sin^2 x}{\sin x \cos x} = \tan x$$

$$\frac{\sin x}{\cos x} = \tan x$$

$$\tan x = \tan x \checkmark$$

9. $\csc x - \sin x = \cot x \cos x$

$$\frac{1}{\sin x} - \frac{\sin^2 x}{\sin x} = \cot x \cos x$$

$$\frac{1 - \sin^2 x}{\sin x} = \cot x \cos x$$

$$\frac{\cos^2 x}{\sin x} = \cot x \cos x$$

$$\frac{\cos x \cdot \cos x}{\sin x} = \cot x \cos x$$

$$\cot x \cdot \cos x = \cot x \cos x \checkmark$$

10. $\cot x (\tan x \sin x + \cos x) = \csc x$

$$\cot x \tan x \sin x + \cot x \cos x = \csc x$$

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

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

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

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

$$\csc x = \csc x \checkmark$$

$$11. (1 + \sin x)(1 - \sin x) = \cos^2 x$$

$$1 - \sin^2 x = \cos^2 x$$

$$\cos^2 x = \cos^2 x \quad \checkmark$$

$$13. \frac{\sin x}{\csc x} + \frac{\cos x}{\sec x} = 1$$

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

$$\sin^2 x + \cos^2 x = 1$$

$$1 = 1 \quad \checkmark$$

$$15. \frac{\csc^2 x}{\cot^2 x} = 1 + \tan^2 x$$

$$\frac{1}{\sin^2 x} \cdot \frac{1}{\cos^2 x} = 1 + \tan^2 x$$

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

$$\sec^2 x = 1 + \tan^2 x$$

$$1 + \tan^2 x = 1 + \tan^2 x \quad \checkmark$$

$$17. \tan^2 x - \sin^2 x = \sin^2 x \tan^2 x$$

$$\frac{\sin^2 x}{\cos^2 x} - \frac{\sin^2 x \cos^2 x}{\cos^2 x} = \sin^2 x \tan^2 x$$

$$\frac{\sin^2 x (1 - \cos^2 x)}{\cos^2 x} = \sin^2 x \tan^2 x$$

$$\frac{\sin^2 x \sin^2 x}{\cos^2 x} = \sin^2 x \tan^2 x$$

$$\sin^2 x \tan^2 x = \sin^2 x \tan^2 x \quad \checkmark$$

$$19. \frac{\sec x - \cos x}{\cos x} = \tan^2 x$$

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

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

$$\frac{\sin^2 x}{\cos^2 x} = \tan^2 x$$

$$\tan^2 x = \tan^2 x \quad \checkmark$$

pot quiz

$$12. \cos x + \sin x \tan x = \sec x$$

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

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

$$\frac{1}{\cos x} = \sec x \rightarrow \sec x = \sec x \quad \checkmark$$

$$14. \frac{1 + \sin x}{\cos x} = \frac{\cos x}{1 - \sin x}$$

$$\frac{(1 + \sin x)(1 - \sin x)}{\cos x (1 - \sin x)} = \frac{\cos x}{1 - \sin x}$$

$$\frac{1 - \sin^2 x}{\cos x (1 - \sin x)} = \frac{\cos x}{1 - \sin x}$$

$$\frac{\cos^2 x}{\cos x (1 - \sin x)} = \frac{\cos x}{1 - \sin x}$$

$$\frac{\cos x}{1 - \sin x} = \frac{\cos x}{1 - \sin x} \quad \checkmark$$

$$16. \frac{\sec^2 x - 1}{\sin^2 x} = \sec^2 x$$

$$\frac{\tan^2 x}{\sin^2 x} = \sec^2 x$$

$$\frac{\sin^2 x}{\cos^2 x} \cdot \frac{1}{\sin^2 x} = \sec^2 x$$

$$\frac{1}{\cos^2 x} = \sec^2 x$$

$$\sec^2 x = \sec^2 x \quad \checkmark$$

$$18. \frac{1 - \sin^2 x}{\csc x - \sin x} = \sin x$$

$$\sin x \left(\frac{\cos^2 x}{\sin x} \right) = \sin x$$

$$\sin x \left(\frac{1}{\sin x} - \sin x \right)$$

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

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

$$\sin x = \sin x \quad \checkmark$$

$$20. \sin x (\csc x - \sin x) = \cos^2 x$$

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

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

$$1 - \sin^2 x = \cos^2 x$$

$$\cos^2 x = \cos^2 x \quad \checkmark$$

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Name _____
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Simplify.

1. $\tan \theta \cdot \csc \theta$

2. $\tan^2 \theta \cdot \cos^2 \theta$

3. $\sin^2 \theta \cdot \cot^2 \theta$

4. $\sin \theta \cdot \tan \theta \cdot \cot \theta \cdot \csc \theta$

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

6. $\sin \theta (\csc \theta - \sin \theta)$

7. $\sec \theta - \sin \theta \tan \theta$

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

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

10. $\frac{\csc \theta}{\sin \theta} - \frac{\cot \theta}{\tan \theta}$

11. $\frac{\tan^2 \theta}{\sec^2 \theta} + \frac{\cot^2 \theta}{\csc^2 \theta}$

12. $\sin^2 \theta + \cos^2 \theta + \tan^2 \theta$

13. $\csc^2 \theta - \cot^2 \theta + \tan^2 \theta$

14. $\sin \theta \csc \theta + \tan \theta \cot \theta$

15. $\cos \theta \sec \theta - \frac{\cos \theta}{\sec \theta}$

16. $\frac{1 - \sin^2 \theta}{1 - \cos^2 \theta}$

17. $\tan \theta \cot \theta - \cos^2 \theta$

18. $\frac{\sin \theta + \tan \theta}{1 + \sec \theta}$

19. $\frac{\sec \theta - \cos \theta}{\tan^2 \theta}$

20. $(1 + \cos \theta)(\csc \theta - \cot \theta)$

21. $\frac{\cot^2 \theta}{\csc \theta + 1} + 1$

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5.2 Worksheet

Name _____
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Prove that each equation is an identity.

1. $\tan x \cdot \frac{1}{\cot x} = \tan^2 x$

2. $(1 - \cos x)(1 + \cos x) = \sin^2 x$

3. $\cos^2 x \csc x \sec x = \cot x$

4. $(1 - \cos^2 x)(\cot x) = \sin x \cos x$

5. $\frac{\sin x}{\cos x} + \frac{\cos x}{\sin x} = \frac{\csc x}{\cos x}$

6. $\tan x \csc x \cos x = 1$

7. $(\sin x - \cos x)^2 = 1 - 2\sin x \cos x$

8. $\frac{\csc x}{\cos x} - \frac{\cos x}{\sin x} = \tan x$

9. $\csc x - \sin x = \cot x \cos x$

10. $\cot x(\tan x \sin x + \cos x) = \csc x$

$$11. (1 + \sin x)(1 - \sin x) = \cos^2 x$$

$$12. \cos x + \sin x \tan x = \sec x$$

$$13. \frac{\sin x}{\csc x} + \frac{\cos x}{\sec x} = 1$$

$$14. \frac{1 + \sin x}{\cos x} = \frac{\cos x}{1 - \sin x}$$

$$15. \frac{\csc^2 x}{\cot^2 x} = 1 + \tan^2 x$$

$$16. \frac{\sec^2 x - 1}{\sin^2 x} = \sec^2 x$$

$$17. \tan^2 x - \sin^2 x = \sin^2 x \tan^2 x$$

$$18. \frac{1 - \sin^2 x}{\csc x - \sin x} = \sin x$$

$$19. \frac{\sec x - \cos x}{\cos x} = \tan^2 x$$

$$20. \sin x(\csc x - \sin x) = \cos^2 x$$