Name:_____

SM3 Unit 12 Review

Show each step in solving the problems below. In the blank provided, give the name of the property used.

1) $2[3-2(1)]+18\div 6$

$2[3-2]+3$	Given
$2[1]+3$	Multiplication/Division
$2+3$	Subtraction
5	Multiplication
	Addition

2) $6(3)-4+2(21\div 7+7)$

$18-4+2(3+7)$	Given
$18-4+2(10)$	Multiplication/Division
$18-4+20$	Addition
34	Multiplication
	Addition/Subtraction

Fill in the correct reasons for each step in the proof below.

3) Given: $4x+12=8x-8$
Prove: $x=5$

Statements	Reasons
a. $4x+12=8x-8$	a. Given
b. $12=4x-8$	b. Subtraction Property of Equality
c. $20=4x$	c. Addition Property of Equality
d. $5=x$	d. Division Property of Equality
e. $x=5$	e. Symmetric Property

Write a two-column proof.

4) Given: $2(3x+6)=8x-4$
Prove: $x=8$

Statements	Reasons
$2(3x+6)=8x-4$	Given
$6x+12=8x-4$	Distribute
$12=2x-4$	Subtraction Property of Equality
$16=2x$	Addition Property of Equality
$8=x$	Division Property of Equality
$x=8$	Symmetric Property

Factor completely.

5) $x^2 + 5x - 6$
$(x + 6)(x - 1)$

6) $x^2 - 2x - 48$
$(x - 8)(x + 6)$

7) $2n^2 + 4n - 16$
$2(n^2 + 2n - 8)$
$2(n + 4)(n - 2)$

8) $5x^2 + 8x - 21$
$(x + 3)(5x - 7)$

9) $16x^2 - 9$
$(4x + 3)(4x - 3)$

10) $25n^2 - 1$
$(5n + 1)(5n - 1)$

Use two columns to prove each identity.

11) $\sin\theta \cot\theta = \cos\theta$

$\sin\theta \cot\theta = \cos\theta$	Given
$\sin\theta \cdot \frac{\cos\theta}{\sin\theta} = \cos\theta$	Cotangent Identity
$\cos\theta = \cos\theta$	Division

12 $\cos\theta \tan\theta = \sin\theta$

$\cos\theta \tan\theta = \sin\theta$	Given
$\cos\theta \cdot \frac{\sin\theta}{\cos\theta} = \sin\theta$	Tangent Identity
$\sin\theta = \sin\theta$	Division

13) $\sin\theta \cot\theta \tan\theta = \frac{1}{\csc\theta}$

$\sin\theta \cot\theta \tan\theta = \frac{1}{\csc\theta}$	Given
$\sin\theta \cdot \frac{1}{\tan\theta} \cdot \tan\theta = \frac{1}{\csc\theta}$	Definition of Cotangent
$\sin\theta = \frac{1}{\csc\theta}$	Division
$\frac{1}{\csc\theta} = \frac{1}{\csc\theta}$	Definition of Sine

14 $\tan^2\theta \cos^4\theta = \sin^2\theta \cos^2\theta$

$\tan^2\theta \cos^4\theta = \sin^2\theta \cos^2\theta$	Given
$\frac{\sin^2\theta}{\cos^2\theta} \cdot \cos^4\theta = \sin^2\theta \cos^2\theta$	Tangent Identity
$\sin^2\theta \cos^2\theta = \sin^2\theta \cos^2\theta$	Division

15 $\dfrac{\sin^2\theta - 2\sin\theta - 48}{\sin^2\theta - 36} = \dfrac{\sin\theta - 8}{\sin\theta - 6}$

$\dfrac{\sin^2\theta - 2\sin\theta - 48}{\sin^2\theta - 36} = \dfrac{\sin\theta - 8}{\sin\theta - 6}$	Given
$\dfrac{(\sin\theta - 8)(\sin\theta + 6)}{(\sin\theta + 6)(\sin\theta - 6)} = \dfrac{\sin\theta - 8}{\sin\theta - 6}$	Factor
$\dfrac{\sin\theta - 8}{\sin\theta - 6} = \dfrac{\sin\theta - 8}{\sin\theta - 6}$	Division

16 $\dfrac{\cos^2\theta + \sin^2\theta}{\sin^2\theta} = \cot^2\theta + 1$

$\dfrac{\cos^2\theta + \sin^2\theta}{\sin^2\theta} = \cot^2\theta + 1$	Given
$\dfrac{\cos^2\theta}{\sin^2\theta} + \dfrac{\sin^2\theta}{\sin^2\theta} = \cot^2\theta + 1$	Division
$\dfrac{\cos^2\theta}{\sin^2\theta} + 1 = \cot^2\theta + 1$	Division
$\cot^2\theta + 1 = \cot^2\theta + 1$	Cotangent Identity

17 $\tan\theta + \sec\theta = \dfrac{\sin\theta + 1}{\cos\theta}$

$\tan\theta + \sec\theta = \dfrac{\sin\theta + 1}{\cos\theta}$	Given
$\dfrac{\sin\theta}{\cos\theta} + \dfrac{1}{\cos\theta} = \dfrac{\sin\theta + 1}{\cos\theta}$	Tangent Identity/Def. of Sec
$\dfrac{\sin\theta + 1}{\cos\theta} = \dfrac{\sin\theta + 1}{\cos\theta}$	Addition

18 $2\cos^2\theta - 1 = 1 - 2\sin^2\theta$

$2\cos^2\theta - 1 = 1 - 2\sin^2\theta$	Given
$2(1 - \sin^2\theta) - 1 = 1 - 2\sin^2\theta$	Pyth. ID
$2 - 2\sin^2\theta - 1 = 1 - 2\sin^2\theta$	Distribute
$1 - 2\sin^2\theta = 1 - 2\sin^2\theta$	Subtraction

19 $2 + 2\cot^2\theta = 2\csc^2\theta$

$2 + 2\cot^2\theta = 2\csc^2\theta$	Given
$2(1 + \cot^2\theta) = 2\csc^2\theta$	Factor
$2\csc^2\theta = 2\csc^2\theta$	Pyth. ID

20 $\dfrac{\cos^2\theta - 1}{\cos\theta} = -\dfrac{\sin^2\theta}{\cos\theta}$

$\dfrac{\cos^2\theta - 1}{\cos\theta} = -\dfrac{\sin^2\theta}{\cos\theta}$	Given
$\dfrac{1 - \sin^2\theta - 1}{\cos\theta} = -\dfrac{\sin^2\theta}{\cos^2\theta}$	Pyth. ID
$-\dfrac{\sin^2\theta}{\cos^2\theta} = -\dfrac{\sin^2\theta}{\cos^2\theta}$	Subtraction

21 $\sin^4\theta - \cos^4\theta = \sin^2\theta - \cos^2\theta$

$\sin^4\theta - \cos^4\theta = \sin^2\theta - \cos^2\theta$	Given
$(\sin^2\theta + \cos^2\theta)(\sin^2\theta - \cos^2\theta) = \sin^2\theta - \cos^2\theta$	Factor
$1(\sin^2\theta - \cos^2\theta) = \sin^2\theta - \cos^2\theta$	Pyth. ID
$\sin^2\theta - \cos^2\theta = \sin^2\theta - \cos^2\theta$	Mult.

22 $(1 - \cot\theta)^2 = \csc^2\theta - 2\cot\theta$

$(1 - \cot\theta)^2 = \csc^2\theta - 2\cot\theta$	Given
$(1 - \cot\theta)(1 - \cot\theta) = \csc^2\theta - 2\cot\theta$	Multiplication
$1 - 2\cot\theta + \cot^2\theta = \csc^2\theta - 2\cot\theta$	Distribute
$1 - 2\cot\theta + \csc^2\theta - 1 = \csc^2\theta - 2\cot\theta$	Pyth. ID
$-2\cot\theta + \csc^2\theta = \csc^2\theta - 2\cot\theta$	Subtraction
$\csc^2\theta - 2\cot\theta = \csc^2\theta - 2\cot\theta$	Symmetric Prop.

23 $\dfrac{\cos^2\theta}{1 - \sin\theta} = 1 + \sin\theta$

$\dfrac{\cos^2\theta}{1 - \sin\theta} = 1 + \sin\theta$	Given
$\dfrac{1 - \sin^2\theta}{1 - \sin\theta} = 1 + \sin\theta$	Pyth. ID
$\dfrac{(1 + \sin\theta)(1 - \sin\theta)}{1 - \sin\theta} = 1 + \sin\theta$	Factor
$1 + \sin\theta = 1 + \sin\theta$	Division

24 $\dfrac{1}{1 - \cos\theta} - \dfrac{1}{1 + \cos\theta} = \dfrac{2\cos\theta}{\sin^2\theta}$

$\dfrac{1}{1 - \cos\theta} - \dfrac{1}{1 + \cos\theta} = \dfrac{2\cos\theta}{\sin^2\theta}$	Given
$\dfrac{1 + \cos\theta}{(1 - \cos\theta)(1 + \cos\theta)} - \dfrac{1 - \cos\theta}{(1 + \cos\theta)(1 - \cos\theta)} = \dfrac{2\cos\theta}{\sin^2\theta}$	Mult. ID
$\dfrac{1 + \cos\theta - (1 - \cos\theta)}{1 - \cos^2\theta} = \dfrac{2\cos\theta}{\sin^2\theta}$	Subtraction/ Mult.
$\dfrac{1 + \cos\theta - 1 + \cos\theta}{1 - \cos^2\theta} = \dfrac{2\cos\theta}{\sin^2\theta}$	Distribute
$\dfrac{2\cos\theta}{1 - \cos^2\theta} = \dfrac{2\cos\theta}{\sin^2\theta}$	Subtract/ Add
$\dfrac{2\cos\theta}{\sin^2\theta} = \dfrac{2\cos\theta}{\sin^2\theta}$	Pyth. ID