2.4

Algebraic and Congruence Properties

ALGEBRAIC PROPERTIES

Commutative Property

Associative Property

Distributive Property

ALGEBRAIC PROPERTIES

Substitution Property

Reflexive Property

Symmetric Property

Transitive Property

ALGEBRAIC PROPERTIES

Addition Property of Equality

Subtraction Property of Equality

Multiplication Property of Equality

Division Property of Equality

Applying Algebraic Properties

* Equation: $7x - 22 = 4(x + 2)$

Solution:

$$7x - 22 = 4(x + 2)$$
$$7x - 22 = 4x + 8$$
$$3x - 22 = 8$$
$$3x = 30$$
$$x = 10$$

Applying Algebraic Properties

Equation: $\frac{5(x-12)}{4} = 3(2x-7)$

Solution:

$$\frac{5(x-12)}{4} = 3(2x-7)$$

$$5(x-12) = 12(2x-7)$$

$$5x - 60 = 24x - 84$$

$$5x = 24x - 24$$

$$-19x = -24$$

$$x = \frac{24}{19}$$

Name _____ Date _____

Properties of Algebra

023-027

Write the property of real numbers that justifies each statement.

1. $a + (b + c) = a + (c + b)$ _____
2. $a + (b + c) = (a + b) + c$ _____
3. If $x + 5 = 12$, then $x = 7$ _____
4. $a + (b + c) = (c + b) + a$ _____
5. If $\frac{t}{3} = 15$, then $t = 45$ _____
6. $a(b + c) = ab + ac$ _____
7. $\frac{1}{2}(13xy)(8x^2y) = \frac{1}{2}(8x^2y)(13xy)$ _____
8. If $a + b = c$, then $b = c - a$ _____
9. $2x + 6y = 2(x + 3y)$ _____
10. $\frac{1}{2}(8x^2y) = [\frac{1}{2}(8)](x^2y)$ _____
11. If $x + y = 6$ and $6 = z$, then $x + y = z$ _____
12. $6x^2 - 2 - 5x^2 + 14 = 6x^2 - 5x^2 - 2 + 14$ _____
13. If $2m + 14 = v$, then $v = 2m + 14$ _____
14. $(a + b)(c + d) = (a + b)c + (a + b)d$ _____
15. $^-2abc + 7bca = {}^-2abc + 7abc$ _____
16. $a(b + c) = a(b + c)$ _____
17. If $m\angle A + m\angle B = 180°$ and $180° = \pi$ radians, then $m\angle A + m\angle B = \pi$ radians _____
18. If $SE + RT = 63$ in., then 63 in. $= SE + RT$ _____

Name _____ Date _____

Properties of Algebra

Directions: Use A–K to name the property demonstrated by the exercises.

A. Associative Property
B. Commutative Property
C. Distributive Property
D. Reflexive Property
E. Symmetric Property
F. Transitive Property
G. Substitution Property
H. Addition Property of Equality
I. Subtraction Property of Equality
J. Multiplication Property of Equality
K. Division Property of Equality

1. $6x^2 + x = x(6x + 1)$

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2. $(m\angle 1 + m\angle 2) + m\angle 3 = m\angle 1 + (m\angle 2 + m\angle 3)$

_____

3. $(m\angle 1 + m\angle 2) + m\angle 3 = (m\angle 2 + m\angle 1) + m\angle 3$

_____

4. If $AB + BC = AC$, then $BC + AB = AC$

_____

5. $2(AB)(MN) = (AB)(2)(MN)$

_____

6. If $m\angle A = m\angle B$ and $m\angle B = 35°$, then $m\angle A = 35°$

_____

7. If $AB + BC = AC$, then $AC = AB + BC$

_____

8. If $m\angle P - m\angle T = 75°$ and $m\angle P = 115°$, then $115° - m\angle T = 75°$

_____

9. $BD = BD$

_____

10. If $PQ + QR = MN$ and $MN = ST + UV$, then $PQ + QR = ST + UV$

_____

11. If $AB + BC = AC$ and $BC = 15$ cm, then $AB + 15 = AC$

_____

12. $m\angle ABC = m\angle ABC$

_____

13. $AB + BC = PQ$, therefore $AB = PQ - BC$

_____

14. $m\angle A = m\angle B$, therefore $m\angle A + 90° = m\angle B + 90°$

_____

15. $2(PQ) = 16$ m, therefore $PQ = 8$ m

_____

16. $m\angle P = \frac{1}{2}m\angle Q$, therefore $2m\angle P = m\angle Q$

_____

17. If $m\angle 1 + m\angle 2 + m\angle 3 + m\angle 4 = 360°$, and $m\angle 2 + m\angle 3 = 180°$, then $m\angle 1 + m\angle 4 = 180°$

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18. If $m\angle P - 86° = 150°$, then $m\angle P = 236°$.

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