



**1-3 Basic Properties of Real Numbers** (continued)**Vocabulary**

**Properties of Equality** For all real numbers  $a$ ,  $b$ , and  $c$ :

**Transitive property** If  $a = b$ , and  $b = c$ , then  $a = c$ .

Example: If  $x = 2 + 7$ , and  $2 + 7 = 9$ , then  $x = 9$ .

**Addition property** Adding the same number to both sides of an equation maintains equality. If  $a = b$ , then  $a + c = b + c$ .

Example: If  $x = 8$ , then  $x + 3 = 8 + 3$ .

**Multiplication property** Multiplying both sides of an equation by the same amount maintains equality. If  $a = b$ , then  $ac = bc$ .

Example: If  $x = 5$ , then  $x \cdot 6 = 5 \cdot 6$ .

**Example 2** Name the property used in each step.

<b>Solution</b>	a. $\frac{1}{3}(1 + 3x) = \frac{1}{3} \cdot 1 + \frac{1}{3} \cdot (3x)$	a. Distributive property
	b. $= \frac{1}{3} \cdot 1 + \left(\frac{1}{3} \cdot 3\right)x$	b. Associative property of multiplication
	c. $= \frac{1}{3} \cdot 1 + (1)x$	c. Property of reciprocals
	d. $= \frac{1}{3} + x$	d. Identity property of multiplication

Name the property used in each step of the simplification.

- |   |   |
|---|---|
| <p>10. <math>\frac{1}{4}(y + 4)</math></p> <p><math>= \frac{1}{4}y + \frac{1}{4} \cdot 4</math>      a. ?</p> <p><math>= \frac{1}{4}y + 1</math>      b. ?</p>  | <p>11. <math>x + (x + 5)</math></p> <p><math>= (x + x) + 5</math>      a. ?</p> <p><math>= (1 \cdot x + 1 \cdot x) + 5</math>      b. ?</p> <p><math>= (1 + 1)x + 5</math>      c. ?</p> <p><math>= 2x + 5</math>      Substitution</p>                                   |
| <p>12. <math>5 + 2(x + 1)</math></p> <p><math>= 5 + (2x + 2 \cdot 1)</math>      a. ?</p> <p><math>= 5 + (2x + 2)</math>      b. ?</p> <p><math>= 5 + (2 + 2x)</math>      c. ?</p> <p><math>= (5 + 2) + 2x</math>      d. ?</p> <p><math>= 7 + 2x</math>      Substitution</p> | <p>13. <math>a(b + 1) + (-1)a</math></p> <p><math>= a(b + 1) + a(-1)</math>      a. ?</p> <p><math>= a[(b + 1) + (-1)]</math>      b. ?</p> <p><math>= a[b + (1 + (-1))]</math>      c. ?</p> <p><math>= a[b + 0]</math>      d. ?</p> <p><math>= ab</math>      e. ?</p> |

**Mixed Review Exercises**

Use  $<$ ,  $=$ , or  $>$  to make a true statement.

- |                              |  |  |
|------------------------------|--|--|
| 1. $0.105$ ? $0.1025$        | 2. $4(9 - 7)$ ? $4 \cdot 9 - 4 \cdot 7$          | 3. $(24 \div 6) \cdot 2$ ? $24 \div (6 \cdot 2)$       |
| 4. $2^2 + 5^2$ ? $(2 + 5)^2$ | 5. $\frac{8 + 4}{7 - 1}$ ? $\frac{7 + 1}{8 - 4}$ | 6. $\frac{2}{3} + \frac{2}{3}$ ? $\frac{2 + 2}{3 + 3}$ |