Alg 1 1.3

Recognize the properties of equality and identity.

Recognize the associative property

Reflexive
Symmetric
Transitive
Substitution
Additive identity
Additive identity

Multiplicative identity
Multiplicative inverse

Commutative property
Associative property

KeyConcept Properties of Equality

Property	Words	Symbols	Examples
Reflexive Property	Any quantity is equal to itself.	For any number a, $a = a$.	$5 = 5$ $4 + 7 = 4 + 7$
Symmetric Property	If one quantity equals a second quantity, then the second quantity equals the first.	For any numbers a and b, if $a = b$, then $b = a$.	If $8 = 2 + 6$, then $2 + 6 = 8$.
Transitive Property	If one quantity equals a second quantity and the second quantity equals a third quantity, then the first quantity equals the third quantity.	For any numbers a, b, and c, if $a = b$ and $b = c$, then $a = c$.	If $6 + 9 = 3 + 12$ and $3 + 12 = 15$, then $6 + 9 = 15$.
Substitution Property	A quantity may be substituted for its equal in any expression.	If $a = b$, then a may be replaced by b in any expression.	If $n = 11$, then $4n = 4 \cdot 11$

Handout

KeyConcept Addition Properties

Property	Words	Symbols	Examples
Additive Identity	For any number a, the sum of a and 0 is a.	$a + 0 = 0 + a = a$	$2 + 0 = 2$ $0 + 2 = 2$
Additive Inverse	A number and its opposite are additive inverses of each other.	$a + (-a) = 0$	$3 + (-3) = 0$ $4 - 4 = 0$

Multiplication identity

KeyConcept Associative Property

Words The way you group three or more numbers when adding or multiplying does not change their sum or product.

Symbols For any numbers a, b, and c,
$(a + b) + c = a + (b + c)$ and $(ab)c = a(bc)$.

Examples $(3 + 5) + 7 = 3 + (5 + 7)$ $(2 \cdot 6) \cdot 9 = 2 \cdot (6 \cdot 9)$

Find the value of x. Then name the property used.

38. $8 = 8 + x$

$8 = 8 + x$

$-8 \quad -8$

$0 = x$

39. $3.2 + x = 3.2$

$3.2 + x = 3.2$

$-3.2 \quad -3.2$

$x = 0$

40. $10x = 10$

$\frac{10x}{10} = \frac{10}{10}$

$x = 1$

$\frac{1}{10} \cdot 10x = 10 \cdot \frac{1}{10}$

$x = 1$

mult inv = reciprocal

41. $\frac{1}{2} \cdot x = \frac{1}{2} \cdot 7$

$\frac{1}{2} \cdot x = \frac{1}{2} \cdot \frac{7}{1}$

$\frac{2}{1} \cdot \frac{1}{2} \cdot x = \frac{7}{2} \cdot \frac{2}{1}$

$x = 7$

42. $x + 0 = 5$

$x + 0 = 5$

$-0 \quad -0$

$x = 5$

43. $1 \cdot x = 3$

$\frac{1 \cdot x}{1} = \frac{3}{1}$

$x = 3$

44. $5 \cdot \frac{1}{5} = x$

45. $2 + 8 = 8 + x$

46. $x + \frac{3}{4} = 3 + \frac{3}{4}$

47. $\frac{1}{3} \cdot x = 1$

$\frac{3}{1} \cdot \frac{1}{3} \cdot x = 1 \cdot \frac{3}{1}$

$x = 3$

$\frac{5}{1} \cdot \frac{1}{5} = x$

$1 = x$

$x + \frac{3}{4} = 3\frac{3}{4}$

$-\frac{3}{4} \quad -\frac{3}{4}$

$x = 3$

$2 + 8 = 8 + x$

$10 = 8 + x$

$-8 \quad -8$

$2 = x$