

Alg 1

1.3

Recognize the properties of equality and identity.

Recognize the associative property

$$16^2 = 256$$

Reflexive $3 = 3$

Symmetric $x = s \quad s = x$

Transitive $a = b, b = c \text{ then } a = c$

★ Substitution *write ans instead*

Additive identity $3 + 0 = 3$

Multiplicative identity $3 \cdot 1 = 3$

Multiplicative inverse = reciprocal

$$\frac{2}{5} \cdot \frac{5}{2} = \frac{10}{10} = 1$$

Commutative property


Associative property

$$\begin{array}{ccc}
 3 + 5 & 5 + 3 & \\
 (1 + 2) + 5 & 1 + (2 + 5) & \\
 \& \&
 \end{array}$$

 **Key Concept** 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.	$a + (-a) = 0$	$3 + (-3) = 0$ $4 - 4 = 0$

Siri Stalder/Sonnenschein Images

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

Evaluate each expression using properties of numbers. Name the property used in each step.

17. $25 + 14 + 15 + 36$

19. $3\frac{2}{3} + 4 + 5\frac{1}{3}$

21. $4.3 + 2.4 + 3.6 + 9.7$

$4.3 + 9.7 + 2.4 + 3.6$
 $14 + 6 = 20$

$25 + 14 + 15 + 36$ Comm.

$25 + 15 + 14 + 36$

$40 + 50$ Subs

90 Subs

18. $11 + 7 + 5 + 13$

20. $4\frac{4}{9} + 7\frac{2}{9} = 11\frac{6}{9}$ Sub
 $= 11\frac{2}{3}$ Sub

22. $3.25 + 2.2 + 5.4 + 10.75$

$11 + 7 + 5 + 13$

$11 + 5 + 7 + 13$ Comm

$16 + 20$ out

36 out

$3\frac{2}{3} + 4 + 5\frac{1}{3}$

$4 + 3\frac{2}{3} + 5\frac{1}{3}$ Comm
 $4 + 9$ out

13 out

Matching activity

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

38. $8 = 8 + x$

39. $3.2 + x = 3.2$

40. $10x = 10$

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

42. $x + 0 = 5$

43. $1 \cdot x = 3$

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

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

45. $2 + 8 = 8 + x$

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

