

Objective: 9/19/07 TSWBAT
 identify and use the Associative,
 Commutative, and Distributive
 Properties

Sep 21-9:47 AM

Associative Property of Addition
 and Multiplication

Arithmetic

$$(4+7)+3=4+(7+3)$$

Algebra

$$(a+b)+c=a+(b+c)$$

} Addition

Arithmetic

$$(4 \cdot 7) \cdot 3 = 4 \cdot (7 \cdot 3)$$

Algebra

$$(a \cdot b) \cdot c = a \cdot (b \cdot c)$$

} Multiplication

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Commutative Property of
 Addition and Multiplication

Arithmetic

$$7+12=12+7$$

Algebra

$$a+b=b+a$$

$$7 \cdot 12 = 12 \cdot 7$$

$$a \cdot b = b \cdot a$$

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Identity Property of Addition
 and Multiplication

Arithmetic

$$6+0=0+6=6$$

Algebra

$$a+0=0+a=a$$

$$6 \cdot 1 = 1 \cdot 6 = 6$$

$$a \cdot 1 = 1 \cdot a = a$$

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Distributive Property

Arithmetic

$$3(2+7)=3 \cdot 2+3 \cdot 7$$

$$(2+7)3=2 \cdot 3+7 \cdot 3$$

$$5(8-2)=5 \cdot 8-5 \cdot 2$$

$$(8-2)5=8 \cdot 5-2 \cdot 5$$

Algebra

$$a(b+c)=a \cdot b+a \cdot c$$

$$(b+c)a=b \cdot a+c \cdot a$$

$$a(b-c)=ab-ac$$

$$(b-c)a=ba-ca$$

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Identify the Property

Ⓐ $14+(12+16)=(14+12)+16$

Ⓑ $m+0=m$

Ⓒ $6(-7)3=6(3)(-7)$

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Use Mental Math

Ⓐ $26 + (-12) + 34$

Ⓑ $-8 + 16 + (-2)$

Ⓒ $4(-12)(5)$

Ⓓ $-8(5.7)$

Ⓔ $4(36 \cdot 25)$

Ⓕ $-28 + 32 + (-46) + 28$

Ⓖ $5(38)$

Ⓗ $8(39)$

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true or false

Ⓐ $9 \cdot 8 + 6 = 9 \cdot 6 + 8$

Ⓑ $-7(11-4) = 7(15)$

Ⓒ $12 \cdot 7 = 10 \cdot 7 + 2 \cdot 7$

Ⓓ $15 + (-17) = -17 + 15$

Ⓔ $93 \cdot (-8) = -93 \cdot 8$

Ⓕ $53 + (-19) = -53 + 19$

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Problem of the Day

A new car purchased for \$36,000 will lose 15% of its value each year for the first 3 years. What is the value of the car after 3 years? Show your work and explain your answer.

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EXERCISES

A Practice by Example Identify each property.

Example 1 (page 46)

1. $-191 + 0 = -191$ 2. $6(-5) = (-5)6$
 3. $(9 + 10) + 20 = 9 + (10 + 20)$ 4. $-62 + 79 = 79 + (-62)$
 5. $4(wx) = (4w)x$ 6. $m \cdot 1 = m$

Examples 2, 3 (pages 46-47)

Use mental math to simplify each expression.

7. $67 + 63 + 25$ 8. $87 + 32 + 13$ 9. $178 + 288 + 22$
 10. $13 - 67$ 11. $38 - 59$ 12. $24 - 46$
 13. $5 \cdot 245 \cdot 20$ 14. $-2(43)(-5)$ 15. $20(34)(-5)$

Example 4 (page 48)

Find each product.

16. $5(a + 6)$ 17. $7(b - 9)$ 18. $-4(t + 3)$
 19. $(x - 2)y$ 20. $(8 + r)s$ 21. $(-11 + w)(-2)$

Example 5 (page 48)

Use mental math and the Distributive Property to simplify.

22. $4 \cdot 18 + 6 \cdot 18$ 23. $9 \cdot 15 + 9 \cdot 5$ 24. $8 \cdot 12 - 8 \cdot 2$
 25. $40 \cdot 67 - 36 \cdot 67$ 26. $12 \cdot 104 - 12 \cdot 4$ 27. $87 \cdot 22 + 13 \cdot 22$

Example 6 (page 48)

Groceries Use the Distributive Property to find each total cost.

28. 3 loaves of bread at \$1.99 each 29. 6 cans of tuna at \$0.97 each
 30. 4 bags of berries at \$1.98 each 31. 5 boxes of rice at \$2.95 each

B Apply Your Skills Reasoning Determine whether each equation is true or false. Explain.

32. $7 \cdot 6 + 4 = 7 \cdot 4 + 6$ 33. $-6(-2) = 6(11)$
 34. $13 \cdot 9 = 10 \cdot 9 + 3 \cdot 3$ 35. $5(4 + b) = 20 + 5b$

Use mental math to simplify each expression.

36. $-50 + 2 + 108 + (-450)$ 37. $15 + (-20) + 45 + (-80)$
 38. $540 + 160 - 280 - 10$ 39. $(40)(-2)(20)(-10)$

The sample below shows how to adjust numbers in a sum to make them easier to add. Use this method to find each sum mentally.

Sample

40. $398 + 247$	41. $52.98 + 11.98$
$496 + 4 \rightarrow 500$	$42. 3.9 + 6.5$
$+246 - 4 \rightarrow 242$	$43. 15.99 + 52.41$
742	$44. 603 + 398$
	$45. 1104.99 + 397.99$

1-8 Properties of Numbers 49-50

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46. **Writing in Math** Explain how you would use the properties in this lesson to simplify $(-68) + 6(-99) + (-32)$.

47. **Shopping** Find the total cost of buying 4 pairs of candles for \$2.97 per pair, 3 cards for \$1.99 each, and 5 colored markers for \$1.99 each.

Challenge Use mental math to simplify each expression. Explain.

48. $17(9) + 9(13)$ 49. $483(0.25) + 517(0.25)$

50. **Stretch Your Thinking** Two planes leave from the same airport at the same time but travel in opposite directions. One is 90 mi/h faster than the other. They are 1820 miles apart after 2 hours. How fast is each plane traveling?

Test Prep

Multiple Choice Use the advertisement for Exercises 51-53.

51. Ellen buys 4 notebooks. She gives the cashier a \$10 bill. How much change does she get?
 A. \$2.44 B. \$2.88
 C. \$7.56 D. \$8.00

52. Brent buys 5 packages of folders. How much money does he spend?
 F. \$40 G. \$3.16 H. \$3.95 I. \$4.00

53. You buy 1 box of markers, 1 package of lined paper, and 2 packages of folders. How much do you spend in all?
 A. \$5.47 B. \$6.26 C. \$7.05 D. \$7.10

Short Response

54. You are in line at the grocery store with 3 items costing \$4.95, \$6.99, and \$1.65. Explain how you can add the cost of the 3 items in your head so that you can have your money ready.

Mixed Review

Lesson 1-6 55. Find the mean, median, mode, and range for this data set.
 $-6 \quad 5 \quad 2 \quad -3 \quad -7$

Lesson 1-5 Simplify each expression.

56. $-6 \cdot (-2) \cdot 3$ 57. $3(-4) \cdot 2$ 58. $-3(-1)(-1) \cdot 5$
 59. $-2 \cdot 5 \cdot (-1) \cdot 6 \cdot 1$ 60. $4 \cdot 5 \cdot (-2) \cdot (-1) \cdot (-3)$

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Name _____ Class _____ Date _____

Practice 1-8

Properties of Numbers

Use mental math to simplify each expression.

1. $8 + (-2) + 7 + (-5)$ 2. $-7 + 9 + 11 + (-13)$ 3. $17 + (-9) + 18 + (-11)$

4. $65 + 23 + 35$ 5. $220 + 343 + 80$ 6. $280 + 170 + 18 + (-5)$

7. $(-5)(38)(-20)$ 8. $2 \cdot 83 \cdot (-5)$ 9. $-5 \cdot (2 \cdot 38)$

10. $4 \cdot (25 \cdot 27)$ 11. $(50)(86)(20)$ 12. $-4 \cdot (36 \cdot 5)$

Use mental math and the Distributive Property to simplify.

13. $25(-99)$ 14. $19(-6)$ 15. $6 \cdot \$2.99$
 16. $102 \cdot \$21$ 17. $19 \cdot 21$ 18. $26 \cdot 97$
 19. $21 \cdot (-11)$ 20. $9 \cdot \$4.98$ 21. $103 \cdot \$32$

Determine whether each equation is true or false.

22. $9 \cdot 8 + 6 = 9 \cdot 6 + 8$ 23. $-7(11 - 4) = 7(15)$

24. $12 \cdot 7 = 10 \cdot 7 + 2 \cdot 7$ 25. $15 + (-17) = -17 + 15$

26. $93 \cdot (-8) = -93 \cdot 8$ 27. $53 + (-19) = -53 + 19$

The table to the right shows changes in daily temperature over a 5-day period.

28. Which two-day period had the greatest change in temperature?

Day	Change in Temperature
Mon	-12°F
Tue	$+6^\circ\text{F}$
Wed	-4°F
Thurs	-9°F
Fri	$+8^\circ\text{F}$

29. On Sunday the temperature was 20°F . What was the temperature at the end of the day on Friday?

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Reteaching 1-8

Properties of Numbers

Properties of numbers can help you find sums, differences, and products mentally.

Use the *Commutative Property* and the *Associative Property* to group opposites, to group negative numbers, or to make multiples of 10.

• Group opposites.
 $(-8) + (-15) + 8$
 $= (-8) + 8 + (-15)$
 $= 0 + (-15)$
 $= -15$

• Group negatives.
 $-13 + 25 + (-18) + 9$
 $= -13 + (-18) + 25 + 9$
 $= -31 + 34$
 $= 3$

• Make multiples of 10.
 $6 + (-28) + 54$
 $= 6 + 54 + (-28)$
 $= 60 + (-28)$
 $= 32$

Use the *Distributive Property* to rewrite one factor as the sum or difference of two numbers.

$3(59)$ (Think: $59 = 60 - 1$)
 $3(59) = 3(60 - 1)$
 $= 3(60) - 3(1)$
 $= 180 - 3$
 $= 177$

$4(8.2)$ (Think: $8.2 = 8 + 0.2$)
 $4(8.2) = 4(8 + 0.2)$
 $= 32 + 0.8$
 $= 32.8$

Use mental math to simplify each expression.

- $-8 + 16 + (-2)$ _____
- $-4 + 3 + (-20) + 7$ _____
- $49 + 12 + 31$ _____
- $5 + (-8) + 25 + 8$ _____
- $55 + (-6) + 15 + 6$ _____
- $4(-12)(5)$ _____
- $20 \cdot 18 \cdot 5$ _____
- $(-2)(9)(-5)$ _____
- $-8(5 \cdot 7)$ _____
- $4(36 \cdot 25)$ _____
- $-81 + 4 + (-19)$ _____
- $-28 + 32 + (-46) + 28$ _____

Use mental math and the distributive property to simplify.

- $8(3.9)$ _____
- $6(21)$ _____
- $4(7.2)$ _____
- $5(38)$ _____
- $6(10.1)$ _____
- $7(42)$ _____

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