33.) $24(2.5) = 24(2 + .5)$

$24 \cdot 2 + 24 \cdot .5$

$48 + 12$

60

$\frac{r}{4}$

$\frac{1}{4}$

31.) $\left(3\frac{1}{17}\right) \cdot 17$

$\left(3 + \frac{1}{17}\right) \cdot 17$

$3 \cdot 17 + \frac{1}{17} \cdot 17$

$51 + 1 = 52$

45.) $a + \frac{a}{5} + \frac{2}{5}a$

$1a + \frac{1}{5}a + \frac{2}{5}a$

$\left(1 + \frac{1}{5} + \frac{2}{5}\right)a$

$\left(1 + \frac{3}{5}\right)a$

$1\frac{3}{5}a = \frac{8}{5}a$

47) $3(x+y)+2(x+y)+4x$

$3x+3y+2x+2y+4x$

$3x+2x+4x+3y+2y$

$9x+5y$

ANSWERS

1. $8a^3 - 4a^2b$
2. $2a^2 + 2ab$
3. $2m + 5n + 4p$
4. $26y$
5. $26x + 10y$

1-8

NAME _____ DATE _____

Study Guide

Student Edition
Pages 51–55

Commutative and Associative Properties

The commutative and associative properties can be used to simplify expressions.

Commutative Properties
For any numbers a and b, $a + b = b + a$ and $a \cdot b = b \cdot a$.

changes order of terms

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

moves parentheses around

Example: Simplify $8(y + 2x) + 7y$.

$8(y + 2x) + 7y$	$= (8y + 16x) + 7y$	Distributive property
	$= (16x + 8y) + 7y$	Commutative property of addition
	$= 16x + (8y + 7y)$	Associative property of addition
	$= 16x + (8 + 7)y$	Distributive property
	$= 16x + 15y$	Substitution property of equality

Simplify.

1. $4x + 3y + x$

$4x + x + 3y$

$5x + 3y$

2. $8r^2s + 2rs^2 + 7r^2s$

$15r^2s + 2rs^2$

3. $6(2x + 4y) + 2(x + 9)$

$12x + 24y + 2x + 18$

$14x + 24y + 18$

4. $3a^2 + 4b + 10a^2$

$13a^2 + 4b$

5. $4xy + 7x^2y + xy$

$5xy + 7x^2y$

6. $3ab + 4a^2b + 5(2a^2b)$

$3ab + 4a^2b + 10a^2b$

$3ab + 14a^2b$

7. $6(a + b) - a + 3b$

$6a + 6b - a + 3b$

$6a - a + 6b + 3b$

$5a + 9b$

8. $0.5(18x + 16y) + 13x$

$9x + 8y + 13x$

$22x + 8y$

9. $\frac{2}{3} + \frac{1}{2}(x + 10) + \frac{4}{3}$

$\frac{2}{3} + \frac{1}{2}x + 5 + \frac{4}{3}$ $\quad 7 + \frac{1}{2}x$

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

10. $5(0.3x + 0.1y) + 0.2x$

11. $5(2y + 3x) + 6(y + x)$

12. $z^2 + 9x^2 + \frac{4}{3}z^2 + \frac{1}{3}x^2$

$z^2 + \frac{4}{3}z^2 + 9x^2 + \frac{1}{3}x^2$

$\left(1 + \frac{4}{3}\right)z^2 + \left(9 + \frac{1}{3}\right)x^2$

$\frac{7}{3}z^2 + \frac{28}{3}x^2$

Name the property illustrated by each statement.

13. $6x + 2y = 2y + 6x$

comm (+)

14. $15(a + 4) = 15a + 15(4)$

dist

15. $1 \cdot b^3 = b^3$

ID (·)

16. $(2c + 6) + 10 = 2c + (6 + 10)$

assoc (+)

$\frac{2}{3} + \frac{4}{3} = \frac{6}{3} = 2$

1) comm (+)

2.) assoc (·)

3) assoc (+)

4) comm (+)

5) $7a+9b$

6) $3j+21+10k$

7) $6+7xz+4y$

8.) $1.5x+0.2y$

9.) $13p+20$

10.) $10a+8b$

7) $6+3xz+4(xz+y)$

$6+3xz+4xz+4y$