3 Coefficients and Terms

[BA-7-05-11-16]

In arithmetic you know that $5 + 5 = 2 \cdot 5$, that $5 + 5 + 5 = 3 \cdot 5$, and so on. Working with variables is very similar.

$$x = 1x$$
$$x + x = 2x$$
$$x + x + x = 3x$$
$$x + x + x + x = 4x$$

Note that x and $1x$ mean the same.

The numbers 1, 2, 3, and 4 are called **coefficients** of x.

Now you can rewrite expressions.

$$x + x + y + y + y = (x + x) + (y + y + y)$$
$$= 2x + 3y$$

In the expression $2x + 3y$, we call $2x$ and $3y$ the **terms.**

$2x + 3y$ — terms of the expression

$3a + 4b - 8c$ — terms of the expression

Sometimes the terms of an expression can be combined. We can only combine *like* terms. We cannot combine *unlike* terms. Here are some examples of like and unlike terms.

like terms: $2x + 3x = 5x$

unlike terms: $2x + 3y$

like terms: $6a - 4a = 2a$

unlike terms: $6ab - 4b$

like terms: $6c + c = 7c$

unlike terms: $6c + 6$

When you combine like terms you **simplify** the expression. Look at the examples at the top of the following page.

EXAMPLES

1. Simplify $2a + 6a + 3$.
$2a + 6a + 3 = 8a + 3$

2. Simplify $3ab + 4ab - 9$.
$3ab + 4ab - 9 = 7ab - 9$

3. Simplify $4x + 5x + 7 - 2$.
$4x + 5x + 7 - 2 = 9x + 5$

4. Simplify $5a + 3xy - xy$.
$5a + 3xy - xy = 5a + 2xy$

Classroom Practice

Complete the statement.

1. In the expression $5x$ the coefficient of x is ___?___.
2. In the expression $6x + 7y$ the coefficient of x is ___?___.
3. In the expression $4a + b$ the coefficient of b is not written. It is understood to be ___?___.

Simplify.

4. $x + x$
5. $y + y + y$
6. $2ab + 3ab$
7. $3a + a + 3 + 2$

Written Exercises

Simplify.

A

1. $2x + 4x$
2. $3x + 5x$
3. $3a + 7a$
4. $5b - 2b$
5. $9y - 6y$
6. $6xy - 2xy$
7. $2a + 5a + 6$
8. $5y + 3y + 4y$
9. $3a + 5a + 4a$
10. $6b + 3b - b$
11. $4 + 5y + 6y$
12. $2x + 4x + 7$
13. $8s - 2s - 2$
14. $3a + a - 2$
15. $3 + 4y + 5y$
16. $3a + 3a + 3$
17. $3a + a - 4$
18. $2a + 5a + 3a$
19. $6 - 2 + 4x$
20. $y + 2y - 7$
21. $6xy - xy + 7$
22. $9c - 2c + 4c$
23. $5d + 6d - 3d$
24. $8y + 3y - 4y$
25. $7y - 2y + 9x$
26. $2x + x + 4y$
27. $7ab - 2ab + 5b$
28. $cd + 4cd - 2a$
29. $3xy - xy + 2x$
30. $2m + 5n + 6 - 4$

Simplify if possible. If you cannot simplify, write *not possible*.

31. $3n + 3$
32. $4s - 4s$
33. $3ab + 3b$
34. $2a + 5a$
35. $ar + 4ar$
36. $r + 4s$
37. $8n + 2$
38. $9a - 3$

Answers to Selected Exercises

CHAPTER 1

Written Exercises, pages 6–7 **1.** 1 **3.** 10 **5.** 3 **7.** 10 **9.** 16 **11.** 0 **13.** 9 **15.** 24 **17.** 24 **19.** 4 **21.** 17 **23.** 10 **25.** 10 **27.** 10 **29.** 26 **31.** 96 **33.** $x + 7$ **35.** $2n$ **37.** ba **39.** Subtract 4. **41.** Divide by 8. **43.** t

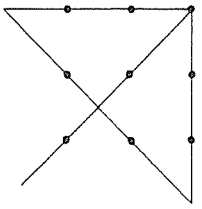
Written Exercises, page 9 **1.** 24 **3.** 36 **5.** 2 **7.** 17 **9.** 7 **11.** 31 **13.** 14 **15.** 18 **17.** 9 **19.** 20 and 14 **21.** 40 and 68 **23.** 12 and 18 **25.** 6, 13 **27.** $2x, 2x + 7$ **29.** 11, 22

Written Exercises, page 11 **1.** $6x$ **3.** $10a$ **5.** $3y$ **7.** $7a + 6$ **9.** $12a$ **11.** $4 + 11y$ **13.** $6s - 2$ **15.** $3 + 9y$ **17.** $4a - 4$ **19.** $4 + 4x$ **21.** $5xy + 7$ **23.** $8d$ **25.** $5y + 9x$ **27.** $5ab + 5b$ **29.** $2xy + 2x$ **31.** Not possible **33.** Not possible **35.** $5ar$ **37.** Not possible

Written Exercises, page 13 **1.** 46 **3.** 143 **5.** 1571 **7.** $8n + 6$ **9.** $7c + 4$ **11.** $31 + 6a$ **13.** $10m + 11$ **15.** $ab + 10$ **17.** $4s + 5$ **19.** $4k + 4n$ **21.** $5n - 9b$ **23.** $7a + 6b$ **25.** $8a + 5b + 4$ **27.** $7d - 7a$ **29.** $3a + 4b$

Written Exercises, page 15 **1.** 9 **3.** 4 **5.** 100 **7.** y^4 **9.** x^2y^3 **11.** rs^3 **13.** t^2m^2 **15.** f^3g^2h **17.** de^2f^2 **19.** $7m^3$ **21.** $2a^2m^2$ **23.** $5n^3p$ **25.** $6a^2b$

Puzzle Problems, page 15



Written Exercises, page 17 **1.** 2900 **3.** 3300 **5.** 730 **7.** $6x$ **9.** $15a$ **11.** $2b^2$ **13.** $18y$ **15.** $20n$ **17.** $72f$ **19.** $4a^2$ **21.** $8ab$ **23.** $16x^2$ **25.** $35a^3$ **27.** $10b^3$ **29.** $6x$ **31.** $2x^2$ **33.** Multiply by 4.

Written Exercises, page 19 **1.** Yes **3.** Yes **5.** $2x + 6$ **7.** $4x + 8$ **9.** $7a + 21$ **11.** $9x + 36$ **13.** $3x - 6$ **15.** $c^2 - 3c$ **17.** $14x + 7$ **19.** $15x - 10$ **21.** $6x + 8y$ **23.** $3x^2 - xy$ **25.** $2x + 13$ **27.** $7x + 15$ **29.** $36 + 5y$ **31.** $8x + 23$ **33.** $8 + 32x$ **35.** $20b + 4$ **37.** $7m + 9$ **39.** $x^2 + xy + 2$

Written Exercises, page 21 **1.** 0 **3.** 35 **5.** 0 **7.** Impossible **9.** 0 **11.** 0 **13.** $8x$ **15.** $6c$ **17.** $15a$ **19.** x **21.** x **23.** x **25.** Add 7. **27.** Subtract 9. **29.** Add 16. **31.** Add 11.

Written Exercises, page 23 **1.** 1 **3.** 1 **5.** 1 **7.** 3 c **11.** 4 **13.** x **15.** a **17.** x **19.** **21.** Divide by 6. **23.** x **25.** Multiply by 7. **27.** 4

Calculator Activities, page 24 **1.** 2 **3.** 32 **5.** 21

Written Exercises, page 26 **1.** 3 **3.** 12 **5.** 2 **7.** 4 **9.** 3 **11.** 5 **13.** 5 **15.** Answers may vary. **17.** Answers may vary. **19.** 8 **21.** 6 **23.** 8 **25.** Any number **27.** 40 **29.** Any number **31.** 2 **33.** 0

Puzzle Problems, page 26 The lion tamer must be bald; since Geraldine and Amos have hair, Christopher is the lion tamer. Then, by clue 3, the ringmaster is Geraldine. Thus, Amos is the elephant trainer.

Written Exercises, page 28 **1.** $<$ **3.** $>$ **5.** $>$ **7.** $>$ **9.** 4 **11.** 1, 3, 7 **13.** 20 **15.** 6, 2 **17.** 4, 6 **19.** 10, 11 **21.** 2, 5 **23.** 4, 5, 6 **25.** $<$ **27.** $=$ **29.** $<$