

2.1 Simplifying Algebraic Expressions

Solutions

Determine the coefficient of each term.	
1. $3x$ coefficient = 3	2. $-7x$
3. $x^2 = 1x^2$ coefficient = 1	4. xy
Tell whether the two terms are “like terms” or “unlike term.”	
5. $5x$ $3x$ like terms	6. $-2x$ $7x$
7. $5x$ $4y$ unlike terms	8. $5x^2$ $3x$
Simplify, if possible.	
9. $4a + 7a = (4 + 7)a$ = 11a	10. $a + 7a$
11. $-3x + 9x - 12y = (-3 + 9)x - 12y$ = 6x - 12y	12. $-4a + 7a - 2b$
13. $-6a + 2 - 4a = -6a + -4a + 2$ $= (-6 + -4)a + 2$ = -10a + 2	14. $-8m + m - 9 - 2m$
15. $3(x - 4) + 9x - 2$ $= 3x - 12 + 9x - 2$ $= 3x + -12 + 9x + -2$ $= 3x + 9x + -12 + -2$ $= (3 + 9)x + -12 + -2$ $= 12x + -14$ = 12x - 14	16. $2x + 7(-2x - 1)$
Answers: 1. 3; 3. 1; 5. like; 7. unlike; 9. 11a; 11. 6x - 12y 13. -10a + 2; 15. 12x - 14	

Simplify.

$$\begin{aligned} 17. \quad & -3(2x + 1) + 2(3x + -4) \\ & = -3 \cdot 2x + -3 \cdot 1 + 2 \cdot 3x + 2 \cdot -4 \\ & = -6x + -3 + 6x + -8 \\ & = -6x + 6x + -3 + -8 \\ & = 0 + -11 \\ & = -11 \end{aligned}$$

$$18. \quad 5(3x + 4) + 2(3x - 1)$$

$$\begin{aligned} 19. \quad & 5x^2 - 3x + x^2 + 2 \\ & = 5x^2 + -3x + x^2 + 2 \\ & = 5x^2 + x^2 + -3x + 2 \\ & = 6x^2 + -3x + 2 \\ & = 6x^2 - 3x + 2 \end{aligned}$$

$$20. \quad 4 + 3x^2 - 2x + 4x^2$$

$$\begin{aligned} 21. \quad & 3(3y - 4) - (7y - 4) \\ & = 3(3y + -4) + -1 \cdot (7y + -4) \\ & = 3 \cdot 3y + 3 \cdot -4 + -1 \cdot 7y + -1 \cdot -4 \\ & = 9y + -12 + -7y + 4 \\ & = 9y + -7y + -12 + 4 \\ & = 2y + -8 \\ & = 2y - 8 \end{aligned}$$

$$22. \quad -5(2m - 3) - (m - 2)$$

$$\begin{aligned} 23. \quad & 7 - 3(4x - 5) \\ & = 7 + -3(4x + -5) \\ & = 7 + -3 \cdot 4x + -3 \cdot -5 \\ & = 7 + -12x + 15 \\ & = -12x + 7 + 15 \\ & = -12x + 22 \end{aligned}$$

$$24. \quad -2 + 5(-3x - 2)$$

$$\begin{aligned} 25. \quad & -7x + (4x + -5) \cdot 3 \\ & = -7x + 3 \cdot 4x + 3 \cdot -5 \\ & = -7x + 12x + -15 \\ & = 5x + -15 \\ & = 5x - 15 \end{aligned}$$

$$26. \quad x + (2x - 3)(4)$$

Answers: 17. -11; 19. $6x^2 - 3x + 2$; 21. $2y - 8$; 23. $-12x + 22$; 25. $5x - 15$

Translate to an algebraic expression. Let x represent the unknown number.

27. The **sum** of the **square** of a **number** and **7**.

$$x^2 + 7$$

28. The sum of 5 times a number and 3.

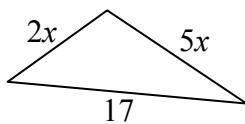
29. **Nine less than 3** times a **number**.

$$3x - 9$$

30. Nine less than the square of a number.

Find a simplified expression for the perimeter of each figure.

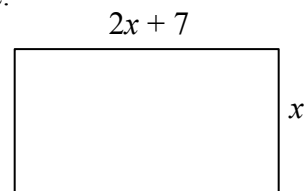
31.



$$\text{Perimeter} = 2x + 5x + 17$$

$$= 7x + 17$$

32.



33. In a recent election for mayor, the first candidate received x votes. The second candidate received **twice as many votes as the first**, and the third candidate received **275 less votes than the first**. Write expressions that represent the number of votes received by the second and third candidates.

First candidate's votes = x

Second candidate's votes = $2x$

Third candidate's votes = $x - 275$

34. Write and simplify an expression that represents the total number of votes received by the three candidates in the previous problem.

Answers: 27. $x^2 + 7$; 29. $3x - 9$; 31. $7x + 17$; 33. $2x, x - 275$