

# Simplifying Polynomials

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Score: \_\_\_\_\_ / 18

## Quick Review and Helpful Hints

To simplify a polynomial, first remove parentheses: distribute any coefficient, and remember that a *minus sign* in front of parentheses flips the sign of every term inside. Then combine like terms and write the result in descending order of degree.

▷ **Example:** Simplify  $(3x^2 + 2x) - (x^2 - 4x)$ . **Work:** Distribute the minus sign across the second group:  $3x^2 + 2x - x^2 + 4x$ . Now combine like terms:  $(3x^2 - x^2) + (2x + 4x)$ . ★ **Answer:**  $2x^2 + 6x$

## ◆ Practice Problems

Simplify each polynomial expression.

1.  $(2x + 3) + (5x - 1)$

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2.  $(4a - 2) + (a + 6)$

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3.  $(3x^2 + x) - (x^2 - 2x)$

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4.  $(6y - 4) - (2y - 9)$

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

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6.  $(5m^2 - 3m) + (2m^2 + m)$

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7.  $(7 - 2x) - (3 - 5x)$

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8.  $4(2a - 1) - (a + 3)$

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9.  $(x^2 + 5x - 2) + (3x^2 - 2x + 6)$

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10.  $(8b + 1) - (b - 7)$

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11.  $3(x^2 - 2) + 2(x^2 + 5)$

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12.  $(9p - 4) - (4p - 4)$

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13.  $(2x^2 - x + 3) - (x^2 + 4x - 1)$

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14.  $5(y + 2) - 2(2y - 3)$

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## ◆ Word Problems

15. A triangle has sides of length  $x + 2$ ,  $2x - 1$ , and  $3x + 4$ . Write its perimeter in simplest form.

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16. A company's revenue is  $(5x^2 + 3x)$  and its cost is  $(2x^2 - x)$ . Revenue minus cost gives profit. Simplify the profit.

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17. Add the polynomials  $(4x^2 - 2x + 7)$  and  $(x^2 + 6x - 3)$ .

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18. Subtract  $(3a - 5)$  from  $(7a + 2)$ .

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## Answer Keys

- |                |                    |                     |
|----------------|--------------------|---------------------|
| 1. $7x + 2$    | 7. $3x + 4$        | 13. $x^2 - 5x + 4$  |
| 2. $5a + 4$    | 8. $7a - 7$        | 14. $y + 16$        |
| 3. $2x^2 + 3x$ | 9. $4x^2 + 3x + 4$ | 15. $6x + 5$        |
| 4. $4y + 5$    | 10. $7b + 8$       | 16. $3x^2 + 4x$     |
| 5. $5x + 5$    | 11. $5x^2 + 4$     | 17. $5x^2 + 4x + 4$ |
| 6. $7m^2 - 2m$ | 12. $5p$           | 18. $4a + 7$        |

### Step-by-Step Explanations

1. Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Combine like terms:  $(2x + 5x) + (3 - 1) = 7x + 2$ . So the final answer is  $7x + 2$ .
2. A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Combine:  $(4a + a) + (-2 + 6) = 5a + 4$ . So the final answer is  $5a + 4$ .
3. Step by step: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Distribute the minus:  $3x^2 + x - x^2 + 2x = 2x^2 + 3x$ . So the final answer is  $2x^2 + 3x$ .
4. Take it one move at a time: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Distribute the minus:  $6y - 4 - 2y + 9 = 4y + 5$ . So the final answer is  $4y + 5$ .
5. Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Distribute:  $2x + 8 + 3x - 3 = 5x + 5$ . So the final answer is  $5x + 5$ .
6. A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Combine:  $(5m^2 + 2m^2) + (-3m + m) = 7m^2 - 2m$ . So the final answer is  $7m^2 - 2m$ .
7. Step by step: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Distribute the minus:  $7 - 2x - 3 + 5x = 3x + 4$ . So the final answer is  $3x + 4$ .
8. Take it one move at a time: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Distribute:  $8a - 4 - a - 3 = 7a - 7$ . So the final answer is  $7a - 7$ .
9. Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Combine:  $(x^2 + 3x^2) + (5x - 2x) + (-2 + 6) = 4x^2 + 3x + 4$ . So the final answer is  $4x^2 + 3x + 4$ .
10. A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Distribute the minus:  $8b + 1 - b + 7 = 7b + 8$ . So the final answer is  $7b + 8$ .
11. Step by step: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Distribute:  $3x^2 - 6 + 2x^2 + 10 = 5x^2 + 4$ . So the final answer is  $5x^2 + 4$ .
12. Take it one move at a time: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Distribute the minus:  $9p - 4 - 4p + 4 = 5p$ . So the final answer is  $5p$ .
13. Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Distribute the minus:  $2x^2 - x + 3 - x^2 - 4x + 1 = x^2 - 5x + 4$ . So the final answer is  $x^2 - 5x + 4$ .
14. A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Distribute:  $5y + 10 - 4y + 6 = y + 16$ . So the final answer is  $y + 16$ .
15. Step by step: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Add the three sides:  $(x + 2) + (2x - 1) + (3x + 4) = 6x + 5$ . So the final answer is  $6x + 5$ .
16. Take it one move at a time: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Profit =  $(5x^2 + 3x) - (2x^2 - x) = 5x^2 + 3x - 2x^2 + x = 3x^2 + 4x$ . So the final answer is  $3x^2 + 4x$ .
17. Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Combine:  $(4x^2 + x^2) + (-2x + 6x) + (7 - 3) = 5x^2 + 4x + 4$ . So the final answer is  $5x^2 + 4x + 4$ .
18. A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is "Subtract from" means  $(7a + 2) - (3a - 5) = 7a + 2 - 3a + 5 = 4a + 7$ . So the final answer is  $4a + 7$ .



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