PREALG: Introduction to Algebra

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Learning Objectives

- Evaluate algebraic expressions by substituting values
- Simplify expressions by combining like terms
- Solve one-step equations (addition, subtraction, multiplication)
- Translate word problems into algebraic expressions

Simplify each expression completely. Show all steps and circle your final answer.

Combining like terms

1. Combine like terms: 3x + 2x

$3x + 2x$

Answer: _____

2. Simplify by combining like terms: 3x + 4x + 8 - 3

$3x + 4x$

Answer: _____

3. A student writes 9x + 5x for the total cost of tickets. Simplify this expression.

$9x + 5x$

Answer: _____

4. Combine like terms: 5x + 4x

$5x + 4x$

Answer: _____

5. Simplify by combining like terms: 7x + 2x + 8 - 3

$7x + 2x$

Answer: _____

6. A student writes 6x + 4x for the total cost of tickets. Simplify this expression.

$6x + 4x$

Answer: _____

7. Combine like terms: 6x + 6x

$$6x + 6x$$

Answer: _____

8. Simplify by combining like terms: 10x + 3x + 8 - 3

$$10x + 3x$$

Answer: _____

9. A student writes 5x + 1x for the total cost of tickets. Simplify this expression.

$$5x + 1x$$

Answer: _____

10. Combine like terms: 2x + 3x

$$2x + 3x$$

Answer: _____

11. Simplify by combining like terms: 4x + 4x + 8 - 3

$$4x + 4x$$

Answer: _____

12. A student writes 8x + 5x for the total cost of tickets. Simplify this expression.

$$8x + 5x$$

Answer: _____

Solving one-step equations

13. Solve for x: x + 6 = 18

$$x + 6 = 18$$

Answer: _____

14. Solve for x: 2x = 7

$$2x = 7$$

Answer: _____

15. After earning $14 more, Maria has $14 in all. Write and solve an equation to find how much she started with.

$$x + 14 = 14$$

Answer: _____

16. Solve for x: x + 4 = 19

$$x + 4 = 19$$

Answer: _____

17. Solve for x: 2x = 5

$$2x = 5$$

Answer: _____

18. After earning $20 more, Maria has $10 in all. Write and solve an equation to find how much she started with.

$$x + 20 = 10$$

Answer: _____

19. Solve for x: x + 9 = 19

$$x + 9 = 19$$

Answer: _____

20. Solve for x: 5x = 4

$$5x = 4$$

Answer: _____

21. After earning $16 more, Maria has $28 in all. Write and solve an equation to find how much she started with.

$$x + 16 = 28$$

Answer: _____

Evaluating expressions

22. Evaluate 6x + -2 when x = 5.

$$6x - 2,\ x = 5$$

Answer: _____

23. A plumber charges $24 per hour plus a $54 service fee. What is the total cost for 4 hours? Evaluate 24x + 54 at x = 4.

$$24x + 54,\ x = 4$$

Answer: _____

24. Evaluate 4x^2 + 3 when x = 3.

$$4x^2 + 3,\ x = 3$$

Answer: _____

25. Evaluate 1x + 5 when x = 1.

$$1x + 5,\ x = 1$$

Answer: _____

26. A plumber charges $57 per hour plus a $35 service fee. What is the total cost for 2 hours? Evaluate 57x + 35 at x = 2.

$$57x + 35,\ x = 2$$

Answer: _____

27. Evaluate 2x^2 + -3 when x = 4.

$$2x^2 + -3,\ x = 4$$

Answer: _____

28. Evaluate 2x + 3 when x = 7.

$$2x + 3,\ x = 7$$

Answer: _____

29. A plumber charges $24 per hour plus a $24 service fee. What is the total cost for 4 hours? Evaluate 24x + 24 at x = 4.

$$24x + 24,\ x = 4$$

Answer: _____

30. Evaluate 4x^2 + -2 when x = 5.

$$4x^2 + -2,\ x = 5$$

Answer: _____

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ANSWER KEY & SOLUTIONS

Topics: Combining like terms, Evaluating expressions, Solving one-step equations. All answers verified by independent computation.

Solutions

Combining like terms

1. Combine like terms: 3x + 2x

$3x + 2x$

→ *Both terms contain the variable x — they are like terms.*
→ *Add the coefficients: 3 + 2 = 5.*
→ *Simplified: 5x.*

Answer: $(3 + 2)x = 5x$

2. Simplify by combining like terms: 3x + 4x + 8 - 3

$3x + 4x$

→ *Combine x terms: 3x + 4x = 7x.*
→ *Combine constants: 8 - 3 = 5.*
→ *Simplified: 7x + 5.*

Answer: $(3 + 4)x = 7x$

3. A student writes 9x + 5x for the total cost of tickets. Simplify this expression.

$9x + 5x$

→ *Both terms have the same variable x.*
→ *Add the coefficients: 9 + 5 = 14.*
→ *Simplified total cost expression: 14x.*

Answer: $(9 + 5)x = 14x$

4. Combine like terms: 5x + 4x

$5x + 4x$

→ *Both terms contain the variable x — they are like terms.*
→ *Add the coefficients: 5 + 4 = 9.*
→ *Simplified: 9x.*

Answer: $(5 + 4)x = 9x$

5. Simplify by combining like terms: 7x + 2x + 8 - 3

$7x + 2x$

→ *Combine x terms: 7x + 2x = 9x.*
→ *Combine constants: 8 - 3 = 5.*
→ *Simplified: 9x + 5.*

Answer: $(7 + 2)x = 9x$

6. A student writes 6x + 4x for the total cost of tickets. Simplify this expression.

$6x + 4x$

→ *Both terms have the same variable x.*
→ *Add the coefficients: 6 + 4 = 10.*
→ *Simplified total cost expression: 10x.*

Answer: $(6 + 4)x = 10x$

7. Combine like terms: 6x + 6x

$6x + 6x$

→ *Both terms contain the variable x — they are like terms.*
→ *Add the coefficients: 6 + 6 = 12.*
→ *Simplified: 12x.*

Answer: $(6 + 6)x = 12x$

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8. Simplify by combining like terms: 10x + 3x + 8 - 3

$10x + 3x$

→ *Combine x terms: 10x + 3x = 13x.*
→ *Combine constants: 8 - 3 = 5.*
→ *Simplified: 13x + 5.*

Answer: $(10 + 3)x = 13x$

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9. A student writes 5x + 1x for the total cost of tickets. Simplify this expression.

$5x + 1x$

→ *Both terms have the same variable x.*
→ *Add the coefficients: 5 + 1 = 6.*
→ *Simplified total cost expression: 6x.*

Answer: $(5 + 1)x = 6x$

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10. Combine like terms: 2x + 3x

$2x + 3x$

→ *Both terms contain the variable x — they are like terms.*
→ *Add the coefficients: 2 + 3 = 5.*
→ *Simplified: 5x.*

Answer: $(2 + 3)x = 5x$

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11. Simplify by combining like terms: 4x + 4x + 8 - 3

$4x + 4x$

→ *Combine x terms: 4x + 4x = 8x.*
→ *Combine constants: 8 - 3 = 5.*
→ *Simplified: 8x + 5.*

Answer: $(4 + 4)x = 8x$

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12. A student writes 8x + 5x for the total cost of tickets. Simplify this expression.

$8x + 5x$

→ *Both terms have the same variable x.*
→ *Add the coefficients: 8 + 5 = 13.*
→ *Simplified total cost expression: 13x.*

Answer: $(8 + 5)x = 13x$

Solving one-step equations

13. Solve for x: x + 6 = 18

$$x + 6 = 18$$

→ *Subtract 6 from both sides to isolate x.*
→ *x = 18 - 6 = 12.*
→ *Check: 12 + 6 = 18. True.*

Answer: $x = 18 - (6) = 12$

14. Solve for x: 2x = 7

$$2x = 7$$

→ *Divide both sides by 2 to isolate x.*
→ *x = 7 / 2 = 7/2.*

Answer: $x = 7 \div 2 = 7/2$

15. After earning $14 more, Maria has $14 in all. Write and solve an equation to find how much she started with.

$$x + 14 = 14$$

→ *Let x = starting amount. Equation: x + 14 = 14.*
→ *Subtract 14 from both sides: x = 14 - 14 = 0.*
→ *Maria started with $0.*

Answer: $x = 14 - (14) = 0$

16. Solve for x: x + 4 = 19

$$x + 4 = 19$$

→ *Subtract 4 from both sides to isolate x.*
→ *x = 19 - 4 = 15.*
→ *Check: 15 + 4 = 19. True.*

Answer: $x = 19 - (4) = 15$

17. Solve for x: 2x = 5

$$2x = 5$$

→ *Divide both sides by 2 to isolate x.*
→ *x = 5 / 2 = 5/2.*

Answer: $x = 5 \div 2 = 5/2$

18. After earning $20 more, Maria has $10 in all. Write and solve an equation to find how much she started with.

$$x + 20 = 10$$

→ *Let x = starting amount. Equation: x + 20 = 10.*
→ *Subtract 20 from both sides: x = 10 - 20 = -10.*
→ *Maria started with $-10.*

Answer: $x = 10 - (20) = -10$

19. Solve for x: x + 9 = 19

$$x + 9 = 19$$

→ *Subtract 9 from both sides to isolate x.*
→ *x = 19 - 9 = 10.*
→ *Check: 10 + 9 = 19. True.*

Answer: $x = 19 - (9) = 10$

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20. Solve for x: 5x = 4

$$5x = 4$$

→ *Divide both sides by 5 to isolate x.*
→ *x = 4 / 5 = 4/5.*

Answer: $x = 4 \div 5 = 4/5$

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21. After earning $16 more, Maria has $28 in all. Write and solve an equation to find how much she started with.

$$x + 16 = 28$$

→ *Let x = starting amount. Equation: x + 16 = 28.*
→ *Subtract 16 from both sides: x = 28 - 16 = 12.*
→ *Maria started with $12.*

Answer: $x = 28 - (16) = 12$

Evaluating expressions

22. Evaluate 6x + -2 when x = 5.

$$6x - 2,\ x = 5$$

→ *Substitute x = 5: 6(5) + -2 = 30 + -2 = 28.*

Answer: $6(5) + -2 = 30 + -2 = 28$

23. A plumber charges $24 per hour plus a $54 service fee. What is the total cost for 4 hours? Evaluate 24x + 54 at x = 4.

$$24x + 54,\ x = 4$$

→ *Total = 24(4) + 54 = 96 + 54 = $150.*

Answer: $24(4) + 54 = 96 + 54 = 150$

24. Evaluate 4x^2 + 3 when x = 3.

$$4x^2 + 3,\ x = 3$$

→ *Substitute x = 3: 4(3)^2 + 3 = 4(9) + 3 = 36 + 3 = 39.*

Answer: $4(3)^2 + 3 = 36 + 3 = 39$

25. Evaluate 1x + 5 when x = 1.

$$1x + 5,\ x = 1$$

→ *Substitute x = 1: 1(1) + 5 = 1 + 5 = 6.*

Answer: $1(1) + 5 = 1 + 5 = 6$

26. A plumber charges $57 per hour plus a $35 service fee. What is the total cost for 2 hours? Evaluate 57x + 35 at x = 2.

$$57x + 35,\ x = 2$$

→ *Total = 57(2) + 35 = 114 + 35 = $149.*

Answer: $57(2) + 35 = 114 + 35 = 149$

27. Evaluate 2x^2 + -3 when x = 4.

$$2x^2 + -3,\ x = 4$$

→ *Substitute x = 4: 2(4)^2 + -3 = 2(16) + -3 = 32 + -3 = 29.*

Answer: $2(4)^2 + -3 = 32 + -3 = 29$

28. Evaluate 2x + 3 when x = 7.

$$2x + 3,\ x = 7$$

→ *Substitute x = 7: 2(7) + 3 = 14 + 3 = 17.*

Answer: $2(7) + 3 = 14 + 3 = 17$

29. A plumber charges $24 per hour plus a $24 service fee. What is the total cost for 4 hours? Evaluate 24x + 24 at x = 4.

$$24x + 24,\ x = 4$$

→ *Total = 24(4) + 24 = 96 + 24 = $120.*

Answer: $24(4) + 24 = 96 + 24 = 120$

30. Evaluate 4x^2 + -2 when x = 5.

$$4x^2 + -2,\ x = 5$$

→ *Substitute x = 5: 4(5)^2 + -2 = 4(25) + -2 = 100 + -2 = 98.*

Answer: $4(5)^2 + -2 = 100 + -2 = 98$