

LESSON

1

Algebraic Reasoning

Review for Mastery: Order of Operations

To help you remember the order of operations use the phrase

* → "Please Excuse My Dear Aunt Sally."

P: first, parentheses (if any)

E: second, exponents (if any)

M and D: then, multiplication and division, in order from left to right

A and S: finally, addition and subtraction, in order from left to right

Evaluate.

$$39 \div (9 + 4) + 5 - 2^2$$

$$\underline{\text{Parentheses}} \longrightarrow 39 \div 13 + 5 - 2^2$$

$$\underline{\text{Exponents}} \longrightarrow 39 \div 13 + 5 - 4$$

$$\underline{\text{Multiply and divide from left to right}} \longrightarrow 3 + 5 - 4$$

$$\underline{\text{Add and subtract from left to right}} \longrightarrow 8 - 4 = 4$$

Simplify each expression.

#1, #6, and #12 are already done for examples.

1. $12 \cdot 4 - 2$

$$48 - 2 = 46$$

2. $15 \div 3 \cdot 5$

3. $15 \cdot 3 \div 5$

4. $8 + 20 \div 4$

5. $5 - 2 \cdot 6 \div 4 + 1$

6. $3^2 + 6 \cdot 4 - 5^2$

$$9 + 6 \cdot 4 - 25$$

$$9 + 24 - 25 = 8$$

7. $1 + 4 \cdot 9 \div 6 - 7$

8. $18 \div (6 \div 3)$

9. $(18 \div 6) \div 3$

$$18 \div 2 = 9$$

10. $4 \cdot 5 + 8 \div 2 - 7$

11. $2 \cdot 3 - 8 \div 2^2$

12. $8(7 - 6) \div 2^3$

$$8 \cdot 1 \div 2^3$$

$$8 \cdot 1 \div 8 = 1$$

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LESSON 1 Algebraic Reasoning
Practice A: Order of Operations

Choose the letter for the best answer.

- | | | |
|--------------------------|-------|----------------------------|
| 1. $75 + 12 \cdot 2$ | | 2. $100 - 25 \div 5$ |
| A 87 | C 108 | F 15 |
| B 99 | D 174 | G 75 |
| | | H 80 |
| | | J 95 |
| 3. $50 - 18 \div 6 + 2$ | | 4. $72 - 4^2 \cdot 2$ |
| A 49 | C 10 | F 32 |
| B 40 | D 4 | G 40 |
| | | H 56 |
| | | J 64 |
| 5. $(8 + 22) \div 5 + 5$ | | 6. $3^3 - (9 \cdot 2 + 1)$ |
| A 30 | C 11 | F 19 |
| B 17.4 | D 3 | G 10 |
| | | H 8 |
| | | J -10 |

Simplify each expression.

- | | | |
|---------------------|----------------------|--------------------------------------|
| 7. $2^4 \div 8 + 5$ | 8. $18 + 2(1 + 3^2)$ | 9. $(16 \div 4) + 4 \cdot (2^2 - 2)$ |
|---------------------|----------------------|--------------------------------------|

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Practice B: Order of Operations

Simplify each expression.

- | | | |
|------------------------------|------------------------------|------------------------------|
| 1. $15 \cdot 3 + 12 \cdot 2$ | 2. $212 + 21 \div 3$ | 3. $9 \cdot 3 - 18 \div 3$ |
| 4. $65 - 36 \div 3$ | 5. $100 - 9^2 + 2$ | 6. $3 \cdot 5 - 45 \div 3^2$ |
| 7. $54 \div 6 + 4 \cdot 6$ | 8. $(6 + 5) \cdot 16 \div 2$ | 9. $60 - 8 \cdot 12 \div 3$ |

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LESSON 1 Algebraic Reasoning
Practice C: Order of Operations

Simplify each expression.

- | | | |
|------------------------------|------------------------------|-------------------------------|
| 1. $25 \cdot 3 + 60 \cdot 2$ | 2. $350 \div 5 + 12 \cdot 7$ | 3. $3 \cdot 9 + 96 \div 4$ |
| 4. $77 - 42 \div 7^1$ | 5. $532 - 2^5 \div 4$ | 6. $3(20 - 4^2) + 7$ |
| 7. $270 \div 6 + 6^2$ | 8. $(5 + 6)^2 + 18 \div 2$ | 9. $10^2 - 25 \cdot 3 \div 5$ |

LESSON

3

Algebraic Reasoning

Review for Mastery: Variables and Algebraic Expressions

A **variable** is a letter that represents a number that can change in an expression. When you **evaluate** an algebraic expression, you substitute the value given for the variable in the expression.

- Algebraic expression: $x - 3$

The value of the expression depends on the value of the variable x .

$$\text{If } x = 7 \rightarrow 7 - 3 = 4$$

$$\text{If } x = 11 \rightarrow 11 - 3 = 8$$

$$\text{If } x = 15 \rightarrow 15 - 3 = 12$$

- Evaluate $4n + 1$ for $n = 5$.

$$\text{Replace the variable } n \text{ with } 5. \rightarrow 4(5) + 1 = 20 + 1 = 21$$

Evaluate each expression for the given value. *Some are done for you as examples.*

1. $a + 7$ for $a = 3$

$$3 + 7 = 10$$

2. $k - 5$ for $k = 13$

3. $y \div 3$ for $y = 6$

4. $12 + m$ for $m = 9$

5. $3n - 2$ for $n = 5$

$$3 \cdot 5 - 2 = 13$$

6. $5x + 4$ for $x = 4$

7. $c - 9$ for $c = 11$

8. $b + 16$ for $b = 4$

9. $a - 4$ for $a = 9$

10. $25 - g$ for $g = 12$

11. $w + 5$ for $w = 2$

12. $3 + s$ for $s = 8$

13. $7q$ for $q = 10$

$$7 \cdot 10 = 70$$

14. $2y + 9$ for $y = 8$

15. $6x - 3$ for $x = 1$

$$6 \cdot 1 - 3 = 3$$

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LESSON

3

Algebraic Reasoning**Practice A: Variables and Algebraic Expressions**Find the value of $n + 3$ for each value of n .

1. $n = 4$

2. $n = 7$

3. $n = 0$

4. $n = 32$

Find the value of $x - 9$ for each value of x .

5. $x = 12$

6. $x = 57$

7. $x = 19$

8. $x = 100$

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LESSON

3

Algebraic Reasoning**Practice B: Variables and Algebraic Expressions**Evaluate $n - 5$ for each value of n .

1. $n = 8$

2. $n = 121$

3. $n = 32$

4. $n = 59$

Evaluate each expression for the given values of the variable.

5. $3n + 15$ for $n = 4$

6. $h \div 12$ for $h = 60$

7. $32x - 32$ for $x = 2$

8. $\frac{c}{2}$ for $c = 24$

9. $(n + 2)5$ for $n = 14$

10. $8p + 148$ for $p = 15$

CDL Day #11