

# Order of Operations and Evaluating Expressions

## Algebra 1 • Section 1.2

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

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

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### Quick Review and Helpful Hints

Algebra becomes easier when every symbol has a job. Read the operation first, keep signs attached to their terms, and check that each step still means the same thing as the original expression.

▷ **Example:** Simplify  $2(x + 6) + 3x$ .

**Work:** Distribute first:  $2(x + 6) = 2x + 12$ . Then combine like terms:  $2x + 12 + 3x = 5x + 12$ .

★ **Answer:**  $5x + 12$

### ◆ Practice Problems

Solve each problem. Show enough work that another student could follow your thinking.

1. Evaluate  $9 + 4 \cdot 3$ . \_\_\_\_\_

6. Evaluate  $3x^2 - 2x$  when  $x = -2$ . \_\_\_\_\_

2. Evaluate  $(9 + 4) \cdot 3$ . \_\_\_\_\_

7. Evaluate  $(a + b)^2$  when  $a = 3$  and  $b = 5$ . \_\_\_\_\_

3. Evaluate  $2^3 + 18 \div 6$ . \_\_\_\_\_

8. Evaluate  $\sqrt{49} + 2^4$ . \_\_\_\_\_

4. Evaluate  $30 - (4 + 2)^2$ . \_\_\_\_\_

9. Evaluate  $5(12 - 8) + 3^2$ . \_\_\_\_\_

5. Evaluate  $\frac{5 + 7}{10 - 6}$ . \_\_\_\_\_

10. Evaluate  $\frac{24}{3 + 5} + 6$ . \_\_\_\_\_

### ◆ Word Problems

11. A gym charges \$18 plus \$4 per class. Evaluate  $18 + 4c$  for  $c = 7$ . \_\_\_\_\_

12. A rectangle has length  $2x + 1$  and width  $x + 4$ . Find the perimeter when  $x = 5$ . \_\_\_\_\_



## Answer Keys

1. 21

2. 39

3. 11

4. -6

5. 3

6. 16

7. 64

8. 23

9. 29

10. 9

11. \$46

12. 40

### Step-by-Step Explanations

1. Multiplication is hungrier than addition, so it eats first:  $4 \cdot 3 = 12$ , and then  $9 + 12 = 21$ .

2. Parentheses get VIP treatment, so  $9 + 4 = 13$  happens before anything else. After that it's just  $13 \cdot 3 = 39$ .

3. Powers and division both outrank addition, so handle them quietly first:  $2^3 = 8$ ,  $18 \div 6 = 3$ , then  $8 + 3 = 11$ .

4. Work outward from the inside:  $4 + 2 = 6$ , then square that to get 36. Since 36 is bigger than 30, you dip below zero to -6.

5. A fraction bar is like invisible parentheses around the top and bottom. Tidy each one — 12 over 4 — and the division gives 3.

6. Wrap the -2 in parentheses so the negative behaves:  $3(-2)^2 = 12$  and  $-2(-2) = +4$ , which add to 16.

7. Plug in before you square — the parentheses want the sum finished first. So  $3 + 5 = 8$ , and  $8^2 = 64$ .

8. Square roots and exponents both like to go early:  $\sqrt{49} = 7$ ,  $2^4 = 16$ , and then you simply add them for 23.

9. Clear the parentheses first ( $12 - 8 = 4$ ), then  $5(4) = 20$ . The power  $3^2 = 9$  joins in last for a total of 29.

10. Finish the bottom of the fraction before dividing:  $3 + 5 = 8$ , so  $24 \div 8 = 3$ , and tacking on 6 gives 9.

11. Let  $c$  be 7 classes. Multiply before adding, so  $4(7) = 28$ , then stack on the \$18 joining fee for \$46.

12. Find the actual sides at  $x = 5$  first: length 11, width 9. Perimeter walks all four sides, so  $2(11) + 2(9) = 40$ .



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