

# Writing and Evaluating Algebraic Expressions

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

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

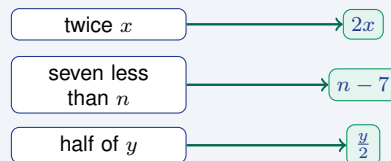
Score: \_\_\_\_\_ / 17

This is where algebra begins! An **algebraic expression** lets you describe a quantity even when you do not know its exact value yet—so words like “five more than a number” become math symbols like  $x + 5$ . When you *evaluate* an expression, you swap the variable for a real number and simplify using order of operations. Master these two skills and you have the keys to equations, formulas, and every algebra topic that comes next!

## Key Concepts & Quick Review

**Key words:** sum (+), difference (−), product (×), quotient (÷), more than, less than, twice, half of, increased/decreased by.

**Evaluating:** replace the variable with the given value and follow order of operations (PEMDAS).  
Example: evaluate  $3x^2 - 4$  for  $x = 2$ :  $3(2)^2 - 4 = 12 - 4 = 8$ .



*Translate the words first, then substitute values.*

## Examples

① Write an expression for each: (a) seven less than twice a number  $n$ ; (b) the product of five and  $x$ , increased by three.

**Think It Through:** Turn the words into math one phrase at a time. In part (a), “twice a number” means  $2n$ . Then “seven less than” tells you to subtract 7 from that amount, giving  $2n - 7$ . In part (b), “the product of five and  $x$ ” means  $5x$ . The phrase “increased by three” means add 3, so the final expression is  $5x + 3$ . The key is to translate each word clue carefully instead of trying to do the whole sentence at once.

**Answer:** (a)  $2n - 7$ ; (b)  $5x + 3$

② Evaluate  $4a^2 - 3b + 1$  for  $a = 3$  and  $b = -2$ .

**Think It Through:** Substitute the given values first:  $4(3)^2 - 3(-2) + 1$ . Then follow the order of operations. Compute the exponent:  $(3)^2 = 9$ . Multiply:  $4 \cdot 9 = 36$ . Be careful with the negative in the middle term:  $-3(-2) = +6$  because a negative times a negative is positive. Now add the pieces:  $36 + 6 + 1 = 43$ .

**Answer:** 43



### Practice Problems

Evaluate each expression for the given values.

- |  |  |
|--|--|
| 1. Evaluate $3x + 5$ when $x = 4$ . _____              | 10. Evaluate $a^2 + b^2$ when $a = 3$ and $b = 4$ . _____        |
| 2. Evaluate $2n - 7$ when $n = 6$ . _____              | 11. Evaluate $6 - 2t$ when $t = -3$ . _____                      |
| 3. Evaluate $4a + 2b$ when $a = 3$ and $b = 1$ . _____ | 12. Evaluate $n^2 - 3n + 2$ when $n = 5$ . _____                 |
| 4. Evaluate $x^2 - 1$ when $x = 5$ . _____             | 13. Evaluate $4x + \frac{y}{3}$ when $x = 2$ and $y = 9$ . _____ |
| 5. Evaluate $\frac{m}{4} + 3$ when $m = 12$ . _____    | 14. Evaluate $(r + s)^2$ when $r = 1$ and $s = 4$ . _____        |
| 6. Evaluate $5y - 2z$ when $y = 3$ and $z = 4$ . _____ | 15. Evaluate $7m - 4$ when $m = \frac{1}{2}$ . _____             |
| 7. Evaluate $3k^2$ when $k = 2$ . _____                |  |
| 8. Evaluate $2(p + 4)$ when $p = 7$ . _____            |  |
| 9. Evaluate $\frac{3c}{2} - 1$ when $c = 8$ . _____    |  |

### Study Tips

-  “**Less than**” flips the order! “Seven less than  $n$ ” is  $n - 7$ , not  $7 - n$ . Read carefully.
-  When substituting a **negative value**, wrap it in parentheses:  $3(-2)^2$  not  $3-2^2$  — the parentheses prevent sign errors.
-  Always follow **PEMDAS** when evaluating: exponents before multiplication, multiplication before addition.

### Word Problems

16. A food truck charges \$3.50 per taco plus a one-time \$1.25 guacamole fee for any order. Write an expression for the total cost  $C$  of ordering  $t$  tacos. How much does a group of friends pay if they order 8 tacos? If another group paid exactly \$18.75, how many tacos did they order? \_\_\_\_\_
17. A drone descends from a height of 120  $m$ . Its height in meters after  $t$  seconds is given by  $h = 120 - 4t^2$ . Find the drone’s height after 3  $s$  and after 5  $s$ . Between which two whole-number seconds does the drone first reach a height below 30  $m$ ? \_\_\_\_\_



## Answer Keys

- |   |  |
|---|--|
| <p>1) 17</p> <p>2) 5</p> <p>3) 14</p> <p>4) 24</p> <p>5) 6</p> <p>6) 7</p> <p>7) 12</p> <p>8) 22</p> <p>9) 11</p> | <p>10) 25</p> <p>11) 12</p> <p>12) 12</p> <p>13) 11</p> <p>14) 25</p> <p>15) <math>-\frac{1}{2}</math></p> <p>16) <math>C = 3.50t + 1.25</math>; 8 tacos: \$29.25; 5 tacos</p> <p>17) After 3 s: 84 m; after 5 s: 20 m; below 30 m between <math>t = 4</math> and <math>t = 5</math></p> |
|---|--|

### Step-by-Step Explanations

**Strategy:** For Percents Greater Than 100% and Less Than 1%, remember that very large percents mean more than one whole, while tiny percents mean only a small fraction of one whole. The answer should feel reasonable: over 100% grows past the whole, while less than 1% stays very small.

**Practice 1:** Convert 150% to a decimal. **Answer:** 1.5

At the beginning of the practice, move the decimal two places left; a percent over 100% becomes a number greater than 1.

**Practice 15:** Convert the fraction  $\frac{7}{4}$  to a percent. **Answer:** 175%

For the later model problem, first rewrite  $\frac{7}{4}$  as 1.75, then multiply by 100%. The answer is greater than 100% because the fraction is greater than 1.

#### Word-problem notes:

**16. Answer:**  $0.8\% = 0.008 = \frac{1}{125}$ ;  $5,000 \times 0.008 = 40$  people.

To change 0.8% into a decimal, divide by 100:  $0.8 \div 100 = 0.008$ . As a fraction, that is  $\frac{0.8}{100} = \frac{8}{1000} = \frac{1}{125}$ . Now find 0.8% of 5,000 by multiplying the decimal form:  $5,000 \times 0.008 = 40$ . Percent problems are often easier once you convert the percent to a decimal first.

**17. Answer:** This month:  $\frac{900}{600} = 150\%$ ; increase:  $\frac{300}{600} = 50\%$ . The first is  $> 100\%$ .

First compare this month's production to last month's:  $\frac{900}{600} = 1.5 = 150\%$ . That means this month's production is 150% of last month's amount. Now find the increase itself:  $900 - 600 = 300$  parts. As a percent of last month's production, that is  $\frac{300}{600} = 0.5 = 50\%$ . The 150% value is greater than 100% because the factory made more this month than it did last month.



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