

# Introduction to Equations and Solutions

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

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

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

## Quick Review and Helpful Hints

An *equation* states that two expressions are equal. A *solution* is a value of the variable that makes the equation true. To check whether a number is a solution, substitute it for the variable and see if both sides come out equal.

▷ **Example:** Is  $x = 4$  a solution of  $3x - 5 = 7$ ? **Work:** Substitute 4 for  $x$ :  $3(4) - 5 = 12 - 5 = 7$ . The left side equals the right side ( $7 = 7$ ).

★ **Answer:** Yes



A solution makes both sides equal.

## ◆ Practice Problems

Tell whether the value is a solution (Yes/No), or solve the equation.

1. Is  $x = 3$  a solution of  $x + 5 = 8$ ? \_\_\_\_\_

8. Is  $x = 10$  a solution of  $x + 3 = 12$ ? \_\_\_\_\_

2. Is  $x = 2$  a solution of  $4x = 12$ ? \_\_\_\_\_

9. Solve  $x + 6 = 10$  \_\_\_\_\_

3. Is  $x = 5$  a solution of  $2x - 1 = 9$ ? \_\_\_\_\_

10. Solve  $x - 3 = 5$  \_\_\_\_\_

4. Is  $x = -1$  a solution of  $3x + 4 = 1$ ? \_\_\_\_\_

11. Solve  $2x = 14$  \_\_\_\_\_

5. Is  $x = 6$  a solution of  $x - 2 = 3$ ? \_\_\_\_\_

12. Solve  $\frac{x}{3} = 4$  \_\_\_\_\_

6. Is  $x = 0$  a solution of  $5x + 7 = 7$ ? \_\_\_\_\_

13. Is  $x = -2$  a solution of  $x^2 = 4$ ? \_\_\_\_\_

7. Is  $x = 4$  a solution of  $\frac{x}{2} = 2$ ? \_\_\_\_\_

14. Is  $x = 3$  a solution of  $2x + 1 = x + 4$ ? \_\_\_\_\_

## ◆ Word Problems

15. A number plus 8 equals 15. Write an equation and solve for the number. \_\_\_\_\_

16. Twice a number is 18. Find the number. \_\_\_\_\_

17. Maria has \$ $x$ . After earning \$5 she has \$20. Solve  $x + 5 = 20$ . \_\_\_\_\_

18. Is  $t = 4$  a solution of  $3t - 2 = 10$ ? Check by substituting. \_\_\_\_\_



## Answer Keys

- |                                 |                                       |                                       |
|---------------------------------|---------------------------------------|---------------------------------------|
| 1. <input type="checkbox"/> Yes | 7. <input type="checkbox"/> Yes       | 13. <input type="checkbox"/> Yes      |
| 2. <input type="checkbox"/> No  | 8. <input type="checkbox"/> No        | 14. <input type="checkbox"/> Yes      |
| 3. <input type="checkbox"/> Yes | 9. <input type="checkbox"/> $x = 4$   | 15. <input type="checkbox"/> $x = 7$  |
| 4. <input type="checkbox"/> Yes | 10. <input type="checkbox"/> $x = 8$  | 16. <input type="checkbox"/> 9        |
| 5. <input type="checkbox"/> No  | 11. <input type="checkbox"/> $x = 7$  | 17. <input type="checkbox"/> $x = 15$ |
| 6. <input type="checkbox"/> Yes | 12. <input type="checkbox"/> $x = 12$ | 18. <input type="checkbox"/> Yes      |

### 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 Substitute 3:  $3 + 5 = 8$ . True, so yes. So the final answer is Yes.

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 Substitute 2:  $4(2) = 8$ , not 12. So no. So the final answer is No.

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 Substitute 5:  $2(5) - 1 = 9$ . True, so yes. So the final answer is Yes.

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 Substitute  $-1$ :  $3(-1) + 4 = -3 + 4 = 1$ . True, so yes. So the final answer is Yes.

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 Substitute 6:  $6 - 2 = 4$ , not 3. So no. So the final answer is No.

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 Substitute 0:  $5(0) + 7 = 7$ . True, so yes. So the final answer is Yes.

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 Substitute 4:  $\frac{4}{2} = 2$ . True, so yes. So the final answer is Yes.

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 Substitute 10:  $10 + 3 = 13$ , not 12. So no. So the final answer is No.

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 Subtract 6 from both sides:  $x = 4$ . So the final answer is  $x = 4$ .

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 Add 3 to both sides:  $x = 8$ . So the final answer is  $x = 8$ .

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 Divide both sides by 2:  $x = 7$ . So the final answer is  $x = 7$ .

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 Multiply both sides by 3:  $x = 12$ . So the final answer is  $x = 12$ .

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 Substitute  $-2$ :  $(-2)^2 = 4$ . True, so yes. So the final answer is Yes.

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 Substitute 3: left  $2(3) + 1 = 7$ , right  $3 + 4 = 7$ . Equal, so yes. So the final answer is Yes.

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 The equation is  $x + 8 = 15$ . Subtract 8:  $x = 7$ . So the final answer is  $x = 7$ .

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 The equation is  $2x = 18$ . Divide by 2:  $x = 9$ . So the final answer is 9.

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 Subtract 5 from both sides:  $x = 15$ . So the final answer is  $x = 15$ .

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 Substitute 4:  $3(4) - 2 = 12 - 2 = 10$ . True, so yes. So the final answer is Yes.



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