

# Introduction to Equations and Solutions

## Algebra 1 • Section 1.4

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

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

Score: \_\_\_\_\_ / 12

### 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. Is  $x = 6$  a solution of  $x + 9 = 15$ ? \_\_\_\_\_

6. Is  $m = 8$  a solution of  $\frac{m}{2} + 3 = 6$ ? \_\_\_\_\_

2. Is  $a = 4$  a solution of  $3a - 2 = 14$ ? \_\_\_\_\_

7. Write an equation: 7 less than a number is 18. \_\_\_\_\_

3. Write an equation: a number plus 11 is 27. \_\_\_\_\_

8. Write an equation: half a number equals 13. \_\_\_\_\_

4. Write an equation: four times a number is 52. \_\_\_\_\_

9. Is  $r = 5$  a solution of  $2r + 4 = r + 9$ ? \_\_\_\_\_

5. Is  $y = 3$  a solution of  $5(y + 1) = 20$ ? \_\_\_\_\_

10. Write an equation: the total of  $x$  and  $x + 4$  is 30. \_\_\_\_\_

### ◆ Word Problems

11. A streaming plan costs \$9 plus \$2 per movie. Write an equation for a \$23 bill. \_\_\_\_\_

12. Sam says  $x = 4$  solves  $6x - 5 = 20$ . Is Sam correct? \_\_\_\_\_



## Answer Keys

- |                  |                        |
|------------------|------------------------|
| 1. Yes           | 7. $n - 7 = 18$        |
| 2. No            | 8. $\frac{n}{2} = 13$  |
| 3. $n + 11 = 27$ | 9. Yes                 |
| 4. $4n = 52$     | 10. $x + (x + 4) = 30$ |
| 5. Yes           | 11. $9 + 2m = 23$      |
| 6. No            | 12. No                 |

### Step-by-Step Explanations

- A solution is just a value that makes the equation honest. Try 6:  $6 + 9$  really is 15, so yes.
- Test it by plugging in:  $3(4) - 2$  comes out to 10, but we wanted 14 — so 4 doesn't fit.
- Give the mystery number a name like  $n$ . 'Plus 11' becomes  $+11$  and 'is' is your equals sign.
- 'Four times a number' means 4 multiplied by  $n$ , and the little word 'is' quietly means equals.
- Substitute and follow the order:  $3 + 1 = 4$  inside, then  $5(4) = 20$ . It matches, so 3 works.
- Pop in 8: half of 8 is 4, plus 3 makes 7. That's not 6, so 8 isn't the answer.
- '7 less than a number' means you start with  $n$  and take 7 away — so  $n - 7$ , set equal to 18.
- Half of something is that thing cut in two, which is dividing by 2. So  $n$  over 2 equals 13.
- With  $r = 5$ , both sides need to agree: the left gives 14 and the right also gives 14, so it checks out.
- 'Total of' is your cue to add the two expressions together, then set that sum equal to 30.
- The \$9 shows up no matter what, while  $2m$  grows with each movie. Together they have to total the \$23 bill.
- Always verify a claimed solution. Here  $6(4) - 5 = 19$ , not 20 — and a real solution has to make both sides match exactly.



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