

# Inverse Variation

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Score: \_\_\_\_\_ / 26

## Q Quick Review

In **inverse variation**, the product of two quantities stays constant:  $xy = k$ , or  $y = \frac{k}{x}$ . The constant  $k$  is found by multiplying one input-output pair:  $k = xy$ . Inverse variation does not pass through the origin because  $x = 0$  is not allowed. When one quantity increases, the other decreases in a way that keeps the product the same.

## PRACTICE

Find the inverse-variation constant or write the model.

- |   |  |
|---|--|
| 1. $y = \frac{12}{x}$ ; $k$ _____   | 10. Table (2, 12), (3, 8), (4, 6); inverse? _____                  |
| 2. $y = \frac{-20}{x}$ ; $k$ _____  | 11. Table (1, 5), (2, 7), (3, 9); inverse? _____                   |
| 3. $(x, y) = (3, 8)$ ; $k$ _____  | 12. $xy = 48$ ; $y$ when $x = 6$ _____                             |
| 4. $(x, y) = (-4, 5)$ ; $k$ _____   | 13. $xy = -15$ ; $x$ when $y = 3$ _____                            |
| 5. $k = 30$ ; model _____   | 14. For $y = \frac{10}{x}$ , what values of $x$ are allowed? _____ |
| 6. $y = \frac{18}{x}$ ; $y$ when $x = 6$ _____  | 15. $y = \frac{10}{x}$ ; does it pass through (0, 0)? _____        |
| 7. $y = \frac{40}{x}$ ; $x$ when $y = 5$ _____  | 16. If $x$ doubles in $xy = 60$ , $y$ does what? _____             |
| 8. If $y$ varies inversely with $x$ , $y = 9$ when $x = 4$ ; $k$ _____  | 17. Point (5, 7); inverse model _____                              |
| 9. A lighting setup follows the inverse-variation model from the previous item, $xy = 36$ . What is $y$ when $x = 12$ ? _____ | 18. $y = \frac{24}{x}$ ; $y$ when $x = -3$ _____                   |
|   | 19. Product $xy = 100$ ; $y = 20$ ; $x$ _____                      |
|   | 20. Inverse variation with $k = 1$ _____                           |

## ◆ VISUAL PRACTICE

Use the graph, table, chart, or diagram to answer the question.

21. The table shows inverse variation. What is the constant  $k$ ?

$x$	2	3	4	6
$y$	12	8	6	4

Answer: \_\_\_\_\_

22. If  $xy = 36$ , what is  $y$  when  $x = 9$ ?

$x$	$y$	$xy$
9		36

Answer: \_\_\_\_\_

## ◆ Word Problems

23. A 120-mile trip has travel time  $t$  that varies inversely with speed  $r$ . Write the model and find the time at 40 mph. \_\_\_\_\_
24. Six workers can finish a job in 10 hours. Assuming the work rate stays the same, how long would 15 workers take? \_\_\_\_\_
25. The pressure of a gas varies inversely with its volume. If pressure is 30 psi at 8 L, find the pressure at 12 L. \_\_\_\_\_
26. A rectangular garden has fixed area 96 square feet. Write the width  $w$  as a function of length  $\ell$ , and find  $w$  when \_\_\_\_\_



## Answer Keys

- |                       |                                   |
|-----------------------|-----------------------------------|
| 1. 12                 | 14. $x \neq 0$                    |
| 2. -20                | 15. no                            |
| 3. 24                 | 16. halves                        |
| 4. -20                | 17. $y = \frac{35}{x}$            |
| 5. $y = \frac{30}{x}$ | 18. -8                            |
| 6. 3                  | 19. 5                             |
| 7. 8                  | 20. $y = \frac{1}{x}$             |
| 8. 36                 | 21. 24                            |
| 9. 3                  | 22. 4                             |
| 10. yes               | 23. $t = \frac{120}{r}$ ; 3 hours |
| 11. no                | 24. 4 hours                       |
| 12. 8                 | 25. 20 psi                        |
| 13. -5                | 26. $w = \frac{96}{\ell}$ ; 6 ft  |

### Step-by-Step Tutor Notes

1. Focus on the main idea of the problem, then simplify carefully. The numerator is the constant of variation. So the answer is 12.
2. Use the clue in the question first, then let the arithmetic finish the job. The product  $xy$  stays at  $-20$ . So the answer is  $-20$ .
3. This is a good place to slow down, check the notation, and simplify cleanly.  $k = xy = 3 \cdot 8 = 24$ . So the answer is 24.
4. Take it one clear step at a time and keep the original question in mind.  $k = (-4)(5) = -20$ . So the answer is  $-20$ .
5. Take it one clear step at a time and keep the original question in mind. Inverse variation has form  $y = k/x$ . So the answer is  $y = \frac{30}{x}$ .
6. Use the clue in the question first, then let the arithmetic finish the job.  $18/6 = 3$ . So the answer is 3.
7. Start with the definition the problem is testing, then apply it directly. Solve  $5 = \frac{40}{x}$ , so  $x = 8$ . So the answer is 8.
8. Focus on the main idea of the problem, then simplify carefully.  $k = xy = 4 \cdot 9 = 36$ . So the answer is 36.
9. Focus on the main idea of the problem, then simplify carefully. Use the constant product  $xy = 36$ . With  $x = 12$ , solve  $12y = 36$ , so  $y = 3$ . So the answer is 3.
10. Start with the definition the problem is testing, then apply it directly. Each product is 24. So the answer is yes.
11. Start with the definition the problem is testing, then apply it directly. The products are 5, 14, 27, not constant. So the answer is no.
12. Use the clue in the question first, then let the arithmetic finish the job.  $6y = 48$ , so  $y = 8$ . So the answer is 8.
13. Take it one clear step at a time and keep the original question in mind.  $3x = -15$ , so  $x = -5$ . So the answer is  $-5$ .
14. First identify the feature of the graph or equation that matches the wording of the question. Division by zero is not allowed, so every real  $x$  works except 0. That leads to  $x \neq 0$ .
15. This is a good place to slow down, check the notation, and simplify cleanly. The graph never has  $x = 0$ . So the answer is no.
16. This is a good place to slow down, check the notation, and simplify cleanly. The product must stay 60. So the answer is halves.
17. This is a good place to slow down, check the notation, and simplify cleanly.  $k = 5 \cdot 7 = 35$ . So the answer is  $y = \frac{35}{x}$ .
18. Use the clue in the question first, then let the arithmetic finish the job.  $24/(-3) = -8$ . So the answer is  $-8$ .
19. Take it one clear step at a time and keep the original question in mind.  $20x = 100$ . So the answer is 5.
20. This is a good place to slow down, check the notation, and simplify cleanly. This is the parent inverse-variation graph. So the answer is  $y = \frac{1}{x}$ .
21. Work one inverse operation at a time and keep both sides balanced. For inverse variation, multiply  $x$  and  $y$ . Each pair gives 24. After simplifying, the answer is 24.
22. Focus on the main idea of the problem, then simplify carefully. Keep the product at 36:  $9y = 36$ , so  $y = 4$ . So the answer is 4.
23. Use the given numbers to build the model, then finish the calculation. Distance is fixed, so  $rt = 120$ . Thus  $t = 120/r$ , and  $120/40 = 3$  hours.
24. Name the quantities first so the model is easy to read. Workers times hours is constant:  $6 \cdot 10 = 60$ . Then  $15h = 60$ , so  $h = 4$ .
25. Name the quantities first so the model is easy to read. The constant is  $30 \cdot 8 = 240$ . At 12 L,  $p = 240/12 = 20$  psi.
26. The safest move is to replace the variable, keep the arithmetic organized, and simplify one step at a time. Area is fixed, so  $\ell w = 96$ . Divide by  $\ell$  and substitute  $\ell = 16$  to get  $w = 6$ . That confirms the final answer is  $w = \frac{96}{\ell}$ ; 6 ft.



Scan Me

## Want a Full Algebra 1 Textbook? Try Our Ohio OST Made Simple Book!



### Ohio OST Algebra I Made Ridiculously Simple

The friendly, step-by-step Algebra 1 textbook  
Plain-English explanations, guided practice, and  
review support.



Full Lessons Inside

**Concepts**  
**Practice**  
**Mastery**

**Important:** All our test books contain **unique, completely different tests** from each other! Each book offers fresh practice questions—no repeats!

#### 5 Practice Tests

- ✓ 5 complete practice tests with detailed explanations
- ✓ Perfect foundation for OST test preparation
- ✓ Builds confidence and test-taking skills
- ✓ High-quality questions aligned with state standards

Start your practice journey!

#### 6 Practice Tests

- ✓ 6 complete practice tests with detailed explanations
- ✓ **Unique tests**—different from the 5 tests book
- ✓ Perfect for more practice after mastering 5 tests
- ✓ Builds even more confidence and test-taking skills
- ✓ Same high-quality questions aligned with standards

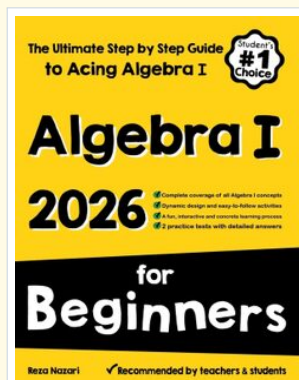
Take your practice to the next level!

#### 7 Practice Tests

- ✓ 7 complete practice tests for maximum preparation
- ✓ **Unique tests**—different from 5 and 6 tests books
- ✓ The most comprehensive practice for Algebra 1
- ✓ Ideal for students aiming for top scores
- ✓ Extensive practice builds mastery and confidence

Go all the way with comprehensive practice!

☐ STUDENT FAVORITE • Master Algebra I From the Ground Up ☐



- ✓ 100% Guaranteed
- ✓ Lifetime Support
- ✓ Trusted by Teachers

Start Your Algebra  
Journey Today! →

### Algebra I for Beginners

Written by a top math teacher & aligned with national and state Algebra I courses. From linear equations to graphing quadratics — explained the easy way.

- ✓ **Complete coverage** of every Algebra I concept — perfect companion to these worksheets
- ✓ **Step-by-step explanations** with worked examples on every topic
- ✓ **QR codes in every chapter** for free video lessons & bonus practice
- ✓ **2 full-length practice tests** with detailed answer keys

★ STUDENT'S #1 CHOICE ★

Teacher-recommended • 12,000+ Happy Students

↓ PDF EDITION



Instant download • any device

☐ PAPERBACK



Paperback on Amazon

Hold it in your hands

Pair these free worksheets with *Algebra I for Beginners* and you have a complete self-paced course — concept lessons, daily practice, and full exam-style reviews, all in one path. →

[EffortlessMath.com/product/algebra-i-for-beginners](https://EffortlessMath.com/product/algebra-i-for-beginners)