# Direct Variation

| Name: _____ | Date: _____ | Score: _____ / 26 |
|---|---|---|

## Quick Review

In **direct variation**, two quantities change by a constant ratio: $y = kx$. The number $k$ is the **constant of variation**. A direct-variation graph is a line through the origin, and the slope is $k$. To find $k$, use $k = \frac{y}{x}$ from any nonzero point. If a table has a constant $y/x$ ratio and includes the origin when graphed, it represents direct variation.

## PRACTICE

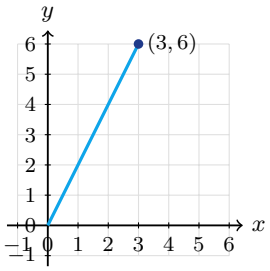
*Find the direct-variation constant or write the model.*

1. $y = 5x;\ k$ _____
2. $y = -3x;\ k$ _____
3. $(x, y) = (4, 20);\ k$ _____
4. $(x, y) = (-2, 10);\ k$ _____
5. $k = 7;$ model _____
6. $k = \frac{1}{2};$ model _____
7. $y = 4x;\ y$ when $x = 9$ _____
8. $y = 6x;\ x$ when $y = 42$ _____
9. Table $(1, 3), (2, 6), (3, 9);$ direct? _____
10. Table $(1, 4), (2, 7), (3, 10);$ direct? _____
11. Line through $(0, 0)$ and $(3, 12);\ k$ _____
12. Line $y = 2x + 5;$ direct? _____
13. If $y$ varies directly with $x$ and $y = 18$ when $x = 6,\ k$ _____
14. A printing machine follows the same direct-variation model from the previous item, $y = 3x$. What output $y$ belongs with input $x = 10$? _____
15. If $y = 12$ when $x = 8,\ y$ when $x = 2$ _____
16. Does $(5, 0)$ fit a nonzero direct variation? _____
17. Direct variation with slope $-2$ _____
18. If $x$ doubles, $y$ does what in $y = 9x$? _____
19. Ratio $y/x = 0.75;$ model _____
20. Point $(12, 30);$ direct model _____

## VISUAL PRACTICE

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

**21.** The line shows direct variation. What is the constant of variation?




**Answer:** _____

**22.** The table shows direct variation. Write the equation.

| $x$ | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| $y$ | 5 | 10 | 15 | 20 |

**Answer:** _____

Scan Me

## Word Problems

**23.** A printer prints $18$ pages in $3$ minutes at a steady rate. Write a direct-variation model for pages $p$ after $m$ minutes. _____

**24.** A recipe uses $2$ cups of flour for every $3$ cups of oats. Write flour $f$ as a function of oats $o$. _____

**25.** A car travels $65$ miles in one hour at constant speed. Write distance $d$ after $t$ hours and find $d$ when $t = 4$. _____

**26.** A store sells apples at $\$1.80$ per pound. Write the cost $C$ for $p$ pounds and find the cost of $6$ pounds. _____

Scan Me

# Answer Keys

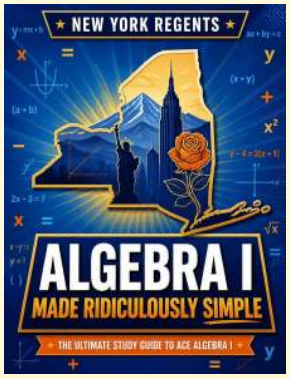
1. $5$
2. $-3$
3. $5$
4. $-5$
5. $y = 7x$
6. $y = \frac{1}{2}x$
7. $36$
8. $7$
9. yes
10. no
11. $4$
12. no
13. $3$
14. $30$
15. $3$
16. no
17. $y = -2x$
18. doubles
19. $y = 0.75x$
20. $y = 2.5x$
21. $2$
22. $y = 5x$
23. $p = 6m$
24. $f = \frac{2}{3}o$
25. $d = 65t;\ 260$ miles
26. $C = 1.80p;\ \$10.80$

## Step-by-Step Tutor Notes

1. Focus on the main idea of the problem, then simplify carefully. The coefficient of $x$ is the constant of variation. So the answer is $5$.
2. This is a good place to slow down, check the notation, and simplify cleanly. Direct variation can have a negative constant. So the answer is $-3$.
3. This is a good place to slow down, check the notation, and simplify cleanly. $k = \frac{20}{4} = 5$. So the answer is $5$.
4. Take it one clear step at a time and keep the original question in mind. $k = \frac{10}{-2} = -5$. So the answer is $-5$.
5. Start with the definition the problem is testing, then apply it directly. Direct variation always has form $y = kx$. So the answer is $y = 7x$.
6. Take it one clear step at a time and keep the original question in mind. Place $k$ in front of $x$. So the answer is $y = \frac{1}{2}x$.
7. Focus on the main idea of the problem, then simplify carefully. $y = 4(9) = 36$. So the answer is $36$.
8. This is a good place to slow down, check the notation, and simplify cleanly. Solve $42 = 6x$. So the answer is $7$.
9. This is a good place to slow down, check the notation, and simplify cleanly. The ratio $y/x$ is always $3$. So the answer is yes.
10. This is a good place to slow down, check the notation, and simplify cleanly. The ratios are not equal, so it is not direct variation. So the answer is no.
11. Line up the two changes first; that keeps the rate from getting mixed up. The slope is $\frac{12}{3} = 4$. So the requested value is $4$.
12. Use the clue in the question first, then let the arithmetic finish the job. A direct variation line must pass through the origin. So the answer is no.
13. This is a good place to slow down, check the notation, and simplify cleanly. $k = \frac{18}{6} = 3$. So the answer is $3$.
14. This is a good place to slow down, check the notation, and simplify cleanly. Use the direct-variation model $y = 3x$. When $x = 10$, $y = 3(10) = 30$. So the answer is $30$.
15. Start with the definition the problem is testing, then apply it directly. $k = \frac{12}{8} = \frac{3}{2}$, so $y = \frac{3}{2}(2) = 3$. So the answer is $3$.
16. First identify the feature of the graph or equation that matches the wording of the question. If $x = 5$ and $y = 0$, then $k = 0$, the zero function. That leads to no.
17. Line up the two changes first; that keeps the rate from getting mixed up. Slope and constant of variation are the same. So the requested value is $y = -2x$.
18. Keep the order of operations in view, then simplify without skipping the sign check. Multiplying $x$ by $2$ also multiplies $y$ by $2$. After simplifying, the answer is doubles.
19. Focus on the main idea of the problem, then simplify carefully. The constant ratio is $k = 0.75$. So the answer is $y = 0.75x$.
20. Take it one clear step at a time and keep the original question in mind. $k = \frac{30}{12} = 2.5$. So the answer is $y = 2.5x$.
21. Focus on the main idea of the problem, then simplify carefully. For direct variation, $k = y/x = 6/3 = 2$. So the answer is $2$.
22. Use the clue in the question first, then let the arithmetic finish the job. The ratio $y/x$ is always $5$, so $k = 5$. So the answer is $y = 5x$.
23. Compare the change in output to the change in input, because slope is a rate of change. The rate is $18/3 = 6$ pages per minute, so $k = 6$ and $p = 6m$. So the requested value is $p = 6m$.
24. Name the quantities first so the model is easy to read. The constant ratio is flour per cup of oats, $2/3$, so $f = \frac{2}{3}o$.
25. Put the given value into the expression first, then simplify from the inside out. Distance varies directly with time at constant speed. Substitute $t = 4$: $d = 65(4) = 260$. That confirms the final answer is $d = 65t;\ 260$ miles.
26. Name the quantities first so the model is easy to read. Cost varies directly with pounds. Six pounds costs $1.80(6) = 10.80$ dollars.

Scan Me

## Want a Full Algebra 1 Textbook? Try Our New York Regents Made Simple Book!




### New York Regents Algebra I Made Ridiculously Simple

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

Scan Me

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 Regents 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

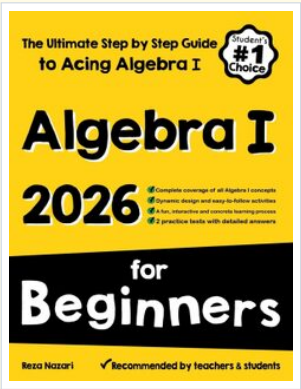
**Take your practice to the next level!**

### 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 ☐




### 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

✓ 100% Guaranteed
✓ Lifetime Support
✓ Trusted by Teachers

⋆ STUDENT'S #1 CHOICE ⋆

Teacher-recommended • 12,000+ Happy Students

Start Your Algebra Journey Today! →

↓PDF EDITION

Scan Me

Instant download • any device

☐ PAPERBACK

Scan Me

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**