

# Direct and Inverse Variation

Algebra 1 •Section 5.7

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|-------------|-------------|-------------------|
| Name: _____ | Date: _____ | Score: _____ / 12 |
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### Quick Review and Helpful Hints

A function pairs each input with exactly one output. Pay attention to what the input means, what rule is being applied, and whether the question asks for a value, a rule, a domain, or an interpretation.

▶ **Example:** For  $f(x) = 2x + 5$ , find  $f(4)$ .

**Work:** Replace  $x$  with 4:  $f(4) = 2(4) + 5 = 13$ .

★ **Answer:** 13

### ◆ Practice Problems

Solve each problem. Show enough work that another student could follow your thinking.

- |                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>1. Find the inverse of <math>f(x) = x + 7</math>.<br/>_____</p> <p>2. Find the inverse of <math>f(x) = 3x</math>.<br/>_____</p> <p>3. Find the inverse of <math>f(x) = 2x - 5</math>.<br/>_____</p> <p>4. Find the inverse of <math>f(x) = \frac{x}{4} + 1</math>.<br/>_____</p> <p>5. Are <math>f(x) = x - 9</math> and <math>g(x) = x + 9</math> inverses?<br/>_____</p> | <p>6. Find <math>f^{-1}(10)</math> if <math>f(x) = 5x</math>.<br/>_____</p> <p>7. Find the inverse of <math>f(x) = -x + 6</math>.<br/>_____</p> <p>8. Verify one point: if <math>(4, 11)</math> is on <math>f</math>, what point is on <math>f^{-1}</math>?<br/>_____</p> <p>9. Find the inverse of <math>f(x) = \frac{2}{3}x + 8</math>.<br/>_____</p> <p>10. Is <math>f(x) = x^2</math> over all real numbers one-to-one?<br/>_____</p> |
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### ◆ Word Problems

11. A Celsius formula is  $F = \frac{9}{5}C + 32$ . Solve for  $C$ .  
\_\_\_\_\_
12. A machine multiplies by 4 and then adds 3. What inverse steps undo it?  
\_\_\_\_\_



## Answer Keys

1.  $f^{-1}(x) = x - 7$

2.  $f^{-1}(x) = \frac{x}{3}$

3.  $f^{-1}(x) = \frac{x+5}{2}$

4.  $f^{-1}(x) = 4x - 4$

5. Yes

6. 2

7.  $f^{-1}(x) = -x + 6$

8. (11, 4)

9.  $f^{-1}(x) = \frac{3}{2}(x - 8)$

10. No

11.  $C = \frac{5}{9}(F - 32)$

12. Subtract 3, then divide by 4

### Step-by-Step Explanations

1. An inverse reverses the action: this function adds 7, so its inverse subtracts 7.
2. To undo multiplying by 3, you do the opposite — divide by 3.
3. Trade  $x$  and  $y$ , then untangle  $x = 2y - 5$  for  $y$  to reveal the inverse.
4. Swap, then solve  $x = y/4 + 1$ : subtract the 1, multiply by 4, and you've reversed it.
5. They cancel each other out — subtracting 9 and adding 9 bring you right back to start.
6. The inverse asks: what input would have produced 10? Solve  $5x = 10$  to find 2.

7. Swap and solve and you get the exact same rule — this line is its own inverse, kind of cool.
8. Inverses trade inputs and outputs, so the point simply flips its coordinates.
9. Peel off the 8 first, then multiply by the reciprocal  $\frac{3}{2}$  to undo the  $\frac{2}{3}$ .
10. Both 2 and  $-2$  map to 4, so reversing it would leave 4 confused about where to go.
11. Work backward from  $F$ : subtract 32, then multiply by  $\frac{5}{9}$  to free  $C$ .
12. To unwind a process, reverse both the steps and their order — last action gets undone first.



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