Finding the Inverse of a Function

Algebra Worksheet · Grade 9–11

Name: _____ Date: _____

Learning Objectives

- Understand inverse function notation and the concept of swapping domain and range
- Find the inverse of a function algebraically by interchanging x and y and solving for y
- Find the inverse of radical and other non-linear functions using algebraic manipulation

Problems

1. A function is given in table form. Write the inverse function as a new table by interchanging the x and y values.

2. Find the inverse of the function below.

$f(x) = x + 5$

3. Find the inverse of the linear function below.

$f(x) = 2x + 7$

4. Find the inverse of the function below.

$f(x) = 3x - 4$

5. Find the inverse of the radical function below.

$f(x) = \sqrt{x + 4}$

6. Find the inverse of the radical function below.

$f(x) = \sqrt{2x - 3}$

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7. Find the inverse of the function below.

$$f(x) = \frac{x+1}{3}$$

8. Find the inverse of the function below.

$$f(x) = \frac{2x+5}{4}$$

9. Find the inverse of the cubic function below.

$$f(x) = x^3 - 2$$

10. Find the inverse of the function below, then evaluate the inverse at x equals 3.

$$f(x) = \frac{5x-1}{2}$$

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Finding the Inverse of a Function — Answer Key

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Answer Key

1. Answer: Inverse table: x = 1, 3, 5, 7 and y = -2, 0, 2, 4

- To find the inverse from a table, swap every x and y value.
- The inverse table becomes: x: 1, 3, 5, 7 and y: -2, 0, 2, 4

2. Answer: f■⁻¹(x) = x – 5

- Replace f(x) with y: y = x + 5
- Interchange x and y: x = y + 5
- Solve for y: y = x – 5
- Write as inverse: f■⁻¹(x) = x – 5

3. Answer: f■⁻¹(x) = (x – 7) / 2

- Replace f(x) with y: y = 2x + 7
- Interchange x and y: x = 2y + 7
- Subtract 7 from both sides: x – 7 = 2y
- Divide both sides by 2: y = (x – 7) / 2
- Write as inverse: f■⁻¹(x) = (x – 7) / 2

4. Answer: f■⁻¹(x) = (x + 4) / 3

- Replace f(x) with y: y = 3x – 4
- Interchange x and y: x = 3y – 4
- Add 4 to both sides: x + 4 = 3y
- Divide both sides by 3: y = (x + 4) / 3
- Write as inverse: f■⁻¹(x) = (x + 4) / 3

5. Answer: f■⁻¹(x) = x² – 4

- Replace f(x) with y: y = sqrt(x + 4)
- Interchange x and y: x = sqrt(y + 4)
- Square both sides: x² = y + 4
- Subtract 4 from both sides: y = x² – 4
- Write as inverse: f■⁻¹(x) = x² – 4

6. Answer: f■⁻¹(x) = (x² + 3) / 2

- Replace f(x) with y: y = sqrt(2x – 3)
- Interchange x and y: x = sqrt(2y – 3)
- Square both sides: x² = 2y – 3
- Add 3 to both sides: x² + 3 = 2y
- Divide both sides by 2: y = (x² + 3) / 2
- Write as inverse: f■⁻¹(x) = (x² + 3) / 2

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7. Answer: f■⁻¹(x) = 3x – 1

- Replace f(x) with y: y = (x + 1) / 3
- Interchange x and y: x = (y + 1) / 3
- Multiply both sides by 3: 3x = y + 1
- Subtract 1 from both sides: y = 3x – 1
- Write as inverse: f■⁻¹(x) = 3x – 1

8. Answer: f■⁻¹(x) = (4x – 5) / 2

- Replace f(x) with y: y = (2x + 5) / 4
- Interchange x and y: x = (2y + 5) / 4
- Multiply both sides by 4: 4x = 2y + 5
- Subtract 5 from both sides: 4x – 5 = 2y
- Divide both sides by 2: y = (4x – 5) / 2
- Write as inverse: f■⁻¹(x) = (4x – 5) / 2

9. Answer: f■⁻¹(x) = cube root of (x + 2)

- Replace f(x) with y: y = x³ – 2
- Interchange x and y: x = y³ – 2
- Add 2 to both sides: x + 2 = y³
- Take the cube root of both sides: y = (x + 2)^(1/3)
- Write as inverse: f■⁻¹(x) = ■(x + 2)

10. Answer: f■⁻¹(x) = (2x + 1) / 5; f■⁻¹(3) = 7/5

- Replace f(x) with y: y = (5x – 1) / 2
- Interchange x and y: x = (5y – 1) / 2
- Multiply both sides by 2: 2x = 5y – 1
- Add 1 to both sides: 2x + 1 = 5y
- Divide both sides by 5: y = (2x + 1) / 5
- Write as inverse: f■⁻¹(x) = (2x + 1) / 5
- Evaluate at x = 3: f■⁻¹(3) = (2(3) + 1) / 5 = 7/5

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