Match Each Function To Its Inverse.A. Y= 4x-7 B. Y= 7x C. Y= 7x-4 D. Y= X-4. E. Y= X+4. F. Y= X-4/7 _________1.

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Understanding inverse functions is a fundamental concept in algebra that helps us explore the relationship between functions and their inverses. When dealing with various functions, especially linear ones, it is essential to know how to find their inverse and how to verify the correctness of the inverse. This article aims to help you match each given function to its inverse, explaining the process step-by-step, and providing insights into the properties of inverse functions.

What Is an Inverse Function?

An inverse function essentially reverses the effect of the original function. If a function $f(x)$ maps an input x to an output y, then its inverse $f^{-1}(x)$ maps y back to x. Mathematically, this is expressed as:

$$
f(f^{-1}(x)) = x \quad \text{and} \quad f^{-1}(f(x)) = x
$$

for all x in the domain of f^{-1} and f, respectively.

For a function to have an inverse, it must be one-to-one (injective), meaning each output corresponds to exactly one input. Linear functions with non-zero slopes are typically invertible because they are one-to-one over their entire domain.

How to Find the Inverse of a Function

Finding the inverse involves swapping the roles of x and y in the original function and then solving for y. The general steps are:

1. Write the original function: $y = f(x)$.
2. Swap x and y: $x = f(y)$.
3. Solve this new equation for y.
4. Replace y with $f^{-1}(x)$ to express the inverse function.

Let's apply these steps to the specific functions listed.

Matching Each Function to Its Inverse

We are given six functions:

- A. $y = 4x - 7$
- B. $y = 7x$
- C. $y = 7x - 4$
- D. $y = x - 4$
- E. $y = x + 4$
- F. $y = \frac{x - 4}{7}$

And we need to match each to its inverse.

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1. Function A: $y = 4x - 7$

Finding the inverse:

1. Swap x and y:

$$
x = 4y - 7
$$

2. Solve for y:

$$
x + 7 = 4y \Rightarrow y = \frac{x + 7}{4}
$$

Inverse function:

$$
f^{-1}(x) = \frac{x + 7}{4}
$$

Matching:

This inverse resembles the form $y = \frac{x + 7}{4}$, which does not directly match any of the options provided, but note that option D is $y = x - 4$, E is $y = x + 4$, and F is $y = \frac{x - 4}{7}$. Since none of these exactly match, perhaps the inverse is not among the options or needs to be re-examined based on the options.

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2. Function B: $y = 7x$

Finding the inverse:

1. Swap x and y:

$$
x = 7y
$$

2. Solve for y:

$$
y = \frac{x}{7}
$$

Inverse function:

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

Matching:

Option F is $y = \frac{x - 4}{7}$, but our inverse is simply $y = \frac{x}{7}$. Since the options include $y = \frac{x - 4}{7}$, which is a shifted version, none of the options exactly match $\frac{x}{7}$. But perhaps the match is with option F, considering the structure.

---

3. Function C: $y = 7x - 4$

Finding the inverse:

1. Swap x and y:

$$
x = 7y - 4
$$

2. Solve for y:

$$
x + 4 = 7y \Rightarrow y = \frac{x + 4}{7}
$$

Inverse function:

$$
f^{-1}(x) = \frac{x + 4}{7}
$$

Matching:

This inverse resembles $y = \frac{x + 4}{7}$. Since the options include $y = \frac{x - 4}{7}$ (F) and others, but none exactly match, but considering the pattern, perhaps the inverse of C is similar to option F with a negative 4, indicating that the inverse is $y = \frac{x + 4}{7}$.

---

4. Function D: $y = x - 4$

Finding the inverse:

1. Swap x and y:

$$
x = y - 4
$$

2. Solve for y:

$$
y = x + 4
$$

Inverse function:

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

Matching:

Option E is $y = x + 4$. This matches perfectly.

Answer: D ↔ E

---

5. Function E: $y = x + 4$

Finding the inverse:

1. Swap x and y:

$$
x = y + 4
$$

2. Solve for y:

\[

$$
y = x - 4
$$

Inverse function:

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

Matching:

Option D is $y = x - 4$. This matches correctly.

Answer: E ↔ D

---

6. Function F: $y = \frac{x - 4}{7}$

Finding the inverse:

1. Swap x and y:

$$
x = \frac{y - 4}{7}
$$

2. Solve for y:

$$
7x = y - 4 \Rightarrow y = 7x + 4
$$

Inverse function:

$$
f^{-1}(x) = 7x + 4
$$

Matching:

This inverse resembles $y = 7x + 4$. The options include $y = 7x$ (B), $y = 7x - 4$ (C), but not $7x + 4$. Since the options are limited, perhaps the best fit is the original function $y = \frac{x - 4}{7}$ (F), which maps to the inverse $7x + 4$. But given the options, none perfectly match, indicating a possible typo or that the focus is on recognizing the inverse's form.

Summary of Matching Pairs

Based on the calculations above, the functions and their inverses can be summarized as:

- D ($y = x - 4$) ↔ E ($y = x + 4$)
- E ($y = x + 4$) ↔ D ($y = x - 4$)
- B ($y = 7x$) ↔ F ($y = \frac{x}{7}$), which is similar in structure to $y = \frac{x - 4}{7}$ but with a shift.
- C ($y = 7x - 4$) ↔ $y = \frac{x + 4}{7}$, close to options F or perhaps a modified version.

For the other functions, the inverses involve more complex expressions, and since the options are limited, the primary matches are:

- D and E form an inverse pair.
- B and F form an approximate inverse pair.
- A and its inverse involve more complex fractions, possibly not directly matching the options.

Final Notes on Inverse Functions

Understanding how to find the inverse of a function is crucial for solving equations, modeling real-world phenomena, and exploring symmetry in graphs. The key takeaways include:

- Always swap x and y before solving for y.
- Keep the domain and range in mind; inverses may have different domains.
- For linear functions, the inverse is typically another linear function with a reciprocal slope.
- Recognizing inverse pairs can help simplify complex algebraic problems.

By practicing these steps with various

Frequently Asked Questions

Which function is the inverse of Y = 4x - 7?

Y = (x + 7) / 4

What is the inverse of the function Y = 7x?

Y = x / 7

Identify the inverse function of Y = 7x - 4.

Y = (x + 4) / 7

Which function is the inverse of Y = X - 4?

Y = x + 4

Find the inverse of the function Y = X + 4.

Y = x - 4

What is the inverse of Y = (X - 4) / 7?

Y = 7x + 4

Additional Resources

Match Each Function To Its Inverse: A Comprehensive Analysis

In the realm of algebra and mathematical functions, understanding the relationship between a function and its inverse is fundamental for grasping the behavior of equations, particularly in the context of graph transformations, symmetry, and real-world applications. The process of matching each function to its inverse involves examining the algebraic structure of each function, deriving its inverse, and then verifying the correspondence. This article delves deeply into this topic, focusing on the specific functions provided: $Y=4x-7$, $Y=7x$, $Y=7x-4$, $Y=X-4$, $Y=X+4$, and $Y=\frac{X-4}{7}$. Through detailed explanations, step-by-step derivations, and insightful analysis, we will explore how each function pairs with its inverse, shedding light on the underlying principles of inverse functions.

Understanding Inverse Functions: Foundations and Significance

What Is an Inverse Function?

An inverse function essentially reverses the effect of the original function. Formally, if a function f maps an input x to an output y, its inverse f^{-1} maps y back to x. Mathematically, this relationship can be expressed as:

$$
f(f^{-1}(x)) = x \quad \text{and} \quad f^{-1}(f(x)) = x
$$

This reciprocal relationship signifies that the inverse function "undoes" the operation performed by the original function.

Graphical Perspective

Graphically, the inverse of a function is obtained by reflecting the graph of the original function across the line $y = x$. This symmetry highlights the concept that for every point (a, b) on the original function, the point (b, a) lies on its inverse.

Why Are Inverse Functions Important?

Inverse functions are crucial across various fields—physics, engineering, computer science, and finance—where reversing processes or solving for original variables is necessary. For example, in solving equations, understanding inverse functions helps in isolating variables; in transformations, it offers insights into symmetry and function behavior.

Analyzing Each Function: Deriving and Matching to Its Inverse

The core of this article revolves around examining each provided function, deriving its inverse, and then matching it to its correct pair. Each step involves algebraic manipulation, verification, and interpretation.

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1. Function: $Y = 4x - 7$

Deriving the Inverse

To find the inverse, follow these steps:

1. Replace Y with $f(x)$:

$$
y = 4x - 7
$$

2. Swap x and y:

$$
x = 4y - 7
$$

3. Solve for y:

$$
x + 7 = 4y \quad \Rightarrow \quad y = \frac{x + 7}{4}
$$

4. Replace y with $f^{-1}(x)$:

$$
f^{-1}(x) = \frac{x + 7}{4}
$$

Matching with Given Functions

Observe the provided options:

- $Y = \frac{X - 4}{7}$
- $Y = X + 4$
- $Y = X - 4$
- Others are linear with different slopes.

None of the options directly match $f^{-1}(x) = \frac{x + 7}{4}$. Notably, the inverse involves dividing by 4, while the options involve division by 7 or addition/subtraction of constants. Therefore, this inverse does not match options B, C, D, E, or F directly.

Conclusion: The inverse of $Y = 4x - 7$ is $f^{-1}(x) = \frac{x + 7}{4}$, which does not correspond to any listed options. This suggests that the inverse is a distinct function, and perhaps the options are designed to match other functions.

---

2. Function: $Y = 7x$

Deriving the Inverse

1. Write as:

$$
y = 7x
$$

2. Swap x and y:

$$
x = 7y
$$

3. Solve for \(y\):

\[
y = \frac{x}{7}
\]

4. Final inverse:

\[
f^{-1}(x) = \frac{x}{7}
\]

Matching with Given Functions

Compare to options:

- \(Y = \frac{X - 4}{7}\): No, because of the subtraction.
- \(Y = \frac{X}{7}\): Yes, this matches exactly.

Match: Function B (\(Y=7x\)) pairs with option F: \(Y = \frac{X-4}{7}\)? No, because that involves a subtraction.

Actually, the inverse is \(y = \frac{x}{7}\), which corresponds directly to option F if it were \(Y= \frac{X}{7}\). But the options include an additional \(-4\) in the numerator. Since the options specify \(Y= \frac{X-4}{7}\), that is not the inverse of \(Y=7x\).

Conclusion: The inverse of \(Y=7x\) is \(Y= \frac{x}{7}\), which is not among the options directly. But among the options, \(Y= \frac{X-4}{7}\) is close in form, involving division by 7, but with an adjustment.

---

3. Function: \(Y=7x - 4\)

Deriving the Inverse

1. Begin with:

\[
y = 7x - 4
\]

2. Swap \(x\) and \(y\):

\[
x = 7y - 4
\]

3. Solve for y:

$$
x + 4 = 7y \quad \Rightarrow \quad y = \frac{x + 4}{7}
$$

4. Final inverse:

$$
f^{-1}(x) = \frac{x + 4}{7}
$$

Matching with Given Functions

Compare to options:

- $Y= \frac{X - 4}{7}$: No, because numerator is $X+4$, not $X-4$.
- $Y= \frac{X + 4}{7}$: Yes, this matches exactly.

Match: Function C matches with option F: $Y= \frac{X-4}{7}$? No, because of the sign.

Correct match: Function C ($Y=7x - 4$) pairs with option F: $Y= \frac{X + 4}{7}$.

---

4. Function: $Y = X - 4$

Deriving the Inverse

1. Set:

$$
y = x - 4
$$

2. Swap:

$$
x = y - 4
$$

3. Solve for y:

$$
y = x + 4
$$

4. Final inverse:

\[
f^{-1}(x) = x + 4
\]

Matching with Given Functions

Options:

- \(Y= X + 4\): Exactly matches.

Match: Function D (\(Y = X - 4\)) pairs with option E: \(Y= X + 4\).

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5. Function: \(Y = X + 4\)

Deriving the Inverse

1. Set:

\[
y = x + 4
\]

2. Swap:

\[
x = y + 4
\]

3. Solve for \(y\):

\[
y = x - 4
\]

4. Final inverse:

\[
f^{-1}(x) = x - 4
\]

Matching with Given Functions

Options:

- $Y= X - 4$: Exactly matches.

Match: Function E ($Y= X + 4$) pairs with option D: $Y= X - 4$.

---

6. Function: $Y= \frac{X-4}{7}$

Deriving the Inverse

1. Set:

$$
y = \frac{x - 4}{7}
$$

2. Swap:

$$
x = \frac{y - 4}{7}
$$

3. Solve for y:

$$
x \times 7 = y - 4
$$

$$
y = 7x + 4
$$

4. Final inverse:

$$
f^{-1}(x) = 7x + 4
$$

Matching with Given Functions

Options:

- \(Y

Match Each Function To Its Inverse A Y 4x 7 B Y 7x C Y 7x 4 D Y X 4 E Y X 4 F Y X 4 7 1

Match Each Function To Its Inverse A Y 4x 7 B Y 7x C Y 7x 4 D Y X 4 E Y X 4 F Y X 4 7 1

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