Can Someone Answer This Please? I'm Stuck. ;-;Use The Function Rule [tex]f[/tex](x)=3[tex]x[/tex]-2.

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If you've encountered the function rule $f(x) = 3x - 2$ and find yourself stuck on understanding or applying it, you're not alone. Many students and learners grapple with grasping the concept of functions, how to evaluate them, and how to interpret their meaning. In this comprehensive guide, we'll walk through everything you need to know about this specific function, including its definition, how to evaluate it for various values of x, understanding its graph, and applying it to solve different types of problems.

Understanding the Function $f(x) = 3x - 2$

Before diving into calculations and applications, it's essential to understand what the function $f(x) = 3x - 2$ represents.

What Is a Function?

A function is a rule that assigns every input x to exactly one output $f(x)$. Think of it as a machine: you input a number, and the machine applies a specific rule to produce an output.

Breaking Down the Function Rule

In the case of $f(x) = 3x - 2$:
- The rule multiplies the input x by 3.
- Then, it subtracts 2 from the product.
- The result is the output $f(x)$.

This is a linear function, which graphs as a straight line.

Evaluating $f(x) = 3x - 2$ for Specific Values

One of the first steps in working with functions is evaluating them at specific points. Here's how to do it:

Step-by-Step Process

1. Substitute the given value of x into the function.
2. Simplify the expression to find $f(x)$.

Examples of Evaluation

- Evaluate $f(0)$:

  $f(0) = 3 \times 0 - 2 = 0 - 2 = -2$

- Evaluate $f(1)$:

  $f(1) = 3 \times 1 - 2 = 3 - 2 = 1$

- Evaluate $f(-1)$:

  $f(-1) = 3 \times (-1) - 2 = -3 - 2 = -5$

- Evaluate $f(4)$:

  $f(4) = 3 \times 4 - 2 = 12 - 2 = 10$

These calculations demonstrate how the function behaves at different points and help you understand its output for any given x.

Graphing the Function $f(x) = 3x - 2$

Graphing linear functions like $f(x) = 3x - 2$ provides a visual understanding of the relationship between x and $f(x)$.

Key Features of the Graph

- Slope: The coefficient of x, which is 3. This indicates the steepness of the line.
- Y-intercept: The point where the line crosses the y-axis, which is at -2.
- Line Equation: The graph is a straight line passing through the y-intercept -2 and rising steeply due to the slope 3.

Plotting the Graph

To graph $f(x) = 3x - 2$:
1. Plot the y-intercept at $(0, -2)$.
2. Use the slope to find another point: since the slope is 3, rise over run, you can go up 3 units and right 1 unit from the y-intercept:
- From $(0, -2)$, move to $(1, 1)$.
3. Draw a straight line through these points.

Understanding the Graph

- The line extends infinitely in both directions.
- For x values greater than 0, $f(x)$ increases rapidly.
- For x values less than 0, $f(x)$ decreases accordingly.

Applications of $f(x) = 3x - 2$

Understanding how to work with this function allows you to solve practical problems.

1. Solving for x Given $f(x)$

Suppose you're told that $f(x) = 7$, and you need to find the corresponding x.

Solution:
$$
f(x) = 3x - 2 = 7
$$
Add 2 to both sides:
$$
3x = 9
$$
Divide both sides by 3:
$$
x = 3
$$

Interpretation: When $f(x) = 7$, $x = 3$.

2. Finding $f(x)$ for a given x

If $x = 5$:
$$
f(5) = 3 \times 5 - 2 = 15 - 2 = 13
$$

3. Solving Real-World Problems

Imagine this function models a situation where:
- x is the number of hours worked.
- $f(x)$ is the total pay in dollars, with a pay rate of \$3 per hour minus a fixed deduction of \$2.

Question: How much do you earn if you work 8 hours?

Solution:
$$
f(8) = 3 \times 8 - 2 = 24 - 2 = 22
$$
You earn \$22 after 8 hours.

Understanding the Function's Behavior

Analyzing the behavior of $f(x) = 3x - 2$ helps in predicting outputs and understanding the function's overall pattern.

Slope and Rate of Change

- The slope of 3 indicates that for every additional 1 unit increase in x, $f(x)$ increases by 3.
- The function is increasing, meaning as x increases, $f(x)$ also increases.

Y-Intercept and Initial Value

- The y-intercept at -2 shows the starting point when $x = 0$: the output is -2.
- In real-world terms, this could represent a fixed deduction or initial cost.

Linearity and Its Implications

- Because the function is linear, its graph is a straight line with constant slope.
- This makes it straightforward to predict outputs for x values beyond the ones explicitly calculated.

Common Problems and How to Solve Them

Let's explore some common types of questions involving $f(x) = 3x - 2$ and their solutions.

Problem Type 1: Find x when $f(x)$ is known

Example: Find x when $f(x) = -5$.

Solution:

$$
3x - 2 = -5
$$

Add 2 to both sides:

$$
3x = -3
$$

Divide both sides by 3:

$$
x = -1
$$

Answer: $x = -1$.

Problem Type 2: Find $f(x)$ for a given x

Example: Find $f(10)$.

Solution:

$$
f(10) = 3 \times 10 - 2 = 30 - 2 = 28
$$

Answer: 28.

Problem Type 3: Determine the x-intercept or y-intercept

- Y-intercept: When $x = 0$, $f(0) = -2$. So the y-intercept is at $(0, -2)$.
- X-intercept: Set $f(x) = 0$:

$$
3x - 2 = 0
$$

$$
3x = 2
$$

$$
x = \frac{2}{3}
$$

So, the x-intercept is at $\left(\frac{2}{3}, 0\right)$.

Practice Problems to Solidify Understanding

Engaging with practice problems enhances comprehension and confidence.

1. Evaluate $f(-4)$.
2. Find x such that $f(x) = 11$.
3. Graph the function and identify the y-intercept and x-intercept.
4. Determine the output when $x = 0.5$.
5. If the function models a scenario, interpret what the slope and intercept represent.

Solutions

Frequently Asked Questions

What is the value of f(4) using the function rule f(x) = 3x - 2?

To find f(4), substitute 4 into the function: f(4) = 3(4) - 2 = 12 - 2 = 10. So, f(4) = 10.

How do I find the x-value when f(x) = 7?

Set the function equal to 7: 3x - 2 = 7. Add 2 to both sides: 3x = 9. Divide both sides by 3: x = 3.

What is the y-value when x = -1 in the function f(x) = 3x - 2?

Substitute x = -1: f(-1) = 3(-1) - 2 = -3 - 2 = -5. So, f(-1) = -5.

How can I graph the function f(x) = 3x - 2?

Plot points by choosing x-values, calculating corresponding f(x), and then drawing a straight line through these points. For example, $x=0$ gives $f(0)=-2$, $x=1$ gives $f(1)=1$, $x=-1$ gives $f(-1)=-5$.

Is the function $f(x) = 3x - 2$ linear?

Yes, because it can be written in the form $y = mx + b$, which is the equation of a straight line. Here, the slope $m=3$ and the y-intercept is -2.

What is the inverse function of $f(x) = 3x - 2$?

To find the inverse, replace $f(x)$ with y: $y = 3x - 2$. Swap x and y: $x = 3y - 2$. Solve for y: $3y = x + 2$, so $y = (x + 2) / 3$. The inverse function is $f^{-1}(x) = (x + 2)/3$.

If $f(x) = 3x - 2$, what is $f(0)$?

Substitute $x=0$: $f(0) = 3(0) - 2 = -2$.

How do I determine if a point (x, y) is on the graph of $f(x) = 3x - 2$?

Plug the x-coordinate into the function and see if the result equals the y-coordinate. For example, for (2, 4), check if $f(2) = 4$: $3(2) - 2 = 6 - 2 = 4$, so yes, (2,4) is on the graph.

Can I use this function rule to model real-world situations?

Yes, linear functions like $f(x) = 3x - 2$ can model situations with constant rates or relationships, such as calculating total cost with a fixed fee plus a per-item charge.

Additional Resources

Understanding and Applying the Function Rule $f(x) = 3x - 2$: A Comprehensive Review

When tackling algebraic functions, especially linear functions like $f(x) = 3x - 2$, students often find themselves asking, "Can someone answer this please? I'm stuck." This kind of plea is common, but it signals the need to deeply understand the function's structure, how to manipulate it, and how to interpret its meaning. In this detailed review, we'll explore every facet of the function rule $f(x) = 3x - 2$, from the fundamental concepts to practical applications, ensuring you're well-equipped to analyze, graph, and solve problems related to this function.

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1. Breaking Down the Function $f(x) = 3x - 2$

Before diving into complex problems, it's essential to understand what the function represents and how to interpret its components.

1.1. What is a Function?
A function is a rule that assigns each input (usually denoted as x) exactly one output (denoted as $f(x)$). In this case:
- Input: x
- Output: $f(x) = 3x - 2$

This means for any given x, you can find the corresponding $f(x)$ by plugging x into the formula.

1.2. The Components of the Function
The function $f(x) = 3x - 2$ is linear, characterized by the following parts:
- Slope (Rate of Change): 3

- Y-intercept (Point where the line crosses the y-axis): -2

Interpretation:
- The slope tells us that for each unit increase in x, $f(x)$ increases by 3.
- The y-intercept indicates that when $x = 0$, $f(x) = -2$.

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2. Graphing the Function $f(x) = 3x - 2$

Graphing helps visualize the behavior of the function and understand its properties.

2.1. Plotting Key Points
Choose specific x-values to compute corresponding $f(x)$:
- When $x=0$: $f(0) = 3(0) - 2 = -2$ → Point: (0, -2)
- When $x=1$: $f(1) = 3(1) - 2 = 1$ → Point: (1, 1)
- When $x=-1$: $f(-1) = 3(-1) - 2 = -3 - 2 = -5$ → Point: (-1, -5)
- When $x=2$: $f(2) = 3(2) - 2 = 6 - 2 = 4$ → Point: (2, 4)

Plotting these points on a coordinate plane and drawing a straight line through them visually demonstrates the function's linearity.

2.2. Slope and Intercept in the Graph
- The slope of 3 indicates that as you move from left to right, the line rises 3 units vertically for every 1 unit horizontally.
- The y-intercept at -2 is where the line crosses the y-axis.

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3. Analyzing the Function's Behavior

Understanding the function's behavior involves analyzing its slope and intercept, and how the graph responds to different x-values.

3.1. Increasing or Decreasing?
- Since the slope is positive (3), the function is strictly increasing: as x increases, $f(x)$ increases.
- Conversely, as x decreases, $f(x)$ decreases.

3.2. Domain and Range
- Domain: All real numbers ($-\infty, \infty$), because you can plug any real number into the function.
- Range: Also all real numbers, since the line extends infinitely in both directions.

3.3. Symmetry and Linearity
- The graph is a straight line, making the function linear.
- No symmetry about the y-axis (not even), but it is symmetric with respect to the origin if considering $f(-x) = -f(x)$. Let's verify:

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

This is not the negative of $f(x) = 3x - 2$, so the function is not odd. It's not symmetric about the origin. Similarly, it's not symmetric about the y-axis.

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4. Solving Problems Using $f(x) = 3x - 2$

Once you've grasped the graph and behavior, applying the function to solve various problems is the next step.

4.1. Evaluating $f(x)$ for Specific Values

Example:
- Find $f(4)$:

$$
f(4) = 3(4) - 2 = 12 - 2 = 10
$$
- Find $f(-3)$:

$$
f(-3) = 3(-3) - 2 = -9 - 2 = -11
$$

This straightforward substitution is fundamental in many applications.

4.2. Finding x Given $f(x)$

Suppose you know the output and want to find the input, e.g., $f(x) = 7$:

$$
3x - 2 = 7
$$
$$
3x = 9
$$
$$
x = 3
$$

Similarly, for $f(x) = -5$:

$$
3x - 2 = -5
$$
$$
3x = -3
$$
$$
x = -1
$$

This process is called solving for x in the context of the function.

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5. Function Transformations and Variations

Understanding how transformations affect the base function $f(x) = 3x - 2$ is essential.

5.1. Vertical Shifts

Adding or subtracting a constant shifts the graph up or down:
- $f(x) = 3x - 2 + k$

For example:
- $f(x) = 3x - 2 + 4 = 3x + 2$: shifts the graph up by 4 units.
- $f(x) = 3x - 2 - 3 = 3x - 5$: shifts down by 3 units.

5.2. Horizontal Shifts

In the form $f(x) = 3(x - h) - 2$, the graph shifts h units to the right if $h > 0$, or h units left if $h < 0$.

5.3. Reflection
- Reflect over the y-axis: \(f(x) = -3x - 2\)
- Reflect over the x-axis: \(f(x) = 3x + 2\) (negate the entire function)

5.4. Stretching and Compression
- Vertical stretch/compression by a factor \(a\): \(f(x) = a(3x - 2)\)
- Horizontal stretch/compression involves more complex transformations, but for linear functions, it can be visualized by modifying the slope.

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6. Practical Applications of \(f(x) = 3x - 2\)

Linear functions are widely used in real-world contexts. Let's explore some examples relevant to this specific function.

6.1. Word Problem: Business Scenario
Suppose:
- \(x\) represents the number of items produced.
- \(f(x)\) represents the total profit in dollars, where profit increases by \$3 for each item produced, minus a fixed cost of \$2.

Question: How much profit do you make when producing 10 items?

Solution:
\[
f(10) = 3(10) - 2 = 30 - 2 = \$28
\]

Interpretation: Producing 10 items yields a profit of \$28.

6.2. Distance, Rate, and Time
If \(f(x)\) models the total distance traveled after \(x\) hours at a constant speed of 3 units/hour (e.g., miles/hour), minus an initial offset of 2 miles, then:
- For \(x=5\) hours: \(f(5) = 3(5) - 2 = 15 - 2 = 13\) miles traveled after 5 hours.

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7. Common Mistakes and Troubleshooting

When working with the function \(f(x) = 3x - 2\), students often make errors. Recognizing these can help clarify understanding.

7.1. Confusing the Slope and Y-Intercept
- Remember: slope (\(m\)) is the coefficient multiplying \(x\); here, 3.
- Y-intercept is the constant term, here, \(-2\).

7.2. Misreading the Function as Non-Linear
- The function is linear; the graph is a straight

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