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Understanding how to interpret and analyze the cost function $F(n) = 5 + 10n$ is essential, especially when it comes to calculating expenses for dog walking services. This article will explore the meaning behind this function, examine what it tells us about costs, and clarify which statements derived from this function are true. Whether you're a pet owner budgeting for walks or a student learning about linear functions, this guide will help you grasp the core concepts.

Deciphering the Cost Function $F(n) = 5 + 10n$

What does the function represent?

The function $F(n) = 5 + 10n$ models the total cost of hiring a dog walker for n hours. Here:

- $F(n)$ represents the total fee for n hours.
- 5 is the fixed starting fee or base charge.
- $10n$ indicates variable cost depending on the number of hours, with 10 being the rate per hour.

This linear function suggests that:

- The cost increases by 10 units (dollars, euros, etc.) for each additional hour.
- There is a fixed initial fee regardless of the number of hours.

Breaking down the components

- Fixed Cost (Base Fee): 5
- Variable Cost (Per Hour Rate): $10n$

This structure is common in service pricing, where a flat fee is combined with an hourly rate.

Analyzing the Statements Based on the Function

Given the function, we can evaluate various statements about how the cost behaves as n increases. One such statement is:

>A. For Each Additional Hour, the Cost Increases by 10 Units.

Let's analyze this statement and others that might be associated with the function.

Statement A: For Each Additional Hour, the Cost Increases by 10 Units

This statement is true because:

- The coefficient of n (which is 10) indicates the rate of change.
- For every increase of 1 in n (adding one hour), $F(n)$ increases by 10 units.

Mathematically:

- $\Delta F(n) / \Delta n = 10$

This is the slope of the line, representing the rate of change.

Other Possible Statements and Their Validity

Let's consider some typical statements related to such functions:

1. The fixed fee is \$5 regardless of hours.
 - True — The constant term in the function is 5, indicating a fixed starting cost.
2. The total cost increases by \$10 for each additional hour.
 - True — As explained, the coefficient of n is 10.
3. If the dog walker works for 0 hours, the total cost is \$0.
 - False — When $n = 0$, $F(0) = 5 + 10 \cdot 0 = 5$, so the minimum cost is \$5 even if no hours are worked.
4. The cost function is nonlinear.
 - False — The function is linear, as it has the form $F(n) = a + bn$.
5. The total cost is proportional to the number of hours.
 - Partially true — Because of the fixed fee, total cost isn't directly proportional to hours alone; it's a linear function with an intercept.

Understanding the Implications of the Cost Function

Calculating Costs for Different Hours

Let’s see how the total cost changes with varying hours:

Number of Hours (n)	Total Cost $F(n) = 5 + 10n$	Explanation
0	5	Fixed fee, no hours worked
1	15	$\$5 + \10
2	25	$\$5 + \20
5	55	$\$5 + \50
10	105	$\$5 + \100

This table illustrates the linear nature of the cost function.

Graphing the Cost Function

Visualizing $F(n) = 5 + 10n$ on a graph:

- The x-axis represents hours (n).
- The y-axis represents total cost (F(n)).
- The line crosses the y-axis at y = 5 (fixed fee).
- The slope of the line is 10, indicating the rate of increase per hour.

Practical Applications and Budgeting

Planning Dog Walking Expenses

Understanding this function helps pet owners estimate costs accurately:

- For a 3-hour walk: $F(3) = 5 + 10 \times 3 = 35$
- For a 7-hour walk: $F(7) = 5 + 10 \times 7 = 75$

Knowing the fixed fee and hourly rate allows for quick calculations and budgeting.

Cost Optimization Tips

- Book longer walks if possible, to benefit from the fixed fee being spread over more hours.

- Confirm if discounts or packages exist for multiple hours or recurring services.

Educational Insights into Linear Cost Functions

Understanding Slope and Intercept

- Slope (10): Represents the cost per additional hour.
- Intercept (5): Represents the fixed starting fee.

Real-World Examples of Similar Functions

- Taxi fares with a base fee plus per-mile charges.
- Subscription services with a fixed monthly fee plus usage-based charges.
- Utility bills with fixed charges plus consumption costs.

Summary: Which Statement Is True?

Based on the analysis, the key takeaway is:

- The cost increases by a fixed amount (10 units) for each additional hour.

This confirms that Statement A — "For each additional hour, the cost increases by 10 units" — is true.

Final Thoughts

Understanding the cost function $F(n) = 5 + 10n$ provides valuable insights into pricing models involving fixed fees plus variable rates. Recognizing the meaning of the slope and intercept helps in making informed decisions, budgeting, and understanding linear relationships in real-world scenarios.

Whether you're calculating costs for pet services, transportation, or utilities, mastering these concepts ensures clarity and accuracy. Remember that in this function:

- The fixed fee is the starting point.
- The rate per hour dictates how costs scale as hours increase.
- The function's linear nature makes calculations straightforward.

By grasping these principles, you can confidently interpret similar functions and make informed financial decisions.

Frequently Asked Questions

What does the function $F(n) = 5 + 10n$ represent in the context of dog walking costs?

It represents the total cost of hiring a dog walker for n hours, where 5 is the base fee and 10 is the hourly rate.

How much would it cost to hire a dog walker for 3 hours according to the function?

$F(3) = 5 + 10(3) = 5 + 30 = \35 .

What is the fixed fee associated with hiring a dog walker according to the function?

The fixed fee is \$5, which is the cost when $n = 0$ hours (though practically, it's the base charge).

How does the cost change with each additional hour of dog walking?

The cost increases by \$10 for each additional hour, as indicated by the coefficient of n in the function.

Which statement is true about the linearity of the cost function?

The function is linear because it has the form $F(n) = a + bn$, with constant rate of change of \$10 per hour.

If the cost for 4 hours is \$45, does this match the function $F(n) = 5 + 10n$?

Yes, because $F(4) = 5 + 10(4) = 5 + 40 = \45 , which matches the given cost.

What does the statement 'A. For Each Additional' likely refer to in the context of the function?

It probably refers to the incremental increase in cost per additional hour, which is \$10 per hour.

Is the cost function an example of a linear function, and

why?

Yes, because the cost increases by a fixed amount (\$10) for each additional hour, making it linear.

Additional Resources

Understanding the Cost Structure of Dog Walking: An In-Depth Analysis of $F(n) = 5 + 10n$

Introduction: Deciphering the Cost Formula for Dog Walking Services

When it comes to choosing a dog walker, understanding the pricing structure is crucial for pet owners to budget effectively and make informed decisions. The expression $F(n) = 5 + 10n$ offers a mathematical representation of the cost for a dog walking service based on the number of hours, n , the service is provided.

This formula suggests a linear relationship, where the total cost depends on a fixed starting fee, combined with an additional charge per hour. To truly grasp what this means in practical terms, we need to dissect the components of the formula, analyze its implications, and explore how it compares to other pricing models in the pet care industry.

The Components of the Formula: Breaking Down $F(n) = 5 + 10n$

Fixed Fee: The Base Cost of \$5

The first term, 5, represents a fixed fee. This is the initial charge that applies regardless of the number of hours the dog is walked. Fixed fees are common in service industries as they cover administrative costs, initial assessments, or simply serve as a starting point for the pricing structure.

- Implication: Even if a pet owner only needs a short walk, they are still paying at least \$5.
- Purpose: This fee can be viewed as the minimum charge for engaging the service, ensuring the provider's basic costs are covered.

Variable Cost: The Hourly Rate of \$10

The second term, $10n$, indicates a variable component that depends on n , the number of hours. For each additional hour, the cost increases by \$10.

- Implication: Longer walks result in higher total costs, scaled linearly with the number of hours.
- Pricing Strategy: This rate aligns with industry standards for pet care, where longer sessions are priced proportionally.

Total Cost Function: Summarizing the Components

Putting it together, the total cost $F(n)$ can be interpreted as:

- Fixed starting fee: \$5
- Per-hour charge: \$10 for each hour of walking

This linear model simplifies understanding costs, making it straightforward for pet owners to estimate expenses for various walk durations.

Analyzing the Statement: Which Is True?

The question posed is: "The cost a dog walker for n hours is given by $F(n) = 5 + 10n$. Which statement is true?" The options typically revolve around the nature of the function and its implications.

Let's explore the most common interpretations and clarify key points:

A. The cost increases by \$10 for each additional hour

Analysis:

- True. Since the variable component is $10n$, for each additional hour n , the total cost increases by \$10.
- Explanation: The coefficient of n (which is 10) indicates the rate of change of the cost with respect to hours.

B. The fixed fee is \$5, regardless of hours

Analysis:

- True. The constant term 5 signifies that the minimum charge, regardless of the number of hours, is \$5.
- Implication: Whether the walk is 1 hour or 5 hours, the base fee remains.

C. The total cost is a linear function of the number of hours

Analysis:

- True. The function $F(n) = 5 + 10n$ is linear, meaning the total cost scales directly with the number of hours.
- Significance: Linear functions are predictable and easier for both providers and clients to understand.

D. For zero hours, the cost would be \$5

Analysis:

- Correct. Substituting $n=0$ yields $F(0) = 5 + 10 \times 0 = \5 .
- Note: This suggests a minimum fee or a setup fee even if no walk occurs, which could be a contractual consideration.

Practical Implications of the Cost Function

Understanding the formula helps pet owners make smarter decisions and allows dog walkers to structure their pricing effectively.

Estimating Costs for Different Walk Durations

Here's a quick reference table for various n values:

Number of Hours (n)	Total Cost $F(n) = 5 + 10n$	Breakdown
0	\$5	Fixed fee only
1	\$15	\$5 fixed + \$10 for 1 hour
2	\$25	\$5 fixed + \$20 for 2 hours
3	\$35	\$5 fixed + \$30 for 3 hours
4	\$45	\$5 fixed + \$40 for 4 hours

This straightforward structure allows pet owners to calculate costs efficiently, ensuring transparency.

Comparison with Other Pricing Models

- Flat Rate Model: Some services charge a flat fee per walk (e.g., \$20 per walk), regardless of duration.
- Tiered Pricing: Others might have different rates for different durations (e.g., first hour is \$15, subsequent hours are \$10).

- Hourly Rate Model: The linear model $F(n) = 5 + 10n$ is advantageous because of its simplicity and predictability.

Advantages of a Linear Pricing Model

- Transparency: Clear understanding of how costs scale.
- Flexibility: No need for complex tiered pricing structures.
- Ease of Budgeting: Pet owners can easily estimate total costs based on desired walk durations.

Understanding the True Statement: Which Is Correct?

Given the options usually associated with such a problem, the most accurate statement is:

> "The total cost increases by \$10 for each additional hour, with a fixed fee of \$5 regardless of the number of hours."

This statement encapsulates the essence of the formula $F(n) = 5 + 10n$, emphasizing both the fixed component and the variable hourly rate.

Additional Considerations and Real-World Applications

While the formula offers a clean, mathematical approach to pricing, real-world scenarios often involve additional factors:

- Minimum Charges: Some dog walkers might have a minimum fee that exceeds the fixed \$5.
- Multiple Dogs: Additional charges may apply for walking more than one dog.
- Special Services: Extra fees for pet sitting, overnight walks, or special needs.
- Location Factors: Travel time and distance might influence the base fee or per-hour rate.

Practical tips for pet owners:

- Always clarify whether the fixed fee applies to partial hours.
- Confirm if the rate increases for multiple dogs or special services.
- Use the formula to compare different providers and select the most cost-effective option.

Conclusion: The Value of Mathematical Clarity in Service Pricing

Understanding the cost formula $F(n) = 5 + 10n$ provides valuable insights into how dog walking services are priced. It demystifies the process, allowing pet owners to plan their budgets accurately and choose providers that offer transparent, fair pricing.

The key takeaway is that the total cost increases linearly with the number of hours, starting with a fixed base fee. This clarity benefits both service providers and clients, fostering trust and facilitating straightforward financial planning.

In essence, recognizing that each additional hour adds \$10 to the total, with a minimum fee of \$5, helps in making informed decisions when selecting a dog walking service. Whether for a quick 15-minute walk or a longer daily session, this model ensures both clarity and fairness in pet care pricing.

Disclaimer: Always verify the specific terms and conditions of individual dog walking services, as actual pricing may vary based on location, provider policies, and additional services.

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