

2022 MCAS Sample Student Work and Scoring Guide

Grade 10 Mathematics

Question 13: Constructed-Response

Reporting Category: Algebra and Functions

Standards: [AI.F-IF.A.2](#) - Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context. For example, given a function representing a car loan, determine the balance of the loan at different points in time.

[MI.F-IF.A.2](#) - Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context. For example, given a function representing a car loan, determine the balance of the loan at different points in time.

Item Description: Evaluate a linear function over specific values of its domain and interpret given values of the function in terms of a real-world context.

Calculator: Not allowed

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Scoring Guide

Select a score point in the table below to view the sample student response.

Score*	Description
4A	The student response demonstrates an exemplary understanding of the Functions concepts involved in using function notation, evaluating functions for inputs in their domains, and interpreting statements that use function notation in terms of a context. The student interprets a real-life situation modeled by a function.
4B	
3	The student response demonstrates a good understanding of the Functions concepts involved in using function notation, evaluating functions for inputs in their domains, and interpreting statements that use function notation in terms of a context. Although there is significant evidence that the student was able to recognize and apply the concepts involved, some aspect of the response is flawed. As a result, the response merits 3 points.
2	The student response demonstrates a fair understanding of the Functions concepts involved in using function notation, evaluating functions for inputs in their domains, and interpreting statements that use function notation in terms of a context. While some aspects of the task are completed correctly, others are not. The mixed evidence provided by the student merits 2 points.
1	The student response demonstrates a minimal understanding of the Functions concepts involved in using function notation, evaluating functions for inputs in their domains, and interpreting statements that use function notation in terms of a context.
0	The student response contains insufficient evidence of an understanding of the Functions concepts involved in using function notation, evaluating functions for inputs in their domains, and interpreting statements that use function notation in terms of a context. As a result, the response does not merit any points.

*Letters are used to distinguish between sample student responses that earned the same score (e.g., 4A and 4B).

Score Point 4A

This question has four parts.

A student received a gift card to use at a coffee shop. The student used the gift card to spend the same amount of money at the coffee shop every day until the remaining value of the card was \$0. This function represents $f(n)$, the value, in dollars, of the gift card after n days.

$$f(n) = -2.5n + 75$$

Part A

Based on the function, what was the original value, in dollars, of the gift card? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

The original value was 75 dollars. I know this because the y intercept is 75, and if $f(n)$, which is also known as y , is the monetary value, then the y intercept is the starting value.

Part B

Based on the function, how much money, in dollars, did the student spend each day at the coffee shop? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

The student spent \$2.50 every day at the coffee shop. I found this by looking at the slope, or how much the value goes down per n , or day.

Part C

What was the remaining value, in dollars, of the gift card after 20 days? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

The remaining value after 20 days was \$25.
 $f(n) = -2.5(20) + 75$
 $f(n) = -50 + 75$
 $f(n) = 25$

Part D

How many days in total did it take until the remaining value of the gift card was \$0? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

30 days.
 $0 = -2.5n + 75$
 $-75 = -2.5n$
 $30 = n$

Score Point 4B

This question has four parts.

A student received a gift card to use at a coffee shop. The student used the gift card to spend the same amount of money at the coffee shop every day until the remaining value of the card was \$0. This function represents $f(n)$, the value, in dollars, of the gift card after n days.

$$f(n) = -2.5n + 75$$

Part A

Based on the function, what was the original value, in dollars, of the gift card? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

The original value of the gift card is \$75. This is because $n = \text{days}$ so if you substitute 0 in that is the value of the gift card after not spending anything. Once solved $f(0)=75$.

Part B

Based on the function, how much money, in dollars, did the student spend each day at the coffee shop? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

The student spend \$2.50 each day at the coffee shop. This is shown in the equation as -2.5 because every day the card loses \$2.50.

Part C

What was the remaining value, in dollars, of the gift card after 20 days? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

$$\begin{aligned} f(n) &= -2.5n + 75 \\ f(20) &= -2.5(20) + 75 \\ f(20) &= -50 + 75 \\ f(20) &= \$25 \end{aligned}$$

Part D

How many days in total did it take until the remaining value of the gift card was \$0? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

It took 30 days for the card to get to \$0. $2.5 \times 30 = 75$

Score Point 3

This question has four parts.

A student received a gift card to use at a coffee shop. The student used the gift card to spend the same amount of money at the coffee shop every day until the remaining value of the card was \$0. This function represents $f(n)$, the value, in dollars, of the gift card after n days.

$$f(n) = -2.5n + 75$$

Part A

Based on the function, what was the original value, in dollars, of the gift card? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

$$\begin{aligned} f(0) &= -2.5(0) + 75 \\ f(0) &= 0 + 75 \\ f(0) &= 75 \end{aligned}$$

Part B

Based on the function, how much money, in dollars, did the student spend each day at the coffee shop? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

$$\begin{aligned} f(1) &= -2.5(1) + 75 \\ f(1) &= -2.5 + 75 \\ f(1) &= 72.5 \end{aligned}$$

Part C

What was the remaining value, in dollars, of the gift card after 20 days? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

$$\begin{aligned} f(20) &= -2.5(20) + 75 \\ f(20) &= -50.0 + 75 \\ f(20) &= 25 \end{aligned}$$

Part D

How many days in total did it take until the remaining value of the gift card was \$0? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

$$\begin{aligned} f(30) &= -2.5(30) + 75 \\ f(30) &= -75.0 + 75 \\ f(30) &= 0 \end{aligned}$$

Score Point 2

This question has four parts.

A student received a gift card to use at a coffee shop. The student used the gift card to spend the same amount of money at the coffee shop every day until the remaining value of the card was \$0. This function represents $f(n)$, the value, in dollars, of the gift card after n days.

$$f(n) = -2.5n + 75$$

Part A

Based on the function, what was the original value, in dollars, of the gift card? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

The original value was \$75 because if graphed that is the y intercept, meaning that is the start and subtract \$2.50 per n days.

Part B

Based on the function, how much money, in dollars, did the student spend each day at the coffee shop? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

It took 55 days.

Part C

What was the remaining value, in dollars, of the gift card after 20 days? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

\$25 were left over, because if you do replace n with 20 and solve it out you get 25

$$f(20) = -2.5(20) + 75$$

$$f(20) = -50 + 75$$

$$f(20) = 25$$

Part D

How many days in total did it take until the remaining value of the gift card was \$0? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

I took 4 days.

Score Point 1

This question has four parts.

A student received a gift card to use at a coffee shop. The student used the gift card to spend the same amount of money at the coffee shop every day until the remaining value of the card was \$0. This function represents $f(n)$, the value, in dollars, of the gift card after n days.

$$f(n) = -2.5n + 75$$

Part A

Based on the function, what was the original value, in dollars, of the gift card? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

according to the function the initial value was \$28.05 because $2.5 \times 75 = 28.5$

Part B

Based on the function, how much money, in dollars, did the student spend each day at the coffee shop? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

The student spent \$2.5 each day because its being subtracted in the equation.

Part C

What was the remaining value, in dollars, of the gift card after 20 days? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

\$5.00 were left on the card after 20 days because $2.5 \times 20 = 5.00$

Part D

How many days in total did it take until the remaining value of the gift card was \$0? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

it took 75 days until the card was at 0 because it says +75 which represents the days in the equation.

Score Point 0

This question has four parts.

A student received a gift card to use at a coffee shop. The student used the gift card to spend the same amount of money at the coffee shop every day until the remaining value of the card was \$0. This function represents $f(n)$, the value, in dollars, of the gift card after n days.

$$f(n) = -2.5n + 75$$

Part A

Based on the function, what was the original value, in dollars, of the gift card? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

The original amount on the card is \$76.75. Since there are 7 days in one week, you have to multiply $-2.5(7)$, which is 1.75, then add 75 and you get 76.75.

Part B

Based on the function, how much money, in dollars, did the student spend each day at the coffee shop? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

The student would have to spend about \$10.70.
You have to divide 76.75 by 7 because there are 7 days in a week.

Part C

What was the remaining value, in dollars, of the gift card after 20 days? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

About \$3.83
You have to divide the initial amount by 20 (days)

Part D

How many days in total did it take until the remaining value of the gift card was \$0? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

It would take about 20 days because the student would have over spent if she went to 21 days.