2023 MCAS Sample Student Work and Scoring Guide

Grade 8 Mathematics
Question 13: Constructed-Response

Reporting Category: Statistics and Probability
Standard: 8.SP.A.1 - Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.
Item Description: Given a scatter plot, determine if there are outliers in the data, describe the association represented by the data, and make a prediction based on the data.
Calculator: Allowed

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

Score*	Description
4A **4B**	The student response demonstrates an exemplary understanding of the Statistics and Probability concepts involved in interpreting a scatter plot for bivariate measurement data to investigate patterns of association between two quantities. Given a scatter plot, the student determines if there are outliers in the data, describes the association represented by the data, and makes a prediction based on the data.
3	The student response demonstrates a good understanding of the Statistics and Probability concepts involved in interpreting a scatter plot for bivariate measurement data to investigate patterns of association between two quantities. 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 Statistics and Probability concepts involved in interpreting a scatter plot for bivariate measurement data to investigate patterns of association between two quantities. 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 Statistics and Probability concepts involved in interpreting a scatter plot for bivariate measurement data to investigate patterns of association between two quantities.
0	The student response contains insufficient evidence of an understanding of the Statistics and Probability concepts involved in interpreting a scatter plot for bivariate measurement data to investigate patterns of association between two quantities. 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 recorded the high temperature, in degrees Fahrenheit, in his town on each day for the first 10 days in January. This scatter plot shows the data the student recorded.

High Temperatures in January
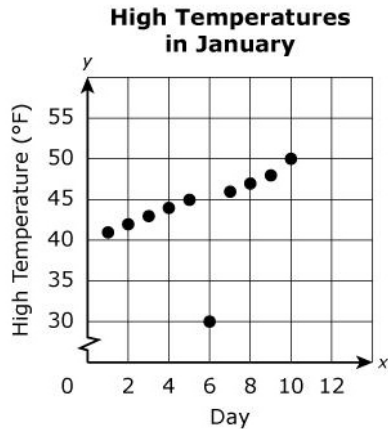
Part A

Based on the scatter plot, what was the high temperature, in degrees Fahrenheit, on day 5?

Enter your answer in the space provided.

> The high temperature on day 5 was 45 degrees Fahrenheit. The x value 5 has a y value of 45.

Part B

Based on the scatter plot, on which day does the high temperature seem to be an outlier? Explain your reasoning.

Enter your answer and your explanation in the space provided.

> There seems to be an outlier on day 6 because the temperature is 30 degrees which is much colder than the other days. It doesn't follow the increasing trend of the data.

Part C

Determine whether the data in the scatter plot have a positive or a negative association. Explain your reasoning.

Enter your answer and your explanation in the space provided.

> The data in the scatter plot has a positive association because the vast majority of the points are increasing y value as the x value increases.

Part D

The student says that, based on the trend in the data, the expected high temperature on day 15 will be greater than the high temperature on day 10. Is the student correct? Explain your reasoning.

Enter your answer and your explanation in the space provided.

Yes, because the association is positive. The greater the x value, the greater the y value will be as well. Day 15 is farther along the x axis than day 10, so its y value will be more if it follows the pattern. The y value on this graph is high temperature, so the high tempurature will be warmer on day 15 than day 10.

Score Point 4B

This question has four parts.

A student recorded the high temperature, in degrees Fahrenheit, in his town on each day for the first 10 days in January. This scatter plot shows the data the student recorded.

High Temperatures in January
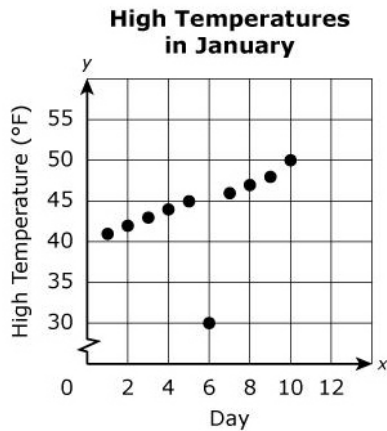
Part A

Based on the scatter plot, what was the high temperature, in degrees Fahrenheit, on day 5?

Enter your answer in the space provided.

> It was 45 degrees fahrenheit

Part B

Based on the scatter plot, on which day does the high temperature seem to be an outlier? Explain your reasoning.

Enter your answer and your explanation in the space provided.

> Based on the scatter plot 30 degrees fahrenheit seems to be the outlier because all the other temeptatures are pretty steady and stay at the same rate of $40 - 50$ but on day 6 it goes all the way down to 30

Part C

Determine whether the data in the scatter plot have a positive or a negative association. Explain your reasoning.

Enter your answer and your explanation in the space provided.

> I think it has a positive association because of the way its going its not going down but going up as each day passes

Part D

The student says that, based on the trend in the data, the expected high temperature on day 15 will be greater than the high temperature on day 10. Is the student correct? Explain your reasoning.

Enter your answer and your explanation in the space provided.

> I think he is correct based on the data the temperatures are going up as each day goes by.

Score Point 3

This question has four parts.

A student recorded the high temperature, in degrees Fahrenheit, in his town on each day for the first 10 days in January. This scatter plot shows the data the student recorded.

High Temperatures in January
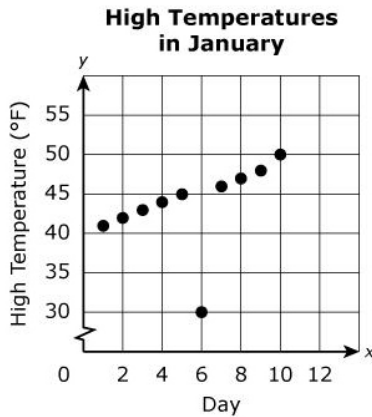
Part A

Based on the scatter plot, what was the high temperature, in degrees Fahrenheit, on day 5?

Enter your answer in the space provided.

> On day 5 the tempature would be 45 degrees Fahrenheight.

Part B

Based on the scatter plot, on which day does the high temperature seem to be an outlier? Explain your reasoning.

Enter your answer and your explanation in the space provided.

> On day 6 it was 30 degrees so the tempature was an outlier. I know this because on day 6 the dot is not following the trend in the data.

Part C

Determine whether the data in the scatter plot have a positive or a negative association. Explain your reasoning.

Enter your answer and your explanation in the space provided.

> It has a negative association because it is set apart from the rest of the dots.

Part D

The student says that, based on the trend in the data, the expected high temperature on day 15 will be greater than the high temperature on day 10. Is the student correct? Explain your reasoning.

Enter your answer and your explanation in the space provided.

> The student is correct because we can see in the data that apart form day 6 as the others day go on the tempature increasingly rises.

Score Point 2

This question has four parts.

A student recorded the high temperature, in degrees Fahrenheit, in his town on each day for the first 10 days in January. This scatter plot shows the data the student recorded.

High Temperatures in January
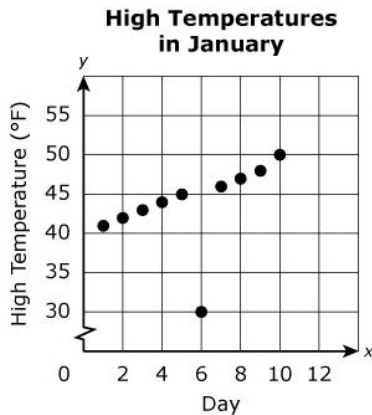
Part A

Based on the scatter plot, what was the high temperature, in degrees Fahrenheit, on day 5?

Enter your answer in the space provided.

> $45°$F as it says on the graph

Part B

Based on the scatter plot, on which day does the high temperature seem to be an outlier? Explain your reasoning.

Enter your answer and your explanation in the space provided.

> Day 6, I say this because as the other days are all in the $40°$ to $50°$ range Day 6 is $30°$ being much colder than the rest.

Part C

Determine whether the data in the scatter plot have a positive or a negative association. Explain your reasoning.

Enter your answer and your explanation in the space provided.

> I think it has a negative association overall. I say this because it only goes up, until Day 6, Day 6 is what gets the positive off track and messes it up.

Part D

The student says that, based on the trend in the data, the expected high temperature on day 15 will be greater than the high temperature on day 10. Is the student correct? Explain your reasoning.
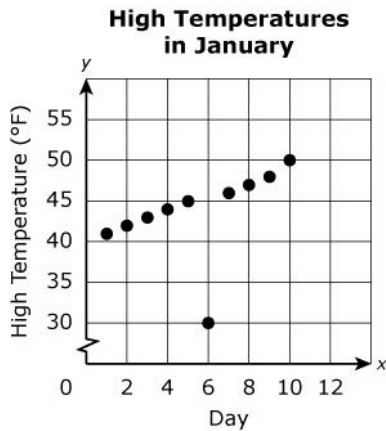
Enter your answer and your explanation in the space provided.

> No the student is wrong. because if its a pattern then the 15th day would be a drop in temperature.

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Score Point 1

This question has four parts.

A student recorded the high temperature, in degrees Fahrenheit, in his town on each day for the first 10 days in January. This scatter plot shows the data the student recorded.

High Temperatures in January

Part A

Based on the scatter plot, what was the high temperature, in degrees Fahrenheit, on day 5?

Enter your answer in the space provided.

> 45

Part B

Based on the scatter plot, on which day does the high temperature seem to be an outlier? Explain your reasoning.

Enter your answer and your explanation in the space provided.

> day 10

Part C

Determine whether the data in the scatter plot have a positive or a negative association. Explain your reasoning.

Enter your answer and your explanation in the space provided.

> It is negative

Part D

The student says that, based on the trend in the data, the expected high temperature on day 15 will be greater than the high temperature on day 10. Is the student correct? Explain your reasoning.

Enter your answer and your explanation in the space provided.

> yes

Score Point 0

This question has four parts.

A student recorded the high temperature, in degrees Fahrenheit, in his town on each day for the first 10 days in January. This scatter plot shows the data the student recorded.

High Temperatures in January
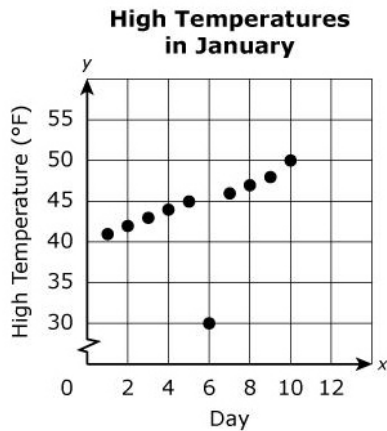
Part A

Based on the scatter plot, what was the high temperature, in degrees Fahrenheit, on day 5?

Enter your answer in the space provided.

> it is shown in the graph that on day 5 it was $40°$

Part B

Based on the scatter plot, on which day does the high temperature seem to be an outlier? Explain your reasoning.

Enter your answer and your explanation in the space provided.

> day 10 because it was $50°$

Part C

Determine whether the data in the scatter plot have a positive or a negative association. Explain your reasoning.

Enter your answer and your explanation in the space provided.

> It has a negative assaociation because the graph is just telling you the weather

Part D

The student says that, based on the trend in the data, the expected high temperature on day 15 will be greater than the high temperature on day 10. Is the student correct? Explain your reasoning.

Enter your answer and your explanation in the space provided.

> The student could be correct. It's bascially a 50 / 50 chance