

**Just in Time Quick Check**  
**Standard of Learning 8.PS.3**  
**Strand: Probability and Statistics**

**Standard of Learning 8.PS.3**

**The student will apply the data cycle (formulate questions; collect or acquire data; organize and represent data; and analyze data and communicate results) with a focus on scatterplots.**

*Students will demonstrate the following Knowledge and Skills:*

- a) Formulate questions that require the collection or acquisition of data with a focus on scatterplots.
- b) Determine the data needed to answer a formulated question and collect the data (or acquire existing data) of no more than 20 items using various methods (e.g., observations, measurement, surveys, experiments).
- c) Organize and represent numeric bivariate data using scatterplots with and without the use of technology.
- d) Make observations about a set of data points in a scatterplot as having a positive linear relationship, a negative linear relationship, or no relationship.
- e) Analyze and justify the relationship of the quantitative bivariate data represented in scatterplots.
- f) Sketch the line of best fit for data represented in a scatterplot.

**Just in Time Quick Check**

**Just in Time Quick Check Teacher Notes**

**Supporting and Prerequisite SOL: 7.PS.2, 8.PS.2**

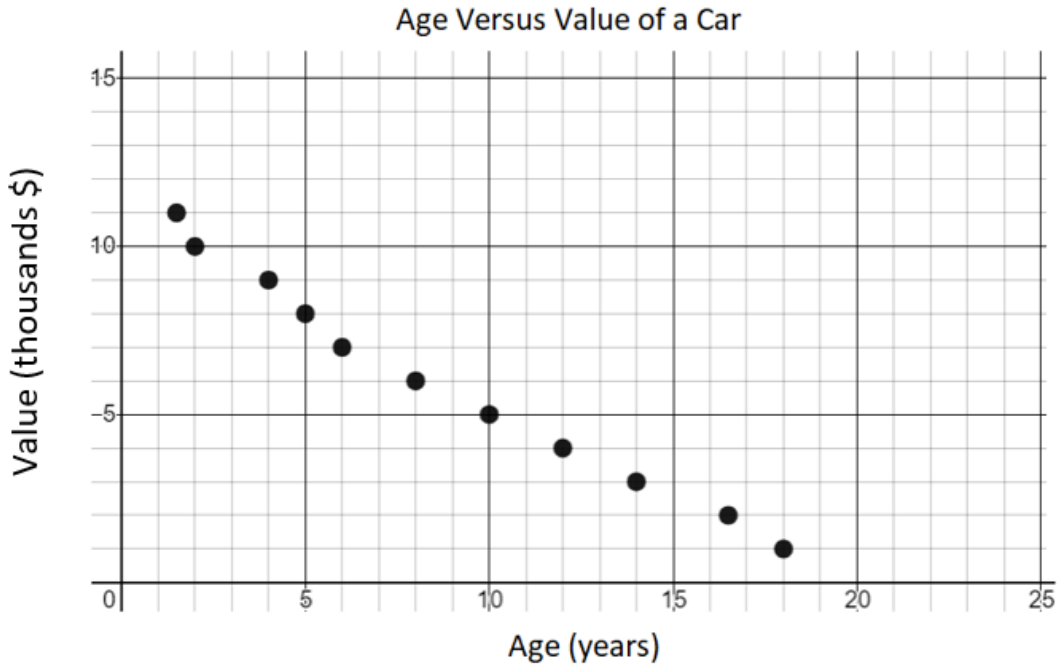
### Just in Time Quick Check 8.PS.3

1. A basketball coach wants to know if there is a relationship between how much a student practices and how many points they score in a game. What would be the best question for the coach to ask her players?
  - a) What time do you practice each day and how many games have you played this season?
  - b) How many hours per week do you practice and what is your average points scored per game?
  - c) Where do you practice each day and what is your jersey number?
  - d) How many hours per week do you practice and how many games have you missed this season?
  
2. Lucia wants to determine whether there is a relationship between the number of hours students spend on their phones each night and how many hours of sleep they get. What data would she need to collect?
  - a) Each student's favorite phone app and what time they go to bed
  - b) The number of texts each student sends at night and what time they wake up in the morning
  - c) The number of hours each student spends on their phone at night and the number of hours they sleep each night
  - d) Each student's type of phone and the number of hours they sleep each night

3. Jacob collected data on the age versus value of a car. These data are displayed in the table below.

Age (years)	1	2	3	4	5	6	7	8	9	10	11
Value (thousands)	18	16.5	14	12	10	8	6	5	4	2	1.5

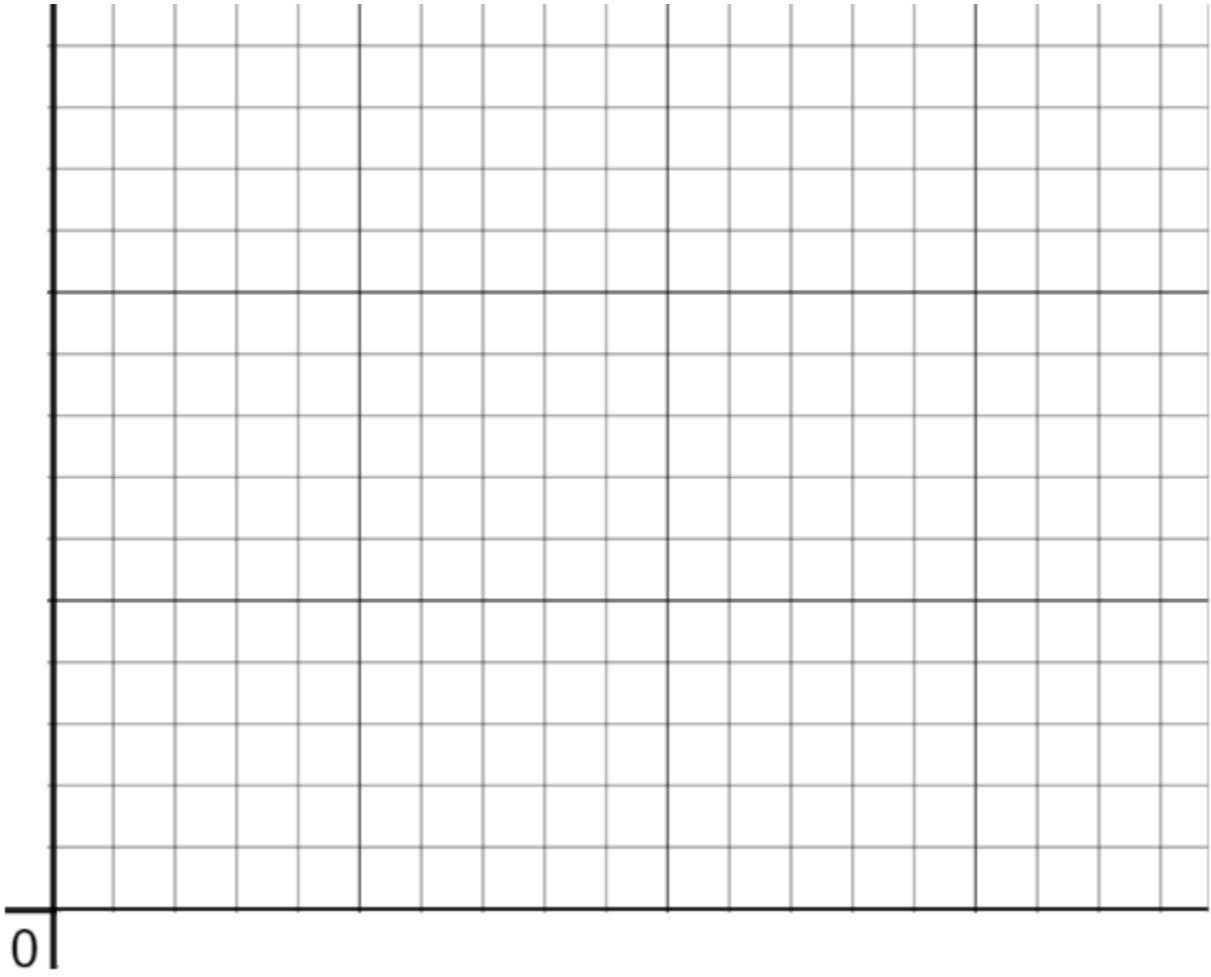
Jacob created a scatterplot to represent these data and made a mistake. Describe the mistake that Jacob made.



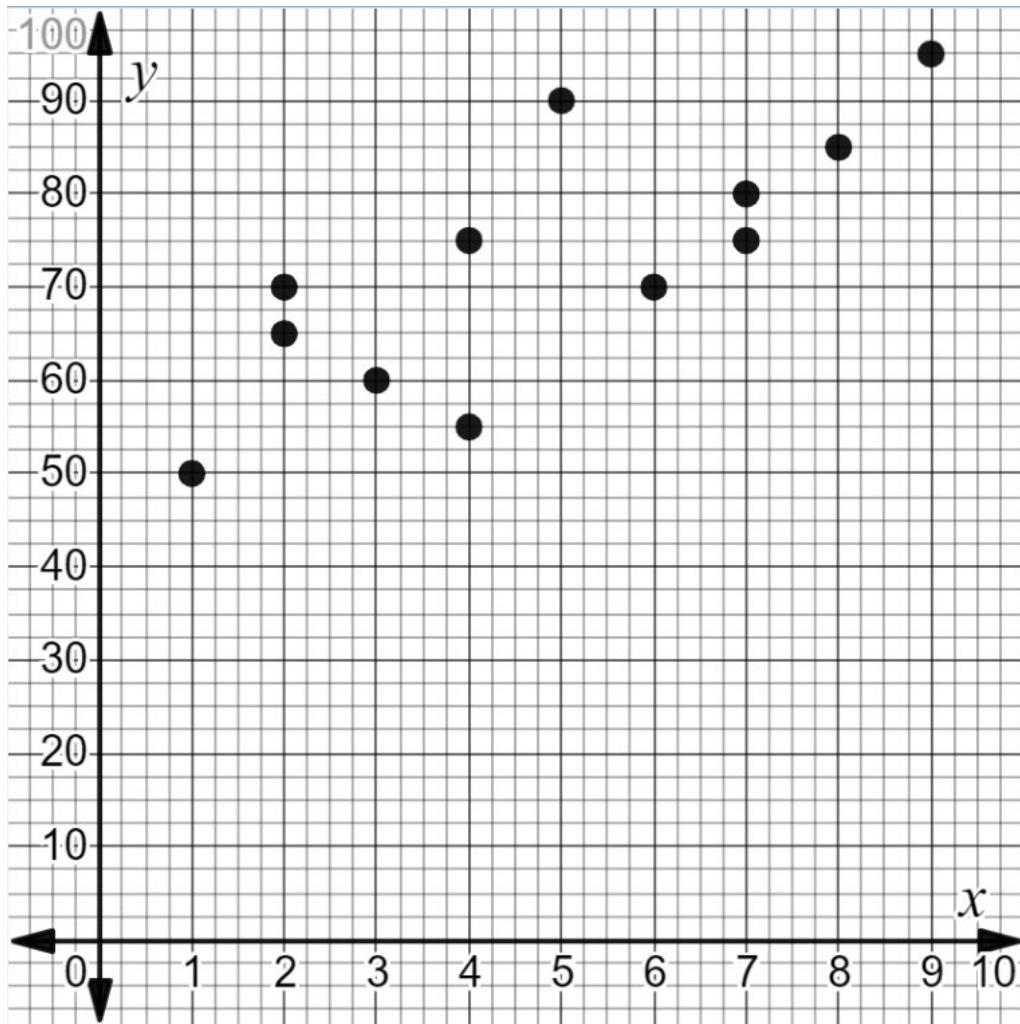
4. Students at a middle school were surveyed. The survey asked students how many hours they watch television per week,  $x$ , and the number of hours they sleep each night,  $y$ . These data are displayed in the table.

Watch Television (hours per week)	1	3	10	15	7	12	2	3	6	2	3	20	9	4	3	11	4.5
Sleep (hours per night)	10	12	3	2	5	5	9	8	5.5	10	9	2	3	8	7.5	5.5	8

Create a scatterplot to represent the data. Include a title, labels for each axis, and all data points recorded in the table.



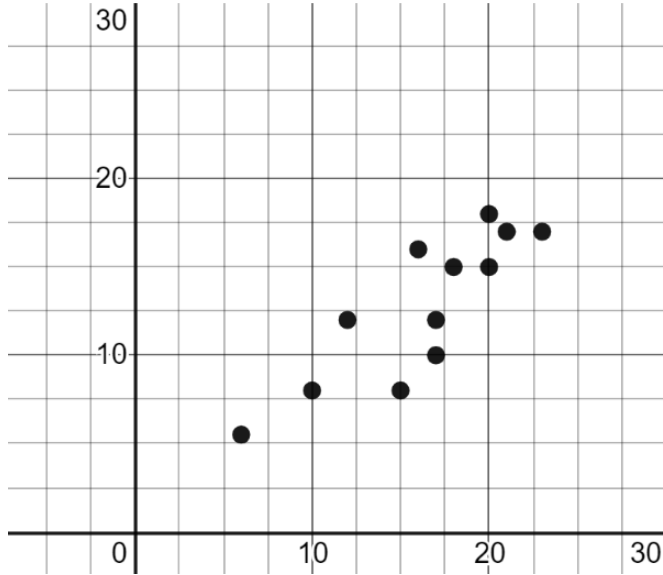
5. The scatterplot shows the number of hours classmates spent studying and the grade on their final exam. The data are displayed in the scatterplot.



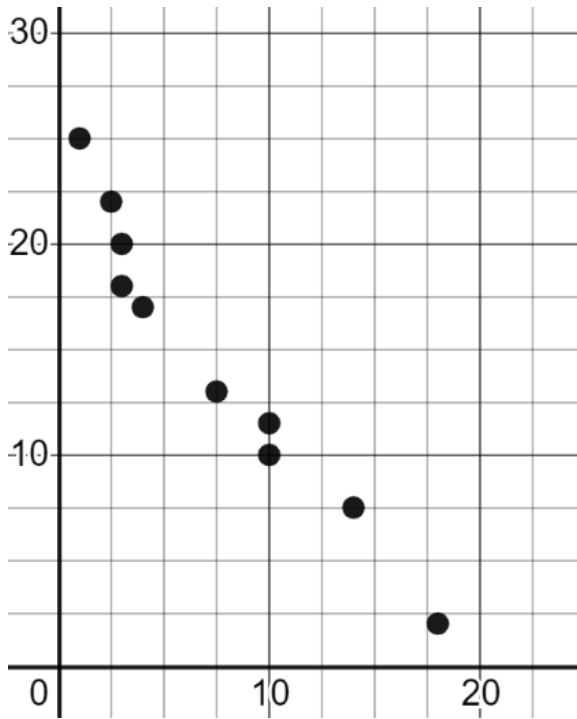
- Place a title on the scatterplot.
- Place labels on the  $x$ - and  $y$ -axis to include the units.
- Create a table to represent the data displayed in the scatterplot. Place row headings for the independent and dependent variables in the table.


6. What type of correlation is shown in each scatterplot? Explain your answer by describing the pattern of points in each graph.

Scatterplot 1:

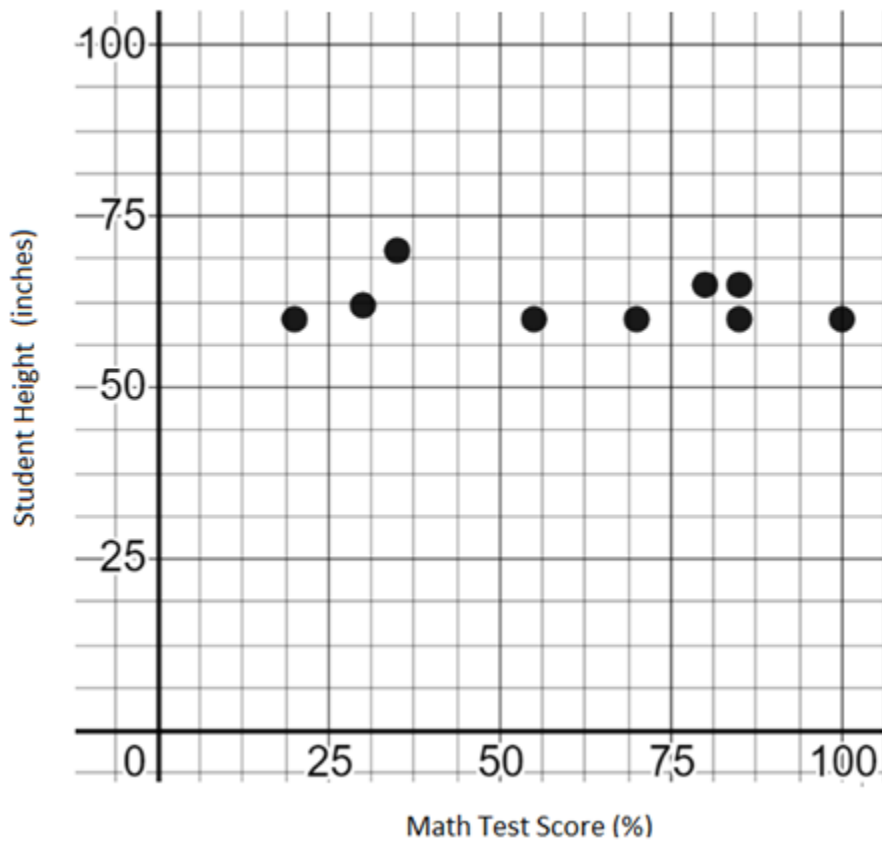


Scatterplot 2:



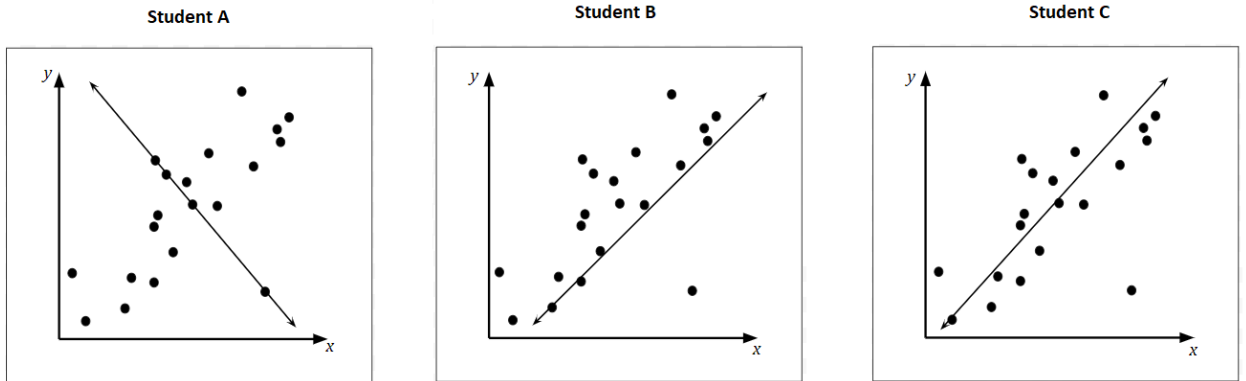
7. The scatterplot shows the relationship between the test scores of nine students and their height.

**Math Test Score and Student Height**



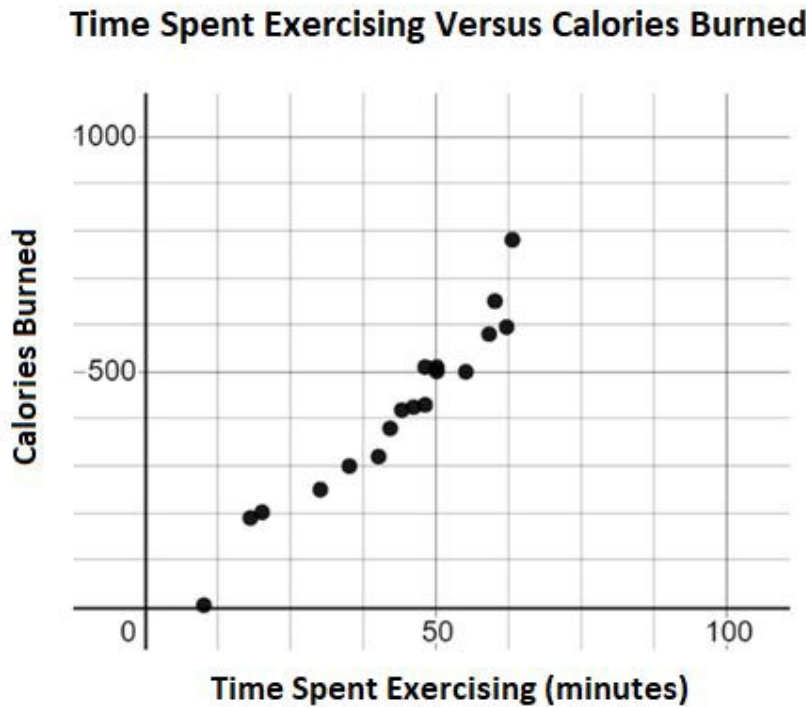
- a) Write a statement describing the relationship between a student's math test score and student height.
- b) Jeremy stated that he will score 75% on his math test because he is 50 inches tall. Can Jeremy's statement be justified using the data presented in the graph? Explain your reasoning.

8. Students from an 8<sup>th</sup> grade math class were asked to draw a line of best fit for the same scatterplot. Three students' work is displayed below.

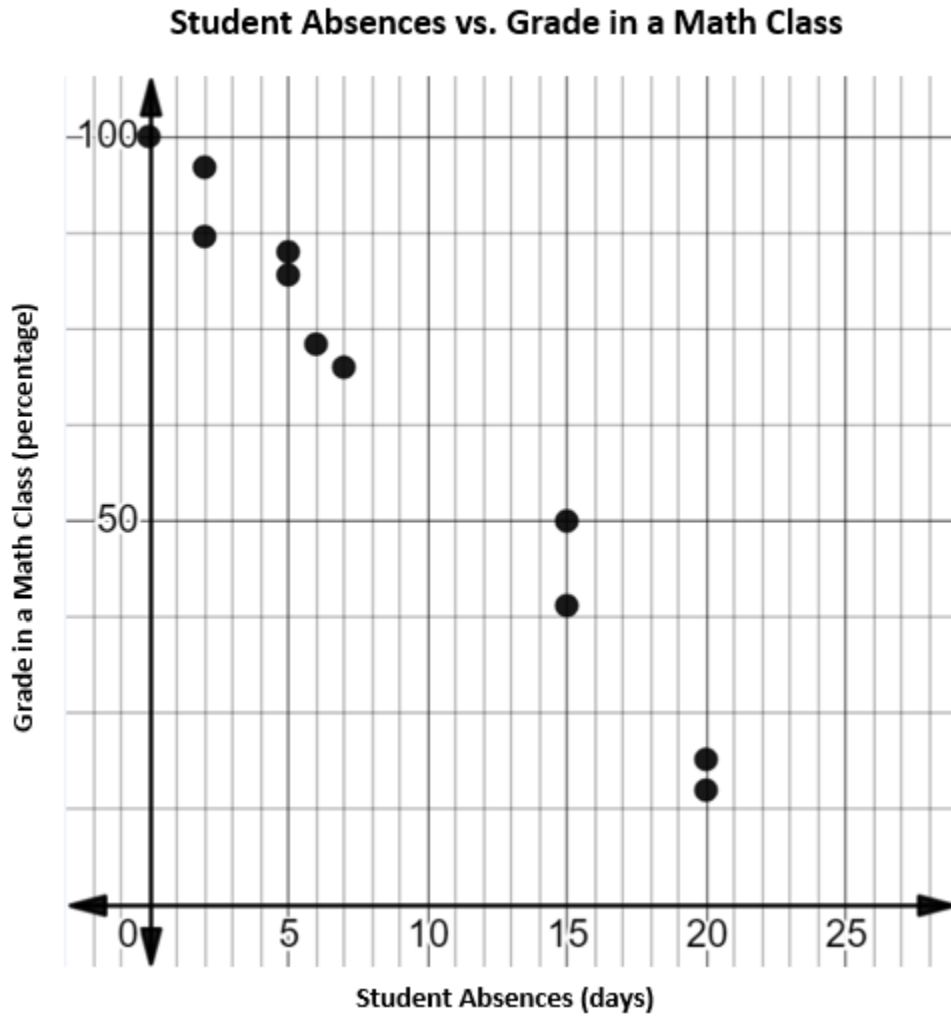


Which student drew the most accurate line of best fit? Explain the error the other two students made.

9. Jessica created a scatterplot to show the relationship between the time spent exercising and the number of calories burned. If the trend in this data continues, what is the best estimate for the number of calories burned when a person spends 90 minutes exercising?



10. The scatterplot shows the relationship between the number of student absences and the grade in a student's math class. Based on the data, what is most likely the number of student absences when that student's grade is 25%?



## 8.PS.3 Just in Time Quick Check Teacher Notes

### Common Errors/Misconceptions and their Possible Indications

1. A basketball coach wants to know if there is a relationship between how much a student practices and how many points they score in a game. What would be the best question for the coach to ask her players?
  - a) What time do you practice each day and how many games have you played this season?
  - b) How many hours per week do you practice and what is your average points scored per game?
  - c) Where do you practice each day and what is your jersey number?
  - d) How many hours per week do you practice and how many games have you missed this season?

*Students may have difficulty determining which question will provide the appropriate information to make a scatterplot. For example, some students may choose a) or d) because they provide information related to practicing basketball and basketball games but would not result in the information needed to about how long students practiced and how many points they scored. One strategy is to have students think through each answer choice and write down what type of information would be provided from each question (e.g., a location [place where students practice] and a random number [students' jersey numbers] would be provided by c), which would not be appropriate to represent on a scatterplot). This will allow students to see which question will result in information that will be needed to create the scatterplot.*

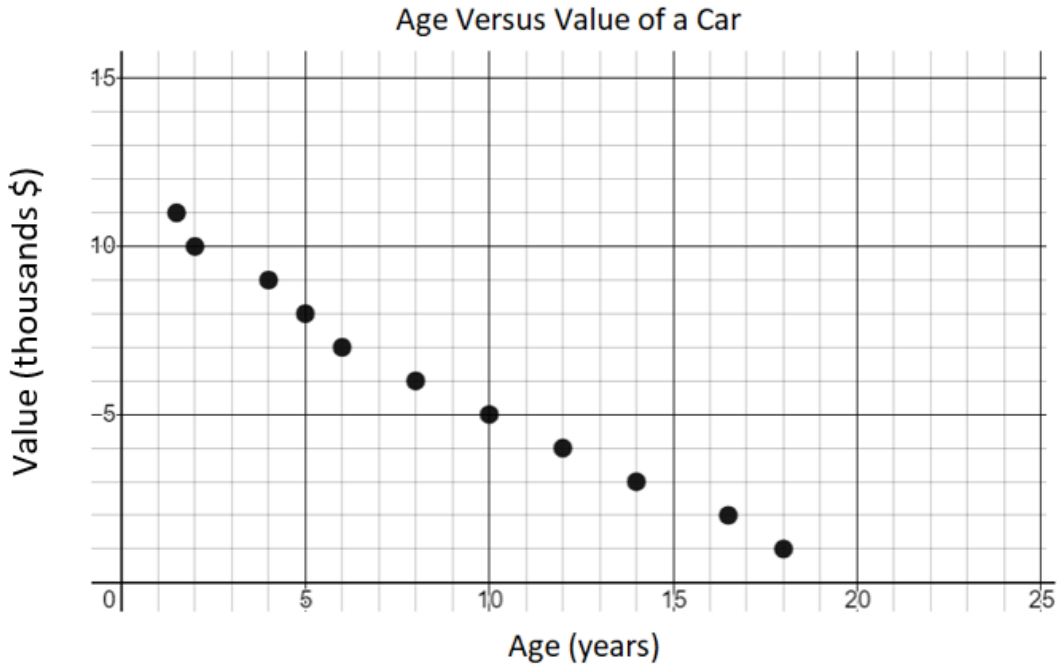
2. Lucia wants to determine whether there is a relationship between the number of hours students spend on their phones each night and how many hours of sleep they get. What data would she need to collect?
  - a) Each student's favorite phone app and what time they go to bed
  - b) The number of texts each student sends at night and what time they wake up in the morning
  - c) The number of hours each student spends on their phone at night and the number of hours they sleep each night
  - d) Each student's type of phone and the number of hours they sleep each night

*Students may choose an answer that is indirectly related to phone usage and sleep patterns. For example, students may choose a) because they see that favorite phone app is related to phone usage and what time students go to bed is related to how much sleep they get. Similarly, students may incorrectly choose b) because they believe that the more texts a student sends each day indicates more phone usage and what time they wake up indicates how much sleep they got the previous night. It may be helpful to have students highlight or underline what information Lucia wants to know from the original problem and then match each answer choice to see if the data provided would answer the question. It may also be beneficial to facilitate conversations about why the other answer options are incorrect (e.g., for b), a student could send 5 text message but spend 6 hours streaming a show on their phone).*

3. Jacob collected data on the age versus value of a car. These data are displayed in the table below.

Age (years)	1	2	3	4	5	6	7	8	9	10	11
Value (thousands)	18	16.5	14	12	10	8	6	5	4	2	1.5

Jacob created a scatterplot to represent these data and made a mistake. Describe the mistake that Jacob made.

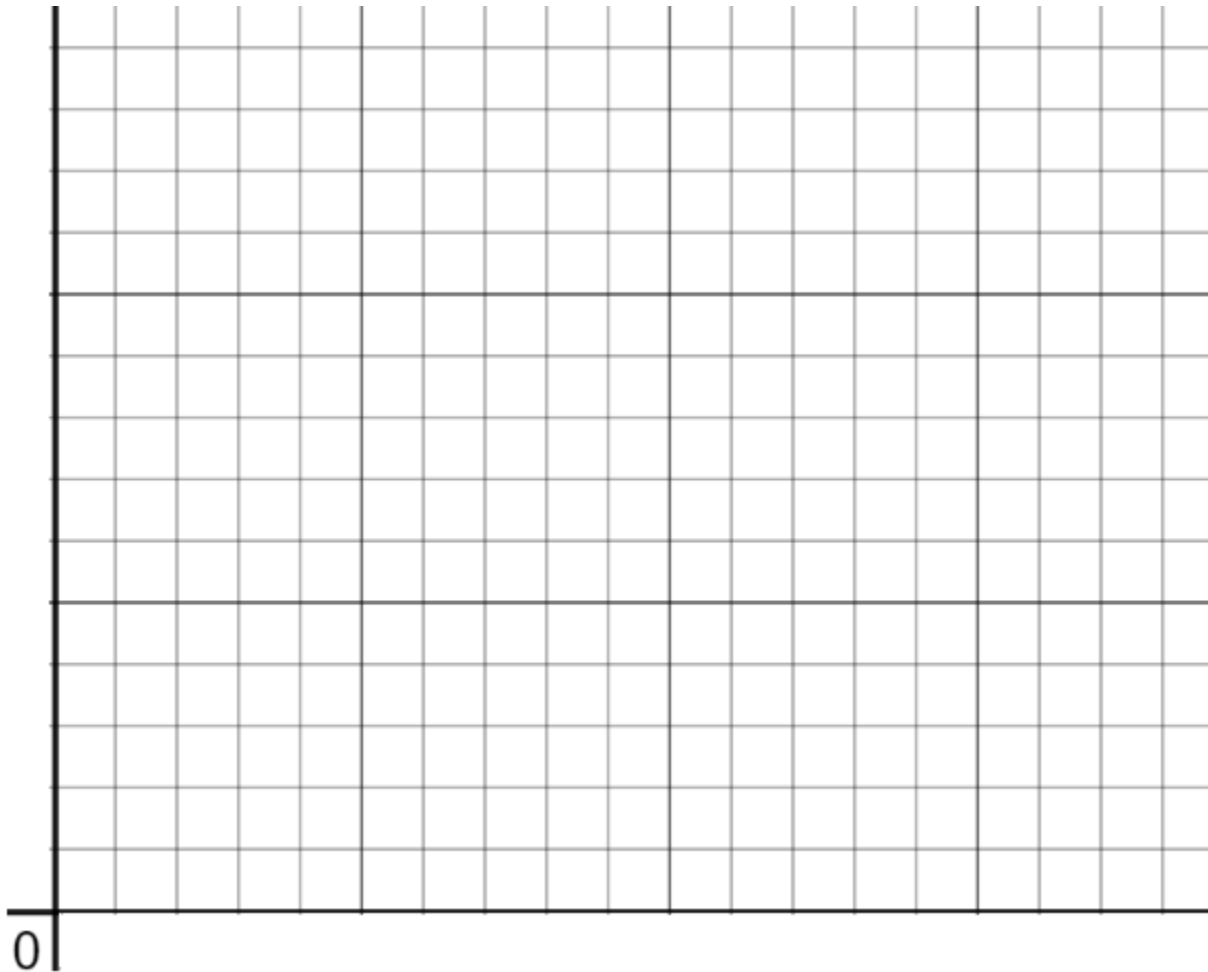


*A common error is for students to state that the labels on the x-axis and y-axis are reversed and may not identify that the values are plotted incorrectly. This error may indicate that students do not understand that x-values are graphed on the horizontal axis and y-values are graphed on the vertical axis. Students may benefit from graphing values on a coordinate plane from ordered pairs and from a table of values.*

4. Students at a middle school were surveyed. The survey asked students how many hours they watch television per week,  $x$ , and the number of hours they sleep each night,  $y$ . These data are displayed in the table.

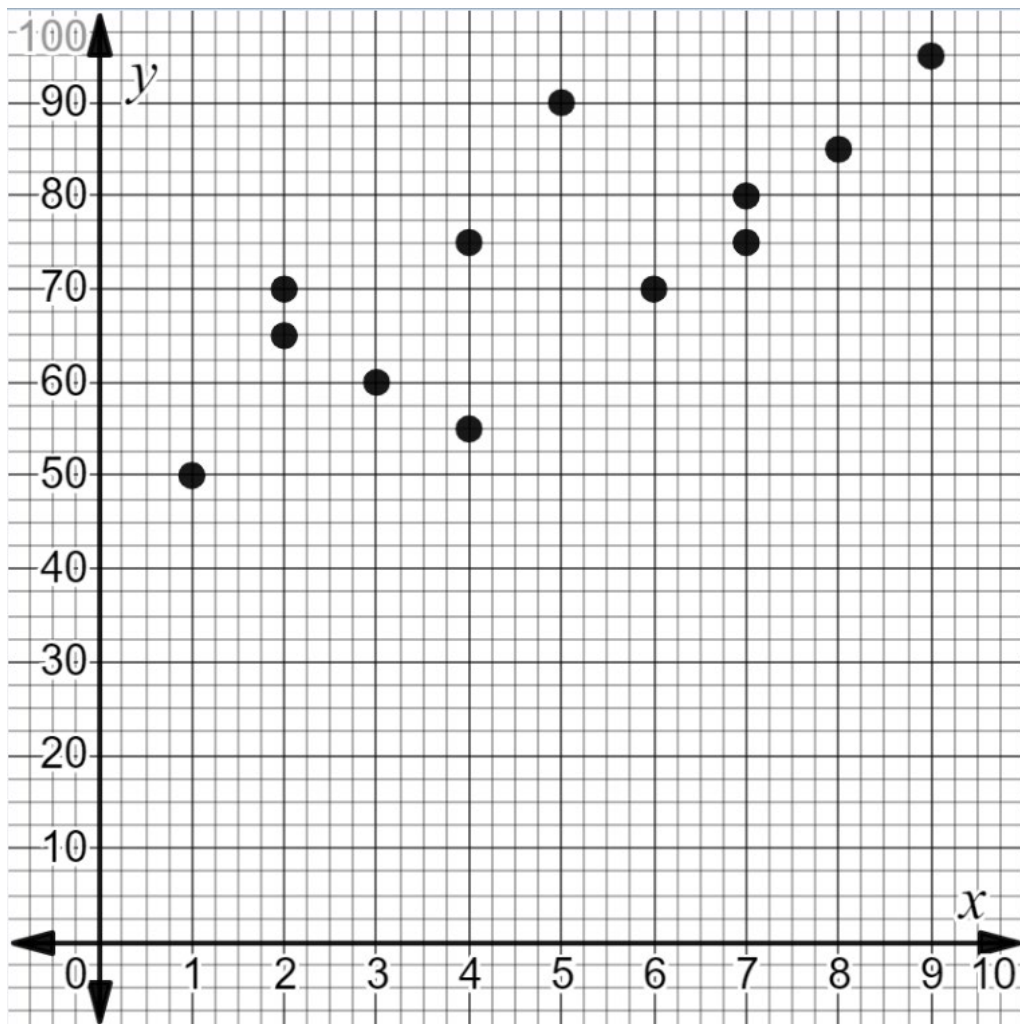
Watch Television (hours per week)	1	3	10	15	7	12	2	3	6	2	3	20	9	4	3	11	4.5
Sleep (hours per night)	10	12	3	2	5	5	9	8	5.5	10	9	2	3	8	7.5	5.5	8

Create a scatterplot to represent the data. Include a title, labels for each axis, and all data points recorded in the table.



*A common error is for students to use inconsistent increments when numbering the axes. This may indicate that students have difficulty creating appropriate increments on an axis to match the data represented in a table. Students may benefit from a guided lesson on creating scatterplots.*

5. The scatterplot shows the number of hours classmates spent studying and the grade on their final exam. The data are displayed in the scatterplot.



- a) Place a title on the scatterplot.

*A possible common error is that students may create a title that does not summarize the data displayed in the scatterplot or only addresses one of the variables (e.g., "Final Exam Grade"). This error indicates that students may not understand the importance of titles and labels on graphs. Students may benefit from graphing and labeling scatterplots using authentic data or a table of values.*

- b) Place labels on the x- and y-axis to include the units.

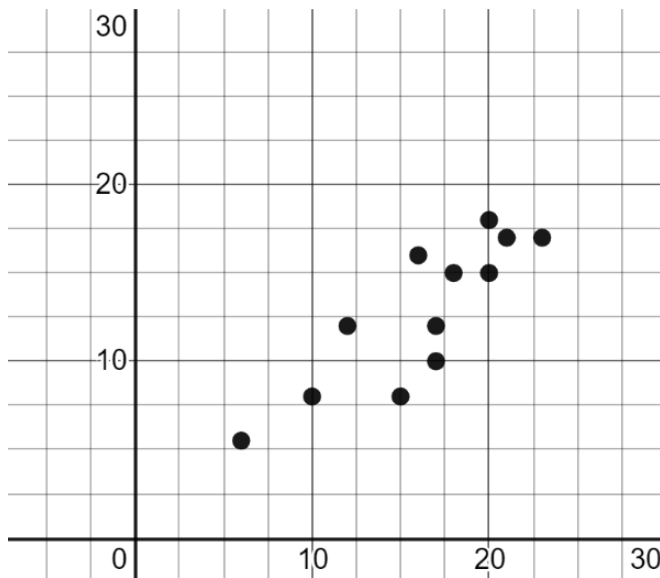
*A possible common error is that students may label the horizontal axis as final exam grade and the vertical axis as time spent studying. This error may indicate that students do not understand what the points on the scatterplot represent. Students may benefit from graphing and labeling scatterplots using authentic data or a table of values.*

- c) Create a table to represent the data displayed in the scatterplot. Place row headings for the independent and dependent variables in the table.

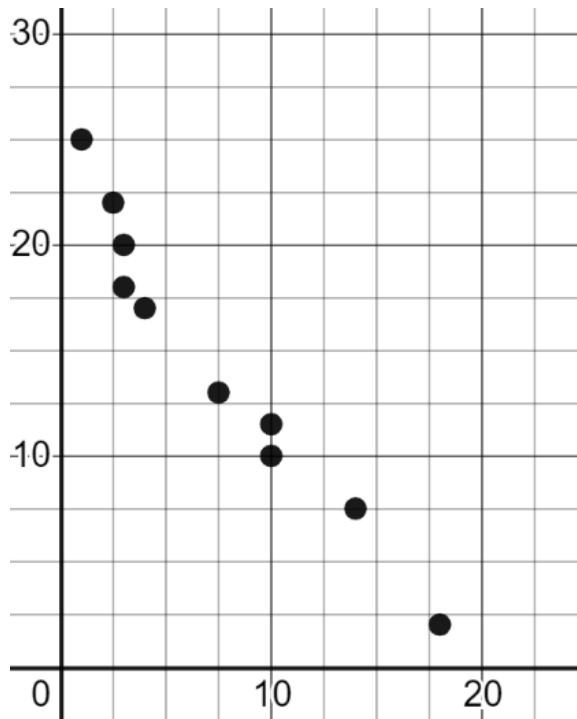

*A possible common error is that students may incorrectly record some of the data points from the scatterplot in the table. This may indicate that students have difficulty interpreting, in this case, a scale of 2.5 on the y-axis. In addition, students may record time spent studying (x) in the y row and final exam grade (y) in the x row of the table. This error may indicate that students do not fully understand that the coordinates of a data point are written in the form (x, y). Students may benefit from additional practice recording the coordinates of a point from a graph into a table of values.*

6. What type of correlation is shown in each scatterplot? Explain your answer by describing the pattern of points in each graph.

Scatterplot 1:



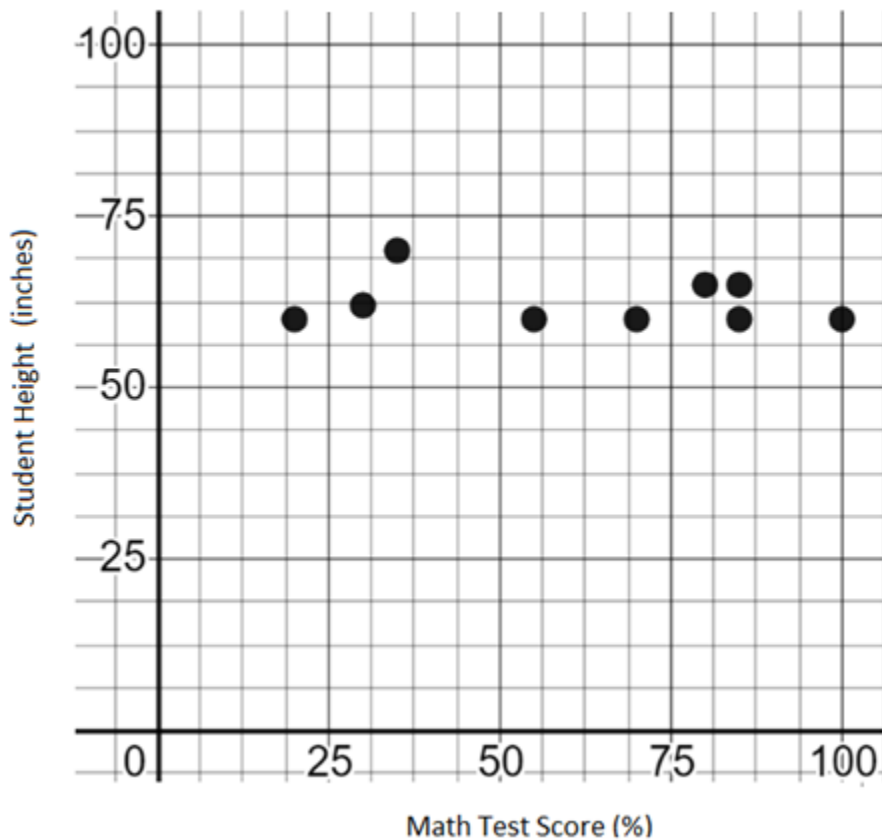
Scatterplot 2:



*A common error students may make is to state that the linear relationship is positive when it is negative and vice versa. This may indicate students do not understand that a scatterplot is read from left to right. In addition, they may not understand if the pattern of points slopes from lower left to upper right, it indicates a positive linear relationship and if the pattern of points slopes from upper left to lower right, it indicates a negative linear relationship. The student may benefit from visual examples of patterns of points in scatterplots in an anchor chart, vocabulary card, or math journal entry.*

7. The scatterplot shows the relationship between the test scores of nine students and their height.

### Math Test Score and Student Height



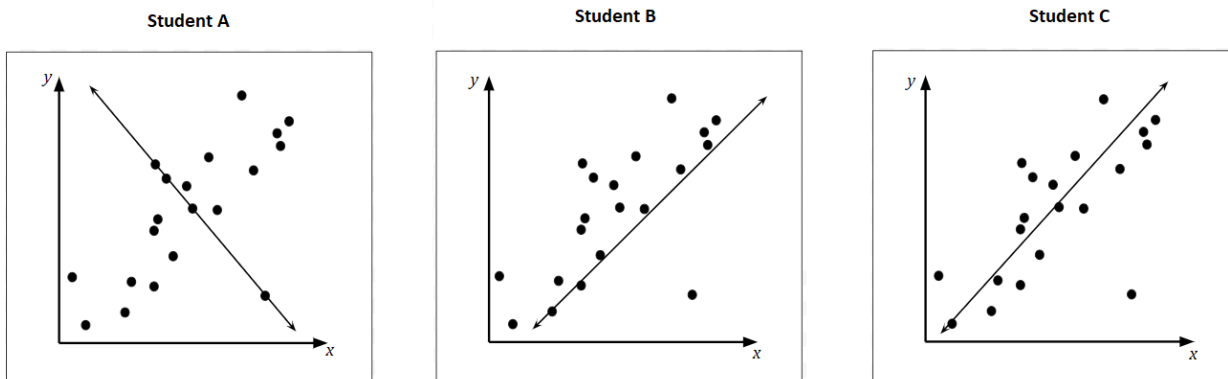
- a) Write a statement describing the relationship between a student's math test score and student height.

*A common error students may make is to write a statement such as, "Math test scores and student height change together" or "Math scores change but height stays relatively the same." This may indicate that students have difficulty making observations about a scatterplot with no linear relationship. Students may benefit from creating additional scatterplots that have no linear relationship such as a student's shoe size and the number of text messages sent in a day. Students may benefit from looking for relationships in scatterplots from real world scenarios displaying all types of linear relationships.*

- b) Jeremy stated that he will score 75% on his math test because he is 50 inches tall. Can Jeremy's statement be justified using the data presented in the graph? Explain your reasoning.

*A common error students may make is to state that Jeremy will not score a 75% because it does not follow the pattern of the data values. This indicates that students may not understand that there is no relationship between the score on a test and a person's height, as demonstrated by this scatterplot. Students may benefit from additional practice interpreting data displayed in a scatterplot.*

8. Students from an 8<sup>th</sup> grade math class were asked to draw a line of best fit for the same scatterplot. Three students' work is displayed below.

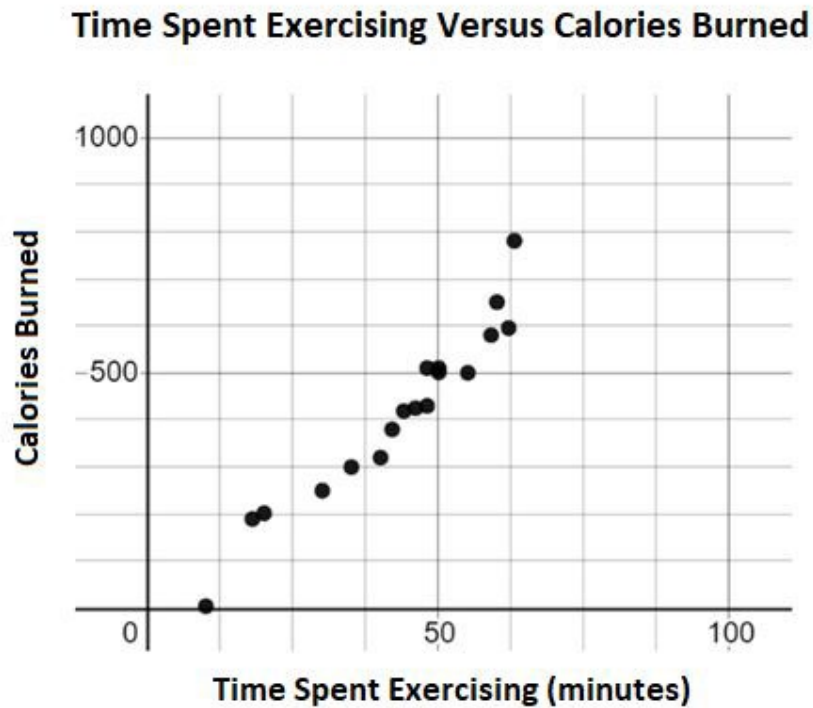


Which student drew the most accurate line of best fit? Explain the error the other two students made.

*Students may incorrectly select Student A. This may indicate that students do not understand that if the data points show a positive relationship, then the line of best fit must show a positive slope. Students may benefit from a discussion about how the slope of a line and the relationship of linear data are similar. Examples of lines with positive and negative slopes can be found in the Grade 8 Instructional Guide.*

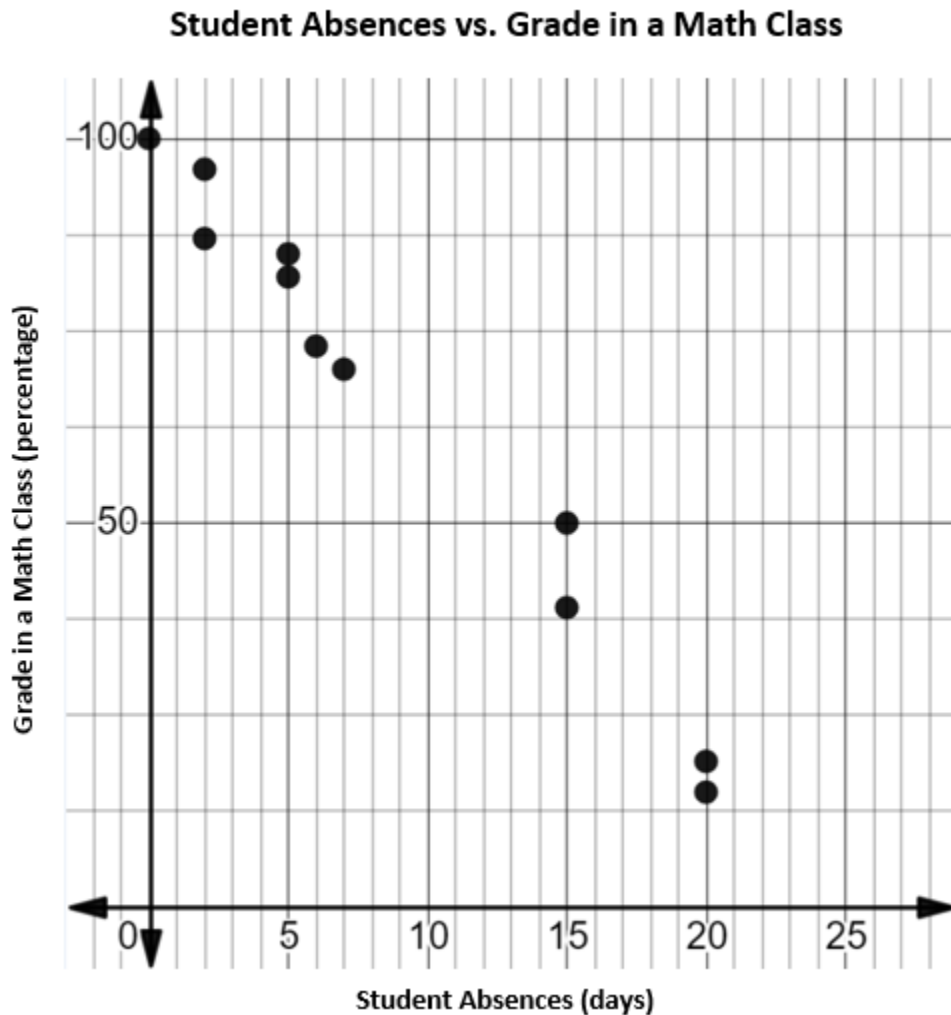
*Students may incorrectly select Student B. This may indicate students do not understand that a line of best fit should be drawn as best as possible to split the data into equal number of points below and above the line of best fit. Students who make this error may benefit from the strategy of drawing an oval shape around the entire set of data points, then drawing a line through the middle of the oval. This may help students to draw a line of best fit that accurately displays the trend in data and shows half of the data above and below the line drawn.*

9. Jessica created a scatterplot to show the relationship between the time spent exercising and the number of calories burned. If the trend in this data continues, what is the best estimate for the number of calories burned when a person spends 90 minutes exercising?



*A common error students may make is to use the given value of 90 as a y-value and stating the answer in the range of 10-14 instead of around 800. This may indicate that students are reading the graph as calories burned as the independent variable (x-axis) and time spent exercising as the dependent variable (y-axis). Students may benefit from drawing a line of best fit for the scatterplot and finding the x-coordinate. From this point, the student may draw a line to the corresponding y-coordinate. A student may also benefit from practice identifying what the points in the scatterplot represent. For example, have students write a sentence about what the point (50, 500) represents on the scatterplot.*

10. The scatterplot shows the relationship between the number of student absences and the grade in a student's math class. Based on the data, what is most likely the number of student absences when that student's grade is 25%?



*A common error students may make is to use the given value of 25% as an x-value and stating the answer is in the range of 5-10 instead of a range of 16-18. This may indicate that students believe the given value of 25% represents the independent variable. Students may benefit from identifying independent and dependent variables in a real world context and writing a statement about the relationship. Using the statement, students can determine if their answer is reasonable. Another strategy is to draw a line of best fit, find the specified value on the line, and draw a point. From there, students may identify the coordinates of the point and predict an outcome.*