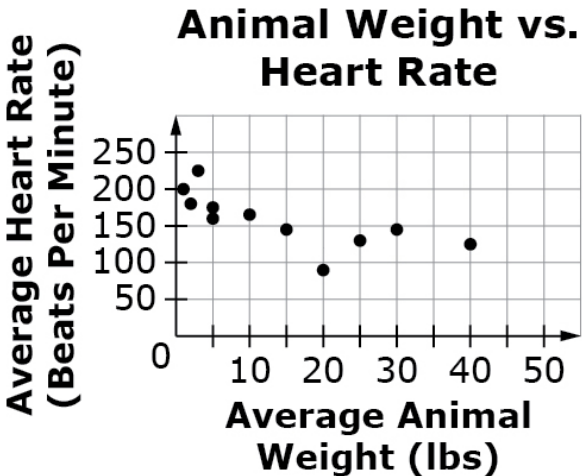


<p>Task Model 1</p> <p>Response Type: Matching Table</p> <p>DOK Level 1</p> <p>8.SP.A.1 Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.</p> <p>8.SP.A.2 Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line.</p> <p>Evidence Required: 1. The student interprets patterns of association between two quantities in a scatter plot (clustering in reference to the line of best fit, positive or negative association, linear association,</p>	<p>Prompt Features: The student is prompted to determine whether statements about the data in a scatter plot are true.</p> <p>Stimulus Guidelines:</p> <ul style="list-style-type: none"> Context should be familiar to students 13–15 years old. Scatter plot will have an informative title relevant to the situation. Axes will have informative titles relevant to the situation and appropriate interval scales. The data set may include clustering. Item difficulty can be adjusted via these example methods: <ul style="list-style-type: none"> The association may be positive, negative, linear, or nonlinear. There may be clustering, gaps, and outliers in the data. <p>TM1a Stimulus: The student is presented with a situation that involves a relationship between two quantities and a scatter plot of measurements of those quantities with sufficient points to demonstrate a linear or nonlinear relationship.</p> <p>Example Stem: This scatter plot shows the relationship between the average weight and average heart rate for 11 different animals.</p> <div style="text-align: center;">  </div> <p>Select True or False for each statement based on the scatter plot.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 70%;">Statement</th> <th style="width: 10%;">True</th> <th style="width: 20%;">False</th> </tr> </thead> <tbody> <tr> <td>There is a positive association between average weight and average heart rate for animals.</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td>Animals with higher body weights tend to have lower heart rates than animals with lower body weights.</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td>For animals weighing 20 lbs or less, there is a linear association between average weight and average heart rate.</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> </tbody> </table>	Statement	True	False	There is a positive association between average weight and average heart rate for animals.	<input type="checkbox"/>	<input type="checkbox"/>	Animals with higher body weights tend to have lower heart rates than animals with lower body weights.	<input type="checkbox"/>	<input type="checkbox"/>	For animals weighing 20 lbs or less, there is a linear association between average weight and average heart rate.	<input type="checkbox"/>	<input type="checkbox"/>
Statement	True	False											
There is a positive association between average weight and average heart rate for animals.	<input type="checkbox"/>	<input type="checkbox"/>											
Animals with higher body weights tend to have lower heart rates than animals with lower body weights.	<input type="checkbox"/>	<input type="checkbox"/>											
For animals weighing 20 lbs or less, there is a linear association between average weight and average heart rate.	<input type="checkbox"/>	<input type="checkbox"/>											

Grade 8 Mathematics Item Specification C1 TJ

<p>nonlinear association, and the effect of outliers) and interprets the slope and y-intercept in terms of the context.</p> <p>Tools: Calculator</p>	<p>Rubric: (1 point) Student determines each statement as being either true or false (e.g., F, T, T) Each statement that interprets the scatter plot and may involve clustering in reference to the line of best fit, positive or negative associations, linear associations, nonlinear associations, or the effect of outliers.</p> <p>Response Type: Matching Table</p>
--	---

Task Model 1

Response Type:
Matching Table

DOK Level 1

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.

8.SP.A.2

Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line.

8.SP.A.3

Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept.

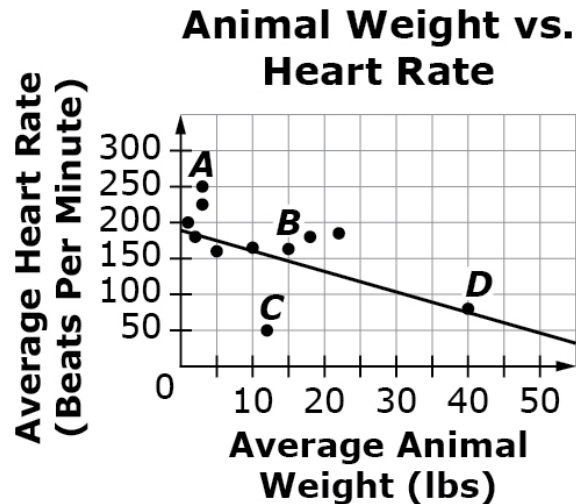
Evidence Required:

1. The student interprets patterns of

TM1b

Stimulus: The student is presented with a situation that involves a relationship between two quantities and a scatter plot of measurements of those quantities and a line purported to be a line of best fit.

Example Stem: This scatter plot shows the relationship between the average weight and average heart rate for 11 different animals. The line of best fit is shown on the graph.



Select True or False for each statement based on the graph.

Statement	True	False
The line of best fit provides a good estimate of an animal's average heart rate based on its weight for all animals.		
The y-intercept is at approximately (0, 185).		
Point D is one outlier because it is far away from the other data points.		

Rubric: (1 point) Student determines each statement as being either true or false (e.g., F, T, F) Each statement interprets the scatter plot and may involve clustering in reference to the line of best fit, positive or negative associations, linear associations, nonlinear associations, the effect of outliers, the identification or the interpretation of the slope or y-intercept in terms of the context.

Response Type: Matching Table

Grade 8 Mathematics Item Specification C1 TJ

association between two quantities in a scatter plot (clustering in reference to the line of best fit, positive or negative association, linear association, nonlinear association, and the effect of outliers) and interprets the slope and y -intercept in terms of the context.

Tools: Calculator

Task Model 2

Response Type:
Multiple Choice,
single correct
response

DOK Level 2

8.SP.3

Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept.

For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height.

Evidence Required:

2. The student identifies the slope (rate of change) and intercept (initial value) of a line suggested by examining bivariate measurement data in a scatter plot.

Tools: Calculator

Version 3 Update:

Revised TM2 and changed from equation/numeric response type to multiple choice. Added a second example stem.

Prompt Features: The student is prompted to interpret the slope and y -intercept of the line of best fit on a scatter plot.

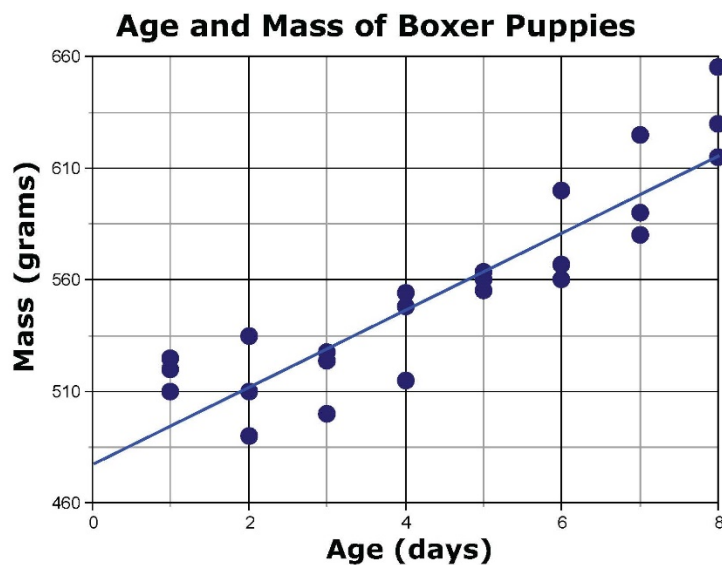
Stimulus Guidelines:

- Context should be familiar to students 13–15 years old.
- Scatter plot will have an informative title relevant to the situation.
- Axes will have informative titles relevant to the situation and appropriate interval scales.
- The data set may include clustering.
- Item difficulty can be adjusted via these example methods:
 - The association may be positive, negative, linear, or nonlinear.
 - The data set may reflect an explicit or implicit linear relationship or explicit or implicit nonlinear relationship.
 - There may be clustering, gaps, and outliers in the data.

TM2a

Stimulus: The student is presented with a situation that involves a relationship between two quantities and a scatter plot measurements of those two quantities with sufficient points to demonstrate a linear relationship. The graph provides the line of best fit.

Example Stem 1: Every boxer puppy in a litter is weighed each day. The scatter plot shows the age and mass recorded at each weighing.



The line of best fit has equation $y = a + bx$, where a and b are constants. What does the y -intercept tell you about the puppies in the litter?

- A.** The predicted change in mass of a puppy each day.
- B.** The predicted mass of a puppy at birth.
- C.** The number of puppies born on day 0.
- D.** The mass of the entire litter of puppies.

Task Model 2

Response Type:
Multiple Choice,
single correct
response

DOK Level 2**8.SP.3**

Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. *For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height.*

Evidence Required:

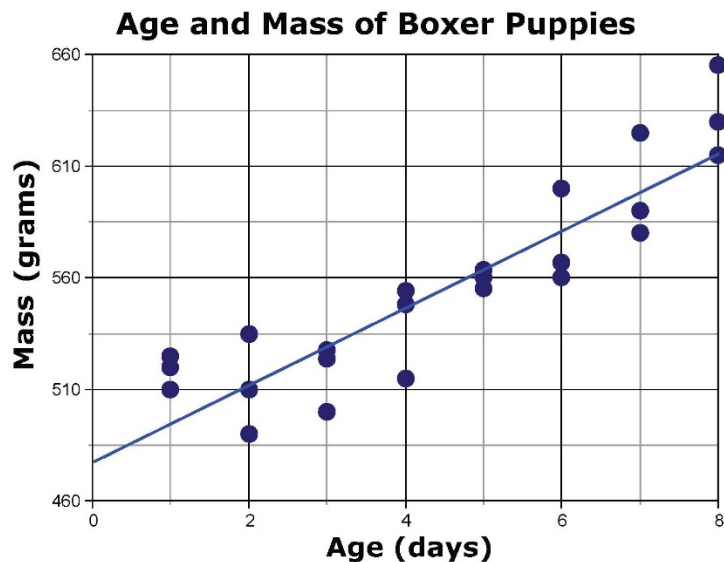
2. The student identifies the slope (rate of change) and intercept (initial value) of a line suggested by examining bivariate measurement data in a scatter plot.

Tools: Calculator

Version 3 Update:

Revised TM2 and changed from equation/numeric response type to multiple choice. Added a second example stem.

Example Stem 2: Each puppy in a litter is weighed each day. The scatter plot shows the age and mass recorded at each weighing.



The line of best fit is shown on the scatter plot. What does the slope of the line tell you about the puppies in the litter?

- A. The predicted change in mass of a puppy each day.
- B. The predicted mass of a puppy at birth.
- C. The number of puppies born on day 0.
- D. The mass of the entire litter of puppies.

Rubric: (1 point) Student selects the correct answer (e.g., B; A).

Response Type: Multiple Choice, single correct response

<p>Task Model 3</p> <p>Response Type: Multiple Choice, single correct response</p> <p>DOK Level 2</p> <p>8.SP.4 Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables.</p> <p>Evidence Required: 3. The student constructs and interprets a two-way table summarizing data on two categorical variables collected from the same subjects.</p> <p>Tools: Calculator</p> <p>Version 3 Update: Revised TM3 and changed from fill-in table response type to multiple choice.</p>	<p>Prompt Features: The student is given a two-way table for two categorical variables for the same population and asked to interpret it.</p> <p>Stimulus Guidelines:</p> <ul style="list-style-type: none"> Context should be familiar to students 13–15 years old. <p>TM3</p> <p>Stimulus: The student is presented with a situation that involves two categorical variables and is asked to interpret the information provided in the table.</p> <p>Example Stem 1: All 8th-grade students at a school answered Yes or No to the two survey questions shown.</p> <ul style="list-style-type: none"> Do you have a cell phone? Yes No Do you have an MP3 player? Yes No <p>The results of the survey are shown in the table.</p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th></th> <th>MP3 Player</th> <th>No MP3 Player</th> <th>Total</th> </tr> </thead> <tbody> <tr> <th>Cell Phone</th> <td>58</td> <td>122</td> <td>180</td> </tr> <tr> <th>No Cell Phone</th> <td>30</td> <td>65</td> <td>95</td> </tr> <tr> <th>Total</th> <td>88</td> <td>187</td> <td>275</td> </tr> </tbody> </table> <p>What percentage of the students have both a cell phone and an MP3 player?</p> <ul style="list-style-type: none"> A. 21% B. 32% C. 66% D. 68% <p>Example Stem 2: A company surveyed both adults and children about whether or not they liked a particular game. The survey results are shown in the table.</p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th></th> <th>Liked the game</th> <th>Did not like the game</th> <th>Total</th> </tr> </thead> <tbody> <tr> <th>Adults</th> <td>28</td> <td>20</td> <td>48</td> </tr> <tr> <th>Children</th> <td>54</td> <td>98</td> <td>152</td> </tr> <tr> <th>Total</th> <td>82</td> <td>118</td> <td>200</td> </tr> </tbody> </table> <p>Which of the following correctly compares the proportion of adults who liked the game with the proportion of children who liked the game?</p> <ul style="list-style-type: none"> A. They are approximately the same. B. The proportion of adults who liked the game is <u>greater than</u> the proportion of children who liked the game. C. The proportion of adults who liked the game is <u>less than</u> the proportion of children who liked the game. D. It is not possible to compare these proportions with the information given. <p>Rubric: (1 point) Student selects the correct answer (e.g., A, B).</p> <p>Response Type: Multiple Choice, single correct response</p>		MP3 Player	No MP3 Player	Total	Cell Phone	58	122	180	No Cell Phone	30	65	95	Total	88	187	275		Liked the game	Did not like the game	Total	Adults	28	20	48	Children	54	98	152	Total	82	118	200
	MP3 Player	No MP3 Player	Total																														
Cell Phone	58	122	180																														
No Cell Phone	30	65	95																														
Total	88	187	275																														
	Liked the game	Did not like the game	Total																														
Adults	28	20	48																														
Children	54	98	152																														
Total	82	118	200																														

<p>Task Model 4</p> <p>Response Type: Multiple Choice, single correct</p> <p>DOK Level 2</p> <p>8.SP.4 Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables.</p> <p>Evidence Required: 4. The student uses relative frequencies calculated for rows or columns to describe possible association between the two variables.</p> <p>Tools: Calculator</p> <p>Version 3 Update: Added new evidence required statement and TM4.</p>	<p>Prompt Features: The student is presented with a situation that involves two categorical variables and asked if there is evidence of an association between them or to identify evidence of an association that exists.</p> <p>Stimulus Guidelines:</p> <ul style="list-style-type: none"> Context should be familiar to students 13–15 years old. <p>TM4a</p> <p>Stimulus: The student is presented with a situation that involves two categorical variables.</p> <p>Example Stem: All 8th-grade students at a school answered Yes or No to the two survey questions shown.</p> <ul style="list-style-type: none"> Do you have a cell phone? Yes No Do you have an MP3 player? Yes No <p>The results of the survey are shown in the table.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>MP3 Player</th> <th>No MP3 Player</th> <th>Total</th> </tr> </thead> <tbody> <tr> <td>Cell Phone</td> <td style="text-align: center;">58</td> <td style="text-align: center;">122</td> <td style="text-align: center;">180</td> </tr> <tr> <td>No Cell Phone</td> <td style="text-align: center;">30</td> <td style="text-align: center;">65</td> <td style="text-align: center;">95</td> </tr> <tr> <td>Total</td> <td style="text-align: center;">88</td> <td style="text-align: center;">187</td> <td style="text-align: center;">275</td> </tr> </tbody> </table> <p>Is there an association between owning a cell phone and owning an MP3 Player for the students at this school?</p> <ul style="list-style-type: none"> A. Yes, because more than half of the students own a cell phone but less than half own an MP3 player. B. Yes, because the proportion of students who own an MP3 player is almost the same for students who own a cell phone and for students who do not. C. No, because more than half of the students own a cell phone but less than half own an MP3 player. D. No, because the proportion of students who own an MP3 player is almost the same for students who own a cell phone and for students who do not. <p>Rubric: (1 point) Student selects the correct percent (e.g., D).</p> <p>Response Type: Multiple Choice, single correct response</p>		MP3 Player	No MP3 Player	Total	Cell Phone	58	122	180	No Cell Phone	30	65	95	Total	88	187	275
	MP3 Player	No MP3 Player	Total														
Cell Phone	58	122	180														
No Cell Phone	30	65	95														
Total	88	187	275														

<p>Task Model 4</p> <p>Response Type: Multiple Choice, single correct</p> <p>DOK Level 2</p> <p>8.SP.4 Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables.</p> <p>Evidence Required: 4. The student uses relative frequencies calculated for rows or columns to describe possible association between the two variables.</p> <p>Tools: Calculator</p> <p>Version 3 Update: Added new evidence required statement and TM4.</p>	<p>TM4b</p> <p>Stimulus: The student is presented with a situation that involves two categorical variables and asked if there is evidence of an association between them or to identify evidence of an association that exists.</p> <p>Example Stem: A coach of a cross country team asked all 200 of the runners who ran at a meet two questions:</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 80%;">Did you get less than 8 hours of sleep last night?</td> <td style="width: 10%; text-align: center;">Yes</td> <td style="width: 10%; text-align: center;">No</td> </tr> <tr> <td>Did you achieve a personal record in this meet?</td> <td style="text-align: center;">Yes</td> <td style="text-align: center;">No</td> </tr> </table> <p>A summary of the data is shown in the table.</p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="width: 30%;"></th> <th style="width: 20%;">8 or more hours of sleep</th> <th style="width: 20%;">Less than 8 hours of sleep</th> <th style="width: 30%;">Total</th> </tr> </thead> <tbody> <tr> <td>Personal Record</td> <td>28</td> <td>20</td> <td>48</td> </tr> <tr> <td>No Personal Record</td> <td>54</td> <td>98</td> <td>152</td> </tr> <tr> <td>Total</td> <td>82</td> <td>118</td> <td>200</td> </tr> </tbody> </table> <p>The coach saw an association between the amount of sleep and achieving a personal record for the runners. Which statement provides evidence for this association?</p> <ul style="list-style-type: none"> A. About 34% of the runners who got more than 8 hours of sleep achieved a personal record, but only 17% of those who got less than 8 hours of sleep did. B. More than 50% of the runners who achieved a personal record got 8 or more hours of sleep. C. Only 25% of the runners achieved a personal record at the meet. D. There is no evidence for an association. <p>Rubric: (1 point) Student selects the correct percent (e.g., A).</p> <p>Response Type: Multiple Choice, single correct response</p>	Did you get less than 8 hours of sleep last night?	Yes	No	Did you achieve a personal record in this meet?	Yes	No		8 or more hours of sleep	Less than 8 hours of sleep	Total	Personal Record	28	20	48	No Personal Record	54	98	152	Total	82	118	200
Did you get less than 8 hours of sleep last night?	Yes	No																					
Did you achieve a personal record in this meet?	Yes	No																					
	8 or more hours of sleep	Less than 8 hours of sleep	Total																				
Personal Record	28	20	48																				
No Personal Record	54	98	152																				
Total	82	118	200																				