

GSE Algebra I

Unit Six Information

EOCT Domain & Weight:

Algebra Connections to Statistics and Probability - 15%

Curriculum Map: Describing Data

Content Descriptors:

Concept 1: Summarize, represent, and interpret data on a single count or measurement variable

Concept 2: Summarize, represent and interpret data on two categorical and quantitative variables

Concept 3: Interpret linear models

Content from Frameworks: [Describing Data](#)

Unit Length: Approximately 20 days

[EOCT Study Guide for Unit 6](#)

GSE Algebra I – Unit 6

Curriculum Map

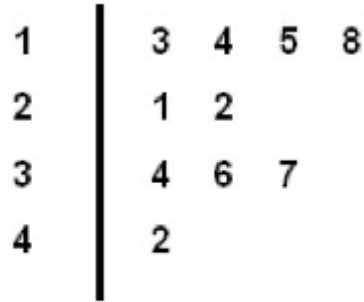
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| <p>Unit Rational: <i>Students will summarize, represent, and interpret data on a single count or measurement variable. Students will summarize, represent, and interpret data on two categorical and quantitative variables. Students will interpret linear models.</i></p> | | |
| <p>Prerequisites: As identified by the GSE Frameworks</p> <ul style="list-style-type: none"> ✓ Know how to compute the mean, median, interquartile range, and mean standard deviation by hand in simple cases and using technology with larger data sets. ✓ Find the lower extreme (minimum), upper extreme (maximum), and quartiles. ✓ Create a graphical representation of a data set. ✓ Present data in a frequency table. ✓ Plot data on a coordinate grid and graph linear functions. ✓ Recognize characteristics of linear and exponential functions. ✓ Write an equation of a line given two points. ✓ Graph data in a scatter plot and determine a trend. ✓ Determine the slope of a line from any representation. ✓ Identify the y-intercept from any representation. ✓ Be able to use graphing technology. ✓ Understand the meaning of correlation. | | <p>Length of Unit <i>20 Days</i></p> |
| Concept 1 | Concept 2 | Concept 3 |
| Summarize, represent, and interpret data on a single count or measurement variable. | Summarize, represent, and interpret data on two categorical and quantitative variables. | Interpret linear models. |
| GSE Standards | GSE Standards | GSE Standards |
| <p>MGSE9-12.S.ID.1 Represent data with plots on the real number line (dot plots, histograms, and box plots).</p> <p>MGSE9-12.S.ID.2 Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.</p> <p>MGSE9-12.S.ID.3 Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).</p> | <p>MGSE9-12.S.ID.5 Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.</p> <p>MGSE9-12.S.ID.6 Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.</p> <p>MGSE9-12.S.ID.6a Decide which type of function is most appropriate by observing graphed data, charted data, or by analysis of context to generate a viable (rough) function of</p> | <p>MGSE9-12.S.ID.7 Interpret the slope (rate of change and the intercept (constant term) of a linear model in the context of the data.</p> <p>MGSE9-12.S.ID.8 Compute (using technology) and interpret the correlation coefficient “r” of a linear fit. (For instance, by looking at a scatterplot, students should be able to tell if the correlation coefficient is positive or negative and give a reasonable estimate of the “r” value.) After calculating the line of best fit using technology, students should be able to describe how strong the goodness of fit of the regression is, using “r”.</p> <p>MGSE9-12.S.ID.9 Distinguish between correlation and causation.</p> |

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| | | |
|--|---|--|
| | <p>best fit. Use this function to solve problems in context. Emphasize linear, quadratic and exponential models.</p> <p>MGSE9-12.S.ID.6c Using given or collected bivariate data, fit a linear function for a scatter plot that suggests a linear association.</p> | |
| Concept 1 | Concept 2 | Concept 3 |
| Lesson Essential Question | Lesson Essential Question | Lesson Essential Question |
| <ul style="list-style-type: none"> How do I summarize, represent, and interpret data on a single count or measurement variable? | <ul style="list-style-type: none"> When taking real-life actions, what factors are important for me to consider in determining which statistics to compare, graphical representation, and interpretation techniques? How do I summarize, represent, and interpret data on two categorical and quantitative variables? Why is technology valuable when making statistical models? | <ul style="list-style-type: none"> What is the difference between correlation and causation? Why are linear models used to study many important real-world phenomena? How do I interpret linear models? |
| Vocabulary | Vocabulary | Vocabulary |
| Association Center First Quartile (Q_1) Interquartile Range Mean absolute deviation Outlier Second Quartile (Q_2) Shape Symmetry Number of Peaks Direction of Skew Uniformity Spread Third quartile (Q_3) Five number summary Fourth quartile (Q_4) | Bivariate data Box Plot Box-and-Whisker Plot Categorical Variables Conditional Frequencies Correlation Coefficient Dot plot Histogram Joint Frequencies Marginal Frequencies Quantitative Variables Residuals (error) Residual plot Scatter plot Two-Frequency Table | Line of best fit (trend or regression line) Trend Causation Correlation |

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Sample Assessment Items



$$1|3 = 13$$

MGSE9-12.S.ID.1

If you were to create a histogram from the data shown in this stem-and-leaf plot, with each bar covering six values from 13 to 42, which bar would not have any data points?

- a. 13-18
- b. 19-24
- c. 25-30
- d. 31-36

MGSE9-12.S.ID.2

Mr. Martin was comparing two random samples of students test scores from his Algebra III 1st and 3rd block classes:

Test scores from 1st block:
92,84,85,77,60,92,68,88,76,89,94,56,72,45,66
;
Mean: ≈ 76.3
Standard deviation: ≈ 14.3

Test scores from 3rd block:
72,77,84,79,66,74,88,72,73,64,82,85,74,74,97
;
Mean: ≈ 77.4
Standard deviation: ≈ 8.34

What can Mr. Martin most accurately conclude between the overall class test scores of 1st and 3rd blocks?

Sample Assessment Items

MGSE9-12.S.ID.5

| | Have Brother | Have Sister | Only Child |
|--------------------|--------------|-------------|------------|
| Do Not have Chores | 6 | 6 | 8 |
| Have Chores | 8 | 10 | 1 |

Franklin interviewed his classmates on whether or not they had a sibling and if they have assigned chores at home. He displayed his results in the two-way table shown. Which statement(s) is/are true?

- a. More than a quarter of his classmates are only children.
- b. About half of his classmates have chores and half don't.
- c. There are more classmates that are only children than have siblings.
- d. Having a brother is more common than having a sister for her classmates.

Sample Assessment Items

MGSE9-12.S.ID.7

A linear model describing the height of a river with respect to the rainfall total for the previous month suggests that for each inch of rainfall, the river rises five inches. What is the slope for this linear model?

- a. -5
- b. 0.2
- c. 2
- d. 5

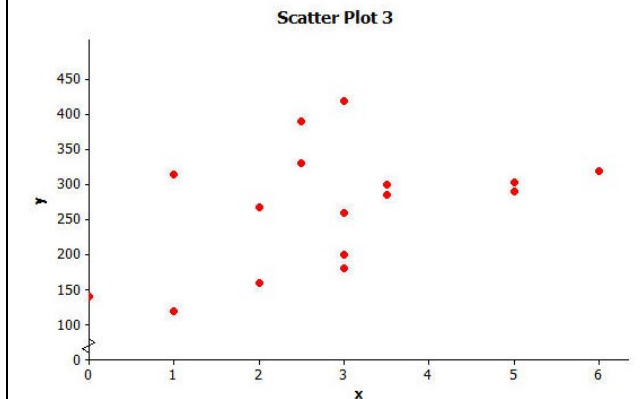
MGSE9-12.S.ID.8

We assume that SAT score is linearly associated with GPA and determine the correlation coefficient to be 0.8. What does this value suggest?

- a. GPA increases as SAT decreases.
- b. SAT score increases as GPA increases.
- c. SAT score decreases as GPA increases.
- d. There is no relation between SAT score and GPA.

MGSE9-12.S.ID.9

Which scatter plot below has a stronger correlation? Explain your answer.



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b. 1st blocks scores had a higher standard deviation, so as a class overall performed much better than 3rd blocks.

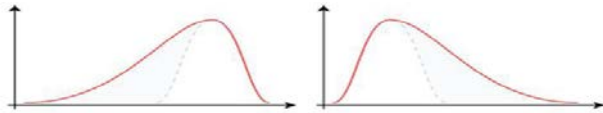
c. 1st blocks scores are more closely grouped around the average, therefore they had better scores than 3rd block.

d. 3rd block students tend to have a slightly better grasp of the material since the mean is a little higher and the dispersion from the mean is less than 1st blocks.

MGSE9-12.S.ID.3

Match the description with the graphs below.

- a. Same standard deviation, different mean.
- b. Same mean, different standard deviation
- c. Median is higher than the mean
- d. Mean is higher than the median



MGSE9-12.S.ID.6

Pay Chart



Using the line of best fit, what is the best approximation for the hourly rate of an individual with 6 years of experience?

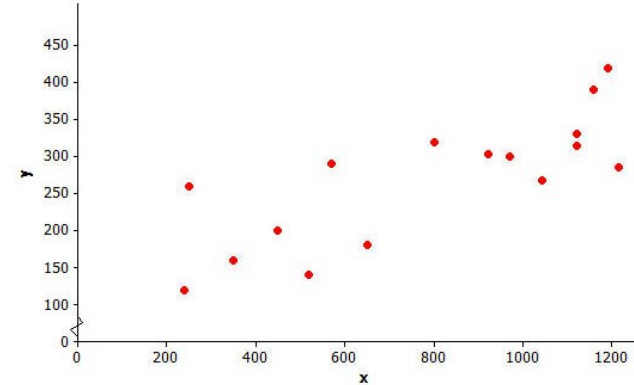
- a. \$10
- b. \$11
- c. \$12
- d. \$13

MGSE9-12.S.ID.6a

Kendra likes to watch crime scene investigation shows on television. She watched a show where investigators used a shoe print to help identify a suspect in a case. She questioned how possible it is to predict someone's height is from his shoe print.

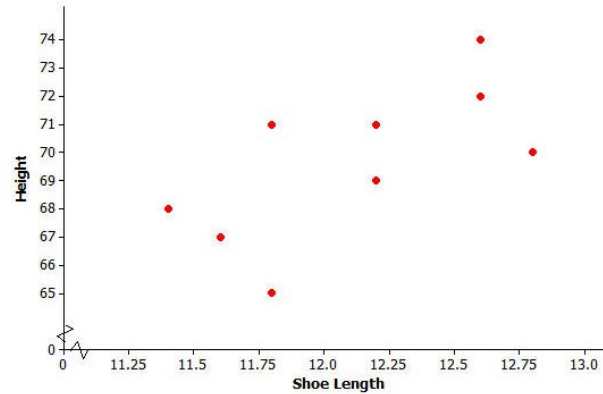
To investigate, she collected data on shoe length (in inches) and height (in inches) from 10 adult men. Her data appears in the scatter plot below.

Scatter Plot 4



Students should comment on the general scatter of the points. The points in Scatter Plot 3 are more scattered and do not cluster tightly around a line, while in Scatter Plot 4, the points conform more closely to a line.

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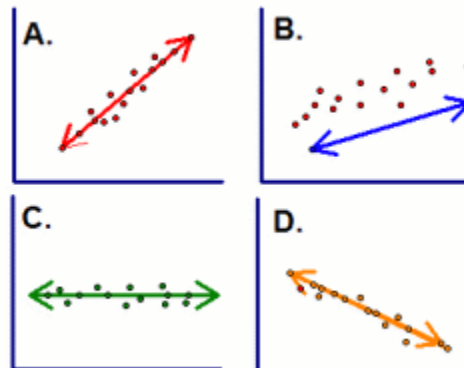
1. Is there a relationship between shoe length and height?

Yes, it looks like there is a relationship between shoe length and height.

2. How would you describe the relationship? Do the men with longer shoe lengths tend to be taller?

As shoe length increases, height tends to increase. Men with longer shoe lengths tend to be taller.

MGSE9-12.S.ID.6c



Which of the choices is NOT a good example of a line of best fit? **B**

At the end of Unit 6 student's should be able to say "I can..."

- ✓ Construct appropriate graphical displays (dot plots, histogram, and box plot) to describe sets of data values.
- ✓ Select the appropriate measures to describe and compare the center and spread of two or more data sets in context.
- ✓ Use the context of the data to explain why its distribution takes on a particular shape (e.g. are there real-life limits to the values of the data that force skewedness?)
- ✓ Explain the effect of any outliers on the shape, center, and spread of the data sets.
- ✓ Create a two-way frequency table from a set of data on two categorical variables.
- ✓ Calculate joint, marginal, and conditional relative frequencies and interpret in context.
- ✓ Recognize associations and trends in data from a two-way table.
- ✓ Create a scatter plot from two quantitative variables and describe the form, strength, and direction of the relationship between the two variables in context.
- ✓ Determine which type of function best models a set of data.
- ✓ Interpret constants and coefficients in the context of the data (e.g. slope and y-intercept of linear models, base/growth or decay rate and y-intercept of exponential models) and use the fitted function to make predictions and solve problems in the context of the data.
- ✓ Calculate the residuals for the data points fitted to a function and create and analyze a residual plot.
- ✓ Use algebraic methods and technology to fit a linear function to the data for data sets that appear to be linear.
- ✓ Interpret the slope and y-intercept in the context of the data.
- ✓ Compute the correlation coefficient and show that it is a measure of the strength and direction of a linear relationship between two quantities in a set of data.
- ✓ Determine if the association between two variables is a result of a cause and effect relationship.