### Interpreting Categorical and Quantitative Data

**Core Guide**

**Secondary Math I**

Summarize, represent, and interpret data on a single count or measurement variable (Standards S.ID.1–3).

**Standard I.S.ID.1:** Represent data with plots on the real number line (dot plots, histograms, and box plots).

### Concepts and Skills to Master

- Represent numerical data using dot plots, histograms, and box plots.
- Represent one or more numerical data sets on the same scale.
- Describe data sets from graphical representations.
- Recognize attributes that may be revealed by different representations (dot plots, histograms, and box plots).

### Related Standards: Current Course

<table>
<thead>
<tr>
<th>I.S.ID.2, I.S.ID.3, I.N.Q.1, I.N.Q.2, I.N.Q.3</th>
<th>Related Standards: Future Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>III.S.ID.4, III.S.IC.1, III.S.IC.6</td>
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</tbody>
</table>

### Support for Teachers

#### Critical Background Knowledge

- Display numerical data in plots on a number line, including dot plots, histograms, and box plots (*6.SP.4*)
- Summarize a data set using mean, median, interquartile range, and mean absolute deviation (*6.SP.5c*)
- Make a line plot (*2.MD.9, 3.MD.4, 4.MD.1, and 5.MD.2*) and draw a picture graph and a bar graph (*2.MD.10 and 3.MD.3*)

#### Academic Vocabulary

- mean, median, interquartile range, center, spread, shape, dot plot, histogram, box plot, quartiles, minimum, maximum, spread, side-by-side (parallel) plots

**Resources**

- **Curriculum Resources:** http://www.uen.org/core/core.do?courseNum=5600#70304
### Summarize, represent, and interpret data on a single count or measurement variable (Standards S.ID.1–3).

**Standard I.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.

<table>
<thead>
<tr>
<th>Concepts and Skills to Master</th>
</tr>
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<tbody>
<tr>
<td>• Understand standard deviation as a measure of spread. Use basic calculations to understand the concept (possibly connecting to MAD). Use technology when appropriate. (Standard deviation is applied to the normal distribution in Secondary Mathematics III.)</td>
</tr>
<tr>
<td>• Given two sets of data (numerically or graphically), identify similarities and differences in shape, center and spread.</td>
</tr>
<tr>
<td>• Compare data sets by describing the similarities and differences between their shapes, measures of center, and measures of spread.</td>
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### Support for Teachers

**Critical Background Knowledge**

- Represent numerical data in plots on a number line, including dot plots, histograms, and box plots (6.SP.4 and I.S.ID.1)
- Use measures of center and spread to draw informal inferences about two data sets (7.SP.3 and 7.SP.4)
- Summarize a data set using mean, median, interquartile range, and mean absolute deviation (6.SP.5c)
- Make a line plot (2.MD.9, 3.MD.4, 4.MD.1, and 5.MD.2) and draw a picture graph and a bar graph (2.MD.10 and 3.MD.3)

**Academic Vocabulary**

mean, median, interquartile range, standard deviation, center, spread, shape, dot plot, histogram, box plot, quartiles, minimum, maximum, spread, side-by-side (parallel) plots

**Resources**

Curriculum Resources: http://www.uen.org/core/core.do?courseNum=5600#70304
Interpreting Categorical and Quantitative Data

<table>
<thead>
<tr>
<th>Summarize, represent, and interpret data on a single count or measurement variable (Standards S.ID.1–3).</th>
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<tr>
<td><strong>Standard I.S.ID.3:</strong> Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). Calculate the weighted average of a distribution and interpret it as a measure of center.</td>
</tr>
</tbody>
</table>

**Concepts and Skills to Master**

- Interpret similarities and differences between the shape, and measures of centers and spreads of data sets.
- Describe the influence of outliers on measures of center and spread.
- Calculate the weighted average (for example, determining a student’s grade when category scores are weighted differently) and interpret it as a measure of center (balance point).

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**Support for Teachers**

**Critical Background Knowledge**

- Represent numerical data in plots on a number line, including dot plots, histograms, and box plots (6.SP.4 and I.S.ID.1)
- Use measures of center and spread to draw informal inferences about two data sets (7.SP.3 and 7.SP.4)
- Summarize a data set using mean, median, interquartile range (6.SP.5c), and standard deviation (I.S.ID.2)
- Make a line plot (2.MD.9, 3.MD.4, 4.MD.1, and 5.MD.2) and draw a picture graph and a bar graph (2.MD.10 and 3.MD.3)

**Academic Vocabulary**

- outliers, skewed, mean, median, interquartile range, standard deviation, center, spread, shape, dot plot, histogram, box plot, quartiles, minimum, maximum, spread, side-by-side (parallel) plots

**Resources**

Curriculum Resources: http://www.uen.org/core/core.do?courseNum=5600#70304
Summarize, represent, and interpret data on two categorical and quantitative variables (Standard S.ID.6).

**Standard I.S.ID.6:** Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.

- a. Fit a linear function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions, or choose a function suggested by the context. Emphasize linear and exponential models.
- b. Informally assess the fit of a function by plotting and analyzing residuals. Focus on situations for which linear models are appropriate.
- c. Fit a linear function for scatter plots that suggest a linear association.

**Concepts and Skills to Master**
- Represent data on two quantitative variables on a scatter plot and describe how variables are associated.
- Given a set of bivariate data, use residuals to assess the appropriateness of a given model to determine if the data has a linear relationship.
- Find the line of best fit using technology.
- Understand what a residual represents.

**Related Standards: Current Course**
- I.F.IF.4, I.F.BF.1, I.F.LE.1, I.F.LE.5, I.S.ID.7, I.S.ID.8

**Related Standards: Future Courses**
- II.F.IF.4, III.F.IF.4, III.S.IC.6

**Support for Teachers**

**Critical Background Knowledge**
- Construct and interpret scatter plots for bivariate data (8.SP.1)
- Informally fit a line (trend line) to bivariate data (8.SP.2)
- Use the equation of a linear model to solve problems in context of bivariate data (8.SP.3)
- Construct a function to model a linear relationship (8.F.4)

**Academic Vocabulary**
- Line of best fit, residuals, bivariate data, linear model, scatter plot

**Resources**

**Curriculum Resources:** http://www.uen.org/core/core.do?courseNum=5600#70304
Interpret linear models building on students’ work with linear relationships, and introduce the correlation coefficient (Standards S.ID.7–9).

**Standard I.S.ID.7:** Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.

<table>
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<tr>
<td>• Interpret the slope in context of the situation.</td>
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<tr>
<td>• Interpret the y-intercept in context of the situation.</td>
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<td>All functions standards (throughout high school), III.S.IC.6</td>
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<td>• Construct a function to model a linear relationship (8.F.4)</td>
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<tr>
<td>• Determine the slope and y-intercept of a line (8.F.3)</td>
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**Academic Vocabulary**

- slope (rate of change), y-intercept

**Resources**

*Curriculum Resources:* http://www.uen.org/core/core.do?courseNum=5600#70304
Interpret linear models building on students’ work with linear relationships, and introduce the correlation coefficient (Standards S.ID.7–9).

**Standard I.S.ID.8:** Compute (using technology) and interpret the correlation coefficient of a linear fit.

**Concepts and Skills to Master**
- Compute the correlation coefficient using technology.
- Interpret the direction (positive, negative, or none) and strength (strong, moderate, weak) of the relationship based on the correlation.

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<td>II.F.IF.6, III.F.IF.6</td>
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**Support for Teachers**

**Critical Background Knowledge**
- Construct and interpret scatter plots for bivariate data to investigate patterns of association (8.SP.1)
- Construct a function to model a linear relationship (8.F.4)

**Academic Vocabulary**
- correlation coefficient, correlation, \( r \)

**Resources**
- Curriculum Resources: [http://www.uen.org/core/core.do?courseNum=5600#70304](http://www.uen.org/core/core.do?courseNum=5600#70304)
Interpret linear models building on students’ work with linear relationships, and introduce the correlation coefficient (Standards S.ID.7–9).

**Standard I.S.ID.9:** Distinguish between correlation and causation.

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<td>• Understand the difference between correlation and causation.</td>
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<td>• Using a context situation when correlation exists, determine if the correlation is a result of causation.</td>
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<td>• Understand a strong correlation may not mean causation.</td>
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Support for Teachers

**Critical Background Knowledge**

• Interpret the meaning of correlation (I.S.ID.8)

**Academic Vocabulary**

correlation, causation

**Resources**

Curriculum Resources: [http://www.uen.org/core/core.do?courseNum=5600#70304](http://www.uen.org/core/core.do?courseNum=5600#70304)