Unit D - *Describing Data - Identifying Trends and Making Decisions*

Overview

Describing Data extends linear thinking to statistical modeling. First, students develop measures of central tendency by studying dispersion through the 5-number summary and the corresponding box and whisker graph. Students then make frequency tables and histograms that shape discussions about skewness.

Next, students compare two quantities in scatterplots and add context to Unit C concepts of slope and line of best fit. Students model linear relationships both manually with trend-lines and digitally with graphing calculators or software. Students use models to make predictions both inside and outside of the known range and understand limitations of those predictions. Students describe strength of fit using correlation coefficients, which strengthen understandings of slope from Unit C. Students are challenged to explain the difference between correlation and causation. Students explain the impact of an outlier on linear models.

Students expand their notions of linear models to piecewise functions. This is a prelude to other nonlinear modeling, including exponential and quadratic models which will resurface later in the course.

21st Century Capacities: Analyzing, Synthesizing

Stage 1 - Desired Results

ESTABLISHED GOALS/ STANDARDS	Transfer:	
MP 1 Make sense of problems and persevere in solving them **MP3** Construct viable arguments and critique the reasoning of others **MP5** Use appropriate tools strategically **MP6** Attend to precision	*Students will be able to independently use their learning in new situations to...* 1. Represent, summarize, and interpret patterns in data (Analyzing) 2. Use appropriate tools/methods to make mathematical concepts more concrete and accessible 3. Make sense of a problem, initiate a plan, execute it, and evaluate the reasonableness of the solution (Synthesizing)	
	Meaning:	
S.ID.1 Represent data with plots on the real number line (histograms, dot plots, box plots). S.ID.2-3 Use statistics appropriate to the shape of the data distribution to compare	UNDERSTANDINGS: *Students will understand that:* 1. Mathematicians select and use appropriate statistical methods and tools to analyze data, show trends, and describe or make predictions;	ESSENTIAL QUESTIONS: *Students will explore & address these recurring questions:* A. As consumers of information, how do we analyze the validity of statistics? B. How does technology help to create meaning out of the data?

center (median, mean) and spread (iqr, standard deviation) and interpret differences between multiple sets including outliers. CC.8.SP.1/S.ID.6 Construct and interpret bivariate data to observe patterns and describe how variables are related. CC.8.SP.2/S.ID6abc/S.ID.8 Informally (trendline) and formally (regression) fit and judge the fit of a straight line to a data set. CC.8.SP.3/S.ID.7 Use linear models to make statements in the context of the problem, ie. slope, y-intercept, and making predictions. S.ID.9 Differentiate between correlation and causation	2. Mathematicians analyzed data to evaluate inferences, make predictions and/or communicate an decision; 3. Correlation does not imply causation.	C. How can I best communicate to an audience what the statistics say?
	Acquisition:	
	Students will know… 1. How to find and interpret measures of center as well as measures of spread 2. How to create and interpret a dot plot, histogram, and box-and-whisker plot 3. How to fit a trend line to data, write an equation for the trend line, and use the equation to interpolate or extrapolate. 4. The contextual meaning of the parameters of the trend line equation. 5. How to find the equation for the line of best fit using technology 6. The difference between one variable being correlated to the other and one variable causing the other to occur; 7. How to use technology to calculate the regression equation and the correlation coefficient; 8. That outliers can affect the accuracy of a prediction made with a regression line; 9. That some relationships do not take a linear form. 10. Vocabulary: Correlation coefficient, Distribution, Extrapolation, Histogram, Interpolation, Linear regression, Linear relationship/model, Non-linear relationship / model, Piecewise function, Regression equation, Skewed distribution, Trend line.	*Students will be skilled at…* 1. Constructing a frequency table and histogram; 2. Finding the five-number summary, range, and IQR, and constructing a box-and-whisker plot to compare sets of data; 3. Drawing a trend line through points, determining the equation of the trend line, interpreting the slope of the trend line in the context of the problem, and using the equation of the trend line to make a prediction; 4. Matching a graph with a possible value of r; 5. Using technology to calculate the regression equation and the correlation coefficient; 6. Making predictions based on the regression equation; 7. Stating the impact of an outlier .