Trigonometry and Statistics

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Unit #4: Data Analysis

Stage 1 – Desired Results

Established Goals

2009 NJCCC Standard(s), Strand(s)/CPI #
(http://www.nj.gov/education/cccs/2009/final.htm)

Common Core Curriculum Standards for Math and English
(http://www.corestandards.org/)

Interpreting Categorical and Quantitative Data: S.ID: #1-4

- Summarize, represent, and interpret data on a single count or measurement variable

Interpreting Categorical and Quantitative Data: S.ID: #5

- Summarize, represent, and interpret data on two categorical and quantitative variables.

Making inferences and Justifying Conclusions: S.IC: #1,3,6

- Make inferences and justify conclusions from sample surveys, experiments, and observational studies.

21st Century Themes
(www.21stcenturyskills.org)

___ Global Awareness
_x__Financial, Economic, Business and Entrepreneurial Literacy
___Civic Literacy
___Health Literacy
___Environmental Literacy

21st Century Skills

Learning and Innovation Skills:
___Creativity and Innovation
_x__Critical Thinking and Problem Solving
___Communication and Collaboration

Information, Media and Technology Skills:
___Information Literacy
___Media Literacy
___ICT (Information, Communications and Technology) Literacy

	Life and Career Skills: _x__Flexibility and Adaptability _x__Initiative and Self-Direction ___Social and Cross-Cultural Skills _x__Productivity and Accountability _x__Leadership and Responsibility
Enduring Understandings: *Students will understand that . . .* *EU 1* data can be collected, organized, summarized and presented through tables and graphs *EU 2* measures of central tendency, variation, and position can be used to summarize a set of data *EU 3* properly developed samples are a representation of the population being examined and will avoid biased results	**Essential Questions:** *EU 1* • Are there differences between types of data? • What types of graphs are appropriate and why? • What meaningful things can be determined when data is collected, organized and presented? *EU 2* • What are some experiences you have had that involved a measure of central tendency and variation, along with position? • How does abnormal data influence the choices made for describing a set of data? *EU 3* • Why is it important for data to be collected randomly? • How are samples collected to properly represent the population being examined?

Knowledge: *Students will know . . .*	**Skills:** *Students will be able to . . .*
EU 1 • that quantitative and categorical data can be organized and presented to describe a set of data • that data can be organized and presented in different ways *EU 2* • which measure of central tendency and variation to use to describe a data set given the distribution of the sample • the effects of outliers on the measures of center and variation of a sample *EU 3* • the importance of properly developed samples and presentation tools to avoid data becoming misleading • that random sampling is an efficient way to collect data that represents the population being examined	*EU 1* • recognize the difference between qualitative and quantitative data • recognize the difference between a discrete and continuous random variable • organize data into frequency distributions • present data in various types of graphs *EU 2* • determine the appropriate central tendency and variation that should be used to describe a data set based on the distribution • analyze a set of data that contains outliers • identify misleading data and consider how the data can be better represented or obtained *EU 3* • determine the difference between a population and a sample • identify the basic sample techniques and the purpose of sampling • develop a simple random sample that represents the population

Stage 2 – Assessment Evidence

Recommended Performance Tasks:*) EU 2, 3*

Mr. Starnes, in addition to his duties as a teacher of AP Statistics, also creates students' schedules. The other AP Statistics teacher, Ms. McGrail, suspects that Mr. Starnes may not have assigned students at random to the two classes. Said less politely, she wonders if Mr. Starnes has loaded his class with brighter students. Mr. Starnes decides to allow you, an independent statistical consultant, to rule on this matter.

The two teachers agree that SAT Math score and cumulative GPA are the best indicators of students' abilities. Here are the data:

Starnes GPA	McGrail GPA	Starnes SAT-M	McGrail SAT-M
2.9	2.9	670	620
2.86	3.3	520	590
2.6	3.98	570	650
3.6	2.9	710	600
3.2	3.2	600	620
2.7	3.5	590	680
3.1	2.8	640	500
3.09	2.9	570	500
3.75	3.95	710	640
3.4	3.1	630	630
3.34	2.85	630	580
3.56	2.9	670	590
3.8	3.25	650	600
3.2	3.0	660	600
3.1	3.0	510	620
	2.8		580
	2.9		600
	3.2		600

In a well-developed narrative, answer the question: "Did Mr. Starnes stack his class?". Giveappropriate graphical and numerical evidence to support your conclusion.

Other Recommended Evidence: *Tests, Quizzes, Prompts, Self-assessment, Observations, Dialogues, etc.*

- Tests and quizzes to include: describe the difference between qualitative and categorical data as well as discrete and continuous data and how this effects the method for displaying data, developing charts and tables to describe data, identifying proper sampling techniques, developing random samples that represent the population, determining the central tendency, variation and position of given data, describing flaws with misleading data

Stage 3 – Learning Plan

Suggested Learning Activities to Include Differentiated Instruction and Interdisciplinary Connections: *Consider the WHERETO elements. Each learning activity listed must be accompanied by a learning goal of A= Acquiring basic knowledge and skills, M= Making meaning and/or a T= Transfer.*

TI-Nspire Activity # 1: Box Plots and Histograms (M,T)

- Students will collect and analyze real-life data
- Students will create a histogram and a box plot
- Students will compare the two data displays
- Students will draw conclusions based on the comparison
- http://education.ti.com/calculators/downloads/US/Activities/Detail?id=8200&ref=%2fcalculators%2fdownloads%2fUS%2fActivities%2fSearch%2fSubject%3fs%3d5022%26sa%3d5026%26t%3d1189

TI-Nspire Activity # 2: Are They Truly Random? (M,T)

- Students will develop lists of random numbers generated by the calculator
- Students will explore their sets of numbers and engage in discussions of whether the random number generator is truly generating number randomly
- Student will look at statistical model of their numbers and discuss whether “patterns” they see in the set of random numbers are possible if the numbers are truly random

Key Vocabulary includes: mean, median, mode, standard deviation, variance, range, outlier, quantitative data, qualitative data, random, simple random sample, bias, population, sample, discrete random variable, continuous random variable

The following is the suggested sequence of learning activities and number of days for the Trigonometry and Statistics class. Adjustments should be made accordingly for other levels.

Approximate time of completion of unit: 24 Days

Students will

- Develop and understanding of statistical terminology (A)
- Identify types of data and measurements and determine validity (A,M)
- Apply various data collection techniques and direct purpose (A,M)
- Identify misleading data (M)
- Develop and analyze graphs and tables that include box plots, histograms, scatter diagrams, stem and leaf plots etc.
- Ti-Nspire Activity #1(A,M)
- Find and interpret the measures of central tendency and variation
- Ti-Nspire Activity # 2 (M,T)
- Identify the presence and effects of outliers, clusters, and correlation while predicting measures such as mean, mode, and standard deviation (M,T)