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The Normal Curve

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Name:	Evan Brauer
Grade level(s)/Subject taught:	AP Statistics
Objectives:	

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1. Understand the concepts and properties of The Normal Curve

2. Understand when The Normal Curve can be used, and what types of questions it will answer.

1. *Write* the <u>Mathematical Concept</u> or "key idea" that modeling will be used to teach: (e.g. Students use mathematical modeling/ multiple representation to provide a means of presenting, interpreting, communicating, and connecting mathematical information and relationships)

Students use mathematical modeling/ multiple representation to provide a means of presenting, interpreting, communicating, and connecting mathematical information and relationships

Students use measurement in both English and metric measure to provide a major link between the abstractions of mathematics and the real world in order to describe and compare objects and data.

Materials:

1. TI Graphing Calculator

2. Web access

**Using <u>Web-Based Applets</u> I plan on having my students…**

The lesson will begin with a review of graphical displays of quantitative data, specifically, histograms. Students will enter various data in lists on their TI calculators and practice drawing histograms to fit the data. We will discuss symmetric, skewed left/right, outliers, gaps and peaks of these displays.

We will then discuss what is commonly known as the bell curve, or, for this course, the normal curve. Students will enter the following data into List 1 of their calculator: 1-1, 2-2's, 3-3's,…8-8's, 7-9's, 6-10's,…2-14's, 1-15, then graph the data with an x-scale of 1.

 We will discuss how the mean and median are identical, the distribution is perfectly symmetric about the mean and find the standard deviation. We will discuss how this type of distribution, called the normal curve, represents many real-world distributions – SAT scores, women's heights, average daily high temperatures, manufacturing defects, etc. While almost no distribution is perfectly normal, approximately normal allows us to closely predict outcomes.

We will then discuss z-scores of a normal distribution, enabling us to determine what proportion of a population that is (approximately) normally distributed can be found between any two values. One web-based applet, found below, will allow the students to model a normal curve with mean 0 and standard deviation 1 and see its parameters and characteristics, specifically, proportions between two set values of the data set.
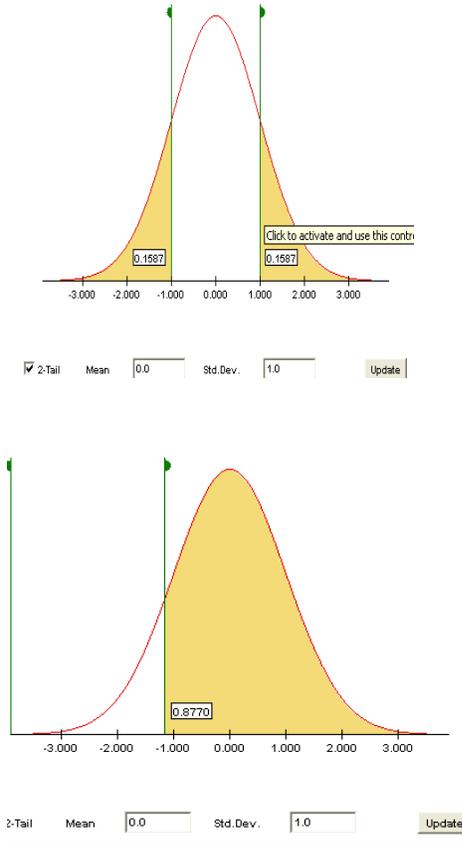
This applet allows students to set the mean and standard deviation to any values, thus, making it more realistic and useable for real-world examples.
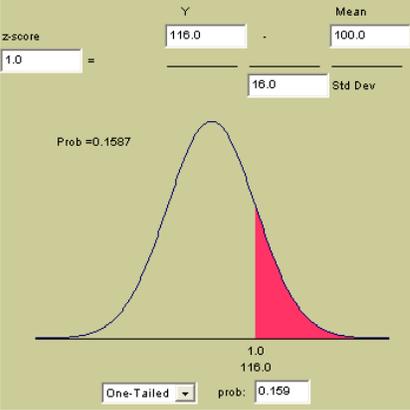
http://psych.colorado.edu/%7Emcclella/java/normal/normz.html

Examples

This applet converts between raw scores and z-scores with a display of various areas of probability.

Y		Mean
116.0	-	100.0

z-score
1.0 =

16.0   Std Dev

Prob =0.1587

1.0
116.0

One-Tailed   prob: 0.159

How-To:
Use this graph to calculate z-scores and to see the corresponding probabilities. Any number can be changed, but the change will not be effective until you press the return key while in one of the boxes. You may also change the portion of the normal distribution selected:

- Cumulative--from minus infinity to the z-score
- One-Tailed--from the z-score to positive infinity
- Two-Tailed--absolute scores more extreme (i.e., further from the middle) than the z-score
- Middle--absolute scores

The lesson will close by gathering classroom data that may very well be normally distributed (heights by gender, SAT scores). The students will be asked to graph the data, find the mean and median to examine normalcy, then answer specific questions using z-scores (what percentage of scores are between x and y, what value is at the x percentile, etc.). The rubric will not be one to obtain a grade, rather, just to review a student's graphical capabilities and z-score formula work to ascertain comprehension.