

Bar graph or Histogram? (Both allow you to compare groups.)

We want to compare total revenues of five different companies.

Key question: What is the revenue for each company?

Bar graph

We want to compare heights of ten oak trees in a city park.

Key question: What is the height of each tree?

Bar graph

We have measured revenues of several companies. We want to compare numbers of companies that make from 0 to 10,000; from 10,000 to 20,000; from 20,000 to 30,000 and so on.

Key question: How many companies are there in each class of revenues?

Histogram

We have measured several trees in a city park. We want to compare numbers of trees that are from 0 to 5 meters high; from 5 to 10; from 10 to 15 and so on.

Key question: How many trees are there in each class of heights?

Histogram

SCENARIO:

- You are trying to decide if you want to take a class in school based on how the difficult the class is. You decide to use the grades of students who have taken the class previously as a measure of difficulty.
- What are some ways of looking at the data to make your decision?

Measures of Central Tendency

Median: The middle score in a rank-ordered distribution.

If the median score is 85%, would you consider this an easy class?

What if you found out that the grades were
42, 44, 50, 85, 85, 85, 85?

Is median a great measure of central tendency?

Measures of Central Tendency

Mode: The most frequently occurring score in a distribution.

If you find a class with a mode of 86 would this be an easy class?

Here are the grades:

14,25,32,45,50,60,86,86.

Is mode a great measure of central tendency?

Measures of Central Tendency

Mean: The arithmetic average of scores in a distribution obtained by adding the scores and then dividing by the number of scores that were added together.

You have found a class with a mean of 85 and have decided that this must be an easy class.

The grades were: 70,70,100,100.

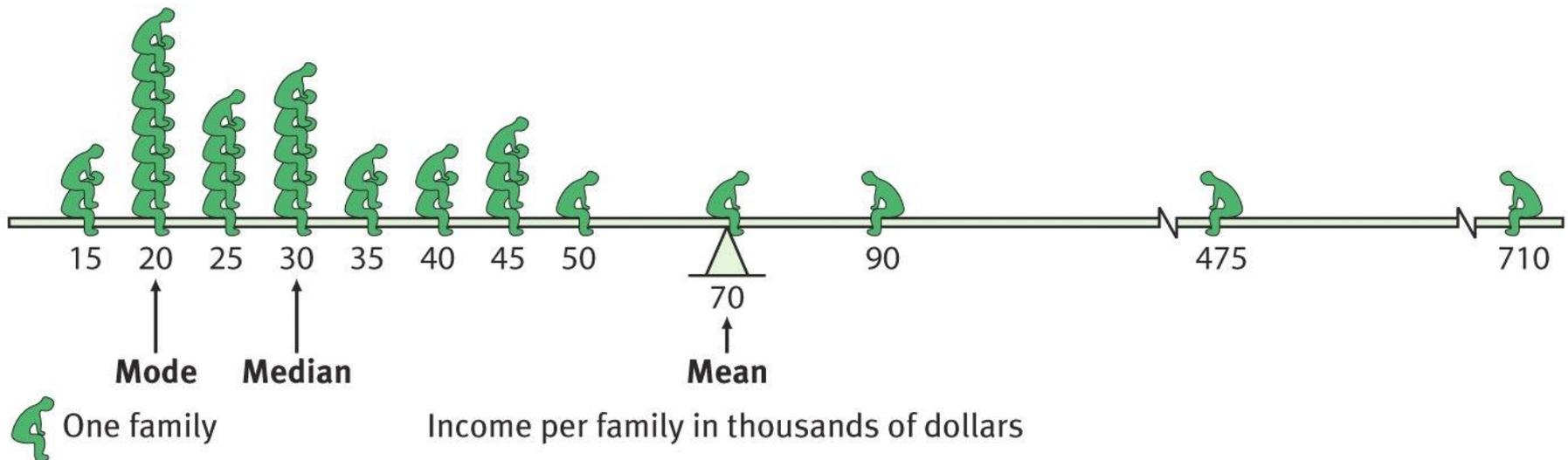
Would you feel confident that this an easy class?

Measures of Central Tendency

- It is important to always note which measure of central tendency is being reported. If it is a mean, one must consider whether a few atypical scores could be distorting it, or causing a *skewed distribution*.
- Skewed distribution: When scores don't distribute themselves evenly around the center. There are a few extremely high or low scores.

Measures of Central Tendency

A Skewed Distribution



Central Tendency

- Mean, Median and Mode.
- Watch out for extreme scores or outliers.

Let's look at the salaries of the employees at Dunder Mifflin Paper in Scranton:

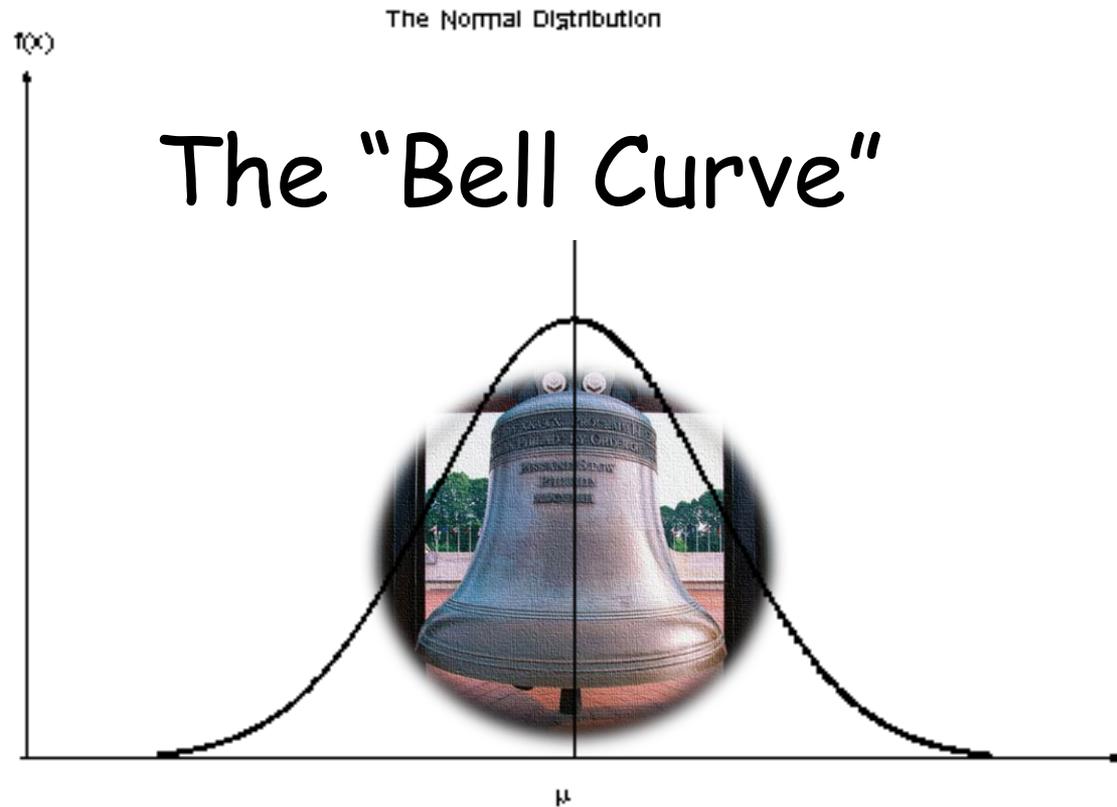
\$25,000- Pam
\$25,000- Kevin
\$25,000- Angela
\$75,000- Andy
\$75,000- Dwight
\$75,000- Jim
\$350,000- Michael



Measures of central tendency are Quick and easy, but outliers may distort the numbers.

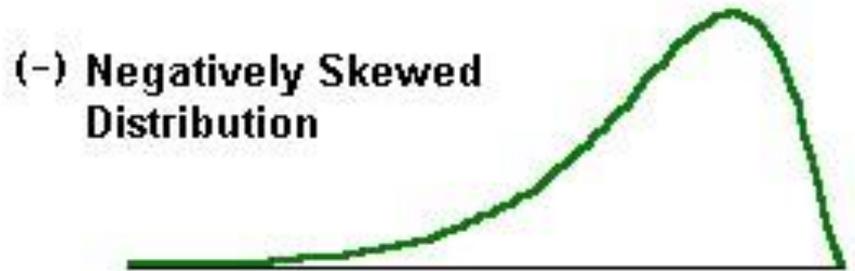
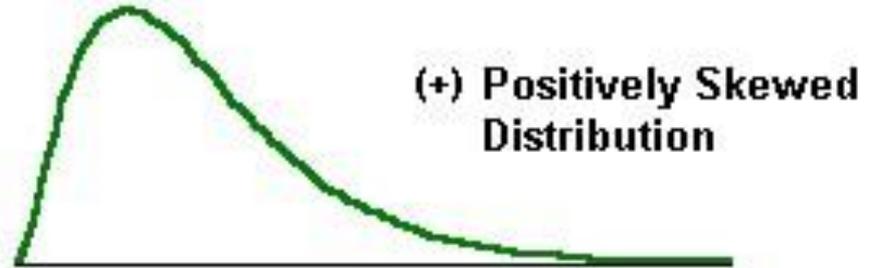
Normal Distribution

- In a normal distribution, the mean, median and mode are all the same.



Distributions

- Outliers skew distributions.
- If group has one high score, the curve has a positive skew (contains more low scores)
- If a group has a low outlier, the curve has a negative skew (contains more high scores)



Measures of variation

- Averages from scores with low variability are more reliable than those with high variability.
- **Range:** Difference between the highest and lowest scores in a distribution. Like with the mean, high and low scores could present a deceptively large range.

Hey diddle diddle,
the median's the middle;

YOU ADD AND DIVIDE FOR THE MEAN.

The mode is the one that appears the most,
and the range is the difference between.

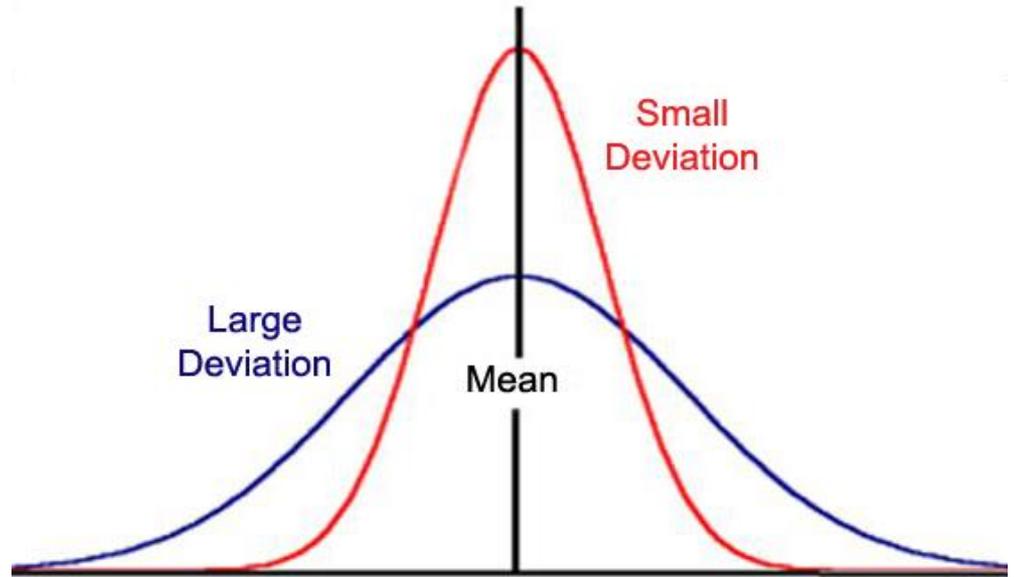
www.PrometheanPlanet.com

Promethean Planet is an online community for teachers in the 21st century classroom.

Measures of Variation

Standard Deviation:
A computed measure of **how much scores vary around the mean.**

Standard Deviation uses information from **each score**, so it better represents data.



Standard Deviation

- SCORES
- Score-Mean (Score-Mean)²

18

-6

36

20

-4

16

24

0

0

25

1

1

33

9

81

134

$\frac{134}{5}$

=

26.8

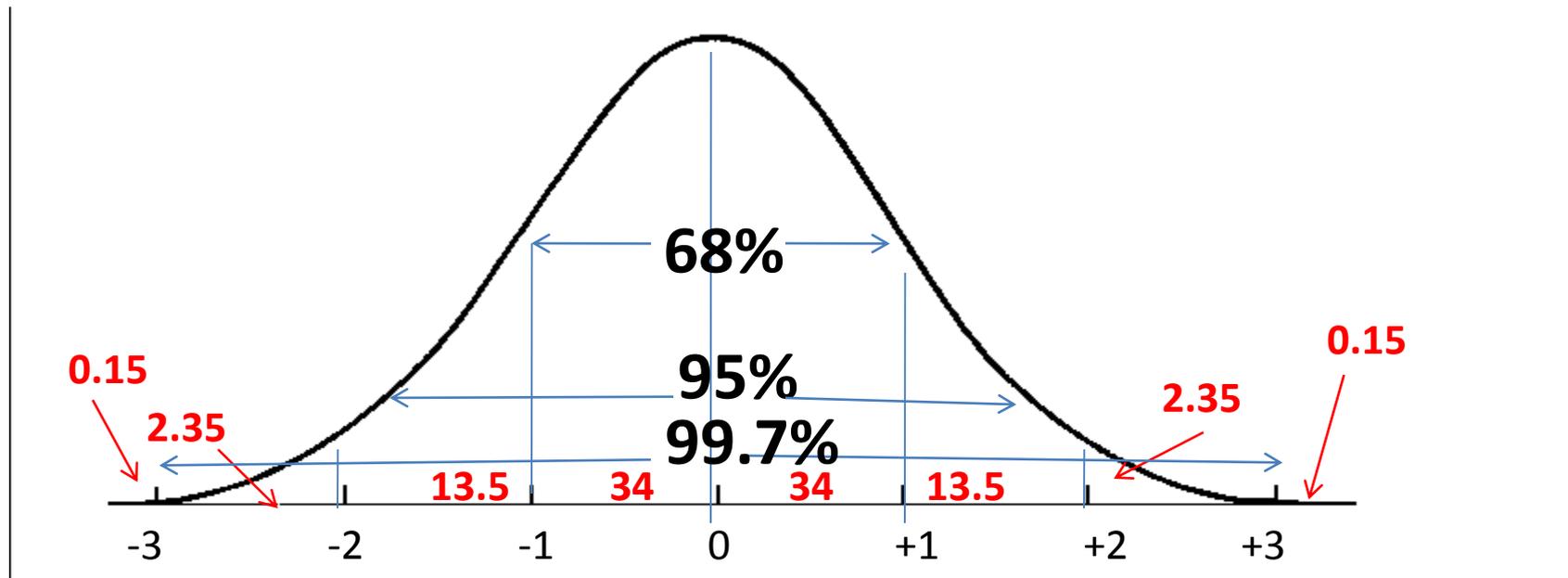
$\sqrt{26.8}$

MEAN: 24

Variance: Gauges a spread of scores within a sample

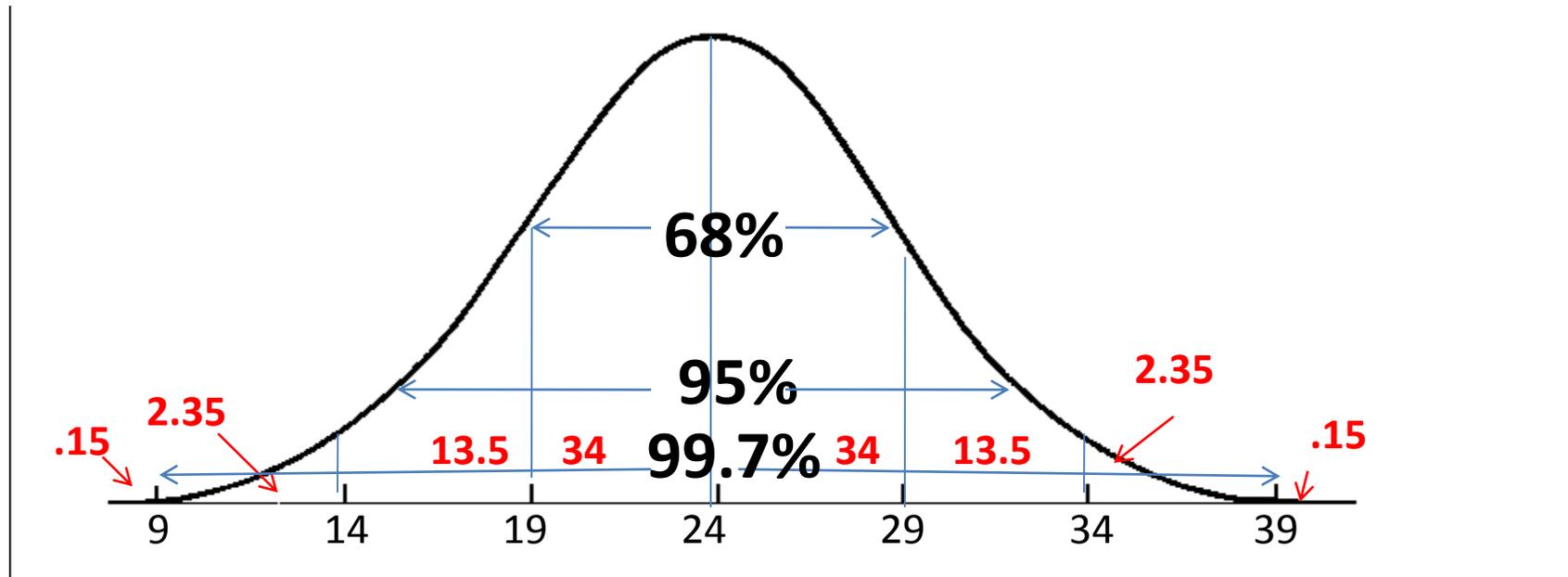
- **26.8 is the “variance”**
- **Standard deviation is the “square root of the variance.” (SD=5.17)**

Normal Curve



- Each mark represents one deviation away from the mean.
- Numbers in red are the percentage of people whose score falls within each standard deviation.
- 68% of people will fall within 1 standard deviation from the mean.
- 95% of people will fall within 2 standard deviations from the mean.

Normal Curve



-Using our numbers from our standard deviation exercise, the normal curve would look like this. 68% would have scored within one standard deviation of the mean, or would have scored between 19 and 29. 95% would have scored within two standard deviations, or between 14 and 34.