Maria Oddo
oddo3137@fredonia.edu

Sarah Yates
yate6889@fredonia.edu

Stat Mysteries Revealed

Introduction:

This lesson involves data sets and problems for teachers to use with students. The audience will be exposed to different ways to implement the data sets and problems in the classroom. The three problems will focus on:

1. Standard Deviation and the "ugly formula"
2. Binomial Probabilities Distribution and the "ugly formula"
3. Combinations and Permutations – how to remember the difference

These problems will give teachers a different way to look at these statistical topics and how to better introduce them to students who are first learning them.

NYS MST Standards:

- A2.S.10 Calculate the number of possible permutations $({}_nP_r)$ of *n* items taken *r* at a time
- A2.S.11 Calculate the number of possible combinations $({}_nC_r)$ of *n* items taken *r* at a time
- A2.S.15 Know and apply the binomial probability formula to events involving the terms *exactly*, *at least*, and *at most*
- A2.S.16 Use the normal distribution as an approximation for binomial probabilities

NCTM Standards:

- Use simulations to explore the variability of sample statistics from a known population and to construct sampling distributions.
- Understand how sample statistics reflect the values of population parameters and use sampling distributions as the basis for informal inference.

Instructional Objectives:

Objectives of this lesson include:

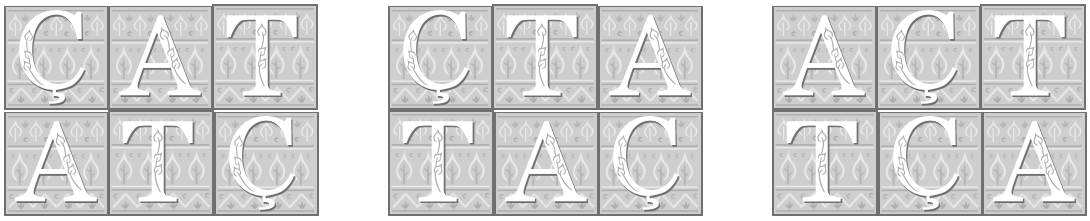
- Introducing a fun way to get students engaged in various topics that involve statistical topics.
- Supplying the audience with suggestions on ways to introduce topics in statistics.
- Promoting ways to get teachers to think of different ways to approach the introduction of certain topics in statistics.

Instructional Protocol/Itinerary:

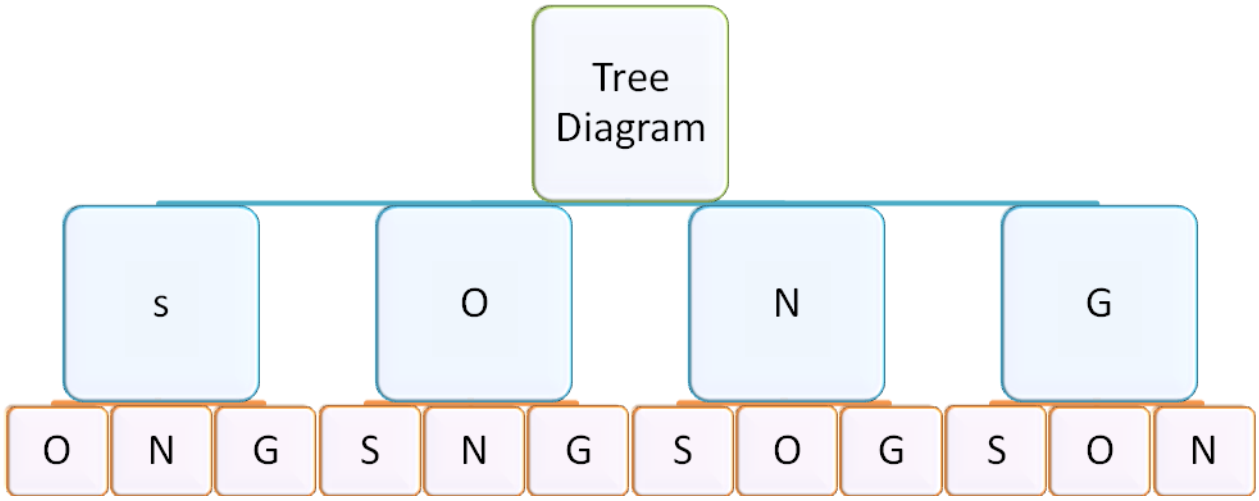
- The audience will be asked questions before presenting each statistic topic to gain their interest.
- This lesson will get the students involved and more interested in working with statistics, rather than the "traditional" way of "plug-n-chug."
- The lesson can be revised to make appropriate for grade levels 7-12.

Peculiar Permutations

As a group of world class "Spelling Bee-ers" you are up for a new task of creating non-sense words. Your group will be given three, 3x5 index cards with letters of the alphabet located on them. Your mission is to create all possible three letter arrangements of these letters. Remember these do not need to spell actual words.



Once you have mastered three lettered words, work on four letters. To check your answers create a tree Diagram.



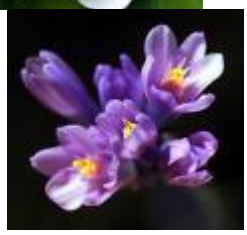
Answers: S – O, S – N, S – G, O – S, O – N, O – G, N – S, N – O, N – G, G – S, G – O, G - N

Pretty Petals

Homecoming is just around the corner and you are at the corner store florist picking out your date's corsage. It is incredibly important that you pick out the proper flowers. So to make sure that it is not too busy you only want to pick out two choices. How many choices of different corsages could your date end up with?





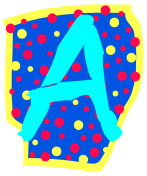



1) 
2) 
3) 

4) 
5) 
6) 

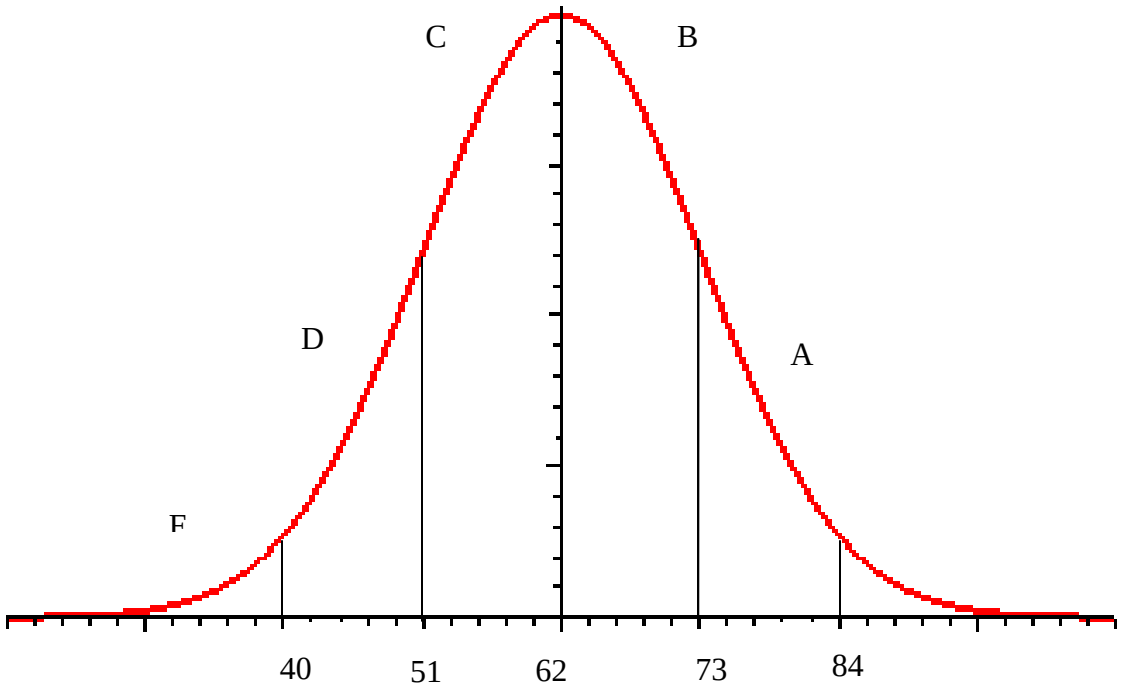
1-2, 1-3, 1-4, 1-5, 1-6, 2-3, 2-4, 2-5, 2-6, 3-4. 3-5, 3-6, 4-5, 4-6. 5-6 (15)

There are 15 combinations in all!



Midterm Madness

Suppose this year's midterm is given in the new Integrated Algebra course. The thoroughly disgusted math department decided to assign letter grades for the exam. The head of the department, Mr. Rogers, was nominated to establish a mean of a C and give the top 10 percent A's. The freshman and sophomore class mean for the test was a 62 with a standard deviation of 11. Help Mr. Rogers establish a scoring guide to assign letter grades on the Integrated Algebra midterm, assuming that we have normal distribution.



Another application to observe standard deviation is applying the data to a box plot.

More Fun Applications

Double Fault?

This year a random sample done by the head of athletics in the area gathered information on 64 high school female tennis athletes. The females had one statistic in particular that the department was interested in, this was their information on double faulting. Double faulting consists of two missed serves done consecutively, resulting in a loss of a point. The mean of the women's double faults in the season was 60 with a standard deviation of 12. Use the normal distribution curve and label all informative values.

- Given that a player had a terrible season and their number of double faults was 96, how many standard deviations above the mean are they?

- Would this be an unusual observation, why or why not?

Best Dressed?

At SUNY Fredonia, Dr. Howard, a professor of Mathematical Sciences, is known for having *A* outfits. He claims that there is a month where he is showing off the greatest variety of his *A* outfits. What month do you think students will see the widest variety of Dr. Howard's *A* outfits? Why?

- In this problem, variance can be introduced. Also its relationship with standard deviation can be introduced.

Binomial What?

We all know that students hate learning about the binomial distribution. They have a difficult time remembering the formula and how to use it. Here are some great applications on the binomial distribution without even mentioning the words "binomial distribution" or even introducing the formula.

Chinatown!

I am going to give you a quiz. It is a ten-question quiz and the answers are either true or false. The test is written in Chinese, so do your best. What do you think your grade will be on the quiz if you do not know any Chinese?

Do you know me?

Let's see who knows me best. True or false.

1. I have been arrested for skinny-dipping in Lake Erie.
2. I went on a road trip over the summer and did not stop once to stay overnight somewhere.
3. I love Haunted Houses.
4. I was hospitalized over the summer because I fell off a mountain while hiking.
5. My favorite band is the Backstreet Boys.

- Let's say that you got 2 of the 5 correct but your friend got 4 of the 5 correct. Why did your friend get more correct than you?

- What does this tell you about your friend?

Passing to an NFL Start

After the bye week, Coach Dick Jauron has a huge decision to make regarding the quarterback situation for the Buffalo Bills. Over the past six weeks, JP Losman and Trent Edwards have been battling for the starting quarterback position. JP Losman had been injured and now is eligible to come back the week after the bye week. JP is a key player who makes 60% of his pass attempts over the course of the three weeks in which he played. Trent Edwards makes 80% of his pass attempts. Is it expected that JP can play at the same level as Trent? Who would you put in as your quarterback?