

POPCORN

by
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The Experiment: We used hot air popcorn poppers and let our students count out 100 white or yellow kernels of regular popcorn. The students then popped their 100 kernels for the allotted four minutes and counted how many did not pop. First time users that day or period, of the hot air poppers, were asked to let them warm up for a minute to make all the experiments the same. We used this information to decide which of the two different kinds of popcorn popped best under these circumstances. The groups were divided into twos or threes and could eat all the popped corn. (Note: Do not plug in more than two poppers without knowing the location of the electrical service panel.)

The Data: Although the students counted how many kernels did not pop, the data reflects how many did pop out of 100.

Procedure: For the students, after the experiment, they need to know how to place the information in the calculator as a list. (stat>edit) Then using the stat button find all the above mentioned distributions about their lists. (stat>calc>1-var stats) A discussion of what each of the distributions mean and what they have to do with the data would be in order. Then the students could see the data using a histogram or a scatter plot. (2nd >stat plot>enter>plots on>hist>L1)

This entire procedure is difficult for the first time users of the TI-83. It is suggested that a similar project with less data be used for the students to familiarize themselves with the calculator and its uses.

Who: This project was done with Applied Math I and Applied Math II students at North Marion. All grades levels and classes could do this project with little or no modifications.

Results: In our experiment, we noticed that the exploding kernels would blow out un-popped kernels. This may have been the biggest factor in our data more so that the type of corn used. We did have

better success with the white popcorn more so than the yellow. This could be taken further with making the popcorn moist, freezing the popcorn and putting the popcorn in a confined area that would not let the kernels out, (All of which are experiments under our Links heading)

The Outcome: Using the TI-83 Plus, the students made a list of data in the calculator for each color of pop-corn. From each list the students used 1-Variable Stats to find the mean, median, min, max, first quartile, third quartile and the standard deviation. They then were to use a histogram to see their data.

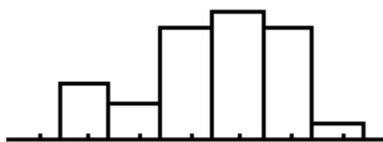
Yellow

```

1-Var Stats
x̄=71.68
Σx=1792
Σx²=134084
Sx=15.32079197
σx=15.01124912
↓n=25
█
  
```

```

1-Var Stats
↑n=25
minX=42
Q1=62
Med=76
Q3=84.5
maxX=97
  
```



White

```

1-Var Stats
x̄=74.44
Σx=1861
Σx²=143411
Sx=14.25681124
σx=13.96876516
↓n=25
█
  
```

```

1-Var Stats
↑n=25
minX=26
Q1=69
Med=78
Q3=84
maxX=91
█
  
```



Group	Number of Yellow	Number of White
1A	64	86
2A	78	88
3A	66	81
4A	70	70
5A	89	83
1B	80	81
2B	76	49
3B	84	91
4B	97	85
5B	88	87
6B	90	88
1C	90	78
2C	60	78
3C	85	26
4C	47	70
5C	77	65
6C	42	76
7C	42	59
1D	67	78
2D	54	80
3D	79	72
4D	57	63
5D	76	68
6D	68	82
7D	66	77

The students were asked to find the average of the number of kernels of corn popped to make a comparison on the two kinds of popcorn. The use of the TI-83 was used for finding the arithmetic mean after the students did this with a regular calculator to support their findings. The students did notice that the white popcorn did pop better but were more interested in having salt to put on the popcorn.

Links:

- Another pop-corn experiment about how far an exploding kernel flies:
<http://www2.bc.edu/~deadyel/popcorn.html>
- Popcorn in a microwave - air popped.
www.ezboard.com
- The science of how a kernel pops
<http://simscience.org/crackling/Advanced/SnapCracklePop/Pop.html>
- Virtually all popped in this hot air popper
http://www.epinions.com/content_53794606724
- The best pop-corn kernels
<http://ths.gardenweb.com/forums/load/recipe/msg0708561622726.html>
- How it pops; The history of pop-corn; Popping facts, etc.
<http://www.kidzworld.com/site/p547.htm>
- Volume using pop-corn. Biology
<http://web.bio.utk.edu/guffey/BiaB/measurement4.html>
- Freeze the kernels
<http://www.broward.k12.fl.us/mikelem/pop.html>
- Remove the top of the hot air popper and ask why it works?
<http://sherik.tripod.com/activities/popcorn.htm>
- How many kernels to make a cup of popped corn. Experiment.
<http://www.familyeducation.com/whatworks/item/front/0,2551,1-13182-3211-13,00.html>
- Soak the kernels in water first.
<http://www.clover.okstate.edu/fourh/aitc/lessons/primary/popcorn.pdf>
<http://maize.agron.iastate.edu/popcorn.html>
- Fun facts about pop-corn.
<http://members.aol.com/kitecd/popcorn.html>
- Don't let it dry out
<http://www.factmonster.com/spot/popcorn1.html>

IGO's

AM1.2.13; AM1.2.16; AM2.21; AM2.2.12; AM1.11; AM2.6; AM2.10;
AM2.11; AM2.13; AM2.17; AM2.18; AM2.19

West Virginia Instructional Goals and Objectives (IGOs)

AM1.11 ^{9,10,11} **collect, organize, and interpret data using graphs, charts, and tables**

AM2.6 ^{9,10,11} analyze a given set of data for the existence of a pattern, represent the pattern algebraically and graphically, determine the domain and range, and determine if the relation is a function

AM2.10 ^{9,10,11} **collect, organize, interpret data, and predict outcomes using the mean, mode, median, range, and standard deviation**

AM2.11 ^{9,10,11} **predict the outcomes of simple events using the rules of probability**

AM2.13 ^{9,10,11} **use process charts and histograms, run charts, scatter diagrams, and normal distribution curves in order to perform statistical process (quality) control**

AM2.18 use graphing software to create graphs, charts, histograms, and tables of given data; to find frequency distribution and standard deviation (AM2.10)

AM2.19 use graphing software to create process charts and histograms, run charts, scatter diagrams, and distribution curves (AM2.13)

CONTENT STANDARDS AND OBJECTIVES FOR WEST VIRGINIA SCHOOLS -- POLICY 2520

AM1.2.13 collect, organize, interpret data, and predict outcomes using the mean, mode, median, range and standard deviation

AM2.2.11 use process (flow) charts and histograms, scatter diagrams, and normal distribution curves in order to perform statistical process (quality) control.

AM2.2.12 perform a linear regression and use the results to predict specific values of a variable. Identify the equation for the line of regression.

NTCM Standards for School Mathematics

- formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them;
- select and use appropriate statistical methods to analyze data;
- develop and evaluate inferences and predictions that are based on data;
- understand and apply basic concepts of probability.