

Activity: And The Winner is....

What a Meal Company includes tokens with each “combo lunch” it sells. There are 10 tokens in the set. The tokens can be redeemed for free items, such as a dessert or milkshake. Assuming the company has distributed an equal number of each token in the lunches, how many lunches on average, would a consumer need to buy in order to collect all 10 tokens? Do you have a prediction? Record it here. _____

Use the Random Number Generator on your *fx-260* calculator (*shift* RAN#) to produce random numbers. For this example, any number that begins with 0.1 will represent the first token, 0.2 will represent the second token, etc. The tenth token is represented by 0.0.

Record the purchases of five different consumers by tallying the number of lunches that each person buys. Keep track of how many lunches each consumer purchases until the person collects at least one of each of the ten tokens.

Consumer	Token 1	Token 2	Token 3	Token 4	Token 5	Token 6	Token 7	Token 8	Token 9	Token 10	Total # of Lunches
A											
B											
C											
D											
E											

1. Determine the mean number of boxes a consumer must purchase to get all ten tokens. ____
2. Was your prediction for the total number of lunches a person would need to buy to collect all ten tokens a good estimate? Explain why or why not.
3. If the tax on food is 5%, and the average combo lunch costs \$3.99 without tax, how much money would a buyer spend on average to get all ten tokens, including tax?

Extension:

Suppose the What a Meal Company did not produce an equal number of each token. Use the chart below to record this situation and then explain how many lunches a buyer might have to purchase to get all ten tokens.

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Objective: To use the random number generator (*shift* RAN#) on the *fx-260* calculator to simulate the purchase of lunches in order to “collect the whole set” of tokens for free items given by a fast food company, and to calculate an arithmetic mean. Ex.(MODE ., *shift* SAC, Data,

Data, *shift* \bar{x}) The number of data points entered (*shift* n) and the sum of the data (*shift* $\sum x$) will also be reviewed.

Students will also make a prediction, gather data, record their data on a tally chart, and draw conclusions from their investigation.

Grade Level: Middle School

Topic: Probability and Statistics and Mean, Median, Mode

Using the Activity:

The *fx-260* scientific calculator has the ability to produce random numbers by using its Random Number Generator (*shift* RAN#) key. This feature can be useful when simulating an event that occurs at random and investigating possible outcomes when the data is not fixed. The *fx-260* calculator also has the ability to calculate an arithmetic mean. The number of data points entered and the sum of the data are stored in the calculator, and can be used with students to reason about the mean (average) that their data reveals. Students can also compare data sets and make inferences about their investigation if their data were to change.

Procedure: Begin the activity by grouping students in teams of at least two students. Discuss the investigation students will perform using visuals of a “Combo Meal” and tokens that would be collected. After discussing the situation with students, solicit student predictions to the following question, “Assuming the company has distributed an equal number of each token in the lunches, how many lunches on average, would a consumer need to buy in order to collect all 10 tokens?” Students record their predictions on their sheet.

Demonstrate how to generate a random number, how to record the tally mark for the number generated, and the required minimum of one tally mark for each token per consumer.

Once students complete the investigation and record their tally marks, they will total the number of lunches a consumer had to purchase to get all ten tokens. Next, students will determine the mean number of boxes required to get all the tokens. To determine the mean, students can perform the following example to learn how to use the calculator for this task before entering their own data set.

To calculate the arithmetic mean of 55, 75, 33, 37, and 92:

Enter stats mode by entering Mode . *shift* SAC 55 Data 75 Data 33 Data 37 Data 92 Data *shift* \bar{x} to determine the mean.

To determine the number of data points entered, enter *shift* n

To determine the sum of the data, enter *shift* $\sum x$

To exit stats mode enter Mode 0

Once students have practiced, students will enter their own data to determine the mean number of boxes a consumer must purchase to get all ten tokens.

Allow students to complete the remaining questions on their sheet, and then hold a class discussion to gather data from the student teams, and discuss each as an experimental trial. Using an overhead or chart paper will be useful for recording class results and will help students understand the need to record the data the class has created. Help students draw conclusions about the data and make inferences about the investigation by asking questions about their investigation and the data they collected. (similarities and differences in tally charts, means, etc.) Further questioning may include questions such as, Is it worth a consumers time and money to attempt to collect all ten tokens?

