**Appendix 9**

Math Lesson

During this Collaborative Activity, you and your partner will engage in a Card Sort, aimed at identifying and practicing statistical concepts within the context of a Food Sensory Evaluation. Begin by reading the scenario and reviewing the sample data provided. As necessary, research math textbooks and/or websites to re-familiarize yourselves with the statistics concepts necessary for completing this activity.

Card Set A: Statistics Concept

Card Set B: Definition or Explanation of Statistics Concept

Card Set C: Application within Scenario Context

Scenario:

Thirty students at Elmwood Elementary school recently participated in a food sensory survey given by the school district’s nutrition program. They were provided with samples of both a popular chocolate sandwich cookie and a low-fat version of the same. The students were asked to rate each of the sample cookies using “overall taste” as the descriptive criteria.

Each participating student provided his/her ranking of each of the cookies on a form similar to the one shown here:

Cookie A or Cookie B

Liked Taste  
Very Much

Disliked Taste  
Very Much

1 2 3 4 5 6 7 8 9 10

Here are the results:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Student # | Cookie A | Cookie B | Student # | Cookie A | Cookie B |
| 1 | 7 | 6 | 16 | 7 | 7 |
| 2 | 6 | 6 | 17 | 8 | 9 |
| 3 | 3 | 5 | 18 | 10 | 6 |
| 4 | 4 | 1 | 19 | 8 | 5 |
| 5 | 9 | 8 | 20 | 7 | 6 |
| 6 | 7 | 4 | 21 | 5 | 3 |
| 7 | 10 | 10 | 22 | 8 | 8 |
| 8 | 9 | 6 | 23 | 7 | 6 |
| 9 | 5 | 7 | 24 | 9 | 8 |
| 10 | 6 | 6 | 25 | 5 | 5 |
| 11 | 8 | 9 | 26 | 8 | 8 |
| 12 | 9 | 6 | 27 | 8 | 9 |
| 13 | 10 | 9 | 28 | 5 | 6 |
| 14 | 9 | 9 | 29 | 10 | 8 |
| 15 | 8 | 7 | 30 | 4 | 5 |

CARD SET A

|  |  |  |
| --- | --- | --- |
| Null Hypothesis | Alternate Hypothesis | Mean |
| Standard Deviation | T-Test | P-value |
| Inferential Statistics | Normal Curve | Sample |
| Population | Confidence Interval | Mean Difference |

CARD SET B

|  |  |  |
| --- | --- | --- |
| Typically corresponds to a general or default position. For example, it might state that there is no relationship between two measured phenomena or that a potential treatment has no effect | In [statistical hypothesis testing](http://en.wikipedia.org/wiki/Statistical_hypothesis_testing), this and the [null hypothesis](http://en.wikipedia.org/wiki/Null_hypothesis) are the two rival hypotheses which are compared by a [statistical hypothesis test](http://en.wikipedia.org/wiki/Statistical_hypothesis_testing). | The sum of all the values in a set divided by the number of values in the set. It is a measure of central tendency for the set of data. |
| A number that indicates the spread or variability in a set of data. | A statistical test involving means of normal populations with unknown standard deviations; small samples are used, based on a variable *t* equal to the difference between the mean of the sample and the mean of the population divided by a result obtained by dividing the standard deviation of the sample by the square root of the number of individuals in the sample. | The [probability](http://en.wikipedia.org/wiki/Probability) of obtaining a [test statistic](http://en.wikipedia.org/wiki/Test_statistic) at least as extreme as the one that was actually observed, assuming that the [null hypothesis](http://en.wikipedia.org/wiki/Null_hypothesis) is true. One often "rejects the null hypothesis" when this value is less than the significance level which is often 0.05 or 0.01. |
| The treatment of a small sample of data that allows one to infer or draw conclusions about a total population from which the sample is taken. | The graph of a frequency distribution for a set of ideal data. Most of the values in the set cluster around the midpoint. The curve is symmetric about its central value and has the shape of a bell: it’s often referred to as a bell-shaped curve. | A group of people or objects selected from a population. You can make predictions or draw conclusions about the entire population based on this selected data. |
| A complete set of people or things being studied. | An interval about the sample mean in which you can be p% confident that the population mean lies. | The average of the differences found among the responses by each subject in the sample. |

CARD SET C

|  |  |  |
| --- | --- | --- |
| There is no difference in overall taste between the popular chocolate sandwich cookie and the low-fat version of the same cookie. | There is a difference in overall taste between the popular chocolate sandwich cookie and the low-fat version of the same cookie. | Cookie A: X = 7.3  Cookie B: X = 6.6 |
| Cookie A:  = 1.9  Cookie B:  = 2.0 | T = mean difference divided by the (standard deviation of difference / square root of 30 the number of samples)  T = 2.39 |  |
| Using the data obtained from the 30 students at Elmwood Elementary to draw conclusions about the taste preferences of all students in the entire school. |  | The 30 students selected to participate in the sensory test. |
| All of the students in the entire school. | Tells you the significance of the difference between the two cookies. Usually this value is benchmarked at either 0.05 or 0.01. | Cookie A – Cookie B  X = 0.7 |