September 12, 2014

Arizona Mathematics Partnership

C/O Bogle Project Teachers

1600 W. Queen Creek Rd

Chandler, AZ 85248

Fred Flintstone

342 Gravel Pit Terrace

Bedrock, Prehistoria 12345

Dear Mr. Flintstone,

Thank you for contacting our advisory group in regards to your new part-time position as a fruit tester at Geode Orange Juice Company. We look forward to assisting you in producing an appropriate plan for securing a representative sample of oranges and ensuring that your results are accurate. Our goal is to help you understand the parameters of your endeavor and explain why your initial attempts were not successful. We have included explanations and recommendations to follow so you will be successful in your position and eventually experience your retirement dream in Bedrock’s Quartzside Bowling Alley.

To assess if an orchard’s crop of oranges is sweet enough for juice, a representative sample of oranges must be pulled and tested. A randomly selected small sample of a population, like a sample of oranges, can indicate the sweetness of the whole crop, if the sample is taken correctly. A representative sample is a subset of a statistical population that accurately reflects the members of the entire population. We agree the appropriate sample size for a farm of Agate’s 25,000 trees would be 1,000 oranges. However, we recommend that instead of pulling all the oranges from one tree, you have more trees represented in the sample. Our recommendation is to pull one orange each from 1,000 trees that are randomly selected throughout the whole farm. The reason for this is different areas of the farm may have different conditions of soil, irrigation, nutrients, insects and pesticides. Pulling from one tree would not represent all the trees in such a large farm, nor all the conditions listed above. Pulling oranges from locations throughout the farm would be a more accurate representation of the sweetness of all the oranges.

Before continuing in our recommendation we’d like to address why we feel pulling one orange per tree from a total of 1,000 trees is optimal and also address your question concerning your physical and blood draw. Although we respect Dr. Bloodstone and his quest to acquire a representative sample of your blood, we respectfully disagree with his method of acquiring it. The blood vessel system in your body is a closed system, meaning the blood cycles through each of your organs in a cyclical fashion, never varying or exiting the system. A draw from your toes will be the same blood as a draw from your knees and lips because it has never left the system. Therefore, one draw of blood would have been more than adequate to test your blood. Similarly, we are going to make the assumption that an orange from each tree will represent all the oranges from that tree. If an orange pulled from the tree is sweet or tart, our assumption is all the oranges on that tree will be sweet or tart, similar to the premise that your blood is the same throughout your body.

It is important to get oranges from the specific randomly selected trees so the sample will accurately represent the whole farm of trees and orange sweetness. The oranges will be picked at the optimum time and each orange will be at its peak ripeness. Each orange will need to be labeled with the same label of the tree it was drawn from. This method of collection will add validity and accuracy to the sample and enable you to locate areas of the farm that produce sweeter vs. tart oranges. If the oranges are found to be deficient or substandard, you’ll know what part of the farm they came from and be able to assess the tree and its viability towards your goal. In the end, we are making the assumption that all oranges will be combined and the sweet and tartness combined will make an average blend of flavor, meaning they will balance each other out to make the perfect blend of orange juice.

In order to graph the orchard and randomly select the trees from which oranges are pulled we are making the assumption the farm is a rectangular plot of land. Trees are planted in rows and columns creating a two dimensional array of trees. There are 200 rows of trees, 125 columns long, generating a farm of 25,000 trees. The farm will be segmented into sectors. Each sector will contain 25 trees, a 5 by 5 array (column and row) of trees, which will produce 1,000 sectors on the graph plotting the farm in its entirety. This will ensure that the sample is indeed a representative sample as it will include all areas of the farm. One tree from each sector will be randomly selected and labeled by its coordinate; the orange pulled from the tree will be similarly labeled so the authenticity of the sample is held constant. We have outsourced the production of the randomly selected coordinates of the trees to a very reputable company called “Bam’s Solutions.” It is a Fortune 500 company that comes highly recommended by Yabba Dabba Forbes. Its CEO, BamBam Rubble, is the leading code producer for programming in Bedrock. I believe you may know of him, he’s Barney Rubble’s son and your daughter’s old boyfriend. BamBam has produced a code that will randomly select a tree from each sector that you can then select an orange from. The coordinates from the random selection are located in a table alongside a graph that is included in this packet. We recommend that you complete the sample pull in the same day. This may require a group of individuals to accomplish the goal.

As mentioned above, we have included an electronic copy of the table, graph of trees and code to be used in an Excel spreadsheet. You may notice that if you hover over the data point in the graph the coordinate of the tree will be displayed. The code will randomly regenerate new trees as a sample if the graph is updated in any way. This again, supports the validity of the random sample. Please be sure to contact us if you have any questions concerning our recommendations towards achieving an accurate random sampling of orange suitability. We hope with the criteria provided you will be successful in assessing the viability of Agate Orange Farm’s oranges towards your goal of producing the sweetest juice for Geode Orange Juice Company. Please note our bill for services rendered will follow in approximately two weeks.

Sincera-Dabba-Do,

Amanda Griffin

Sladjana Larson

Veronique Malay

Marilyn Sprowal

Steve Whiting

**Bogle 7th Grade Cohort**