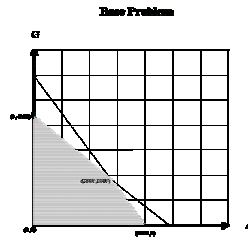


An Application of Linear Programming

“Adventures in Cereal Land”



A Web Quest for Honors Algebra II

Designed by

Barbara Thompson

thompsonbj@wcschools.com



Check out the complete line of Kellogg's® cereal below.

[Introduction](#) | [Task](#) | [Process](#) | [Evaluation](#) | [Conclusion](#) | [Credits](#) | [Teacher Page](#)

Introduction

In the mathematics classroom, we are often too focused on getting the “right” answer. But in real-world problems there is often not just one “right” answer. In this web quest, you will seek to find an answer to a

production problem that may not be the only “answer”. You will be asked to justify your answer and determine how your answer could change depending upon the information being sought.

The Task

The Kellogg® Cereal Company has become aware that there is a new fad in the market place. Research has discovered that the public wants foods with high contents of certain minerals. As a member of a research and development team with the Kellogg’s, your team’s task is to invent a new cereal made up of a mixture of two other cereals already produced by the company. This new cereal should have a high mineral content with respect to potassium and iron (with no milk added). It should also be cost efficient. As you research the possible cereal combinations, you will be led through various stages of decision-making. Use your knowledge of solving systems of inequalities as well as linear programming to organize and visualize your information.

The class will be divided into groups of three or two. The group will assign the following positions. While all members of the team have the responsibility of making sure all equations, inequalities and solutions are correct, each member will also have other specific duties.

The INFORMATION GATHERER:

1. will gather the needed information from the internet websites and relate this information to the RECORDER.
2. will give the final presentation to the “Board of Directors” (the other class members)

The RECORDER:

1. will complete all worksheets with the INFORMATION GATHERER.
2. will graph the systems of inequalities on the graphing calculator and determine the points of intersection.

The GRAPHER:

1. will graph the systems of inequalities on the provided graph paper.
2. will write the information needed on a transparency to be used in the final presentation.

If there are only two people on your team, you should divide the work of the GRAPHER.

The Process

1. Access this website <http://www.kelloggs.com> in order to gather information on the cereals produced by your company. Once you are at this website, click "products" at the top of the Kellogg's® home page, then on the right side of the screen, double-click "cereals". All of the Kellogg's® cereal will be listed. Double-click on the ones you want to choose and scroll down until you see the nutrition information. Your team may pick any 5 cereals produced by Kellogg's®. Enter all of the needed information onto the "Organizing your Information" worksheet.
2. In order to locate prices for the five cereals you picked, access this website <http://www.netgrocer.com>. When you get to this website, type in the name of the cereal you wish to "purchase" in the search space at the top right of the screen. Compute the price per ounce. If you cannot find your cereal at this website, try <http://www.peapod.com>. At this website, double-click the "Groceries for your Home" circle, then select Chicago as your delivery area, then type in your product in the "Search" area. If your cereal cannot be found at either site, you will have to pick another cereal.
3. Comparing the information on your "Organizing your Information" worksheet, choose the two cereals with the mineral content that seem to be the most economical. Be prepared to defend your choices.

4. Create a system of linear inequalities based on the constraints listed on the "Constraints" worksheet. Be sure to include the constraints that will let your graph be in the 1st quadrant.

5. Using the graph paper provided, graph your systems of inequalities. You will be responsible for setting the scales on the axes and labeling the axes correctly. Find the coordinates of the point of intersection. (You may use your graphing calculators to find the points of intersections, but the point of intersection must be in fractional form, not rounded decimals!)

6. Create a cost equation from the information contained on your "Constraints" worksheet. Remember you are looking for cost efficient; therefore, you will be looking for the minimum cost not the maximum.

7. On the day following this web quest, your team will need to complete the "Summation" worksheet. This can be done online, but if the laptops are not available, we will use the old-fashioned method-pencil and paper.

8. You will need to give your cereal a name. Prepare a 3-5 minute presentation on why you think the "Board of Directors" (your classmates) should manufacture your cereal. Include on the transparency what you think are the important justifications as to why the board should pick your new cereal. Be ready to present this on the following day.

Evaluation

You will be evaluated on the completion of each part of the process. The following Rubric will be implemented to establish the grade for the group.

| | Beginning 10-11 pts | Developing 12-13 pts | Accomplished 15-16 pts | Exemplary 17-18 pts | Score |
|---|---|--|---|---|--------------|
| "Organizing your Information" Worksheet | Table not complete | Table contains some errors | Table correct but hard to read | All information correct; neatly written | |
| Constraints | Missing constraints | All constraints present, but contains errors in one or more inequalities | All constraints present; contains only small errors such as equal signs instead of inequality signs | All constraints present; no errors | |
| Graph | Lines with no shading | Lines with shading; axes not labeled | Lines with neat shading, axes labeled correctly | Lines with neat shading; axes labeled correctly; points of intersection labeled | |
| Cost analysis | Points of intersection are incorrect; cost equation not correct | One incorrect point of intersection; cost equation correct | All points of intersections are correct; cost equation correct | All points of intersections are correct; cost equation correct; stated summary of results | |
| Presentation | No visuals were used; Presenter not prepared | Visual used but information not organized; presenter not well prepared | Visual neatly arranged; information is organized; presenter was adequate but not exciting | Visual very creative; information organized; presenter gave an excellent report | |

| | | | | | |
|--------------------------|-----------------------------------|---|---|---|--|
| "Summation" Worksheet | All items were not answered | Items were answered but not given much thought | Items were answered with complete sentences and showed that thought had been given to them | Items were answered with complete sentences; Answers showed a good understanding | |
|--------------------------|-----------------------------------|---|---|---|--|

Conclusion

By doing this exercise you should begin to realize how many decisions are used in the workplace daily. By completing the "Summation Worksheet" you will begin to understand some of the complexities in running a business and how you can utilize mathematics to make this job easier.

Credits & References

This Web Quest was modified from one created by [Maria Cuozzo](#).

Last updated on August 15, 1999. Based on a template from [The WebQuest Page](#)