

CLEMSON ALGEBRA PROJECT

UNIT 5: LINEAR SYSTEMS

PROBLEM 1: NUTRITIOUS SNACKS

In an attempt to eat healthier, many teens are changing the amounts and types of foods that they eat. Recommended kilocalorie, abbreviated Calorie, intake for teens is 2200 - 2300 Calories per day. Most of these Calories should come from meals; however snacks are also important. Suppose that a teenager chooses to limit snacks to 500 Calories per day. Further suppose that carbohydrates from snacks should be limited to 88g and that the fat intake from snacks should be limited to 15g. If snacks are limited to microwave popcorn, sun-dried raisins and dry roasted peanuts, determine how much of each food a teenager can consume while remaining within the suggested guidelines.

- A. Using the nutrition labels on page 2, calculate the Calories, carbohydrates, and fat for 1 gram of each snack food.
- B. Determine the number of grams of popcorn, peanuts, and raisins that would provide 500 Calories, 88g of carbohydrates and 15g of fat.
- C. Do you think that these foods are healthy choices for snacks? Explain.

MATERIALS

Casio CFX-9850Ga Plus or ALGEBRA FX2.0 Graphing Calculator

EXTENSIONS

1. Select other nutrients and calculate the daily requirements, and decide how much of each nutrient should come from meals and snacks. Determine how much of each of the snack foods listed above should be eaten daily.
2. Calculate the *ideal* nutritional composition of each meal and snack. Maintain a nutrition journal for a week and compare the nutritional value of each meal and snack and compare your diet to an *ideal* diet.
3. Choose three snack foods that you regularly eat. Using the constraints listed in the original problem, determine how much of each food you can eat.

The tables below shows the nutritional information listed on the identified foods. Formatting has been changed for this document. Some information has been omitted.

MICROWAVE POPCORN				UNSALTED DRY ROASTED PEANUTS	
Nutrition Facts Serving Size about 3 Tbsp (37g) Unpopped (makes about 6 cups popped) Serving Per Bag about 2 Servings Per Package about 16				Nutrition Facts Serving Size 1 oz (28g/About 39 Pieces) Servings Per Container 16	
Amount Per Serving	3Tbsp Unpopped	6Cups (30g) Popped	1 Cup Popped	Amount Per Serving	
Calories	125	100	15	Calories 160 Calories from Fat 120	
Calories from fat	25	20	0		
% Daily Value *				% Daily Value *	
Total Fat 3g	5%	3%	0%	Total Fat 14g	21%
Cholesterol 0mg	0%	0%	0%	Cholesterol 0mg	0%
Sodium 0mg	0%	0%	0%	Sodium 0mg	0%
Total Carbohydrate 25g	8%	7%	1%	Total Carbohydrate 6g	2%
Protein 4g				Protein 8g	8%
* percent Daily Values are based on a 2,000 calories diet. Your daily values may be higher or lower depending on your calorie intake.				* percent Daily Values are based on a 2,000 calories diet. Your daily values may be higher or lower depending on your calorie intake.	

CALIFORNIA SUN-DRIED RAISINS	
Nutrition Facts Serving Size 1 box (14.1g) Servings Per Container 14	
Amount Per Serving	
Calories	45
% Daily Value *	
Total Fat 0g	0%
Sodium 0mg	0%
Total Carbohydrate 11g	4%
Protein 0g	
* percent Daily Values are based on a 2,000 calories diet. Your daily values may be higher or lower depending on your calorie intake.	

ONE SOLUTION TO PROBLEM ONE: NUTRITIOUS SNACKS**A. Using the nutrition labels on page 2, calculate the Calories, carbohydrates, and fat for 1 gram of each snack food.**

To determine the Calories, carbohydrates, and fat per gram, we need to divide the number of Calories, carbohydrates, and fat in each snack by the number of grams. For popcorn, using the information on 6 cups, the amount of Calories, carbohydrates, and fat are 100, 25, and 3, respectively, which we will divide by 30, the number of grams in the six cups. For the dry roasted peanuts, the amounts are 160, 6, and 14, all of which will be divided by 28. For raisins, the values are 45, 11, and 0, all of which will be divided by 14.1.

From the MAIN MENU, choose “Run.” Using the values given above, simply type in the operation, pressing EXE after each entry. The results, rounded to two decimal places, are shown in the table below.

Snack Food	Calories/g	Carbohydrates/g	Fat/g
Popcorn (Popped)	3.33	0.83	0.1
Peanuts	5.71	0.21	0.5
Raisins	3.19	0.78	0

B. Determine the number of grams of popcorn, peanuts and raisins that would provide 500 Calories, 88g of carbohydrates and 15g of fat.

Using the information from the table above, we will write a system of linear equations.

Let p = the number of grams of popcorn we should have

n = the number of grams of peanuts we should have

r = the number of grams of raisins have.

Our system becomes:

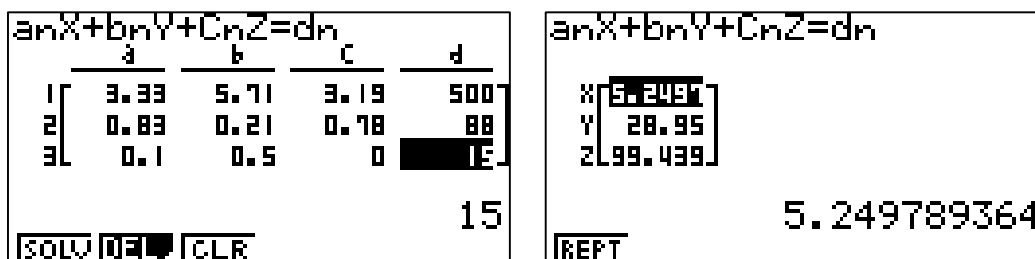
$$3.33p + 5.71n + 3.19r = 500$$

$$0.83p + 0.21n + 0.78r = 88$$

$$0.1p + 0.5n + 0r = 15$$

To solve this system of equations, from the MAIN MENU, select “Equations.” Then,

- x Choose **[F1]** for “Simultaneous.”
- x Press **[F2]** to indicate there are 3 unknowns.
- x Type in the values from the system into the matrix, pressing **[EXE]** after each entry. Your screen should look like the one shown below left.
- x To solve the system, after entering all of the values, press **[F1]** . See below right.



Although we used, p , n , and r instead of X , Y , and Z , our results tell us that $p=$ 5.24 grams of popcorn, $n = 28.95$ grams of nuts, and $r = 99.44$ grams of raisins. Based on the serving sizes listed on the packaging, the snacks could consist of approximately 1 cup of popped popcorn (one serving is about 5 grams), 1 serving of dry roasted peanuts (one serving is about 28 grams), and 7 small boxes of raisins (one serving is about 14 grams).

C. Do you think that these foods are healthy choices for snacks? Explain.

Answers will vary.