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# The Mathematics of Nutrition Science

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# **The Mathematics of Nutrition Science**

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## Instructor Notes

These materials are intended to be used to support student learning and success in an introductory college level nutrition class by integrating and contextualizing developmental and foundational quantitative skills. At the Community College level these skills would be typically taught in developmental algebra course, but instructors frequently note that students have difficulty transferring skills from one discipline to another.

More specifically the mathematical content is aligned with CUNY Elementary Algebra Outcomes and Standards as tested by the CEAFE exam which most CUNY students are required to pass in order to exit remedial mathematics. See <http://www.cuny.edu/academics/testing.html> for details.

The materials are designed so that the Health/Nutrition course instructor has to do minimal mathematical instruction. They could work through the examples in class with the students and then have students work in groups on the exercises while circulating the classroom to help, clarify and check student work. The reading and writing assignments are also aligned with CUNY remediation, and may be used to support student thinking and reflection about the quantitative concepts.

Other possibilities are a 'flipped' classroom scenario where the students are expected to read and study the examples before class and then work in the exercises as a classroom activity, or assigning everything as homework/independent study to reinforce prerequisites without expending any classroom time.

However, these are just suggestions, and the Creative Commons licensing means the instructor is free to use and adapt the materials for non-commercial purposes subject to certain restrictions.



Name:

## Pretest

### ATTITUDES TOWARD MATHEMATICS

**Directions:** This inventory consists of statements about your attitude toward mathematics. There are no correct or incorrect responses. Read each item carefully. Please think about how you feel about each item. Enter the letter that most closely corresponds to how each statement best describes your feelings. Please answer every question.

PLEASE USE THESE RESPONSE CODES:

- A – Strongly Disagree
- B – Disagree
- C – Neutral
- D – Agree
- E – Strongly Agree

Question	Response
1. My mind goes blank and I am unable to think clearly when working with mathematics	
2. Mathematics makes me feel uncomfortable	
3. I have a lot of self-confidence when it comes to mathematics	
4. A strong math background could help me in my professional life	
5. I am comfortable talking about nutrition mathematically	



### Unit 1: Food Labels

- 1. Prewriting:** Describe the last meal that you had. On a scale of 1-5 (1 being the least healthy and 5 being the most), what score would you give this meal for healthiness and why? What makes this meal healthy/unhealthy?

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Now consider some general questions: How can a person decide whether a meal is healthy or not? Is it always easy to tell whether a meal is healthy? What are the challenges in making this determination?

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**Reading:**

<http://well.blogs.nytimes.com/2010/01/28/six-meaningless-claims-on-food-labels/>

For specific examples of food companies that make health claims, see:

<http://www.cspinet.org/new/200912291.html>

**2. Activity:** Examining Food Claims

*Choose a food package that makes one of the claims described in the reading you just completed. Looking carefully at the package, respond to the following questions:*

- a. Does the package contain any claims mentioned in the articles above? Where on the package are these claims presented?
- b. Now focus on the detailed nutritional information connected to this package—the nutrition label, list of ingredients, and serving size. Take notes on what you see.

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**3. Postwriting:** Do the nutrition label and list of ingredients support the claims made on the package? What challenges did you face trying to examine this?

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#### 4. Understanding Nutrition Fact Labels

**Example:** A Cheerios box says that one cup (28 grams) of Cheerios contains 190 milligrams of sodium which it claims is 8% of the recommended maximum daily allowance of sodium.

1. The recommended daily allowance of sodium is 2400 milligrams. Should you believe the claim on the box?

**Solution:** We are asked to find what percentage **is** 190 **of** 2400. Let the percentage be  $x$  and use the percentage equation

$$\frac{\textit{is}}{\textit{of}} = \frac{\textit{percent}}{100}$$

Substitute

$$\frac{190}{2400} = \frac{x}{100}$$

Simplify the right-hand side by dividing numerator and denominator by 10 (cancel the zero)

$$\frac{19}{240} = \frac{x}{100}$$

Cross multiply

$$1900 = 240x$$

Divide both sides by 240

$$\frac{1900}{240} = x$$

Divide both sides by 10.

$$\frac{190}{24} = x$$

Use long division to calculate  $x = 190 \div 24 = 7.9166$ , so  $x \approx 8$  and so one cup of Cheerios contains approximately 8% of the daily allowance of sodium. (**Remark:** Some of the steps above are not really necessary to solve this particular problem but they are good practice for solving equations with fractions in general)

2. How many milligrams of sodium are there in 2 cups of Cheerios?

**Solution:** There are  $2 \times 190 = 380$  milligrams of sodium in two cups of Cheerios

3. Find a formula, which describes how many milligrams of sodium there are in  $x$  cups of Cheerios.

**Solution:** Let  $y$  be the number of milligrams then there are

$$y = 190x$$

milligrams of sodium in  $x$  cups of Cheerios. This is a **linear function**.

4. How many milligrams of sodium are there in  $\frac{4}{5}$  cups of Cheerios?

**Solution:**  $y = 190 \cdot \frac{4}{5} = \frac{190}{1} \cdot \frac{4}{5} = \frac{38}{1} \cdot \frac{4}{1} = 152$

There are 152 milligrams of sodium in  $\frac{4}{5}$  cups of Cheerios.

5. A box of Cheerios contains 14 cups in total. How many milligrams of sodium are there in the whole box?

**Solution:**  $y = 190 \cdot 14 = 2660$  milligrams of sodium.

6. From the above you see that a box of Cheerios contains more than the daily allowance of 2400 milligrams of sodium. How many cups of Cheerios make up the entire daily allowance?

**Solution:** We are given the amount of sodium  $y=2400$ , and need to find the number of cups  $x$ . Substitute

$$2400 = 190 \cdot x$$

Divide through by 190

$$\frac{2400}{190} = x$$

Divide through by 10.

$$\frac{240}{19} = x$$

Use long division or a calculator to calculate  $240 \div 19 \approx 12.6$ . So, 12.6 cups of Cheerios contain the maximum daily allowance of sodium.

7. There are 15 calories from fat in a cup of Cheerios, and 10 calories from fat in a cup of skim milk. The total number of calories  $t$  in  $c$  cups of Cheerios and  $m$  cups of skim milk is described by the **literal** equation

$$t = 15c + 10m$$

- a. Solve this literal equation for  $m$

**Solution:** We have to isolate  $m$ , so first subtract  $15c$  from both sides

$$t - 15c = 10m$$

Then divide both sides by 10

$$\frac{t - 15c}{10} = m$$

- b. If your bowl of cereal has 50 Kcal of fat and includes 2 cups of Cheerios, then how many cups of milk did you use?

**Solution:** Substitute  $t = 50$  and  $c = 2$

$$\frac{50 - 15 \cdot 2}{10} = m$$

Simplify the numerator

$$\frac{20}{10} = m$$

Then divide, so you had 2 cups of skim milk.

**Exercises:**

1. One cup of Cheerios contains 3 grams of Dietary Fiber. The recommended daily value of Dietary Fiber is 25 grams for a 2000-calorie diet.
  - a. What percentage of the recommended Dietary Fiber daily value does one cup of Cheerios contain? Round to nearest whole number

- b. Find a linear equation, which gives the number of grams  $y$  of Dietary Fiber in  $x$  cups of Cheerios.
- c. How many grams of Dietary Fiber are there in a whole box of Cheerios? (Recall that a box of Cheerios contains 14 cups)
- d. How many grams of Dietary Fiber are there in  $\frac{7}{9}$  of a cup of Cheerios?
- e. How many cups of Cheerios contain the daily value of Dietary Fiber?
2. A cup of Cheerios contains 5% of the daily allowance of 3500mg of Potassium.
- How many milligrams of Potassium are in one cup of Cheerios?
  - How many milligrams of Potassium are in one box of Cheerios?
  - What percentage of your daily allowance of Potassium is contained in one box of Cheerios?
    - 70%
    - 35%
    - 5%
    - 19%

3. One cup (50 grams) of Fiber One Caramel Delight contains 25 calories from fat, and one cup of skim milk contains 10 grams from fat. The total number of calories from fat  $f$  in  $d$  cups of Fiber One Caramel Delight and  $s$  cups of skim milk is given by  $f = 25d + 10s$ . Solve this literal equation for  $s$

a.  $s = f - \frac{5d}{2}$

b.  $s = f + \frac{5d}{2}$

c.  $s = \frac{f-25d}{10}$

d.  $s = \frac{f+25d}{10}$

4. Analyze a given food label using the mathematical techniques of this Unit

5. Find your own food label and analyze it mathematically.

### 5. Redesigning Food Labels

**Read:** <http://well.blogs.nytimes.com/2014/10/26/revised-nutrition-labels-still-wont-tell-whole-story/>

#### Reading Comprehension Questions:

- a. According to the article, what are some current problems with nutrition labels?

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b. How does the FDA want to improve nutrition labels in its redesign?

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c. What is the criticism of the new labels?

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d. What changes do you think should be made to nutrition labels?

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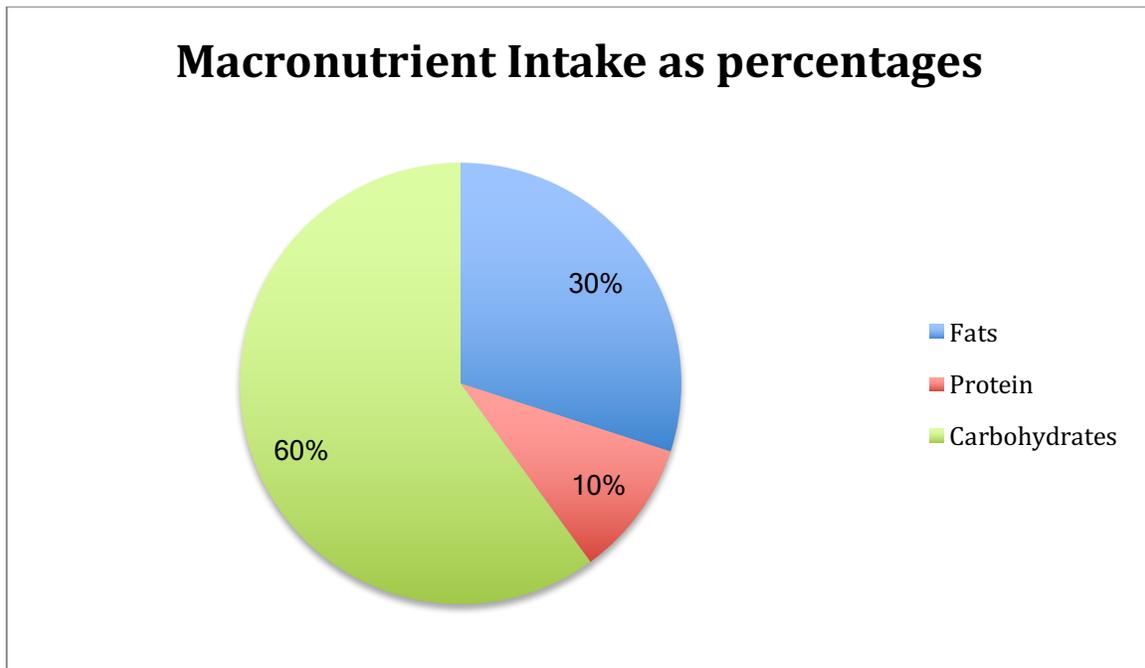
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## Unit 2: Graphing Nutrition Intake

**Example 1:** Nutritionists recommend that no more than 30% of your daily value come from Fats, with Protein making up 10%-20% and Carbohydrates 50%-60%. Possible daily values for a diet might be 30% from Fats, 10% from Protein and 60% from Carbohydrates.

Percentage data is often presented in Pie Chart form with the size of each slice representing the percentage of that category.



The following table gives the number of kcal/gram:

	kcal/gram
Fats	9
Carbohydrates	4
Protein	4

Use this information to find the number of grams of fats, carbohydrates and protein in a 2000 kcal/day diet with Daily Values as given above.

1. The number of kcal  $x$  of Fats is 30% of 2000. Use the percentage equation to find

$$\frac{x}{2000} = \frac{30}{100}$$

Simplify the right-hand side by dividing numerator and denominator by 10

$$\frac{x}{2000} = \frac{3}{10}$$

Cross multiply

$$10x = 6000$$

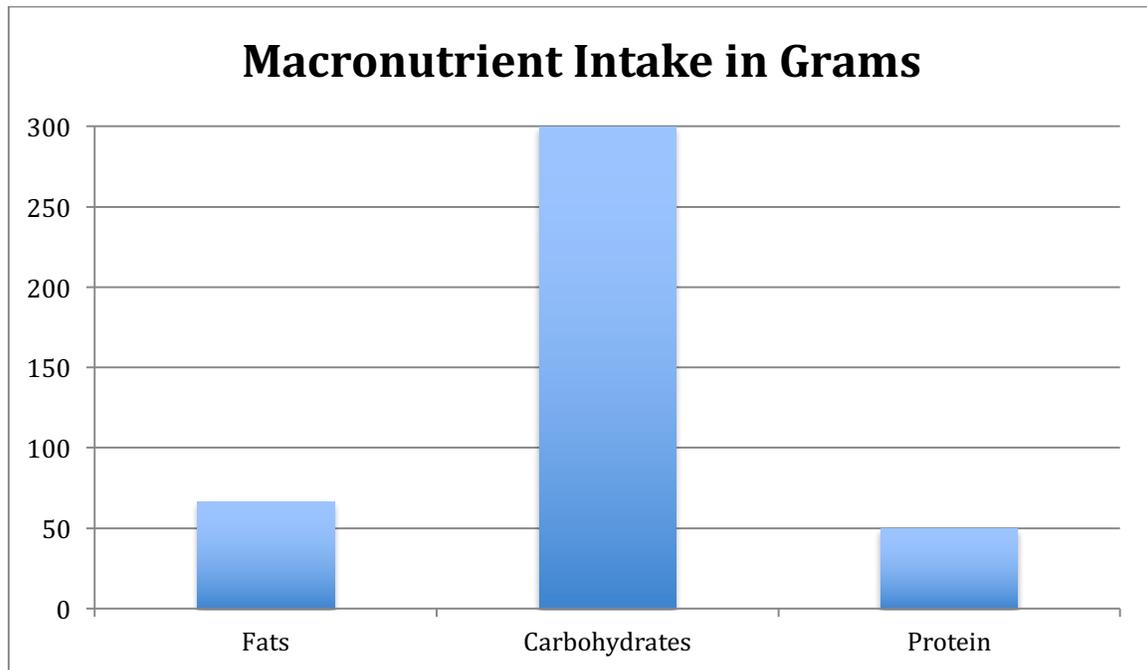
Then divide both sides by 10, so  $x = 600$  kcal of Fat. There are 9 Kcal/gram of Fat so 1 gram is 9 kCal. If  $f$  is the number of grams of Fat, then

$$9f = 600$$

so  $f = \frac{600}{9} = 66.67$  grams of Fat.

2. The number of kcal  $y$  of Carbohydrates is 60% of 2000.
- Show that  $y = 1200$  KCal
  
  
  
  
  
  
  
  
  
  
  - Let  $c$  be the number of grams of Carbohydrates. Show that  $c = 300$  grams.
3. The number of kcal  $z$  of Protein is 10% of 2000.
- Show that  $z = 200$  kcal.
  
  
  
  
  
  
  
  
  
  
  - Let  $p$  be the number of grams of Protein. Show that  $p = 50$  grams

4. Look at a food package label. Do the numbers you computed correspond?
5. The number of grams of Fats, Carbohydrates and Protein we found in a 2000 Kcal diet is an example of **quantitative data**. This type of data is often represented in a bar graph.



**Exercise 1:** Suppose a 2500 kcal diet has daily values of 30% from Carbohydrates, 30% from Fats and 40% from Protein.

1. Draw and label a Pie chart representing the percentages in this diet

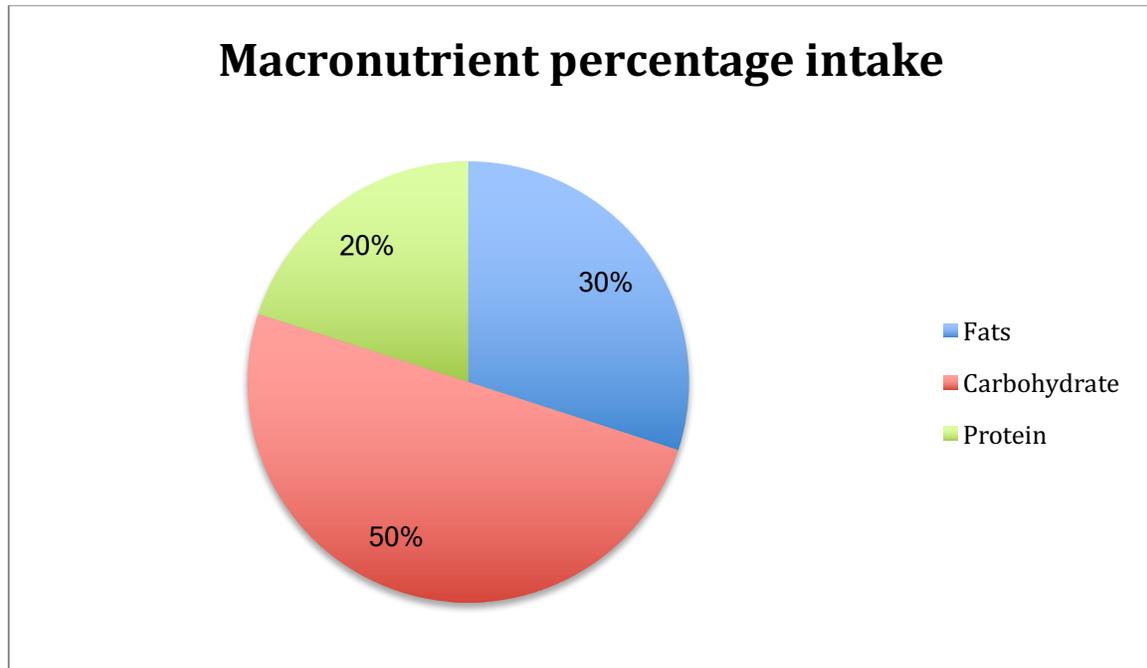
2. Compute the number of kcal and grams in this diet of  
a. Fat

b. Carbohydrates

c. Protein

3. Draw a Bar Graph representing the grams of each macronutrient in this diet.

**Exercise 2:** A 2100 Kcal diet has the following percentages of macronutrients



1. How many Kcal of Fats are there in the diet
  - a. 30
  - b. 63
  - c. 630
  - d. 70
  
2. How many grams of Protein are in the diet?
  - a. 20
  - b. 420
  - c. 105
  - d. 46.67
  
3. What is the total number of grams in the diet?
  - a. 420
  - b. 437.5
  - c. 2100
  - d. 210

**Example 2:** One cup of Cheerios contains 15 Kcal from Fat and one cup of skim milk contains 10 Kcal from Fat. The total number of Kcal in  $x$  cups of Cheerios and  $y$  cups of skim milk is then  $15x + 10y$ . If your bowl of cereal has 60 Kcal from Fat in total, then it is described by the linear equation  $15x + 10y = 60$ .

1. Find the  $x$  and  $y$  intercepts of the graph of this equation

**Solution:** To find the  $y$  intercept, set  $x = 0$  in the equation and solve for  $y$

$$10y = 60$$

Divide both sides by 10 so  $y = 6$  and the  $y$  intercept is  $(0,6)$

To find the  $x$  intercept, set  $y = 0$  and solve for  $x$

$$15x = 60$$

Divide both sides by 15, so  $x = 4$  and the  $x$  intercept is  $(4,0)$

2. What do the intercepts represent?

**Solution:** The  $y$  intercept  $(0,6)$  represents the fact that if there are no Cheerios then 6 cups of skim milk makes up the 60 Kcal. The  $x$  intercept  $(4,0)$  represents that if there is no milk the 4 cups of Cheerios makes up the 60 KCal

3. Put the equation in slope-intercept form ( $y = mx + b$  form)

**Solution:** Solve the equation  $15x + 10y = 60$  for  $y$

First subtract  $15x$  from both sides.

$$10y = -15x + 60$$

Then divide both sides by 10

$$\frac{10y}{10} = -\frac{15x}{10} + \frac{60}{10}$$

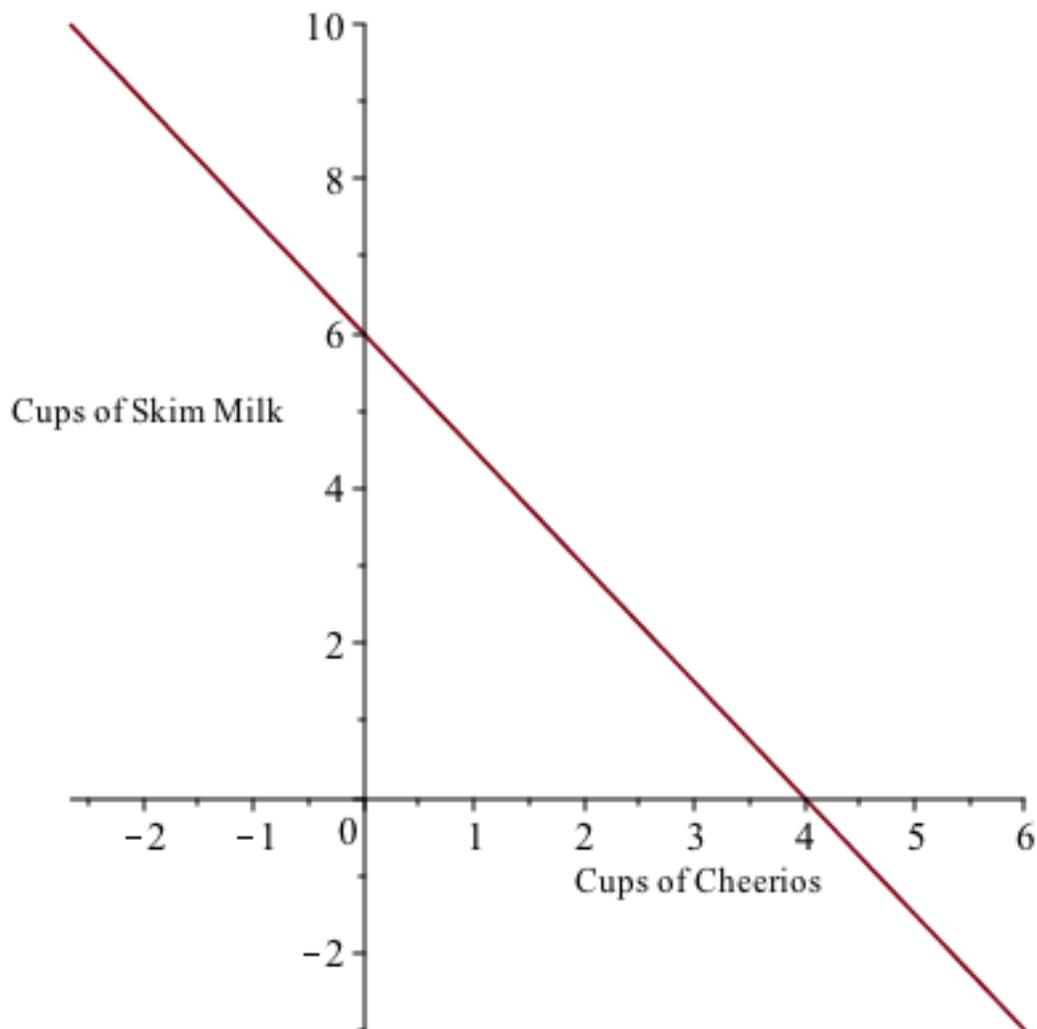
Simplify

$$y = -\frac{3x}{2} + 6$$

So, the slope of the line is  $m = -\frac{3}{2}$  and the  $y$  intercept is  $(0,6)$  (which we already knew.)

4. Use the previous information to graph the linear equation  $15x + 10y = 60$

**Solution:**



**Exercise 3:** One cup (50 grams) of Fiber One Caramel Delight contains 25 kcal from fat, and one cup of whole milk contains 70 kcal from Fat. Suppose your bowl of cereal contains  $x$  cups of One Caramel Delight and  $y$  cups of whole milk, and 175 kcal from Fat in total.

1. Write down a linear equation which describes this situation
2. Find the  $x$  intercept for the graph of this equation.
3. Find the  $y$  intercept for the graph of this equation.
4. Put the equation in slope intercept form.
5. Graph the linear equation

### Unit 3: Determining the Content of a Well-Balanced Diet

**Example 1:** Jan needs 2200 kcal per day to maintain her weight. If we know no more than 10% of total kcal should come from saturated fat, how many grams per day should she not exceed if 1 gram of saturated fat contains 9 kcal?

Before we solve this example, let's break it down into steps and then connect it to topics from **elementary algebra**.

- 1. Percentages:** First we need to compute 10% of 2200 kcal to determine the maximum amount of kcal allowed from saturated fat. To solve a percentage problem in elementary algebra **without a calculator** use the percentage equation

$$\frac{\textit{is}}{\textit{of}} = \frac{\textit{percent}}{100}$$

What is 10 percent of 2200? The “is” is unknown (what) so call it  $x$ , the “percent” is 10 and the “of” is 2200.

$$\frac{x}{2200} = \frac{10}{100}$$

Next simplify the fraction on right hand side by dividing numerator and denominator by 10. (Cancel the 0s)

$$\frac{x}{2200} = \frac{1}{10}$$

Cross Multiply to remove denominators

$$10x = 2200$$

Finally divide both sides by 10 to solve for  $x$

$$x = \frac{2200}{10} = 220$$

So 10% of 2200 kcal is 220 kcal. (units are important!)



$$10\% \text{ of } 2200 \text{ is } \frac{10}{100} \times 2200 = 10/100 * 2200 = 220$$

2. **Proportions:** Second we need to convert the units from kcal into grams. This involves solving a proportion though once you have practiced a few problems you will see shortcuts.
- A **ratio** is a fraction where the units of the numerator and denominator matter.
  - A **proportion** is an equation where two ratios are set equal and units are matched.

In this problem, the units are kcal and grams, so our fractions will have the form:

$$\frac{\text{grams}}{\text{kcal}}$$

We need to convert 220 kcal into grams and we know that 1 gram of saturated fat contains 9 kcal. Let the number of grams be denoted by  $x$  so our proportion is

$$\frac{x}{220} = \frac{1}{9}$$

Cross multiply and divide.

$$x = \frac{220}{9} \approx 24.4$$

So, Jan should not exceed 24.4 grams of saturated fat/day.

**Write about it #1:** Your friend's father is trying to get healthy after recently visiting the doctor and learning he has high cholesterol. He asked you to give him some advice. His doctor told him to set a goal of 2500kcal per day and to make sure that he does not eat too much saturated fat. He wants to do this, but he has trouble figuring out what to eat when food packaging lists fats in grams.

Write your friend's father a short email that advises him on how many kcals per day should come from saturated fat and how he can calculate the number of grams of saturated fat he should consume each day based on a 2500kcal diet.

**Example 2:** Jan needs 2200 kcal to maintain her weight. Based on the RDA recommendation that 60% of total kcal should come from carbohydrate, how many grams of carbohydrate does she need if one gram of carbs has 4 kcal?

**Solution:**

**Step 1:** Find 60% of 2200. Fill in the blanks in the percentage equation:

$$\frac{x}{\quad} = \frac{\quad}{100}$$

Simplify the right-hand side – divide by 20:

$$\frac{x}{\quad} = \frac{\quad}{5}$$

Cross multiply

$$5x = \quad$$

Divide through by 5.

$$x =$$

60% of 2200 kcal is \_\_\_\_ kcal

**Step 2:** Find how many grams of carbs (x) contain the value for kcal from the previous step using the fact that 1 gram of carbs is 4 kcal.

Solve as a proportion using  $\frac{\text{grams}}{\text{kcal}}$  for the ratios

$$\frac{x}{\quad} = \frac{1}{4}$$

Cross-multiply and divide

$$x = \frac{\quad}{4} =$$

So, Jan should not exceed \_\_\_\_ grams of carbs per day

**Exercise 1:** Jan needs 2200 kcal to maintain her weight. Based on the RDA recommendation that 30% of total kcal should come from fat, how many grams of fat does she need if one gram of fat has 9 kcal?

**Solution**

**Exercise 2:** Suppose your diet is such that your daily saturated fat allowance shouldn't exceed 20g. If a Snickers bar has 5g of saturated fat, what percentage of your daily allowance does it contain?

- a. 5%
- b. 20%
- c. 25%
- d. 4%

**Exercise 3:** Suppose your diet is such that your daily carbs allowance shouldn't exceed 300g. If a Snickers bar has 33g of carbs, what percentage of your daily allowance does it contain?

- a. 3%
- b. 11%
- c. 33%
- d. 99%

**Example 3:** A healthy person needs 0.8 grams of protein per kilogram of body weight per day. Jan sits in front of a computer all day long (sedentary). She weighs 145lb. How many grams of protein does she need per day?

**Solution:** This is a two-step problem, which involve solving two proportions.

1. Convert Jan's body weight from Pounds to Kilograms
2. Use her body weight in kilograms to calculate how many grams of protein she needs per day.

**Step 1:** Use the weight conversion 1 kilogram = 2.2 pounds, and use ratios of the form

$$\frac{\text{kilograms}}{\text{pounds}}$$

If Jan weighs  $x$  kilograms, then

$$\frac{x}{145} = \frac{1}{2.2}$$

Cross-multiply and then divide

$$x = \frac{145}{2.2} \approx 66$$

Jan weighs approximately 66 kilograms

**Step 2:** Use the fact that Jan weighs 66 kilograms, and needs 0.8 grams of protein per kilogram of body weight. Recall that per literally means to divide, so we will use ratios of the form

$$\frac{\text{grams of protein}}{\text{kilograms of body weight}}$$

If Jan needs  $x$  grams of protein, then our proportion is

$$\frac{x}{66} = \frac{0.8}{1}$$

Cross-multiply

$$x = 66 (0.8) \approx 53$$

Jan needs approximately 53 grams of protein per day.

**Alternate solution for Example 3:** You might see the problem solved like this in a Quantitative Reasoning course. The idea is to convert from one unit (body weight in pounds) to the other (grams of protein) using the conversion rates as fractions.

$$\frac{1 \text{ kilogram}}{2.2 \text{ pounds}} = 1 \text{ and } \frac{0.8 \text{ grams of protein}}{1 \text{ kilogram}} = 1$$

And then because multiplying by 1 does not change the value



$$145 \text{ pounds} = 145 \text{ pounds} \cdot \frac{1 \text{ kilogram}}{2.2 \text{ pounds}} \cdot \frac{0.8 \text{ grams of protein}}{1 \text{ kilogram}}$$

Then cancel the pounds and kilograms in numerator and denominator as if they were fractions, and we are left with

$$\frac{145 \cdot 0.8}{2.2} = 53 \text{ grams of protein}$$

**Example 4:** Ian weighs 180lb. How many grams of protein does he need per day

**Solution:** He needs

$$\text{pounds} = \text{pounds} \cdot \frac{\text{kilogram}}{\text{pounds}} \cdot \frac{\text{grams of protein}}{\text{kilogram}}$$

So, he needs \_\_\_\_ grams of protein per day.

**Exercise 4:** Compute how many grams of protein you need to eat per day.

1. My body weight is \_\_\_\_ pounds
2. My body weight is \_\_\_\_ kilograms

3. I need \_\_\_\_ grams of protein/day

For the next two problems, use the percentage change formula

$$\frac{\text{increase or decrease}}{\text{original amount}} = \frac{\text{percent}}{100}$$

**Exercise 5:** The daily recommended fiber intake for women is 25g. If Michelle currently eats 20g of fiber, by what percentage does she need to increase her fiber intake?

- a. 5%
- b. 20%
- c. 25%
- d. 45%

**Exercise 6:** The daily recommended fiber intake for a man is 38g. If Jason currently eats 50g per day, by what percentage should he decrease his intake to get down to the recommended amount?

- a. 12%
- b. 24%
- c. 30%
- d. 38%

**Write about it #2:** Your friend, Sonia, really wants to eat a healthy diet, but she feels overwhelmed by dieting tips and health guidelines. She knows you are learning about health, and she has asked you to create a healthy daily diet plan that she can follow. There are two things she would like you to do in this plan:

1. Provide her with a daily allowance of carbohydrates, protein, saturated fat, and fiber in grams, based on her current weight: 140 pounds.
2. Suggest how many total kcals she should consume at each meal if she plans to eat three meals a day and consume a total of 2200kcals. Also recommend how many grams of carbohydrates, protein, saturated fat, and fiber she should consume at each meal.

Try to write this as a set of steps that are easy for Sonia to follow. Also, try to write this in a friendly and encouraging tone. Sonia really wants to start a healthy eating plan, but she gets easily discouraged!

## Unit 4: Sample Calculations for Dietary Analysis

**Example 1:** Your dietary analysis shows that you consume 2,633 kcal in a day including 33 grams of fat.

1. The acceptable range of carbohydrate intake is 45%-65% of total kcal. You consume 450 grams of carbohydrates in the day. Is that within the acceptable range?

**Solution:**

Carbohydrates contain 4 kcal/gram so you are consuming  $4 \times 450 = 1800$  grams of carbohydrates. If 1800 is  $x$  percent of 2633, then

$$\frac{1800}{2633} = \frac{x}{100}$$

cross-multiply

$$1800 \times 100 = 2633x$$

and divide

$$\frac{180000}{2633} = x$$

so  $x = 68.36\%$  and that is just above the acceptable range so you should cut down on carbohydrates.

2. What is the least grams of carbohydrates you should be consuming?

**Solution:**

First compute 45% of 2633

$$\frac{x}{2633} = \frac{45}{100}$$

Simplify the right-hand side by dividing by 9.

$$\frac{x}{2633} = \frac{9}{20}$$

Cross-multiply and divide

$$x = \frac{2633 \times 9}{20}$$

So  $x = 1184$  kcal (rounded down.) Now divide by 4 to convert to grams, so your minimum acceptable carbohydrate intake is  $\frac{1184}{4} = 296$  grams.

3. Is your daily fat intake acceptable?

**Solution:** Recommended intake of fat is 20% - 35% of total calories, and fat contains 9 kcal/gram. First compute how many kcal of fat you are consuming by multiplying  $33 \times 9 = 297$  kcal. If 297 is  $x$  percent of 2633 then

$$\frac{297}{2633} = \frac{x}{100}$$

Cross-multiply and divide

$$\frac{29700}{2633} = x$$

So  $x = 11.28\%$  of fat which is low.

4. Suppose 25 grams out the 33 grams of fat are saturated fats, is that too high?

**Solution:** It is recommended by the American Heart Foundation that less than 7% of your daily calorie intake should be from saturated fats. First compute that 25 grams of saturated fat is  $9 \times 25 = 225$  kcal. If 225 is  $x$  percent of 2633 then

$$\frac{225}{2633} = \frac{x}{100}$$

Solving  $x = \underline{\hspace{2cm}}$  % and this is/is not too much. (Circle the correct answer)

**Remark:** 2,633 kcal should probably be reduced to stay healthy. This will change the computed percentages and allowances in this example.

**Example 2:** The formula to calculate recommended daily allowance for protein is

Body weight (in kg) x 0.8 grams of protein

Suppose you know your body weight is 165 pounds. First you must compute your bodyweight to kilograms using the conversion

$$1 \text{ kg} = 2.2 \text{ lbs}$$

If your bodyweight is  $x$  kg then matching units in a proportion, we have

$$\frac{1}{2.2} = \frac{x}{165}$$

Cross-multiplication gives

$$165 = 2.2x$$

Then divide through by 2.2, so  $x = \frac{165}{2.2} = 75$  kg is your bodyweight in kilograms

So, your RDA for protein is  $75 \times 0.8 = 60$  grams of protein.

**Exercise 1:** If you weigh 198 pounds then your RDA in protein is

- 90 grams
- 72 grams
- 112.5 grams
- 158.4 grams

**Example 3:** The formula for how many ounces of fluid you need per day is given by the formula

$$\frac{\text{bodyweight (pounds)}}{2}$$

So, if you weigh 148 pounds then you need  $\frac{148}{2} = 74$  fluid ounces of liquid per day.

**Exercise 2:** If you weigh 160 pounds, how many **pints** of liquid do you need per day. (1 pint = 16 fluid ounces)

- 10 pints
- 80 pints
- 5 pints
- 20 pints

Name:

## PostTest

### ATTITUDES TOWARD MATHEMATICS

**Directions:** Please take this test after reading the booklet and answering all the questions inside the booklet.

PLEASE USE THESE RESPONSE CODES:

A – Strongly Disagree

B – Disagree

C – Neutral

D – Agree

E – Strongly Agree

Question	Response
1. My mind goes blank and I am unable to think clearly when working with mathematics	
2. Mathematics makes me feel uncomfortable	
3. I have a lot of self-confidence when it comes to mathematics	
4. A strong math background could help me in my professional life	
5. I am comfortable talking about nutrition mathematically	

## Answers to Select Exercises

### Unit 1: Food Labels

Exercise 1:

- a. 12%
- b.  $y = 3x$
- c. 42 grams
- d.  $\frac{7}{3} \approx 2.33$  grams
- e.  $\frac{25}{3} = 8\frac{1}{3}$  cups

Exercise 2:

- a. 175 milligrams
- b. 2450 milligrams
- c. 70%

Exercise 3:  $S = \frac{f-25d}{10}$

### Unit 2: Graphing Nutrition Intake

Exercise 1:

2. This diet contains
  - a. 750 kcal = 83.33 grams of Fats
  - b. 750 kcal = 187.5 grams of Carbohydrates
  - c. 1000 kcal = 250 grams of Protein

Exercise 2:

1. 630 kcal
2. 105 grams
3. 437.5 grams

Exercise 3:

1.  $25x + 70y = 175$
2.  $(7, 0)$
3.  $(0, 2.5)$  or  $(0, \frac{5}{2})$
4.  $y = -\frac{5}{14}x + \frac{5}{2}$

### Unit 3: Determining the Content of a Well-Balanced Diet

Exercise 1:  $\frac{660}{9} \approx 73.3$  grams of fat

Exercise 2: 25%

Exercise 3: 11%

Exercise 5: 25%

Exercise 6: 24%

### Unit 4: Sample Calculations for Dietary Analysis

Exercise 1: 72 grams

Exercise 2: 5 pints