

Section 2

Understanding Nutrients

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In Section 1, you learned how to assess your body composition and discovered the many factors that impact your body. These factors revolve around calories. You now know how to estimate the number of calories you need to function as well as how many calories you use during various physical activities. In this section, we are going to dig deeper into nutrients. You will learn about the several types of nutrients, the foods which contain these nutrients, how much of each nutrient you need, and how these nutrients function in your body.

Typically, when people talk about nutrients, they are referring to vitamins and minerals. However, in this section, we will learn that there are other key nutrients, such as fat and water. What? Water? Well, technically, water is not a nutrient. However, like our key nutrients, we cannot live without water, so we must get it from our diet.

Nutrients, which are necessary for maintaining our immune systems, have other important functions within our bodies. These include everything, from giving us energy so that we can enjoy our favorite sports, to playing a vital role in the development of healthy bones. Each nutrient is essential if we are to live long and healthy lives. We must get our nutrients from the foods and drinks we consume.

Let's get started!



ACTIVITY #5

ENERGY-YIELDING NUTRIENTS

We get energy from fat, protein and carbohydrates

So far, we have learned we need energy to live. We get energy from food in the form of calories, and we use energy to work, play, do chores, even to breathe. **Macronutrients** are large molecules and the only nutrients that give us energy in the form of calories per gram. They are different than **micronutrients**, which are vitamins and minerals. Grams (g) are another measure of weight. There are three different types of macronutrients. These are **fat**, **protein**, and **carbohydrates**.

Fat has had a bad reputation, but our bodies need it to stay healthy. Fat, or lipid, is the major source of energy our bodies store for later use. Fat provides our bodies with about 9 calories per gram. We can find fat in foods like nuts, avocado, meat, milk, oil, and butter.

Another macronutrient is **protein**, which is very important because we need it to build and maintain different tissues in our bodies like muscles and organs. We also need protein to support our immune systems and protein is needed to heal our skin when we get a cut. Protein gives our bodies 4 calories per gram. We can find protein in foods like beef, poultry, fish, eggs, cheese, milk, beans, nuts, and soybeans.

One final macronutrient we should look at is **carbohydrates** which, like fat, sometimes has a bad reputation. However, carbohydrates are, first and foremost, what our bodies use for energy.

Carbohydrates provide our bodies with us 4 calories per gram. We can find carbohydrates in foods like fruits, vegetables, bread, rice, and pasta.

All three macronutrients are important if we wish to live healthy, happy lives, and we can't exist without any of them. It is important to understand how fat, protein, and carbohydrates work in our bodies. A food's **caloric value**, or the total amount of energy we get from that food, depends on the number of grams of each macronutrient in that food. In this activity we are going to help Savannah and James calculate the total number of calories in some of their favorite foods.

FUN FACT:

Although your brain is only about 2% of your total body weight, it uses more than 20% of your daily energy. That is one hungry brain!

CHECK YOUR THINKING

Use the reading to find and support your answers

1. Underline the definition of macronutrients.
2. Draw a picture of a food that has protein in it.

3. Write the number of calories per gram found in each macronutrient:

Fat: _____ calories **Protein:** _____ calories **Carbohydrates:** _____ calories

LET'S TRY IT TOGETHER

Energy-Yielding Nutrients

Here's the Story

Savannah has had a long day of school, and now she is on her way to soccer practice. She's feeling hungry before practice and would like a snack. She is having a hard time choosing which of her two favorite snacks she should eat before practice. She needs something that will give her energy. Can you help Savannah figure which snack has the highest number of calories?

Directions

First, we must identify how many grams of each macronutrient is in each food item. Review the charts below.

Nonfat Yogurt	Grams
Fat	0g
Carbohydrate	15g
Protein	6g

Pudding	Grams
Fat	10g
Carbohydrate	14g
Protein	2g

Next, let's help Savannah calculate the number of calories per gram of each macronutrient by using the conversion method. We just need to know a few conversion factors:

Macronutrient	Conversion Factor
Fat	9 calories/gram
Carbohydrate	4 calories/gram
Protein	4 calories/gram

How many calories of fat are present when we compare the yogurt to the pudding?

1. Convert the grams of fat to calories by multiplying the number of grams by 9.

Yogurt = 0 g x 9 = 0 calories Pudding = 10 g x 9 = 90 calories

How many calories of carbohydrates are present when we compare the yogurt to the pudding?

- Convert the grams of carbohydrate to calories by multiplying the number of grams by 4.

$$\text{Yogurt} = \underline{15 \text{ g} \times 4 = 60 \text{ calories}} \quad \text{Pudding} = \underline{14 \text{ g} \times 4 = 56 \text{ calories}}$$

How many calories of protein are present when we compare the yogurt to the pudding?

- Convert the grams of protein to calories by multiplying the number of grams by 4.

$$\text{Yogurt} = \underline{6 \text{ g} \times 4 = 24 \text{ calories}} \quad \text{Pudding} = \underline{2 \text{ g} \times 4 = 8 \text{ calories}}$$

Last, let's calculate the total number of calories present when we compare the yogurt to the pudding. We can use the following formula and the answers listed above:

Calories from Fat + Calories from Carbohydrates + Calories from Protein = Total Calories

$$\text{Yogurt: } \underline{0} \text{ calories} + \underline{60} \text{ calories} + \underline{24} \text{ calories} = \underline{84 \text{ calories}}$$

$$\text{Pudding: } \underline{90} \text{ calories} + \underline{56} \text{ calories} + \underline{8} \text{ calories} = \underline{154 \text{ calories}}$$

Which snack should Savannah pick if she wants one with the highest number of calories?

FUN FACT:

Kilocalories (kcal) is a unit of energy of 1000 calories. On food labels, the word "calorie" is commonly used to refer to a unit of food energy rather than kilocalorie. This means that 1 "calorie" on a food label represents 1000 calories of energy.

Thinking More Deeply

What percent of the total calories in the yogurt is from fat? What percent of the total calories in the pudding is from carbohydrates?

TRY IT ON YOUR OWN

James is trying to find a delicious snack to eat while watching TV. However, he ate a lot during lunch today, so he really wants something light. Can you help James find the snack with the fewest number of calories?

Directions

First, identify how many grams of each macronutrient in each food item. Review the charts below.

Microwave Popcorn	Grams
Fat	10g
Carbohydrate	18g
Protein	3g

Pretzels	Grams
Fat	1g
Carbohydrate	24g
Protein	3g

Next, using the conversion method, help James calculate the number of calories per gram of each macronutrient.

Microwave Popcorn	
Macronutrient	Number of Calories
Fat	
Carbohydrate	
Protein	

Pretzels	
Macronutrient	Number of Calories
Fat	
Carbohydrate	
Protein	

Last, calculate the total number of calories present when we compare microwave popcorn and pretzels. If you need help, use the conversion chart from the previous page. We can use the following formula:

$$\text{Calories from Fat} + \text{Calories from Carbohydrates} + \text{Calories from Protein} = \text{Total Calories}$$

Microwave Popcorn

Pretzels

Summarize It

Complete the charts below:

Calories in Microwave Popcorn	
Macronutrient	Number of Calories
Fat	
Carbohydrate	
Protein	
Total Calories	

Calories in Pretzels	
Macronutrient	Number of Calories
Fat	
Carbohydrate	
Protein	
Total Calories	

Which snack should James pick if he wants one with the lowest number of calories?

TAKE IT HOME: HOW ABOUT YOU?

Directions

Find two of your favorite snacks at home. Using the nutritional information on the back of the package, have your parents or another adult help you locate the total grams of fat, carbohydrates, and protein for both food items.

First, write down the total grams of fat, carbohydrates, and protein for both items in the charts below.

Your Food Item:	
Fat	
Carbohydrate	
Protein	

Your Food Item:	
Fat	
Carbohydrate	
Protein	

Next, calculate the calories of each macronutrient. **Then**, use the formula to calculate the total number of calories for each food item.

Your Food Item:	
Macronutrient	Number of Calories
Fat	
Carbohydrate	
Protein	
Total Calories	

Your Food Item:	
Macronutrient	Number of Calories
Fat	
Carbohydrate	
Protein	
Total Calories	

Thinking More Deeply

Which snack would you consume when you will need a lot of energy?

Which snack would you consume when you will **not** need a lot of energy?