ACTIVITY #3

CALCULATING CALORIES

Our bodies need food to provide energy

Just like a car needs the energy from fuel to get its engine started, our bodies need the energy from food to keep us going. In order to stay at a healthy weight, we need to eat enough food to give ourselves energy for all of our daily activities. It is important for us to have the right amount of food for our bodies because having too much or too little food is not healthy for us. The energy provided by food and drink is measured in **calories**. It's easy to estimate how much food we each need for a healthy body. First, we need to know how many calories our bodies would normally burn if we did no physical activity. That's called our **resting metabolic rate, or RMR**. We can find our RMR by first knowing our height and weight. There are two RMR equations – one for boys and one for girls. Remember, kg is kilograms and cm is centimeters. The RMR equations are listed below:

Girls: [8.37 x (weight in kg)] + [4.65 x (height in cm)] + 200 = calories at rest

Boys: [16.25 x (weight in kg)] + [1.373 x (height in cm)] + 515.5 = calories at rest

Next, we use the **energy balance equation**, which tells us how many calories our bodies burn based on our level of activity. Using this equation, we can find our **total energy expenditure (TEE)**, or the number of calories our bodies burn everyday doing physical activities. To find TEE,

we multiply our RMR by the ***activity factor*** that best represents our level of activity, whether that is sedentary, light, or heavy activity. The more we move, the more fuel-or calories- our bodies need from food. Examples of sedentary activities might be sleeping, reading, or playing video games. Some light activities are walking, cleaning, and shopping. Heavy activities include running, swimming, and playing soccer.

Resting Metabolic rate (RMR) x Activity Factor = Total energy expenditure (TEE)

Knowing total energy expenditure is important for maintaining a healthy lifestyle and weight. Not only does TEE tell us how many calories the body burns based on our activity level, but it also estimates how many calories we should eat or drink throughout the day. If we eat more calories than our TEE, we might gain weight. If we eat fewer calories than our TEE, we might lose weight. If we eat about the same number of calories as our TEE, we should maintain weight.

FUN FACT:

Our bodies complete many tasks throughout the day that require energy. For example, our heart is constantly pumping blood to our whole body. To work efficiently, our bodies use about 60-70% of the calories we consume each day to complete these tasks.

CHECK YOUR THINKING

Use the reading to find and support your answers.

1. Underline the definition of RMR or resting metabolic rate.

2. Draw a picture of a stick figure doing something that you think requires high-or heavy- activity.

3. Circle the phrase in this reading that explains the purpose of the energy balance equation.

Calculating Calories

Here's the Story

Now that you have learned the basic vocabulary and formulas needed to understand your body's energy balance, let's see if you can calculate it!

Let's go back to Savannah and James, who are classmates and both 17 years old. During their after-school programs, they both really like to play outside. Savannah enjoys playing soccer, and James loves to play football. However, when it rains, they have to sit in the cafeteria instead of playing outside. Savannah reads, and James plays a handheld video game. Let's figure out how many calories Savannah and James burn at different activity levels.

Directions

First, we need to figure out Savannah's RMR, or how many calories she needs at rest. To calculate this, we need to pick the correct RMR equation based on gender:

Girls: [8.37 x (weight in kg)] + [4.65 x (height in cm)] + 200 = calories at rest

Boys: [16.25 x (weight in kg)] + [1.373 x (height in cm)] + 515.5 = calories at rest

Next, let's calculate Savannah's RMR: If we know that Savannah is 59 inches tall and weighs 110 pounds, we can figure out her height in centimeters and her weight in kilograms. We just need a few conversion factors. If you know that

1 cm= 2.54 in

12 in = 1 foot (ft)

1 lb = 0.45 kg

What is Savannah's **height in centimeters**? Round to the nearest **whole number**.

1. Convert Savannah's height to centimeters by multiplying her height in inches by 2.54.

59 in x 2.54 cm/in = 150 cm

What is Savannah's **weight in kilograms?** Round to the nearest **whole number**.

2. Multiply Savannah's weight by 0.45.

110 lbs x 0.45 kg/lb = 50 kg

Now, let's use the RMR estimation equation for girls to find out Savannah's resting metabolic rate .

Girls'Equation: [8.37 x (weight in kg)] + [4.65 (height in cm)] +200 = calories at rest

Show your work. Round to the nearest **whole number**.

(8.37 x ___*50 kg*___) + (4.65 x___*150 cm*___) + 200 = ___*1316 calories*___ = RMR

Last, let's find Savannah's total energy expenditure. To do this, we need to consider the different activity factors: sedentary, light or heavy activity. Using the chart below, multiply the activity factor that matches her energy needs by her RMR.

> **TEE (calories) = RMR x Activity Factor**

Multiply by the physical activity factors in the table below.

1.2	*1.3*	*1.4*
Sedentary	**Light**	**Heavy**
Basic daily activities like walking, computer or screen time, watching TV	Jumping rope, basketball, dancing to music for up to 30 minutes	Dancing, playing basketball or soccer for at least an hour

Let's calculate for light activity. Round to the nearest **whole number**.

Savannah's RMR x Activity factor = TEE

___*1316 calories*___ x 1.4 = ___*1842 calories*___

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FUN FACT:

An **indirect calorimeter** can more accurately measure your individual RMR. It measures your breathing, oxygen consumption and your production of carbon dioxide.

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TRY IT ON YOUR OWN

Can you calculate James' TEE if he goes to football camp and plays all day? James is 67 inches tall and 185 pounds. Round to the nearest **whole number**. Remember these steps and equations:

First	*Next*	*Last*
Convert height and weight to centimeters and kilograms	Insert height in centimeters and weight in kilograms into the equation for RMR	Multiply James' RMR and his activity factor Is playing football all day:
James' Height: _____ in x 2.54 cm = _____ cm **James' Weight:** _____ lbs x 0.45 kg = _____ kg	(16.15 x _____ kg) + (1.373 x _____ cm) + 515.5 **James' RMR =** _____	1.2 (Sedentary) 1.3 (light activity) 1.4 (heavy activity) **TEE =** _____

Summarize it

1. What is James' height in centimeters?

2. What is James' weight in kilograms?

3. What is James' RMR? In other words, how many calories does his body need at rest?

Thinking More Deeply

What is James' TEE if, instead of playing football, he watches TV with a friend all day?

Calculating Calories

TAKE IT HOME: HOW ABOUT YOU?

Directions

Work with a parent or another adult to do the activities below. Round to the nearest **whole number**.

Measurement: You will need a tape measure and scale to determine height and weight.

Girls: (8.37 x weight in kg) + (4.65 x height in cm) +200 = calories at rest
Boys: (16.25 x weight in kg) + (1.373 x height in cm) + 515.5 = calories at rest

First	*Next*	*Last*
Convert height and weight to cm and kg	Insert your height in cm and weight in kg into the equation for RMR	Multiply your RMR and activity factor based on the activity of your choice
Your Height: _____ in x 2.54 cm = _____ cm **Your Weight:** _____ pounds x 0.45 kg = _____ kg	(_____ x _____ kg) + (_____ x _____ cm) + _____ ***Remember, there are different numbers for boys and girls.*** **Your RMR =** _____	**Your Activity:** _____ 1.2 (Sedentary) 1.3 (Light activity) 1.4 (Heavy activity) **TEE** = _____

Summarize it

1. What is your height in centimeters?

2. What is your weight in kilograms?

3. What is your RMR? In other words, how many calories does your body need at rest?

4. What are the total calories you need on days that you are only lightly active?

5. What are the total calories you need on the days that you are heavily active?

Calculating Calories