

Human Metabolism

Real World Energy
Learner Worksheet Answer Key
Grade Level: 9-12



Name:

Part 1: Background Questions

Read the food analysis backgrounder and answer the following questions.

1. What is metabolism?

Metabolism is all of the chemical reactions that take place in a living organism.

2. What are the two types of metabolic reactions?

The two types of metabolic reactions are catabolic and anabolic.

3. Name the reaction that is occurring when food is broken down.

The reaction occurring when food is broken down is catabolic.

4. List at least three factors that affect metabolism and body weight.

The factors that affect metabolism and body weight are: basal metabolic rate, diet, exercise, age, gender, emotional state and hormones.

5. What is required to maintain a balanced diet?

A balance of the different food groups and nutrients are required to maintain a balanced diet.

6. The following charts provide an overview of a week in the life of two different people. They are the same age, height and weight. Their activity level and food intake are different. Review the charts. Then predict the outcomes that will result if the two people continue this weekly profile over five to ten years.

In 5 to 10 years, Person 1 will have slowly gained weight and his or her metabolic rate may have decreased with the increase in weight. Person 2 will have lost some weight and will be physically fit with a better metabolic rate and healthier lifestyle.

Person 1		Person 2	
Age	22	Age	22
Weight	95 kg (187 lbs)	Weight	95 kg (187 lbs)
Height	1.7 m (5 ft, 8 in)	Height	1.7 m (5 ft, 8 in)
Activity Level	Sedentary (little or no exercise)	Activity Level	Moderately (moderate exercise 3 to 5 days per week)
Base Metabolic Rate (BMR) - daily calories needed to maintain weight	2330	Base Metabolic Rate (BMR) - daily calories needed to maintain weight	3010
Daily Food Intake (calories)	2500	Daily Food Intake (calories)	2800

Part 2: Metabolic Activity in Muscles

Record your observations from your exercise tests in the observation chart below.

Observations Chart:

Time of Measurement	Temperature (°C)
Start	
After 10 minutes of exercise	
5 minutes after exercise	
10 minutes after exercise	
15 minutes after exercise	

Questions:

- Describe the change of temperature of the muscle before, during and after exercise.**
The temperature of the muscle should increase during exercise and start to decrease after exercise has been completed.
- What is occurring during metabolic reactions in muscles?**
During metabolic reactions in muscles, glucose is converted into glycogen and stored for later use. When muscles need the energy, the glycogen is converted back into a usable form.
- If you were to lift a weight of 2 kg and one of 20 kg, what would you expect to see if you measured the temperature change for the different weights?**
There would be a greater temperature change in muscles when lifting heavier weight because the muscle is working harder.

Calorie Output Chart:

Activity	Time Spent in One Day (mins.) on Each Activity	Calories Per Minute Used (See Table Cal/Min)	Rate of Energy Use (Cal/Min times Min)	Calories Used

Total calories consumed: _____

Total calories used: _____

Questions:

- 1. Compare the difference between the calorie intake and use. Were they the same? If not, which one was greater?**

Answers will vary when learners compare the difference between the calorie intake and use.

- 2. Explain the energy balance.**

The energy balance is a balance between energy consumed through food and the energy used through bodily functions and activity.

- 3. Why is it important to have an energy balance?**

It is important to have an energy balance to ensure you are consuming the right amount of calories for your physical activities.