

## Biology Laboratory Practical: Version A

Name: \_\_\_\_\_  
Student ID #: \_\_\_\_\_  
Teacher: \_\_\_\_\_ Period: \_\_\_\_\_

**Introduction.** The food we eat contains many different types of sugars. Some of these sugars are monosaccharides and some are disaccharides. A monosaccharide is a simple sugar. Glucose, galactose, and fructose are examples of monosaccharides. A disaccharide, in contrast, is composed of two monosaccharides. Sucrose and lactose are examples of disaccharides. Sucrose is composed of a molecule of glucose and a molecule of fructose. Lactose is composed of a molecule of galactose and a molecule of glucose. Our cells use the monosaccharide glucose to produce the energy we need through the process of cellular respiration. We therefore need a way to breakdown the disaccharides found in the food we eat into glucose. Our body produces proteins called enzymes that can break down disaccharides into monosaccharides. There are many different types of enzymes. One such enzyme is called lactase. This enzyme breaks the disaccharide lactose into a molecule galatose and a molecule of glucose.

**The Task.** You will be given a sucrose solution, a lactose solution, a glucose solution and a solution of the enzyme lactase. Your goal is to determine if this enzyme, which breaks down the disaccharide lactose, can also break down the disaccharide sucrose. You will have one class period (but no more than 60 minutes if your class is longer) to plan and carry out your investigation.

**The guiding question of this investigation is:** *Can the same enzyme breakdown lactose and sucrose?*

**Materials.** You can use any of the following materials:

### Consumables

- Sucrose solution (a disaccharide)
- Lactose solution (a disaccharide)
- Glucose solution (a monosaccharide)
- Lactase solution (an enzyme)
- Distilled water

### Equipment

- 5 test tubes
- Glucose test strips
- Stopwatch
- Test tube rack

**Part 1:** Design your investigation.

1. How will you collect the data you need to answer the guiding question? Describe the procedure you will follow during your investigation with enough detail so someone else can replicate it.

2. What are some strengths of the investigation you designed? (What makes your investigation scientific?)

3. What are some weaknesses of the investigation you designed? (What makes your investigation less scientific?)

**Part 2.** Carry out your investigation and collect the data you need to answer the guiding question.

1. Record your data (observations and/or measurements) in the space below.

2. Why did you decide to make these observations and/or measurements? (Why were these the most appropriate data to collect?)

**Part 3:** Analyze your data and then answer the following questions.

1. What is your claim? (Your answer to the guiding question.)

2. What is your evidence to support your claim?

3. Why is your evidence important? (Defend or justify your choice of evidence to support your claim).

## Biology Laboratory Practical: Version B

Name: \_\_\_\_\_  
Student ID #: \_\_\_\_\_  
Teacher: \_\_\_\_\_ Period: \_\_\_\_\_

**Introduction.** The food we eat contains many different types of sugars. Some of these sugars are monosaccharides and some are disaccharides. A monosaccharide is a simple sugar. Glucose, galactose, and fructose are examples of monosaccharides. A disaccharide, in contrast, is composed of two monosaccharides. Sucrose and lactose are examples of disaccharides. Maltose is composed of two molecules of glucose. Lactose is composed of a molecule of galactose and a molecule of glucose. Our cells use the monosaccharide glucose to produce the energy we need through the process of cellular respiration. We therefore need a way to breakdown the disaccharides found in the food we eat into glucose. Our body produces proteins called enzymes that can break down disaccharides into monosaccharides. There are many different types of enzymes. One such enzyme is called lactase. This enzyme breaks the disaccharide lactose into a molecule of galactose and a molecule of glucose.

**The Task.** You will be given a maltose solution, a lactose solution, a glucose solution and an enzyme. Your goal is to determine if this enzyme, which breaks down the disaccharide lactose, can also break down the disaccharide maltose. You will have one class period (but no more than 60 minutes if your class is longer) to plan and carry out your investigation.

**The guiding question of this investigation is:** *Can the same enzyme breakdown lactose and maltose?*

**Materials.** You can use any of the following materials:

### Consumables

- Maltose solution (a disaccharide)
- Lactose solution (a disaccharide)
- Glucose solution (a monosaccharide)
- Lactase solution (an enzyme)
- Distilled water

### Equipment

- 5 test tubes
- Glucose test strips
- Stopwatch
- Test tube rack

**Part 1:** Design your investigation.

1. How will you collect the data you need to answer the guiding question? Describe the procedure you will follow during your investigation with enough detail so someone else can replicate it.

2. What are some strengths of the investigation you designed? (What makes your investigation scientific?)

3. What are some weaknesses of the investigation you designed? (What makes your investigation less scientific?)

**Part 2.** Carry out your investigation and collect the data you need to answer the guiding question.

1. Record your data (observations and/or measurements) in the space below.

2. Why did you decide to make these observations and/or measurements? (Why were these the most appropriate data to collect?)

**Part 3:** Analyze your data and then answer the following questions.

1. What is your claim? (Your answer to the guiding question.)

2. What is your evidence to support your claim?

3. Why is your evidence important? (Defend or justify your choice of evidence to support your claim).