

# AEROBIC RESPIRATION

**GRADE LEVEL:** 10<sup>th</sup>

**SUBJECT:** Biology I

**SSS:** SC.B.1.4.1, SC.F.1.4.8, SC.G.1.4.1

**STUDENTS:** 25 including 2 ELL's

**ELL-1:** Male, Cuban, 1<sup>st</sup> week in the U.S., at pre-production level. No English reading, writing, or oral abilities.

**ELL-2:** Female, Taiwanese, has lived in U.S. since 6<sup>th</sup> grade, at intermediate fluency. At 40% reading, writing, and oral communication.

## CONTENT OBJECTIVE

Students will be able to describe the stages of aerobic respiration

## LANGUAGE OBJECTIVE

Students will use a sequencing map to describe the movement of glucose through the cell using a list of predefined statements and sequencing words such as, first, next, and last.

## ADAPTED CONTENT

Both ELL students will receive a completed flow map consisting primarily of photos with minimal text which summarizes the lesson. ELL-1 will receive a comprehensive dictionary of Spanish to English terms and will be given a Biology textbook in Spanish to use as a reference. ELL-2 will be given a Taiwanese to English dictionary. ELL student responses will be graded for correct answers, but not for correct grammar.

## PROCEDURES

### Agenda

- Quick Write
- Introduction to Aerobic Respiration
- Terms and Concepts
- Sequence Map
- Share results

### Quick Write (5 min)

Students are shown an overhead with illustrations of molecules, and three questions. Each student marks their answers on their own sheet of paper.

[QUESTION 1] What do you think is the most important component of aerobic respiration? [ANSWER] Students should respond with a short phrase. ELL-1 student will be given a printed worksheet with three phrases in both Spanish and English from which he'll circle one. ELL-2 student will write short phrases.

[QUESTION 2] Which of the following molecules (labeled A,B, or C) do you think would take the longest to break down during aerobic respiration? [ANSWER] All students including both ELL's will respond with either A,B, or C

[QUESTION 3] Why is sugar necessary for your health? [ANSWER] Students should respond with a short phrase. ELL-1 student will be given a printed worksheet with three phrases in both Spanish and English from which he'll circle one. ELL-2 student will write short phrases.

### **Introduction to Aerobic Respiration?** (5 min)

Last week we learned about photosynthesis. [QUESTION] Can anyone tell me how photosynthesis works? [ANSWER] It all starts with plants. Plants absorb sunlight and use that energy to build molecules of sugar. Sugar is then stored in leaves (lettuce), used to build plant mass (giant redwoods), and stored in roots (carrots). This week we'll be investigating how cells break down those sugar molecules. Some new terms we'll be using in this lesson include: glucose, ATP, glycolysis, electron transport system, and of course aerobic respiration.

Organisms are open systems that depend on external energy sources. Animals get their energy in chemical form by eating other organisms. But, cells can't process whole chunks of food, so how do we derive this energy? Our bodies are magnificent at extracting sugar molecules from larger chunks of food and breaking those molecules down into useful bits of potential energy through what is known as Aerobic respiration. In this lesson we are going to explore how the cells break down sugar molecules to produce energy for our bodies.

For the following activities both ELL students will be paired together with an above average English-speaking student. The ELL-2 student would serve as the primary partner to that student, while the ELL-1 student would serve mostly as a listener, except where specific tasks have been assigned for that student.

### **Terms and Concepts** (15 min)

To introduce students to the terms used to describe aerobic respiration, students will find a partner and complete the **Aerobic Respiration Worksheet**, which consists of two parts (**Part A and Part B**) with each part missing specific words that can be found in the other part. The objective is for students to help one another figure out those missing words without stating the missing word. ELL-1 students listen and should be encouraged to repeat any words he recognizes.

#### **Aerobic Respiration Worksheet (Part A)**

1. When living \_\_\_\_\_ break down molecules, energy is stored as ATP.
2. Aerobic respiration uses \_\_\_\_\_ to produce energy, which occurs in the mitochondria. Produces a large amount of energy and releases carbon dioxide as a waste product
3. The breakdown of \_\_\_\_\_ compounds to produce ATP is known as cellular respiration.

4. The chemical energy in glucose can be used to provide the energy required for \_\_\_\_\_, repair and movement.
5. Aerobic Respiration requires \_\_\_\_\_ and oxygen.
6. \_\_\_\_\_ Respiration produces energy, carbon dioxide, and water.
7. Pyruvate is the \_\_\_\_-product of glycolysis

### **Aerobic Respiration Worksheet (Part B)**

1. When living cells break down molecules, \_\_\_\_\_ is stored as ATP.
2. Aerobic respiration uses oxygen to produce energy, which occurs in the mitochondria. Produces a large amount of \_\_\_\_\_ and releases carbon dioxide as a waste product
3. The breakdown of organic compounds to \_\_\_\_\_ ATP is known as cellular respiration.
4. The chemical energy in glucose can be used to provide the energy required for growth, repair and \_\_\_\_\_.
5. Aerobic Respiration requires glucose and \_\_\_\_\_.
6. Aerobic Respiration produces energy, carbon dioxide, and \_\_\_\_\_.
7. Pyruvate is the end-\_\_\_\_\_ of glycolysis

### **Sequencing Maps** (10 min)

After students have completed the Aerobic Respiration worksheet, they will work cooperatively with their partner to develop a sequence map using only those words found in the worksheet. Students may use as many or as few words necessary to complete their sequence map, but they must have no more or less than five events and must use the words first, next, and last to order the events. One student writes the events (Writer), while the other reads from the list of concepts (Reader). ELL-1 student listens and should be encouraged to repeat any words he recognizes. In addition, the ELL-1 student should understand the meaning of the words first, next, and last. Spanish translation of those words will be available.

**Example:** [FIRST] Cells break down molecules [NEXT] Glycolysis forms pyruvate.

### **Share Results** (15 min)

Once everyone has completed their sequence map, each pair will share their sequence of events with the class. One student reads the sequence of events out loud (Reader), while the other writes the events on the board (Writer). The group with the two ELL students will share as follows: (1) ELL-1 student will say “First” in English and

Spanish, (2) ELL-2 student will read the “First” event, (3) English speaker will write the event on the board. This process will be repeated for each event.

### **ASSESSMENT**

**Content Objective:** Students complete the terms worksheet, sequence map, and share their results with the class.

**Language Objective:** Students develop a sequence map of events using the words first, next, and last.

### **REFERENCE**

BIOLOGY: The Dynamics of Life  
Glencoe Science, Florida SSS Edition