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# NYC Companion Lesson



# Reading “How You Are Like a Sneezing Iguana”

## Overview

The article “How You Are Like a Sneezing Iguana” leverages students’ understanding of interactions between body systems in order to introduce how body systems work together to maintain homeostasis. Following the Active Reading approach, students first read and annotate the article on their own, then they discuss their annotations with a partner. To deepen their understanding, students reread a section of the article that describes how the human body maintains homeostasis during physical exertion. The purpose of this lesson is for students to learn that body systems, including cells, tissues, and organs, work together to maintain homeostasis.

**Recommended Placement:** *Metabolism*, after Lesson 3.2

**Suggested Time Frame:** 60 minutes

## NYS P–12 Science Learning Standards

### Performance Expectations

- **MS-LS1-3:** Construct an explanation supported by evidence for how the body is composed of interacting systems consisting of cells, tissues, and organs working together to maintain homeostasis.

### Disciplinary Core Ideas

- **PS3.D: Energy in Chemical Processes and Everyday Life:**
  - Cellular respiration in plants and animals involves chemical reactions with oxygen that release stored energy. In these processes, complex molecules containing carbon react with oxygen to produce carbon dioxide and other materials. (secondary to MS-LS1-7)



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### Disciplinary Core Ideas

- **LS1.A: Structure and Function:**
  - In multicellular organisms, the body is a system of multiple interacting subsystems. These subsystems are groups of cells that work together to form tissues and organs that are specialized for particular body functions. (MS-LS1-3)

### Science and Engineering Practices

- **Practice 1:** Asking Questions
- **Practice 8:** Obtaining, Evaluating, and Communicating Information

### Crosscutting Concepts

- Stability and Change
- Systems and System Models

## Vocabulary

- circulatory system
- energy
- glucose
- homeostasis
- molecule
- oxygen
- respiratory system

## Materials & Preparation

### Materials

#### For the Class

- Reading “How You Are Like a Sneezing Iguana” copymaster
- Annotation Tracker
- 1 large index card\*
- marker\*

#### For Each Student

- Student Edition: “How You Are Like a Sneezing Iguana” article

- student sheets\*
- Reading “How You Are Like a Sneezing Iguana”
- Second Read of “How You Are Like a Sneezing Iguana”

\*teacher provided

### Preparation

1. **Print Reading “How You Are Like a Sneezing Iguana” copymaster.** Locate the Reading “How You Are Like a Sneezing Iguana” copymaster



## Preparation (continued)

on the New York City Resources webpage: [www.amplify.com/amplify-science-new-york-city-resources](http://www.amplify.com/amplify-science-new-york-city-resources). Make one copy of all pages for each student.

### 2. Create and post vocabulary card on the classroom wall.

With a marker, write “homeostasis” in large print on a large index card. Post this card on the classroom wall.

### 3. Prepare for Active Reading.

Prepare to model Active Reading by previewing the “How You Are Like a Sneezing Iguana” article. Review the first few sentences carefully. For a full description of preparing for an Active Reading day, see *Metabolism* Lesson 2.2, Lesson Brief, Preparation. **Note:** In order to achieve the full benefit of this approach, it is highly recommended that students use sticky notes to annotate the Student Editions directly.

### 4. Print one copy of the Annotation Tracker for each class.

A blank copy is available in your digital teacher’s guide in *Metabolism* Lesson 2.2, Lesson Brief, Digital Resources. If you plan to use the Annotation Summary Sheet to track students’ annotations or wish to review the Annotation Tracker Instructions, these are

also available in Lesson 2.2, Digital Resources.

### 5. Make sure the Active Reading Guidelines are clearly visible.

If they are not posted on your classroom wall, write them on the board before class. (See Active Reading Guidelines on the Reading “How You Are Like a Sneezing Iguana” student sheet.)

### 6. Plan to model Active Reading.

To model the Active Reading approach, you will need to have students follow along as you read aloud the first few sentences of the article. If you have a document camera in your classroom, consider projecting and annotating the article as you read aloud. Alternatively, you can project the article from the PDF available on the New York City Resources webpage.

### 7. Prepare for On-the-Fly

**Assessment.** The second read section of this lesson provides an opportunity to informally assess students’ understanding of homeostasis. Refer to the On-the-Fly Assessment in the Assessment section of this lesson for details about what to look for and how you can use the information to maximize learning by all students.



**8. Immediately before the lesson, have on hand the following materials:**

- “How You Are Like a Sneezing Iguana” article

- student sheets
- Annotation Trackers

## Science Background

Homeostasis describes the stability maintained by an organism’s body systems. In the body, systems of cells, tissues, and organs work together to maintain homeostasis. Maintaining homeostasis generally relies on a system of negative feedbacks in which the body detects that a variable is too high or too low and then responds in a way that counteracts the imbalance. For example, during exercise, your musculoskeletal system, respiratory system, and cardiovascular system all work together to maintain stability. As your muscles work, your metabolic rate increases, and your muscle cells respire to release energy. Cellular respiration uses up oxygen and releases carbon dioxide into the bloodstream. Your body detects an increase in carbon dioxide, which can lower the pH of your blood, cause a buildup of lactic acid, and impair your performance. Your respiratory system responds, and you begin to breathe deeper and faster to get rid of carbon dioxide. Breathing deeper and faster also brings more oxygen into your lungs, and your heart begins to beat faster to deliver the oxygen from your lungs, through your bloodstream, to your muscle cells. This series of responses helps to maintain stable levels of carbon dioxide and oxygen, allowing you to perform to the best of your ability. Similarly, if a person goes to a high-altitude location where there is less oxygen in the air, the body detects a lower level of oxygen. The musculoskeletal and respiratory systems work together to make the person breathe faster. This brings more oxygen into the lungs and the bloodstream, where it can be delivered to cells in order to maintain a certain amount of oxygen.

Not all organisms maintain homeostasis for the same variables or in the same ranges. For example, mammals actively maintain their body temperature within a fairly small range, while snakes and lizards allow their body temperatures to fluctuate over a wider range. Mammals, as well as birds, are endotherms, meaning that they use metabolic heat to maintain a relatively stable body temperature. When it’s cold, endotherms can increase metabolic heat production by contracting their muscles, i.e., by shivering. Endotherms



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also insulate their bodies when it's cold—some mammals grow a thicker coat of fur in the winter and birds may fluff their feathers. This is also why people get goosebumps—when it's cold, our hairs stand up, but they're too thin to provide effective insulation. On the other hand, snakes and lizards are ectotherms, meaning their body temperature matches the temperature of the surrounding environment. To warm up when it's cold, an ectotherm moves to a warmer environment, such as a warm rock where it can sunbathe. Though endotherms and ectotherms thermoregulate through different means, both have mechanisms that allow them to maintain homeostasis.



## Instructional Guide

### First Read of “How You Are Like a Sneezing Iguana”

**1. Introduce the article and make a connection to students’ background knowledge.**

🗨 You have been learning about how human body systems work together to get important molecules to the cells so they can release energy. Today, you will read an article called “How You Are Like a Sneezing Iguana” that builds on what you know about body systems.

🗨 It may seem strange to compare humans and sneezing iguanas. What could you have in common with a sneezing iguana? In a moment, you will read to find out more.

**2. Model Active Reading.** Read the first few sentences of the article aloud. Ask questions and make connections as you model the Active Reading process.

**3. Review Active Reading Guidelines.** Before students begin reading, point out the Active Reading Guidelines on the classroom wall.

**4. Distribute the Reading “How You Are Like a Sneezing Iguana” student sheets.**

**5. Prompt students to read and annotate independently.** Direct students to the “How You Are Like a Sneezing Iguana” article in their Student Editions. Circulate as students read, providing support as needed.

**6. Review the process for discussing annotations.** When most students have finished reading and annotating, explain that students will choose one or two annotations to share with a partner. They should select questions or connections that they find interesting or those that will help them better understand what they read.

**7. Provide a moment for students to select the annotations they will share with their partners.**

**8. Prompt partners to discuss annotations.** Circulate as pairs discuss, using the Annotation Tracker and listening for questions and connections that you would like to invite students to share during the class discussion.

**9. Prompt partners to prepare for class discussion.** Ask them to choose an interesting or unanswered question or connection that they would like to share with the class. Explain that they can discuss the same annotations they shared with their partners if the questions are still unresolved.


**10. Facilitate a brief class discussion about annotations.** Invite students to share their questions and connections. Encourage students to respond to one another and to look back at the article in order to answer their peers’ questions.

**11. Highlight exemplary or noteworthy annotations.** Refer to your Annotation Tracker and invite students to share those annotations you noted. Provide specific, positive feedback



as students share, noting when annotations show evidence of Active Reading. Examples might include annotations that make a connection to science ideas, use vocabulary from the unit, or instances in which students were able to answer their own questions.

## Second Read of “How You Are Like a Sneezing Iguana”

12. **Set purpose for rereading “How You Are Like a Sneezing Iguana.”** Explain that students will reread paragraphs 2 and 3 of the article in order to explain why they breathe faster when they exercise.
13. **Distribute the Second Read of “How You Are Like a Sneezing Iguana” student sheets and direct students to complete Part 1.**
14. **Have partners share information that they found.** Partners should discuss information that helps them explain why they breathe faster when they exercise.
15. **Lead a brief class discussion about Part 1.** Ask students to share information that they found. Highlight responses that refer to body systems working together to maintain the balance of oxygen in the body.
16. **Introduce the vocabulary word *homeostasis*.**  
 Homeostasis is the stability maintained by an organism’s body systems.  
Point out that the vocabulary word is posted on the classroom wall. Students can also find the definition in the glossary at the back of their Student Editions.
17. **Direct students to complete Part 2.**
18. **Have partners share ideas.** Partners should discuss why a cyclist begins to breathe faster at the start of a race. Circulate as partners discuss so you can listen to their responses.
19. **On-the-Fly Assessment: Understanding Homeostasis.** For further suggestions on how to support students’ understanding of homeostasis, refer to the On-the-Fly Assessment in the Assessment section of this lesson.
20. **Lead a brief discussion of Part 2.** Invite students to share their ideas. If it does not come up, help students understand that the cyclist breathes faster in order to maintain homeostasis. Her respiratory system takes in more oxygen, and her circulatory system delivers the oxygen to her cells.
21. **Make a connection to the unit.** Remind students that they have been learning about cellular respiration in this unit. Ask students to share ideas about why homeostasis is important for cellular respiration. [Cells need a stable level of oxygen and glucose for cellular respiration.]





# On-the-Fly Assessment: Students’ Understanding of Homeostasis

## Look for:

Students should be building the understanding that body systems work together to maintain stability in the body. As students discuss the questions in Part 2 of Second Read of “How You Are Like a Sneezing Iguana,” look for students to demonstrate the understanding that body systems work to keep the amount of oxygen in the body stable. Look for students to figure out that a cyclist starts breathing faster when she pedals in order to keep the amount of oxygen in the body stable while her cells are using more oxygen to release more energy. This is an example of the respiratory system, circulatory system, and cells working together to maintain homeostasis.

## Now what?

If students aren’t showing the understanding that body systems work to keep the amount of oxygen in the body stable, revisit and build on the kinesthetic activity from *Metabolism* Lesson 3.1, Gathering Evidence from Heart and Breath Rates. This time, help students visualize their body systems interacting as their breath rates increase, and help them connect these observations to the body’s ability to maintain homeostasis. Pose the following questions:

- What is happening in your muscle cells when you begin running?  
[More oxygen and glucose are being used to release more energy during cellular respiration.]
- What happens when you breathe faster?  
[You take in more oxygen from the air.]
- Why does this happen?  
[You take in more oxygen because more oxygen is being used by cells, and this keeps the amount of oxygen in the body stable.]
- How is your increased breath rate evidence of your body systems working together to maintain homeostasis?  
[The respiratory system is taking in more oxygen than the circulatory system delivers to your cells.]



## Reading “How You Are Like a Sneezing Iguana”

1. Read and annotate the “How You Are Like a Sneezing Iguana” article.
2. Choose and mark annotations to discuss with your partner. Once you have discussed these annotations, mark them as discussed.
3. Now, choose and mark a question or connection, either one you already discussed or a different one that you would like to discuss with the class.
4. Answer the reflection question below.

Rate how successful you were at using Active Reading skills by responding to the following statement:

**As I read, I paid attention to my own understanding and recorded my thoughts and questions.**

- Never
- Almost never
- Sometimes
- Frequently/often
- All the time

### Active Reading Guidelines

1. Think carefully about what you read. Pay attention to your own understanding.
2. As you read, annotate the text to make a record of your thinking. Highlight challenging words and add notes to record questions and make connections to your own experience.
3. Examine all visual representations carefully. Consider how they go together with the text.
4. After you read, discuss what you have read with others to help you better understand the text.

## Second Read of “How You Are Like a Sneezing Iguana”

### Part 1

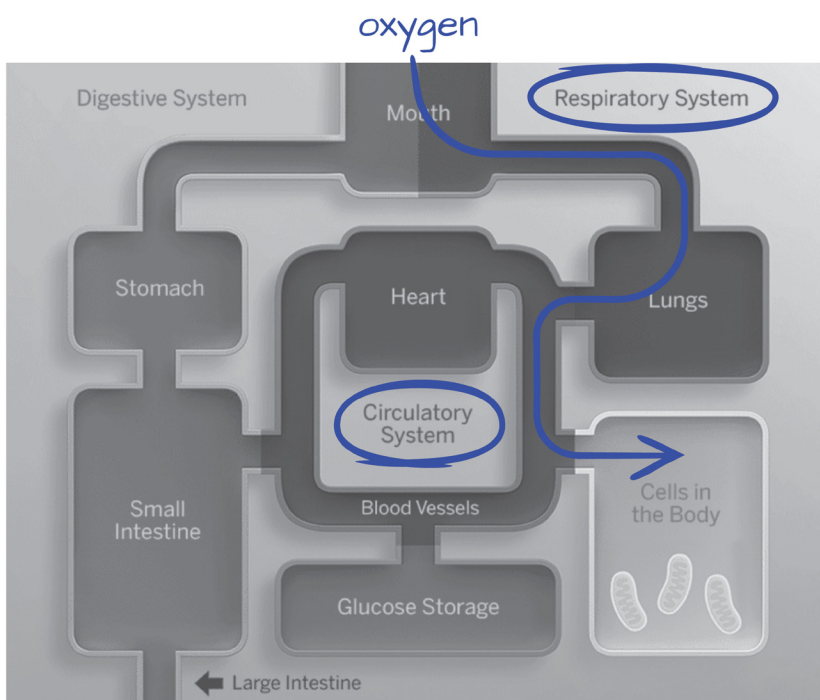
Reread paragraphs 2 and 3 of the article “How You Are Like a Sneezing Iguana.” As you read, highlight information that helps you explain why you breathe faster when you exercise. You will use that information to help you answer the questions in Part 2.

### Part 2

A cyclist starts a race. As she pedals, she begins to breathe faster. Why?

The cyclist breathes faster to take in more oxygen. Her muscle cells are using more oxygen, so taking in more oxygen helps keep the level of oxygen in her body stable.

How do the cyclist’s body systems work together as she breathes faster? You can add notes to the diagram below to explain your thinking.



The respiratory system delivers oxygen to the circulatory system, which delivers the oxygen to the muscle cells.