

AmplifyScience



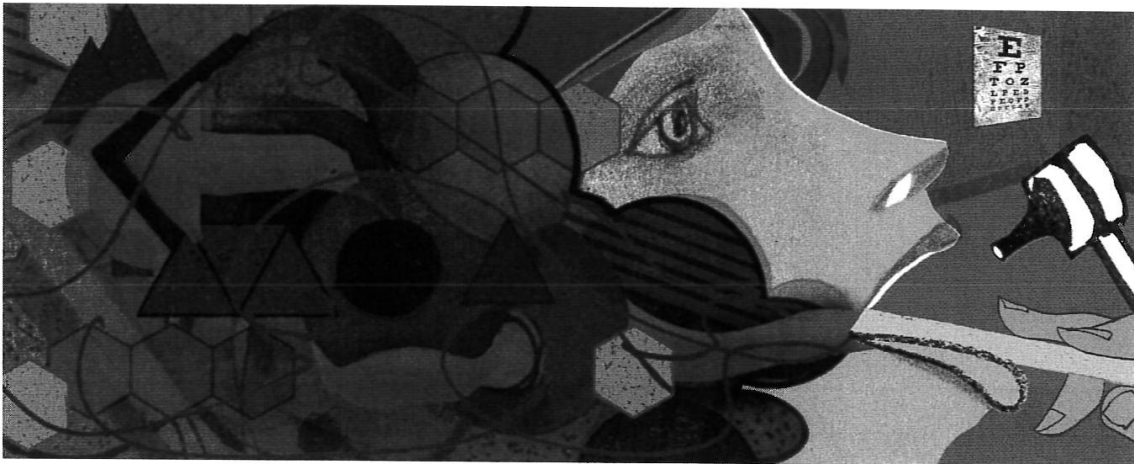
Metabolism: Making the Diagnosis

Investigation Notebook

Name: _____ Date: _____

Chapter 1: Molecules Needed by the Cells Chapter Overview

Welcome to medical school! Soon you'll meet your first patient, Elisa. In order to help diagnose her condition, you are going to become an expert on metabolism—all the things that occur inside our bodies to keep them functioning. Along with your fellow medical students, you will be learning about the human body just as medical professionals do: through investigating, reading, writing, and discussing. With your new knowledge, you will be ready to explain what is going wrong inside Elisa's body that is causing her to feel tired all the time.



Name: _____ Date: _____

Lesson 1.2: Welcome to Medical School

Welcome to your first day of medical training! Today, you'll meet a patient, Elisa, and discuss what might be causing her symptoms. To get started working toward a diagnosis, you'll use the *Metabolism* Simulation to explore what happens inside a human body.

Unit Question

- How do the trillions of cells in the human body get what they need to function, and what do the cells do with the things they absorb?

Chapter 1 Question

- Why does Elisa feel tired all the time?

Vocabulary

- cells
- claim
- metabolism

Digital Tools

- *Metabolism* Simulation (Healthy Body)

Name: _____ Date: _____

Warm-Up

Why do you think your new patient, Elisa, is feeling tired all the time? Explain your ideas.

Name: _____ Date: _____

Introducing the *Metabolism* Simulation

Part 1

1. Launch the *Metabolism* Simulation.
2. Select HEALTHY BODY from the menu.
3. Select OBSERVE.
4. Explore with your partner.
5. Think about these questions:
 - How does the Simulation work?
 - What do you notice?

Part 2

Keep observing the *Metabolism* Simulation, but now focus on this question:

- What happens to the food and air that enter this healthy Simulation body?

Part 3

Consider the following question as you observe:

- Which molecules are entering the cell?

Name: _____ Date: _____

Homework: Testing Diets in the Sim

In this homework, you will experiment with different diets in the Simulation to see how the diet affects the number of molecules getting to the cells.

1. Launch the *Metabolism* Simulation.
2. Select HEALTHY BODY and then select TEST.
3. Plan at least three different tests of the diet for the healthy body. Record your plans in the Diet Plan tables below.
4. Run your tests and record your results: the number of molecules absorbed by the cells.

How to Use Test Mode:

- Set up a pre-planned diet by pressing on items under Add Food Source. Then, press play and observe the Simulation. The diet you selected is fed to the body automatically, and the test runs until the timer reaches 200. During the test, you can observe the Sim in the Live View or switch to the Graph View. In the Graph View, you can see the final results for Total Molecules Absorbed by Cells, which is the data you will record below.
- **Note:** With some diets, your Simulation body will run out of energy before you reach 200 seconds. You'll need to reset and try a new diet.

Healthy Body Diet Tests

Diet Plan #1

Food	Number of servings
corn	
fish	
sandwich	

Results of Diet Plan #1

Molecule	Number of molecules absorbed by cells
glucose	
amino acids	
oxygen	

Diet Plan #2

Food	Number of servings
corn	
fish	
sandwich	

Results of Diet Plan #2

Molecule	Number of molecules absorbed by cells
glucose	
amino acids	
oxygen	

Diet Plan #3

Food	Number of servings
corn	
fish	
sandwich	

Results of Diet Plan #3

Molecule	Number of molecules absorbed by cells
glucose	
amino acids	
oxygen	

Name: _____ Date: _____

Lesson 1.3: Evaluating Initial Claims About Elisa

What's going on with Elisa? Could it be something happening in her cells? Today, you will learn more about the molecules that cells need to function in a healthy body. Cells are everywhere in your body and make up most of your living tissue—for example, your heart, lungs, skin, and muscles are all made of different types of cells. When your cells don't get the molecules they need, you can feel sick and tired, as Elisa does. Today, you will also get new evidence about Elisa—the results from food and sleep journals she kept. You'll evaluate this evidence and decide whether it supports any of our possible claims.

Unit Question

- How do the trillions of cells in the human body get what they need to function, and what do the cells do with the things they absorb?

Chapter 1 Question

- Why does Elisa feel tired all the time?

Key Concept

- A functioning human body has molecules from food (glucose and amino acids) and molecules from air (oxygen) in its cells.

Vocabulary

- cells
- claim
- evidence
- glucose
- metabolism
- molecules
- oxygen

Digital Tools

- *Metabolism* Modeling Tool activities: 1.3 Warm-Up and 1.3 Molecules in a Cell
- *Metabolism* Sorting Tool activity: 1.3 Evaluating Evidence
- Scale Tool

Name: _____ Date: _____

Warm-Up

Launch the *Metabolism* Modeling Tool activity: 1.3 Warm-Up.

- The *Metabolism* Modeling Tool is a tool you will use often to show your thinking about how the human body works.
- Spend the next few minutes trying out different things in the Modeling Tool to get familiar with how it works.
- Try moving the molecules around the body to show your ideas about what happens inside a human body.
- When your model is complete, press HAND IN. If you worked with a partner, write his or her name here: _____

Goal: Explore the Modeling Tool.

Do:

- Try moving the molecules around the body to show your ideas about what happens inside a human body.

Name: _____ Date: _____

Reading “Molecules Cells Need”

1. Read the article “Molecules Cells Need.” Add annotations as you read.
2. Choose and mark annotations to discuss with your partner. Once you have discussed these annotations, mark them as discussed.
3. Read the article a second time, focusing on the questions your teacher wrote on the board.
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.

Name: _____ Date: _____

Modeling Molecules in a Healthy Cell

1. Launch the *Metabolism* Modeling Tool activity: 1.3 Molecules in a Cell.
2. Use the information from the article you have just read to model the molecules you think should be in the functioning cells of a healthy body.
3. When your model is complete, press HAND IN. If you worked with a partner, write his or her name here: _____

Goal: Show which molecules should be in the functioning cells of a healthy body.

Do:

- Add molecules to the cell.

Name: _____ Date: _____

Evaluating New Evidence About Elisa

Part 1

Work with your partner to decide which card offers higher quality evidence, based on how much evidence was collected.

- Be prepared to explain your evaluation.

Evidence Card A

John observed his 14-year-old brother's sleep for one night. His brother slept for 10 hours. Based on this, John concluded that all 14-year-olds need 10 hours of sleep a night.

Evidence Card B

Scientists observed 2,000 healthy 14-year-olds sleep for one month each. The average number of hours the 14-year-olds slept was 9.4 hours. Based on this, the scientists concluded that 14-year-olds need about 9 hours of sleep a night.

Name: _____ Date: _____

Evaluating New Evidence About Elisa (continued)

Part 2

Launch the *Metabolism* Sorting Tool activity: 1.3 Evaluating Evidence.

1. With your partner, examine the evidence cards and consider where these cards would be placed on the Evidence Gradient.
2. Discuss if there are any low-quality pieces of evidence that should be eliminated.
3. Decide whether this evidence supports or contradicts any of the possible claims about Elisa.
4. When you have finished sorting the evidence, press HAND IN. If you worked with a partner, write his or her name here: _____

Claims

Elisa is feeling tired:

- because she isn't getting enough sleep.
- because she is not eating enough food or not eating the right foods.
- because she has a medical condition.

Name: _____ Date: _____

Evaluating Claims About Elisa

Healthy Sleep Comparison

Average Teenage Sleep Patterns	Elisa's Sleep Pattern
Many scientific studies of teenagers show that most healthy teenagers get between 8 and 10 hours of sleep each night.	Elisa's sleep journal shows that she is getting about 9 hours of sleep every night.

Healthy Eating Comparison

Average Teenage Eating Habits	Elisa's Eating Habits
A scientific study done on 1,000 healthy 14-year-olds found that they ate between 5 and 8 servings of starch per day and between 1 and 4 servings of protein per day.	Elisa's food journal shows that she ate between 6 and 8 servings of food that contained starch every day. She ate between 2 and 4 servings of food that contained protein every day.

Name: _____ Date: _____

Homework: Exploring the Relative Scale of Molecules

Molecules, even though they are very tiny, can be different sizes. Below is a list of some of the molecules that are in the *Metabolism* Simulation.

glucose molecule
starch molecule
protein molecule
carbon dioxide molecule
water molecule
amino acid molecule
oxygen molecule

1. In the space below, list the molecules in order from smallest to largest. It is okay if you aren't sure.

Smallest

Largest

2. Do you think these molecules are larger or smaller than a cell in the human body? Explain your answer.

3. Explore the Scale Tool if you want to learn more about these different-sized molecules that can be found in the human body.

Name: _____ Date: _____

Homework: Check Your Understanding

This is a chance for you to reflect on your learning so far. This is not a test. Be open and truthful when you respond to the question below.

Scientists investigate in order to figure things out. Are you getting closer to figuring out why your patient, Elisa, could be feeling so tired?

1. I understand what molecules Elisa's cells need and where they come from.

- yes
 not yet

Explain your answer choice above.

2. I understand how those molecules get to the cells in Elisa's body.

- yes
 not yet

Explain your answer choice above.

3. I understand how the cells use those molecules to release energy for Elisa's body to function.

- yes
 not yet

Explain your answer choice above.

Name: _____ Date: _____

Homework: Check Your Understanding (continued)

4. What do you still wonder about Elisa's condition or how her body gets what it needs to function?

Name: _____ Date: _____

Chapter 2: Body Systems Chapter Overview

In Chapter 1, you learned about the molecules that need to get to Elisa's cells. But how do the molecules get to the cells? In Chapter 2 you'll investigate how different systems of the body work together to get the cells what they need. You will also investigate what happens when body systems fail.



Name: _____ Date: _____

Lesson 2.1: Exploring the Classroom Body Systems Model

Today, you'll be playing a role in a classroom-sized model of the human body. You'll get to be one of the body systems that takes in molecules from food and air and delivers them to cells, or you might get to be a cell that needs molecules. Either way, this experience will help you learn more about how a healthy body works so that you can figure out what might be going wrong with the systems in Elisa's body.

Unit Question

- How do the trillions of cells in the human body get what they need to function, and what do the cells do with the things they absorb?

Chapter 2 Question

- What is happening in Elisa's body that could be preventing molecules from getting to her cells?

Vocabulary

- amino acids
- circulatory system
- digestive system
- glucose
- oxygen
- respiratory system

Digital Tools

- *Metabolism* Simulation (Healthy Body)

Name: _____ Date: _____

Warm-Up

1. Launch the *Metabolism* Simulation.
2. Select HEALTHY BODY.
3. Select OBSERVE.
4. Focus on *just* oxygen by selecting the other molecules at the bottom of the screen to hide them.
5. Observe how oxygen moves through different parts of the body. Then, answer the question below.

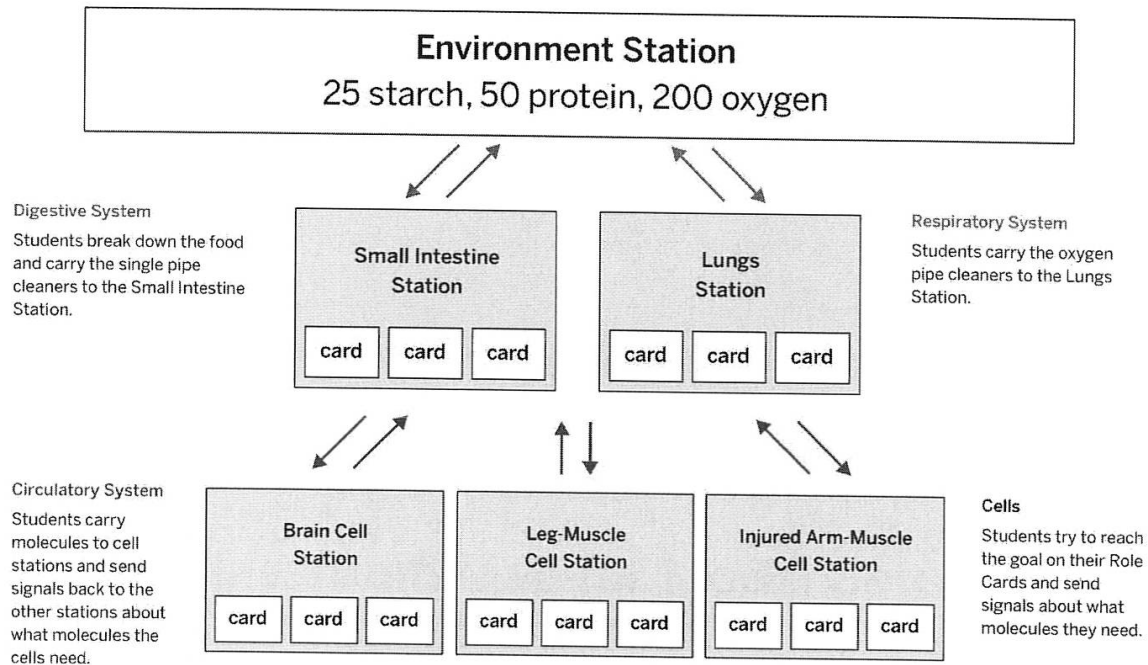
What do you notice about the path oxygen molecules take inside the *Metabolism* Simulation of a healthy body? Describe in detail.

Name: _____ Date: _____

Classroom Body Systems Model

Part 1: Running the Model

Classroom Map for Model Setup



Part 2: Discussing the Model

Discuss your answers to the questions below with your group. Make sure each person in your group has a turn to share.

- What did you do in your role in the Classroom Body Systems Model?
- What did you learn about this body system or the cells in the body from participating in this model?

Name: _____ Date: _____

Homework: Making Observations in the Sim

Make observations about how the different body systems work in the *Metabolism* Sim. Record your observations and answer the questions below.

1. Launch the *Metabolism* Simulation, select HEALTHY BODY, and select OBSERVE.
2. Feed the body sandwiches (which provide a mix of molecule types).
3. Focus on what happens to starch in the digestive system. Turn off all the molecules except for starch and glucose. What do you observe?

4. Now repeat your observation, but this time turn off all the molecules except for protein and amino acids. What do you observe?

5. Finally, turn off all the molecules except for oxygen. What do you observe?

6. Which molecules from food and air end up in the cells in the body? (circle all that apply)

starch amino acids oxygen glucose fiber protein

7. Match each body system to what it does by drawing a line between the system (in the left column) and what it does (in the right column).

circulatory system

breaks down large molecules into smaller molecules

digestive system

takes in oxygen molecules from the environment

respiratory system

delivers molecules to cells in the body

Name: _____ Date: _____

Homework: Making Observations in the Sim (continued)

8. What questions do you still have about how molecules from food and air get to the cells in the body?

Name: _____ Date: _____

Lesson 2.2: Patient Stories: Problems with Body Systems

Elisa's medical team thinks there are a few different medical conditions that might explain her symptoms. You will be working in a four-person group to learn as much as you can about each condition so that in a few days you can help make a diagnosis. Today, you'll begin to become an expert on one of four conditions—either anemia, asthma, diabetes, or pancreas injury—by reading an article. Each of these conditions can make it difficult for the body's systems to provide molecules the cells need.

Unit Question

- How do the trillions of cells in the human body get what they need to function, and what do the cells do with the things they absorb?

Chapter 2 Question

- What is happening in Elisa's body that could be preventing molecules from getting to her cells?

Key Concepts

- Cells can only use molecules that are small enough to enter a cell.
- The respiratory system brings in oxygen molecules from the air. These oxygen molecules are already small enough to fit into cells.
- The digestive system brings in food and breaks it down into smaller molecules, such as glucose and amino acids, that can fit into cells.
- The circulatory system transports glucose, oxygen, and amino acid molecules to every cell in the body.

Vocabulary

- glucose
- system
- metabolism
- oxygen

Digital Tools

- *Metabolism* Modeling Tool activity: 2.2 Warm-Up
- *Metabolism* Simulation (Anemia, Asthma, Diabetes, and Pancreas Injury)

Name: _____ Date: _____

Warm-Up

1. Launch the *Metabolism Modeling Tool* activity: 2.2 Warm-Up.
2. When your model is complete, press HAND IN. If you worked with a partner, write his or her name here: _____

Goal: Model your ideas about how molecules from food and air get to the cells in the body.

Do:

- Add molecules along the path they take in the body until they reach the cell. Use only as many molecules as you need to show the path.
- A number 1 has been added to the starch molecule to show where this molecule starts its path through the body. Add a number 2 where you think the molecule goes next. Continue to add numbers until the molecules reach the cell.
- If a molecule breaks down into smaller molecules, use an arrow to represent this process.
- If you have time, show the path molecules from air take through the body to reach the cell.

Tips:

- A starch molecule has been placed in the mouth because starch is in food.

Name: _____ Date: _____

Reading *Patient Stories*

1. Choose an article from the article set *Patient Stories: Problems with Body Systems*. Read and annotate the 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 you still want 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.

Name: _____ Date: _____

Homework: Using the Sim to Observe a Condition

1. Launch the *Metabolism* Sim.
2. Choose the condition you read about below, and then select OBSERVE.
3. Feed and observe the body.
4. Record your observations and questions.

Condition: (circle one)

anemia

asthma

diabetes

pancreas injury

Observations in the Simulation of this condition:

Questions I have about this condition:

Name: _____ Date: _____

Lesson 2.3: Learning More About a Condition

What exactly happens in the body of a person with asthma, anemia, diabetes, or a pancreas injury? Today, you'll show your ideas about this by creating a model of the condition you read about, using the *Metabolism* Modeling Tool. You'll get the information you need to make your model by rereading the *Patient Stories* article you read in the previous lesson. Your model will help your group make a diagnosis.

Unit Question

- How do the trillions of cells in the human body get what they need to function, and what do the cells do with the things they absorb?

Chapter 2 Question

- What is happening in Elisa's body that could be preventing molecules from getting to her cells?

Key Concepts

- Cells can only use molecules that are small enough to enter a cell.
- The respiratory system brings in oxygen molecules from the air. These oxygen molecules are already small enough to fit into cells.
- The digestive system brings in food and breaks it down into smaller molecules, such as glucose and amino acids, that can fit into cells.
- The circulatory system transports glucose, oxygen, and amino acid molecules to every cell in the body.
- In a functioning human body, body systems work together to deliver glucose, oxygen, and amino acid molecules to the cells in the body.
- Systems can work together to form a larger more complex system.

Vocabulary

- circulatory system
- glucose
- molecules
- respiratory system
- digestive system
- metabolism
- oxygen
- system

Digital Tools

- *Metabolism* Modeling Tool activity: 2.3 Model a Condition
- *Metabolism* Simulation (Anemia, Asthma, Diabetes, and Pancreas Injury)

Name: _____

Date: _____

Warm-Up

Answer the question below. Then, explain why your answer is the best one.

Why can't a starch molecule enter a cell right after a person eats a meal with starchy foods in it?
(check one)

- Because a starch molecule only stays in the digestive system and never leaves it to go into other systems.
- Because a starch molecule is too large to fit into a cell and needs to first be broken down into smaller glucose molecules in the digestive system.
- Because starch molecules first need to enter the respiratory system before they can get into cells.

Why is your answer the best one?

Name: _____ Date: _____

Second Read of *Patient Stories* Articles

Reread the article from the *Patient Stories* article set about the condition you read about in the last lesson. Answer the following questions about this condition.

1. Which condition did you read about? (circle one)

anemia

asthma

diabetes

injury to the pancreas

2. Which body system or systems are affected by this condition? (circle all that apply)

digestive

respiratory

circulatory

3. Which molecules are affected by this condition? (circle all that apply)

oxygen

glucose

amino acids

4. Describe what is going wrong in the body of a person with this condition that is preventing the right molecules from getting to the body's cells.

Name: _____ Date: _____

Modeling a Condition

1. Launch the *Metabolism* Modeling Tool activity: 2.3 Model a Condition.
2. When your model is complete, press HAND IN. If you worked with a partner, write his or her name here: _____

Goal: Change this model of a healthy body to show what happens in a body with a medical condition.

Do:

- Add molecules to or remove molecules from her healthy body to show how her body would change if she had the condition you read about (asthma, anemia, pancreas injury, or diabetes).

Tips:

- This model is of a healthy person's body.
- Her body is taking in the molecules she needs and delivering them to her cells.
- Remember to look back at the article to check if your model fits with what you read about the condition.

Name: _____ Date: _____

Comparing Models to the Sim

1. Launch the *Metabolism* Sim.
2. Select the condition you read about (asthma, anemia, diabetes, or pancreas injury), and then select OBSERVE.
3. Feed and observe the body.
4. Explain what you observed in the Sim and how it fits with your model or doesn't fit with your model.

Name: _____ Date: _____

Homework: Ideas About Elisa's Condition

1. Do you think Elisa might have the condition you read about? Why or why not? (Make sure to identify the condition in your response.)

2. What further evidence do we need to diagnose Elisa?

Name: _____ Date: _____

Homework: Reading “Meet a Scientist Who Grows New Cells”

Did you know scientists can grow new cells? To learn more about a scientist who is studying how to solve medical problems by growing new cells, read and annotate the “Meet a Scientist Who Grows New Cells” article. Then, answer the question below.

What is one interesting thing you learned from this article?

Name: _____

Date: _____

Lesson 2.4: Conducting Sim Tests

In this lesson, you will deepen your understanding of how medical conditions affect the human body. To do this, you will use the *Metabolism* Sim to conduct tests that will reveal how healthy bodies are different from bodies with medical conditions. You will work with a partner to discuss the data you collect from the Sim.

Unit Question

- How do the trillions of cells in the human body get what they need to function, and what do the cells do with the things they absorb?

Chapter 2 Question

- What is happening in Elisa's body that could be preventing molecules from getting to her cells?

Key Concepts

- Cells can only use molecules that are small enough to enter a cell.
- The respiratory system brings in oxygen molecules from the air. These oxygen molecules are already small enough to fit into cells.
- The digestive system brings in food and breaks it down into smaller molecules, such as glucose and amino acids, that can fit into cells.
- The circulatory system transports glucose, oxygen, and amino acid molecules to every cell in the body.
- In a functioning human body, body systems work together to deliver glucose, oxygen, and amino acid molecules to the cells in the body.
- Systems can work together to form a larger more complex system.

Vocabulary

- | | | |
|----------------------|--------------|----------------------|
| • circulatory system | • metabolism | • respiratory system |
| • digestive system | • molecules | • system |
| • glucose | • oxygen | |

Digital Tools

- *Metabolism* Simulation (Healthy Body, Anemia, Asthma, Diabetes, and Pancreas Injury)
- *Metabolism* Modeling Tool activity: 2.4 Homework

Name: _____

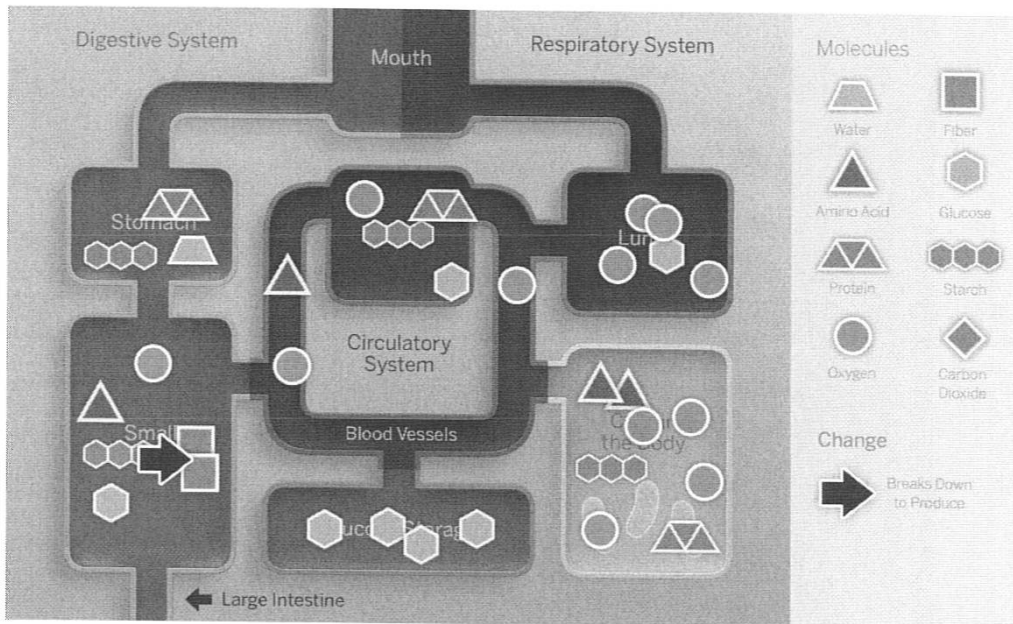
Date: _____

Warm-Up

An intern at the hospital created this model to show what happens to the molecules in a healthy person's body after they eat and breathe. The model has some very big mistakes. Add annotations to the image to explain to the intern what is inaccurate about the model.

These sentence starters can help you:

- This molecule would not be found in this body system because . . .
- This molecule would not be found in the cells in the body because . . .



Name: _____ Date: _____

Making Comparisons with the Sim

Part 1: Making Predictions

Predict what you will see in the Simulation of the body with the condition you studied. Circle your answers below.

The medical condition that I am learning about is (**anemia** / **asthma** / **diabetes** / **pancreas injury**).

It affects this/these molecule(s) that the human body needs to function: (**oxygen** / **glucose** / **glucose and amino acids**).

In the cells of a body with this condition, I would expect to see (**fewer** / **more**) (**oxygen** / **glucose** / **glucose and amino acids**) molecules than in a healthy body.

Why do you expect to see this in the Simulation? Explain your ideas.

Name: _____ Date: _____

Making Comparisons with the Sim (continued)

Part 2: Testing a Healthy Body

Launch the *Metabolism* Simulation.

1. Select HEALTHY BODY, select TEST, and then feed the Healthy Body: two corn, two fish, and two sandwiches.
2. Set the activity level to Walk.
3. Press play to begin the test and switch to Graph View to see the results. (Hint: You can make the tests faster by changing the speed of the Simulation.)
4. Record the results in the data table.
5. Repeat the test and record the results in the Trial 2 column of the table. Record any additional observations in the space below the table.

Data for Healthy Body

	Trial 1	Trial 2
Total glucose molecules absorbed by cells		
Total amino acid molecules absorbed by cells		
Total oxygen molecules absorbed by cells		
Oxygen molecules taken in per breath		

Observations

Name: _____ Date: _____

Making Comparisons with the Sim (continued)

Part 3: Testing a Body with a Condition

Launch the *Metabolism* Simulation.

1. Select the body with the condition you read about, select TEST, and then feed the body with a condition: two corn, two fish, and two sandwiches.
2. Set the activity level to Walk.
3. Press play to begin the test and switch to Graph View to see the results. (Hint: You can make the tests faster by changing the speed of the Simulation.)
4. Record the results in the data table.
5. Repeat the test and record the results in the Trial 2 column of the table. Record any additional observations in the space below the table.

The medical condition I tested was: _____

Data for Body with a Medical Condition

	Trial 1	Trial 2
Total glucose molecules absorbed by cells		
Total amino acid molecules absorbed by cells		
Total oxygen molecules absorbed by cells		
Oxygen molecules taken in per breath		

Observations

Name: _____ Date: _____

Making Comparisons with the Sim (continued)

Part 4: Comparing Your Results

1. Review your data and observations for the healthy body and the body with a condition. How are these two bodies different? Record your ideas below.

2. Use your data tables and your recorded observations to discuss these questions with your partner:
 - How were the healthy body results different from the results for the body with a condition? Was this what you predicted?
 - Why do you think the body with a condition was different from the healthy body? Explain your understanding of this medical condition to your partner.

Name: _____ Date: _____

Word Relationships: Discussing Conditions

1. Work with your partner to create a sentence that answers each question, using one or more of the vocabulary words. Every word must be used at least once.
2. After you have discussed, record your sentences below.

Note: Work on either the asthma and anemia questions OR the diabetes and pancreas injury questions, not both.

Word Bank

oxygen	circulatory system	starch
respiratory system	cells	digestive system

Asthma and anemia questions	Diabetes and pancreas injury questions
1. What happens to oxygen in the body of a healthy person?	1. What happens to glucose in the body of a healthy person?
2. What happens to oxygen in the body of a person with anemia?	2. What happens to glucose in the body of a person with diabetes?
3. What happens to oxygen in the body of a person with asthma?	3. What happens to glucose in the body of a person with a pancreas injury?
4. What happens to glucose in the body of a healthy person?	4. What happens to oxygen in the body of a healthy person?

Name: _____ Date: _____

Homework: Revising Inaccurate Models in the Modeling Tool

1. Launch the *Metabolism* Modeling Tool activity: 2.4 Homework.
2. When your model is complete, press HAND IN. If you worked with a partner, write his or her name here: _____
3. Then, answer the question below.

Goal: Change this incorrect model so that it correctly shows what happens after a healthy person eats and breathes.

Do:

- Add and remove molecules from the different body systems so that the model accurately represents a healthy body.

Tips:

- Remember this model has some very big mistakes.

Which molecules do cells need to get from outside the body in order to function properly? (check one)

- water, oxygen, and carbon dioxide
- glucose, amino acids, and oxygen
- starch, protein, and fiber
- glucose, water, and protein

Explain what you changed about the model and why.

Name: _____

Date: _____

Lesson 2.6: Playing Guess My Model

Even medical students have fun sometimes, right? Today, you will play a game using the *Metabolism* Modeling Tool. You will work with a partner, and each of you will make a model of something that can happen inside the human body. You won't know what your partner is modeling. Then, you will try to figure out what your partner modeled. This game will help you review important ideas and apply everything you've learned so far about how the human body gets molecules to its cells.

Unit Question

- How do the trillions of cells in the human body get what they need to function, and what do the cells do with the things they absorb?

Chapter 2 Question

- What is happening in Elisa's body that could be preventing molecules from getting to her cells?

Key Concepts

- A functioning human body has molecules from food (glucose and amino acids) and molecules from air (oxygen) in its cells.
- Cells can only use molecules that are small enough to enter a cell.
- The respiratory system brings in oxygen molecules from the air. These oxygen molecules are already small enough to fit into cells.
- The digestive system brings in food and breaks it down into smaller molecules, such as glucose and amino acids, that can fit into cells.
- The circulatory system transports glucose, oxygen, and amino acid molecules to every cell in the body.
- In a functioning human body, body systems work together to deliver glucose, oxygen, and amino acid molecules to the cells in the body.
- A problem with a body system can result in fewer oxygen, glucose, and/or amino acid molecules getting to the body's cells.
- Systems can work together to form a larger more complex system.

Vocabulary

- | | | | |
|----------------------|--------------|----------------------|----------|
| • amino acids | • glucose | • oxygen | • starch |
| • circulatory system | • metabolism | • protein | • system |
| • digestive system | • molecules | • respiratory system | |

Digital Tools

- *Metabolism* Modeling Tool activities: 2.6 Green Group, 2.6 Blue Group, 2.6 Purple Group

Name: _____ Date: _____

Warm-Up

In your Digital Resources, find and read the background information for your group.

- For example, if you are in the Purple Group, you will read the background information labeled "Purple Group." This will help prepare you for the game we are going to play today.

Name: _____ Date: _____

Playing the Guess My Model Game

Launch the *Metabolism* Modeling Tool activity for your group, and then follow the instructions below to play the Guess My Model Game.

Guess My Model Game Instructions

1. Each partner gets an envelope with a set of cards.
2. Each partner shuffles their set of cards and turns them face down.
3. Each partner chooses a card from their pile. (Do not let your partner see your card.)
4. Reread the Background Information for the scenario on the card you chose.
5. Using the Modeling Tool, make a model of the scenario.
6. The first partner guesses first: use the Key and Background Information to decide which scenario you think your partner modeled.
7. Give feedback and revise the model with your partner, if needed.
8. Switch roles: the second partner guesses the first partner's model.
9. Play another round: each partner draws a new card.

Which group are you in (circle one)?

Green Group

Blue Group

Purple Group

What is one scenario that you modeled? _____

Describe what you showed in your model.

Name: _____ Date: _____

Reflecting on the Guess My Model Game

- Were there any scenarios that you had a hard time modeling?
- What did you learn from the game?
- Do you have any more questions about body systems?

Name: _____ Date: _____

Homework: Reading *Systems of the Human Body*

You have learned a lot about the circulatory, digestive, and respiratory systems. From the *Systems of the Human Body* article set, choose one of the other systems to read about and answer the questions below.

I read the article: (check one)

- "The Nervous System"
- "The Excretory System"
- "The Musculoskeletal System"
- "The Reproductive System"

1. What does this system do?

2. What are the important parts of this system?

Name: _____

Date: _____

Lesson 2.7: Diagnosing Elisa

Today, you will finally diagnose Elisa! You'll share your expertise with your group, explaining the condition you investigated and how it could affect Elisa's body systems. Then, you'll receive Elisa's test results and compare them to the Sim tests you did earlier. Together, your group will consider the possible claims about why Elisa is tired and decide on a diagnosis that is supported by all the available evidence. You'll craft a written argument supporting this diagnosis. This will help Elisa get the treatment she needs.

Unit Question

- How do the trillions of cells in the human body get what they need to function, and what do the cells do with the things they absorb?

Chapter 2 Question

- What is happening in Elisa's body that could be preventing molecules from getting to her cells?

Key Concepts

- Cells can only use molecules that are small enough to enter a cell.
- The respiratory system brings in oxygen molecules from the air. These oxygen molecules are already small enough to fit into cells.
- The digestive system brings in food and breaks it down into smaller molecules, such as glucose and amino acids, that can fit into cells.
- The circulatory system transports glucose, oxygen, and amino acid molecules to every cell in the body.
- In a functioning human body, body systems work together to deliver glucose, oxygen, and amino acid molecules to the cells in the body.
- A problem with a body system can result in fewer oxygen, glucose, and/or amino acid molecules getting to the body's cells.
- Systems can work together to form a larger more complex system.

Vocabulary

- | | | |
|----------------------|-------------|----------------------|
| • circulatory system | • evidence | • oxygen |
| • diagnosis | • glucose | • respiratory system |
| • digestive system | • molecules | • system |

Name: _____

Date: _____

Warm-Up

Read the message below. Then, answer the questions below the message.

To: Medical Students
From: Dr. Walker, MD
Subject: Elisa Rodriguez

Today is an exciting day; you will get Elisa's test results and work together to use all the available evidence to make a diagnosis.

Remember, our hospital medical team started you out with four possible claims about Elisa's condition:

- Elisa is feeling tired because she has diabetes.
- Elisa is feeling tired because she has anemia.
- Elisa is feeling tired because she has an injury to her pancreas.
- Elisa is feeling tired because she has asthma.

1. Which condition are you investigating? (circle one)

anemia

asthma

diabetes

injury to the pancreas

2. Which body system would have a problem if Elisa has the medical condition you've been investigating? (circle all that apply)

respiratory system

circulatory system

digestive system

3. Which molecule that cells need is affected by the medical condition you've been investigating? (circle all that apply)

amino acids

glucose

oxygen

water