

Slim Goodbody's Body Buddies

A Closer Look at the Systems of the Body

As new diseases are discovered and new vaccines are developed, issues of health and wellness are becoming increasingly talked about in our society. Consequently, students are curious about the way their bodies work. The *Slim Goodbody's Body Buddies* Teachers' Guide serves to fuel further exploration of bodily systems. By using this guide, you have an opportunity to tap into high student interest while exposing students to broader health and science issues.

Participation in these lessons will lead students to make global connections and understand higher-level concepts, such as awareness of bodily systems, health, and wellness. Students will become aware of some of the issues involved in staying healthy. They will realize that they can make a positive difference through their actions.

The lesson plans in this guide are tailored for grades 3-4 and address various subjects, such as science, language arts, mathematics, and social studies. Each lesson plan is designed to stand alone. As such, they do not need to be presented in sequential order. Helpful reproducible worksheets and rubrics appear at the end of the guide. The book titles referenced in this guide include:

The Amazing Circulatory System

The Astounding Nervous System

The Dynamic Digestive System

The Exciting Endocrine System

The Mighty Muscular and Skeletal System

The Remarkable Respiratory System

As students investigate the topics addressed in the guide and become more aware of their bodies and health, they will sharpen their critical thinking skills to work toward creative solutions to worldwide problems. We invite you to jump in and ask questions with your class as you have fun learning more about the systems of the body.



National Standards Correlation

Lesson Plan Title	Correlation to National Standards
Glands at Work	<p>Language Arts Students use spoken, written, and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion, and the exchange of information).</p> <p>Science Students should develop an understanding of personal health. Students should develop an understanding of the characteristics of organisms.</p> <p>Social Studies The learner can work independently and cooperatively to accomplish goals.</p>
Fill It Up!	<p>Language Arts Students adjust their use of spoken, written, and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes.</p> <p>Science Students should develop an understanding of the characteristics of organisms. Students should develop an understanding of personal health.</p>
Go With the Flow	<p>Language Arts Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes.</p> <p>Science Students should develop the abilities necessary to do scientific inquiry. Students should develop an understanding about scientific inquiry. Students should develop understanding of the characteristics of organisms.</p>
Moving Muscles	<p>Science Students should develop understanding of the characteristics of organisms. Students should develop understanding of personal health.</p> <p>Social Studies The learner can work independently and cooperatively to accomplish goals.</p>

Lesson Plan Title	Correlation to National Standards
Inside a Bone	<p>Language Arts Students use spoken, written, and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion, and the exchange of information).</p> <p>Science Students should develop an understanding of the characteristics of organisms. Students should develop an understanding of personal health.</p> <p>Social Studies The learner can work independently and cooperatively to accomplish goals.</p>
Follow the Food!	<p>Language Arts Students adjust their use of spoken, written, and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes.</p> <p>Science Students should develop an understanding of the characteristics of organisms. Students should develop an understanding of personal health.</p> <p>Social Studies The learner can work independently and cooperatively to accomplish goals.</p>
Break It Down	<p>Language Arts Students read a wide range of print and nonprint texts to build an understanding of texts, of themselves, and of the cultures of the United States and the world; to acquire new information; to respond to the needs and demands of society and the workplace; and for personal fulfillment. Among these texts are fiction and nonfiction, classic and contemporary works.</p> <p>Science Students should develop an understanding of personal health. Students should develop understanding of the characteristics of organisms.</p>
The Busy Brain	<p>Language Arts Students adjust their use of spoken, written, and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes.</p> <p>Science Students should develop an understanding of the characteristics of organisms. Students should develop an understanding of personal health.</p> <p>Social Studies The learner can work independently and cooperatively to accomplish goals.</p>

For state specific educational standards, please visit www.crabtreebooks.com/.

Overview and Scope of Lesson Plan Activities

Lesson Plan Title	Subject Areas	Major Concepts
Glands at Work	Language Arts Science Social Studies	<ul style="list-style-type: none"> • gland names • gland functions • matching
Fill It Up!	Language Arts Science Social Studies	<ul style="list-style-type: none"> • lung function • making a model
Go With the Flow	Language Arts Science	<ul style="list-style-type: none"> • blood vessels • effects of cholesterol • making a model
Moving Muscles	Science Social Studies	<ul style="list-style-type: none"> • types of muscles • muscle function • classifying
Inside a Bone	Language Arts Science Social Studies	<ul style="list-style-type: none"> • bone layers • making a model
Follow the Food!	Language Arts Science Social Studies	<ul style="list-style-type: none"> • path of digestion • organs used in digestion • solving a puzzle
Break It Down	Language Arts Science	<ul style="list-style-type: none"> • stomach digestion • making a model
The Busy Brains	Language Arts Science Social Studies	<ul style="list-style-type: none"> • parts of the brain • functions of the brain

Pacing Chart and Vocabulary

One class period is approximately 40 minutes.

Lesson Plan Title	Pacing	Vocabulary	Assessment
Glands at Work	1 class period	balance homeostasis hormone	Evaluate students' work for accuracy and completeness.
Fill It Up!	1–2 class periods	exhale inhale trachea	Evaluate student models and reproducibles for accuracy and understanding of major concepts.
Go With the Flow	1–2 class periods	arteries capillaries cholesterol veins	Check student models and reproducibles for comprehension of main concepts.
Moving Muscles	1 class period	cardiac involuntary skeletal smooth voluntary	Check student reproducibles for accuracy and completeness.
Inside a Bone	2 class periods	bone marrow cancellous bone compact bone periosteum	Check student models and reproducibles for accuracy and completeness.
Follow the Food!	1 class period	digest nutrients	Evaluate student puzzles for accuracy and understanding of major concepts.
Break It Down	1–2 class periods	chyme gastric acid mucus	Check student reproducibles for comprehension of main concepts.
The Busy Brain	2–3 class periods	brain stem cerebellum cerebrum lobes	Evaluate student posters and reproducibles for understanding of content.

Glands at Work

A Lesson on Glands and their Functions

Content

Students will learn about the different glands in the endocrine system and the way each gland functions in the body.

National Standards

The following standards will be addressed in the lesson:

Language Arts

Students use spoken, written, and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion, and the exchange of information).

Science

Students should develop an understanding of personal health.

Students should develop an understanding of the characteristics of organisms.

Social Studies

The learner can work independently and cooperatively to accomplish goals.

Multiple Intelligences

The following intelligences will be activated throughout the lesson:



Bodily-Kinesthetic



Linguistic



Logical-Mathematical

Prerequisites

Before starting the lesson, have students read the book *The Exciting Endocrine System*, paying particular attention to pages 10–23. Remind students that glands are special groups of cells in the endocrine system.

Materials

- *The Exciting Endocrine System* books
- 8–10 small strips of paper
- chalkboard and chalk or whiteboard and markers
- student copies of the *Glands at Work* reproducible
- scissors
- tape
- lined paper
- pens or pencils

Instructional Procedure

Anticipatory Set

Before the lesson, create strips of paper that list ways in which the body might “lose *balance*” during the course of a day. (Some examples are as follows: feel hungry and thirsty before meals, sweat when hot, shiver when cold, feel tired when up late, feel energetic after a nap, experience a rapid heartbeat while exercising, experience a slow heartbeat while resting.) Each paper strip should contain just one example. Distribute the paper strips to student volunteers, and have each student act out the description on his slip. When the other students guess the correct answers, write them on the board.

Class Discussion

Ask students to review what you’ve written on the board and identify what all the items have in common. (They are all signs that the body is out of balance.) Explain that the normal, balanced way the body works is called *homeostasis*. Then explain that the glands of the endocrine system help the body maintain balance, or homeostasis. Have students review page 8 of *The Exciting Endocrine System* and list the activities the endocrine system controls. (growth, strength, energy level, moods, hunger and thirst, body temperature, sleep) Ask students to explain how the glands control these functions. (They send out *hormones*, which are chemicals that travel through the body and send messages to the cells.)

Ask student volunteers to read aloud page 11 for an example of how one gland uses hormones to keep the body in balance. Then have another student provide a summary of the information on

Objectives

The student will be able to...

- name the glands in the endocrine system
- understand the functions and importance of the glands
- work in pairs to match glands to their functions

the page. (When it's dark, the pineal gland secretes melatonin to make you feel sleepy. When it's light, it secretes less melatonin so you feel awake. This helps the body get enough rest.) Point out that hormones help keep balance by starting some activities (such as releasing melatonin), and also stopping them.

Activity

Divide students into pairs, and distribute copies of the *Glands at Work* reproducible and scissors to each pair. Point out that the circles contain the names of glands, and the rectangles contain their functions. Have students cut out the circles and rectangles from the reproducible. Then explain that they must work with their partners to match each gland to its function. Use the pineal gland as an example. Tell students to find the circle that says "pineal gland" and match it to the correct rectangle. ("I help you fall asleep.") Encourage students to refer to their books for help.

When students have finished matching the glands to their functions, have them tape each circle-rectangle pair to a piece of lined paper, leaving a few blank lines beneath each pair of shapes. On these lines, they should write a sentence or two that explains how the gland carries out its function. Again, they should refer to the book for information.

Here is a list of the glands with their matching functions:

- **hypothalamus:** I help your body temperature stay the same.
- **pituitary:** I help you grow taller.
- **thyroid:** I help you change food into energy.
- **thymus:** I help your body fight diseases.
- **adrenal:** I help when you are in a dangerous situation or feel stressed.
- **pancreas:** I help control your blood sugar.
- **pineal:** I help you fall asleep.

Accommodations and Extensions

After student pairs match the glands to their functions, review their answers. Then work as a class to discuss how each gland carries out its job.

As an extension, ask students to choose one gland listed on the reproducible and do research on it. They should write a few sentences explaining what they learn, such as other functions the gland carries out, what happens if the gland stops working properly, or more detailed information about how the gland works.

Closure

As a class, review the matched pairs from the reproducible. Discuss each gland, its function, and how it carries out its function. Ask students to explain why the endocrine system is important. (The glands of the endocrine system keep the body balanced, have many jobs inside the body, and help people feel normal and healthy.)

Assessment

Evaluate students' work for accuracy and completeness.

Fill It Up!

A Lesson on Lung Function and the Respiratory System

Content

Students will learn about the parts of the lungs and how they function by making a model of a trachea and a lung.

National Standards

The following standards will be addressed in the lesson:

Language Arts

Students adjust their use of spoken, written, and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes.

Science

Students should develop an understanding of the characteristics of organisms.

Students should develop an understanding of personal health.

Multiple Intelligences

The following intelligences will be activated throughout the lesson:



Bodily-Kinesthetic



Logical-Mathematical



Visual-Spatial

Prerequisites

Have students read the book *The Remarkable Respiratory System* before starting the lesson, paying particular attention to pages 12–14.

Materials

- *The Remarkable Respiratory System* books
- student copies of the *Fill It Up!* reproducible
- straws (1 per student)
- balloons (1 per student)
- rubber bands (1 per student)

Instructional Procedure

Anticipatory Set

Have students take several deep breaths. Ask them how it feels as they take their breaths. (feel air going in their nose or mouth, chest expands, and feel air going out of their nose or mouth) Discuss what happens inside the body while a person takes a deep breath. (Air is pulled into and pushed out of the lungs.)

Class Discussion

Write the words *inhale* and *exhale* on the board, and ask students what the two words mean. (*Inhale* means to breathe in and *exhale* means to breathe out.) Explain that people are constantly inhaling and exhaling. Ask students where air enters the body. (through the nose or mouth) Explain that air flows through the nasal passages, into the nasal cavity, and into the pharynx. Write *trachea* on the board. Ask students what a trachea is and write their responses on the board. (the tube that air flows through to get to the lungs; a tube that runs down the center of your neck) Tell students that the trachea divides into two big branches that enter the lungs. Ask: *What are the branches called?* (the bronchial tubes) Point out that there is a right lung and a left lung. Write the word *lobes* on the board. Tell students that lobes are the sections of the lungs. Ask: *How many lobes are in each lung?* (three lobes in the right lung and two lobes in the left lung) Ask students to explain why there is a difference in lobes in the right and left lung. (The two lungs are not the same size. The left lung is smaller to leave room for the heart.)

Objectives

The student will be able to...

- understand how air enters the lungs
- make a model of a lung and trachea

Activity

Distribute the *Fill It Up!* reproducible, balloons, straws, and rubber bands, giving one of each to every student. Students will make a model of a trachea and a lung. Tell students to put the opening of the balloon over one end of the straw. Have them secure the balloon to the straw with the rubber band. The rubber band should be tight against the straw so that no air can enter. Ask students to experiment blowing into the straw to inflate the balloon. Students should also try to deflate the balloon. As students experiment, have them answer the questions on the reproducible.

Accommodations and Extensions

Have each student make their own model, but have them work in groups to complete their reproducible.

As an extension, ask students to make a diagram of the inside of a lung. Students should make each part a different color and label the parts correctly.

Closure

Ask students how their models are different from an actual trachea and lungs. (There are actually two lungs. The trachea divides into two branches called bronchial tubes.) Then have students explain what goes on inside the lung. Ask: *What would we see if the balloon lung worked like a real lung and we looked inside it?* (We would see the bronchial tubes divide into smaller and smaller branches until they end in the alveoli, which help transfer oxygen from the air in the lungs into our blood.)

Assessment

Evaluate student models and reproducibles for accuracy and understanding of major concepts.

Go With the Flow

A Lesson on Blood Vessels and the Circulatory System

Content

Students will learn how blood flows through normal and clogged blood vessels by making blood vessel models.

National Standards

The following standards will be addressed in the lesson:

Language Arts

Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes.

Science

Students should develop the abilities necessary to do scientific inquiry.

Students should develop an understanding about scientific inquiry.

Students should develop understanding of the characteristics of organisms.

Multiple Intelligences

The following intelligences will be activated throughout the lesson:



Bodily-Kinesthetic



Linguistic



Visual-Spatial

Prerequisites

Have students read the book *The Amazing Circulatory System* before starting the lesson.

Materials

- *The Amazing Circulatory System* books
- chalkboard and chalk or whiteboard and markers
- student copies of the *Go With the Flow* reproducible
- small pieces of clear plastic tubing that is 1½ inches (3.8 centimeters) wide (2 per student)
- modeling clay
- pencils
- small plastic trays or tubs (1 per every 3 or 4 students)
- small paper cups
- water in small containers

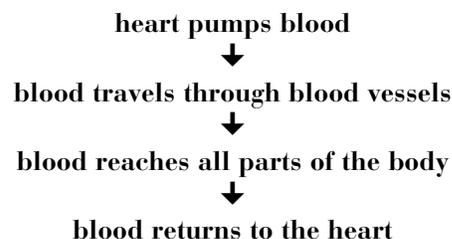
Instructional Procedure

Anticipatory Set

Have students stand up and do ten jumping jacks. Then ask them to sit down and find their pulse by placing their index and middle fingers on the inside of the opposite wrist. Ask students to explain what they're feeling. (their pulse; their heart pumping their blood) Have students explain why they can feel their pulse in their wrists. (because there are blood vessels there carrying the blood through the body)

Class Discussion

Draw the following flow chart on the board:



Ask students to explain what the flow chart shows. (how blood moves in a cycle through the body) Then ask students what blood brings to or takes away from the cells in the body. (delivers food and oxygen to cells, removes waste from cells) Tell students that since blood needs to reach all the parts of the body, there

Objectives

The student will be able to...

- understand how blood flows through the body
- define *cholesterol* and understand how it can damage a blood vessel
- make models of blood vessels

are different kinds of blood vessels to do different jobs. Explain that *arteries* carry blood away from the heart, *veins* bring blood back to the heart, and *capillaries* connect arteries to veins. Explain to students that sometimes the cycle of blood through the body can be slowed down by problems in the blood vessels. Have students look at page 22 of their books and ask: *What is cholesterol?* (a kind of fat that is carried through the blood) Ask students how cholesterol can affect blood vessels. (Cholesterol can stick to the sides of blood vessels, which can slow blood flow.)

Activity

Distribute the *Go With the Flow* reproducible, plastic tubing, modeling clay, and pencils to each student. Tell students that the pieces of plastic tubing represent blood vessels and the modeling clay represents cholesterol. Ask students to leave one tube alone to represent a normal blood vessel. Then tell them to put pieces of clay around the inside walls of the other tube to represent a blood vessel that is clogged with cholesterol. Students may use pencils to push the clay along the inside walls of the tube. Remind students to make sure there is still an empty hole going through the tube. Have students refer to page 22 of their *The Amazing Circulatory System* books to see what their models should look like.

Then divide students into groups of three or four. Give each group a small plastic tray or tub, a cup, and a small container of water. Have students experiment with pouring water through each tube, and have them compare the way the water flows through each. After they have finished their water experiments, have students complete their reproducibles.

Accommodations and Extensions

Demonstrate how to make the model of the clogged blood vessel. Then have students work in small groups to make their models and complete their reproducibles.

As an extension, have students use their *The Amazing Circulatory System* books to research what happens if cholesterol completely blocks a blood vessel. Have them write a paragraph describing how blocked blood vessels could lead to a heart attack.

Closure

Ask students how too much cholesterol affects the body. (It clogs the blood vessels; it makes it harder for blood to go through blood vessels; it slows the amount of blood that reaches cells in the body; parts of the body might be damaged if they don't get enough blood.) Ask students to describe ways they can control the amount of cholesterol in their bodies. (avoid fatty and fried foods; eat fruits, vegetables, and grains; avoid butter, margarine, and cream; avoid whole milk and shakes)

Assessment

Check student models and reproducibles for comprehension of main concepts.

Moving Muscles

A Lesson on the Different Types of Muscles

Content

Students will learn about the three types of muscles and where they are found in the body.

National Standards

The following standards will be addressed in the lesson:

Science

Students should develop understanding of the characteristics of organisms.

Students should develop understanding of personal health.

Social Studies

The learner can work independently and cooperatively to accomplish goals.

Multiple Intelligences

The following intelligences will be activated throughout the lesson:



Bodily-Kinesthetic



Linguistic



Visual-Spatial

Prerequisites

Have students read the book *The Mighty Muscular and Skeletal Systems* before starting the lesson.

Materials

- *The Mighty Muscular and Skeletal Systems* books
- small cups (1 per student)
- water
- diagrams of various body parts (see Activity section)
- student copies of the *Moving Muscles* reproducible

Instructional Procedure

Anticipatory Set

Give each student a cup of water. Ask students to take a sip of water, blink their eyes, and then feel their pulse on their wrists. Tell students that each of these actions uses different muscles in the body. Explain that *smooth* muscles send the water through their bodies, *skeletal* muscles make them blink, and *cardiac* muscles make their hearts beat, which produces a pulse.

Class Discussion

Write *smooth*, *skeletal*, and *cardiac* on the board. Ask students to use their *The Mighty Muscular and Skeletal Systems* books to help them identify examples of what each type of muscle does in the body. (Possible responses: smooth muscles move blood, food, and waste; cardiac muscle moves the heart; skeletal muscles move bones and other muscles or skin in the parts of the face.) As students provide responses, write them on the board under the appropriate category of muscle.

Explain to students that not only do the different types of muscles move different parts of the body, but they are also controlled in different ways. Tell students the difference between the meanings of the words *voluntary* and *involuntary*. (Voluntary is when you choose to do something and involuntary is when you do not have control over something.) Ask students to name a few places in the body where the muscles are voluntary (e.g., face, arm, toes, legs, tongue) and involuntary (e.g., blood vessels, intestines, liver, heart). Explain that the voluntary muscles they mentioned are all skeletal muscles, since you can choose to move your skeletal muscles. The involuntary muscles they mentioned are either smooth or cardiac muscles. Reinforce that you cannot control those muscles.

Objectives

The student will be able to...

- identify the types of muscles in the body
- identify which type of muscle controls specific body parts
- distinguish between voluntary and involuntary muscles

Activity

Before class begins, set up six stations around the classroom. At each station, place a picture or diagram of a body part and a brief description of the muscles involved in the movement or function of that part. Make sure you include at least one muscle of each of the three types (skeletal, smooth, and cardiac). Some examples of descriptions might include the following:

Skeletal “I am a mouth and I can move to make you smile.”

“I am an arm and I can help you throw a ball.”

Smooth “I am a stomach and I help digest food.”

“I am a blood vessel and I move your blood through your body.”

Cardiac “I am a heart and I pump your blood.”

Distribute the *Moving Muscles* reproducible to students. Divide the class into six groups, and have each group start at a different station. Tell students that they will visit each station to identify the type of muscle associated with the body part in the picture. They will then record their answers on the reproducible.

Accommodations and Extensions

Have students work as a class to complete the reproducible. Allow them to use their *The Mighty Muscular and Skeletal Systems* books for help.

As an extension, ask students to create a 3-way Venn diagram that compares and contrasts smooth, cardiac, and skeletal muscles.

Closure

Ask students to give examples of different actions that use voluntary muscles while sitting at their desks. (moving hands, fingers, and arms to write or type; blinking their eyes; sitting up in their chairs) Then ask them for examples of actions that use involuntary muscles while sitting at their desks. (heart is beating; blood vessels are pumping blood; stomach is mashing food) Have students discuss other ways that each type of muscle is used throughout the day.

Assessment

Check student reproducibles for accuracy and completeness.

Inside a Bone

A Lesson on the Composition of Bones

Content

Students will learn about the layers of a bone by making a bone model.

National Standards

The following standards will be addressed in the lesson:

Language Arts

Students use spoken, written, and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion, and the exchange of information).

Science

Students should develop an understanding of the characteristics of organisms.

Students should develop an understanding of personal health.

Social Studies

The learner can work independently and cooperatively to accomplish goals.

Multiple Intelligences

The following intelligences will be activated throughout the lesson:



Bodily-Kinesthetic



Linguistic



Visual-Spatial

Prerequisites

Have students read the book *The Mighty Muscular and Skeletal Systems* before starting the lesson, paying special attention to page 9.

Materials

- *The Mighty Muscular and Skeletal Systems* books
- small pieces of corrugated cardboard (6 total)
- chalkboard and chalk or whiteboard and markers
- toilet paper tubes (1 per 2 students)
- scissors
- white, green, and red modeling clay
- cellophane wrap
- toothpicks
- student copies of the *Inside A Bone* reproducible
- pens or pencils

Instructional Procedure

Anticipatory Set

Show students a few pieces of corrugated cardboard. Hand the pieces of cardboard to students and tell them to pass the pieces around the class. Ask: *What does the cardboard feel like?* (It is light and strong.) Then ask students to look inside the cut edge of the cardboard and describe what they see. (It has layers and empty space between the layers.) Tell students that the layers make the cardboard strong and keep it light.

Class Discussion

Tell students that bones are also built in layers, for the same reasons that the cardboard is built in layers: to keep the bones light and strong. Explain that if bones were completely solid, they would be too heavy. Ask students why bones need to be lightweight. (It would be hard to move if bones were very heavy)

Review page 9 of the book with students. Tell students that in order for bones to be light, they are built in three layers. Write *periosteum*, *compact bone*, and *cancellous bone* on the board, and have student volunteers describe each layer. (The periosteum is the thin outer layer of bone; compact bone is a smooth, hard layer of bone; cancellous bone is a layer of bone that has small holes like a sponge.) Explain that the empty spaces in cancellous bone are filled with *bone marrow*, which looks like jelly. Ask students how these layers make a bone lightweight. (They are not solid; cancellous bone is strong but has holes in it.)

Objectives

The student will be able to...

- identify the layers that make up bones
- describe the functions of each layer of bone
- make a model of a bone

Activity

Before class begins, cut the toilet paper tubes in half lengthwise. Then separate each color of modeling clay into 3-inch balls. Make enough clay balls for each student to have a white, green, and red ball. Distribute the toilet paper tubes, a green ball of modeling clay, a white ball of modeling clay, a red ball of modeling clay, a piece of cellophane wrap, and a toothpick to each student. Tell students that the cellophane wrap, toilet paper tube, and clay represent the layers of a bone.

Have students assemble the pieces to make a model of a bone. Ask them to follow these steps:

1. Flatten out the white ball of clay. Cover the outside of the toilet paper tube with the white clay.
2. Lay the cellophane wrap over the white clay. Press so that the wrap sticks to the clay.
3. Flatten out the green ball of clay. Cover the inside of the toilet paper tube with green clay. Then poke holes in the clay with the toothpick.
4. Roll the red clay into a long “snake.” Put it inside the middle of the green layer. Make sure it spans the entire length of the tube.

After the models are finished, distribute the *Inside a Bone* reproducible, and have students complete it by identifying which part of the bone is represented by each material and describing the function of each part of the bone. (Cellophane wrap is the periosteum, white clay on the paper tube is the compact bone, green clay with holes is cancellous bone, and red clay is bone marrow.)

Accommodations and Extensions

Show students a completed model to refer to while making their models. Have students work in groups to make their models and complete their reproducibles.

As an extension, have students use their models as a guide to draw a cross-section of a bone. Students should label each part of the bone and write a descriptive sentence about the function of each part. When they are finished, ask students to share their drawings with the class.

Closure

Discuss what bones do inside the body. (They grow to make people taller, they make blood cells, they protect the organs, and they hold a person’s body up.) Tell students that the layers in bones help make it possible for bones to do these jobs. Ask: *How does each layer work to help the whole bone?* (The periosteum brings nutrients to and takes the waste away from the bone; the compact bone is very hard and protects the inside of the bone; the cancellous bone protects the bone marrow; bone marrow makes blood cells that are used by the bone.)

Assessment

Check student models and reproducibles for accuracy and completeness.

Follow the Food!

A Lesson on the Digestive System

Content

Students will learn how food moves through the digestive path of the body by putting together a puzzle.

National Standards

The following standards will be addressed in the lesson:

Language Arts

Students adjust their use of spoken, written, and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes.

Science

Students should develop an understanding of the characteristics of organisms.

Students should develop an understanding of personal health.

Social Studies

The learner can work independently and cooperatively to accomplish goals.

Multiple Intelligences

The following intelligences will be activated throughout the lesson:



Bodily-Kinesthetic



Linguistic



Logical-Mathematical



Visual-Spatial

Prerequisites

Students should read the book *The Dynamic Digestive System* before starting the lesson to gain an understanding of the fact that food needs to be digested to be absorbed into our bodies.

Materials

- *The Dynamic Digestive System* books
- 2 bananas
- fork
- bowl
- chalkboard and chalk or whiteboard and markers
- student copies of the *Follow the Food!* reproducible
- scissors
- construction paper
- glue sticks
- pens or pencils

Instructional Procedure

Anticipatory Set

Show students the two whole bananas. Then unpeel both bananas and use the fork and bowl to mash one of them. Ask students: *What is the difference between these two bananas?* (One is whole and the other is broken into smaller pieces.) Explain to students that it is the job of the digestive system to break food into very small pieces. Ask them why our bodies need to break down our food. (to make the nutrients small enough to fit inside the tiny cells in our bodies)

Class Discussion

Tell students that each part of the digestive system does its part to break down food into small pieces so our bodies can use it. Explain that some parts of the body help you *digest* by mashing or squeezing, and some body parts help you digest by using chemicals. Ask students to give examples of parts of the digestive system that mash or squeeze food (your teeth chew; your stomach muscles mash food) and parts of the digestive system that use chemicals to break down food (salivary glands use saliva to make food soft; your stomach has acid that helps break down food; your intestines make digestive juices that help break food into *nutrients*).

Explain that the process of digestion follows a path. Ask students where food first enters the body. (the mouth) Ask: *What happens to food in the mouth?* (It is chewed into small pieces by the teeth; it mixes with *saliva*.) Then ask students where food goes once it is swallowed. (It moves down the esophagus to the

Objectives

The student will be able to...

- identify the name and function of the parts of the digestive system
- understand the path that food takes through the body

stomach.) Explain that after food reaches the stomach, it is broken down into smaller and smaller pieces by each part of the digestive system. Ask students what happens to food that cannot be digested. (It leaves the body as waste through the rectum.)

Activity

Distribute the *Follow the Food!* reproducible, scissors, pens or pencils, construction paper, and glue sticks. Have students make simple sketches of the parts of the digestive system on the blank puzzle pieces. Students may refer to pages 18 and 19 of their *The Dynamic Digestive System* books for help. Explain that when the puzzle pieces are put together in the correct order, they will show the path of digestion through the body. Ask students to cut out the pieces and put them in the correct order, using their books for help. Then have them glue the pieces in order on the construction paper. After the puzzles are finished, ask students to write a short sentence next to each piece that describes what the body part does in the digestive system.

Accommodations and Extensions

Have students work in small groups to complete their puzzles and write their descriptions.

As an extension, ask students to draw the outline of a body around their puzzle pieces. Have students write a list of facts about each part of the digestive system under its descriptive sentence.

Closure

Ask students why it is important for food to be broken down in the digestive system. (to extract the food's nutrients, to separate the waste from the food, to help cells absorb the nutrients from the food)

Assessment

Evaluate student puzzles for accuracy and understanding of major concepts.

Break It Down

A Lesson on Digestion

Content

Students will learn how food is broken down in the stomach by conducting an experiment that imitates stomach digestion.

National Standards

The following standards will be addressed in the lesson:

Language Arts

Students read a wide range of print and nonprint texts to build an understanding of texts, of themselves, and of the cultures of the United States and the world; to acquire new information; to respond to the needs and demands of society and the workplace; and for personal fulfillment. Among these texts are fiction and nonfiction, classic and contemporary works.

Science

Students should develop an understanding of personal health.

Students should develop understanding of the characteristics of organisms.

Multiple Intelligences

The following intelligences will be activated throughout the lesson:



Bodily-Kinesthetic



Linguistic



Visual-Spatial

Prerequisites

Have students read the book *The Dynamic Digestive System* before starting the lesson.

Materials

- *The Dynamic Digestive System* books
- plastic tray
- three soda crackers
- water
- empty glass
- chalkboard and chalk or whiteboard and markers
- student copies of the *Break It Down* reproducible
- lemon or orange juice
- small cups
- zip-top plastic bags
- slices of bread

Instructional Procedure

Anticipatory Set

Set the three soda crackers on the tray in front of the class. Put the first one into the empty glass. Then use your hands to smash the second cracker into pieces. Pour a few drops of water on the third one. Then have students explain what happened to each cracker. (The first is just being held inside the glass; the second got squished into small pieces; the third got soggy and started to dissolve.) Explain that these three steps represent three things that the stomach does to help digest food: It holds the food you eat, it uses muscles to break down food into little pieces, and it uses liquid to dissolve food.

Class Discussion

Tell students that the stomach is a J-shaped, stretchy bag made of muscles. Ask students what the muscles of the stomach do to food. (They squeeze, mix, and mash the food.) Tell students that a special liquid called *gastric acid* is released inside the stomach. Explain that the acid has chemicals that break food down into *chyme*. Write the word *chyme* on the board and ask students to explain what it is. (Chyme is the thick liquid that food becomes after it goes through the stomach.) Then ask: *What else does gastric acid do?* (kills germs that may have been in the food) Tell students that because gastric acid is so strong, it could hurt the stomach. Explain that *mucus* protects the stomach from gastric acid by lining its walls. Ask students how long the stomach takes to do its job. (two to five hours)

Objectives

The student will be able to...

- understand the process of digestion
- define the words *chyme*, *gastric acid*, and *mucus*
- work in small groups to conduct an experiment that imitates stomach digestion

Activity

Before class, pour juice into the small cups. Then break bread slices into four pieces each. Divide the class into groups of three or four. Distribute the *Break It Down* reproducible, cups of juice, zip-top plastic bags, and pieces of bread to each group. Tell students that they are going to do an experiment that shows how a stomach digests food. Explain that the juice is like stomach acid, the plastic bag is like a stomach, and the bread is food that is being digested. Ask them to follow the steps listed on their reproducibles and fill out their reproducibles as they go.

Accommodations and Extensions

Perform the experiment as a class. Have student volunteers come to the front of the room to perform each step in front of the class, and complete the reproducible together as you go.

As an extension, have students write a paragraph describing how the stomach works with the rest of the digestive system to break down food. Make sure the paragraph includes a description of the parts of the digestive process that come right before and right after the stomach.

Closure

Review the reproducible as a class to talk through the stomach's digestive process. Discuss why it is important for food to be broken down into a liquid. (so the body can more easily absorb nutrients) Ask students what would happen if the stomach used only acid and no muscles, or if it used only muscles and no acid. (Food wouldn't be broken down as easily; without acid, food would not turn into chyme.)

Assessment

Check student reproducibles for comprehension of main concepts.

The Busy Brain

A Lesson on the Parts of the Brain

Content

Students will learn about the different parts of the brain and what they control by making and presenting posters.

National Standards

The following standards will be addressed in the lesson:

Language Arts

Students adjust their use of spoken, written, and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes.

Science

Students should develop an understanding of the characteristics of organisms.

Students should develop an understanding of personal health.

Social Studies

The learner can work independently and cooperatively to accomplish goals.

Multiple Intelligences

The following intelligences will be activated throughout the lesson:



Bodily-Kinesthetic



Linguistic



Visual-Spatial

Prerequisites

Have students read the book *The Astounding Nervous System* before starting the lesson. Students should have a basic understanding of the fact that the brain has different parts and that each part controls a different part of the body or different kinds of thought.

Materials

- *The Astounding Nervous System* books
- pieces of paper (1 per student)
- chalkboard and chalk or whiteboard and markers
- student copies of *The Busy Brain* reproducible
- crayons or markers
- construction paper

Instructional Procedure

Anticipatory Set

Ask students to draw a line down the middle of a piece of paper. Tell students to draw a bird on one side of the paper. On the other side, have students write out this math problem and solve it: $18 + 23 = ?$ (41). When students are finished, tell them that they just used two different areas of their brain. Explain that the right hemisphere of their brain helped them draw the bird, and the left hemisphere of their brain helped them solve the math problem.

Classroom Discussion

Tell students that even though the brain is one organ, it is divided into many parts. Explain that the body uses different parts of the brain every moment of each day. Ask students to list some things that the brain checks and controls. (heart, stomach, lungs, thinking, dreaming, making decisions, playing music, making art, solving problems, hearing, sight, touch, movement) Ask: *Why do you think the brain is divided into many parts?* (It controls a lot of things in the body, so it needs to have different parts that are each responsible for different things.)

Objectives

The student will be able to...

- identify the parts of the brain and their locations
- understand what each part of the brain controls
- work in small groups to present information to the class

Activity

Part I: Making Posters

Divide the class into four groups. Distribute construction paper and crayons or markers. Assign each group one of these brain areas to research in their *The Astounding Nervous System* books:

- the two hemispheres of the *cerebrum*: pages 9–10
- the four *lobes* of each hemisphere: page 11
- *cerebellum*: pages 12–13
- *brain stem*: pages 14–15

Ask groups to find as many facts as they can about their area of the brain. Then tell students that they are going to make posters using the information they gathered. Students should write the name of their brain part at the top and then write and illustrate their facts on the construction paper. Use the frontal lobe as an example: Write: “The Frontal Lobe – It is a large area at the front of the brain. It helps you solve problems.” Remind students to include the following facts: the location of the brain part, the size or shape of the brain part, and what it controls.

Part II: Presenting the Posters

Distribute copies of *The Busy Brain* reproducible to students. Ask each group to present their posters to the class. All group members should participate in their group’s presentation. Encourage students to act out their fact with sounds or movements that demonstrate their brain part’s control of the body. For example, a student could sing or pretend to paint, and then say, “I am the right hemisphere of the cerebrum. I help you make art or play music.” Tell students to record the information from the presentations and posters on their reproducible.

Accommodations and Extensions

Have students create posters as a class. Have student volunteers read aloud the sections of the book for each brain area. After each section of the book, write the name of the parts in each brain area on a separate piece of construction paper. Ask for volunteers to write facts about each part on the separate posters. When posters are completed, review the information for each brain part with the class.

As an extension, ask students to draw their own diagram of the brain and label the different parts. Students can also write a descriptive sentence of each part’s function underneath the labels.

Closure

Ask students to discuss what would happen if parts of the brain could not communicate with other parts of the brain. (The body would not work together; it would be hard to perform certain tasks.) Discuss how the brain’s communication between its parts and with the body is important..

Assessment

Evaluate student posters and reproducibles for understanding of content.

Glands at Work

Directions: Cut out the circles and rectangles. Match each gland to its function. Then tape the circle-rectangle pairs to a piece of paper and write a sentence or two explaining how each gland carries out its function.

pituitary

I help your body temperature stay the same.

thymus

I help you grow taller.

adrenal

I help you fall asleep.

hypothalamus

I help you change food into energy.

pancreas

I help your body fight diseases.

pineal

I help when you are in a dangerous situation or feel stressed.

thyroid

I help control your blood sugar.

Fill It Up!

Directions: Follow these directions to make your model. Then answer the questions below.

1. First, put the end of the balloon over one end of the straw.
2. Next, wrap the rubber band around the end of the balloon. Make sure it is tight against the straw.
3. Try blowing into the open end of the straw to fill up the balloon. Then try to squeeze the balloon.

Questions

1. What part of the model is like a trachea?

2. What part of the model is like a lung?

3. What happens when you blow into the straw? What action does this represent in your body?

4. What happens when you squeeze the balloon? What action does this represent in your body?

5. How does the balloon look and feel when it is full?

6. How does the balloon look and feel when it is empty?

7. What would happen if a pin pricked the balloon? What part of the body protects the lungs?
Why is it important to protect the lungs?

Go With the Flow

Directions: Answer these questions based on your blood vessel models and your experiment.

Questions	Normal Blood Vessel	Clogged Blood Vessel
What does the hole in the middle of each blood vessel look like?		
What do the inside walls of each blood vessel look like?		
How does water move through each blood vessel?		

1. What does the water in your experiment represent? How do you think blood would move through each type of blood vessel?

2. Which blood vessel is better for the body? Why?

Moving Muscles

Directions: Visit each station around the classroom. Look at the body part and read its description. Write the body part name next to its station number. Decide whether it is controlled by a skeletal, cardiac, or smooth muscle, and put an X in the correct box. Then decide whether it is a voluntary or involuntary muscle, and put an X in the correct box.

	Body Part	Skeletal Muscle	Cardiac Muscle	Smooth Muscle	Voluntary Muscle	Involuntary Muscle
Station 1						
Station 2						
Station 3						
Station 4						
Station 5						
Station 6						

Inside a Bone

Directions: Once you finish making your model of a bone, use your model and *The Mighty Skeletal and Muscular Systems* book to answer the questions about each layer.

First Layer: Cellophane wrap

What layer of bone does this represent? _____

What is this layer's job in the bone?

Second Layer: White clay

What layer of bone does this represent? _____

What is this layer's job in the bone?

Third Layer: Green clay

What layer of bone does this represent? _____

What is this layer's job in the bone?

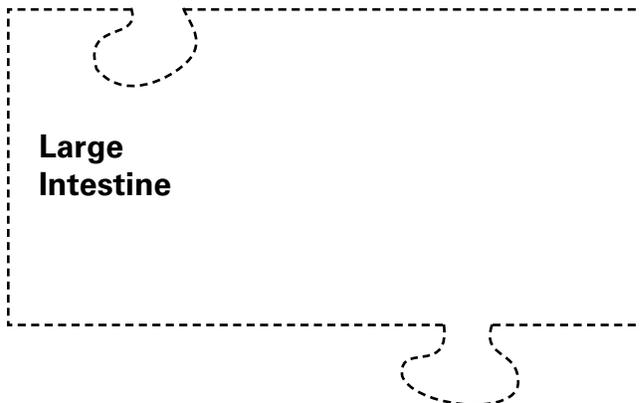
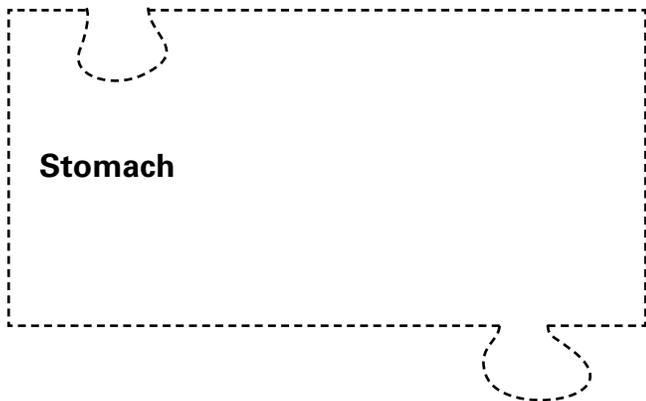
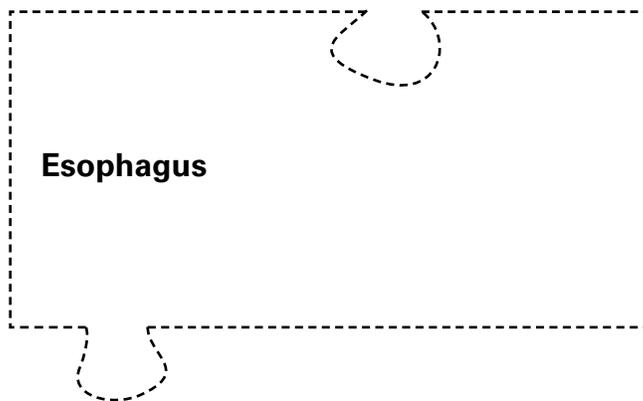
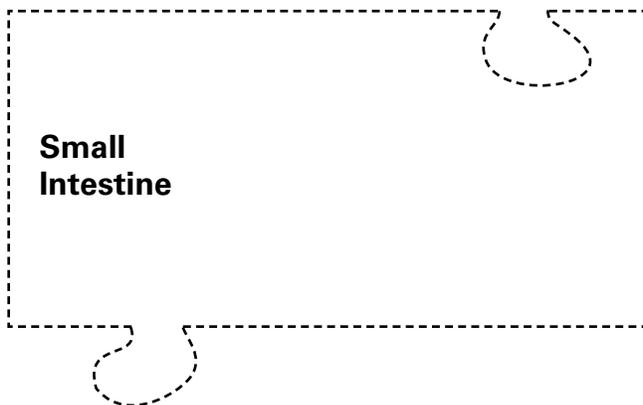
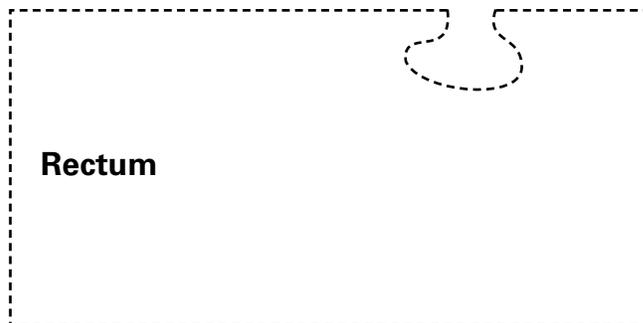
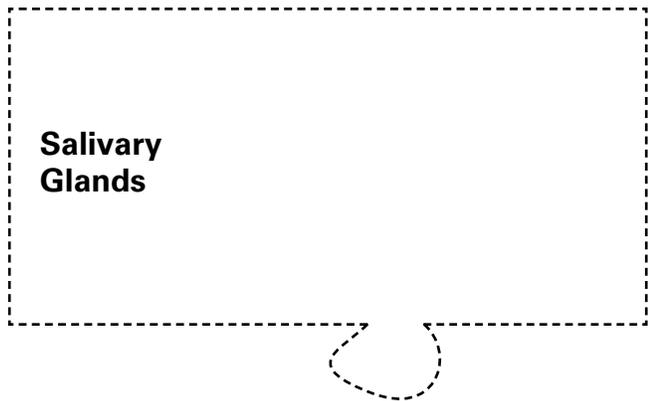
Fourth Layer: Red clay

What layer of bone does this represent? _____

What is this layer's job in the bone?

Follow the Food!

Directions: Draw the body part in each puzzle piece. Cut out the pieces. Put the pieces together in the correct order. Glue the pieces in order onto your construction paper. Next to each puzzle piece, write a short sentence about what that part of the digestion system does.



Break It Down

Directions: Fill out the chart as you do your experiment. Then answer the questions below the chart.

What materials are you using? _____

What parts of the body does each material represent? _____



Step 1: Pour the juice in the bag.

What part of digestion does this represent? _____



Step 2: Drop the bread in the bag.

What part of digestion does this represent? _____



Step 3: Squeeze the bag a few times.

What part of digestion does this represent? _____



Step 4: Let go of the bag and look at the changes in the bread.

What part of digestion does this represent? _____

How did the bread change? _____

How did the squeezing affect the bread? _____

How did the juice affect the bread? _____

How does this represent what happens in the stomach? _____

The Busy Brain

Directions: Watch each group present its poster. Record the facts you learn about each brain part in this chart.

Brain Area	Name of Part	Size and Location	What it Controls
Cerebrum: Hemispheres			
Cerebrum: Lobes			
Cerebellum			
Brain Stem			