HEALTH AND THE PHYSICAL BODY

3–8 Science Unit Study

THE GOOD AND THE BEAUTIFUL

Health & the Physical Body

CREATED BY THE GOOD AND THE BEAUTIFUL TEAM

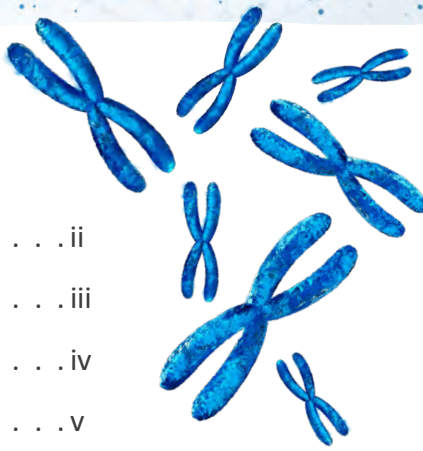
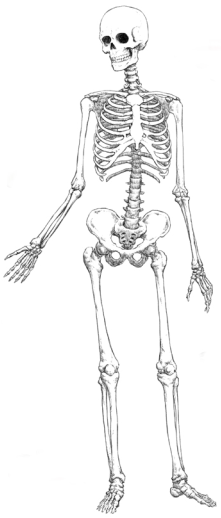


Table of Contents



The Good and the Beautiful

© 2022 The Good and the Beautiful, LLC | goodandbeautiful.com

All rights reserved. This book may be printed or copied for use within your home or immediate family once the download has been purchased directly from goodandbeautiful.com by the person who will be using it. This file may not be shared electronically or posted on the internet. Copies that have been printed at home or at a printing company may not be resold.

Unit Information

Science Journal

All The Good and the Beautiful science units include activities in a student journal. Each student should have his or her own student journal, and the parent or teacher will direct the student regarding when to complete the activities as directed in the lessons. Student journals can be purchased by going to **goodandbeautiful.com/science** and clicking on the *Health and the Physical Body* unit link.

Science Wall

All The Good and the Beautiful science units include vocabulary words to be placed on your science wall, which is a wall or tri-fold presentation board in your learning area on which you can attach the vocabulary words and other images. ***Cut out the vocabulary word cards at the beginning of the unit.*** The course will indicate when to place them on the wall.

Lesson Preparation

All The Good and the Beautiful science units include easy-to-follow lesson preparation directions at the beginning of each lesson.

Activities

Many of The Good and the Beautiful science lessons involve hands-on activities. An adult should always closely supervise children as they participate in the activities to ensure they are following all necessary safety procedures.

Unit Videos

Some lessons include videos that were created by The Good and the Beautiful. Have a device available that is capable of playing the videos from **goodandbeautiful.com/sciencevideos** or from the Good and Beautiful Homeschool app.

Content for Older Children

Some lessons include extra content that is more applicable for older children (grades 7–8). Parents or teachers may choose to skip this content if instructing only younger children.

Content for Younger Children

Some lessons include extra content that is more applicable for younger children (grades 3–6). Parents or teachers may choose to skip this content if instructing only older children.

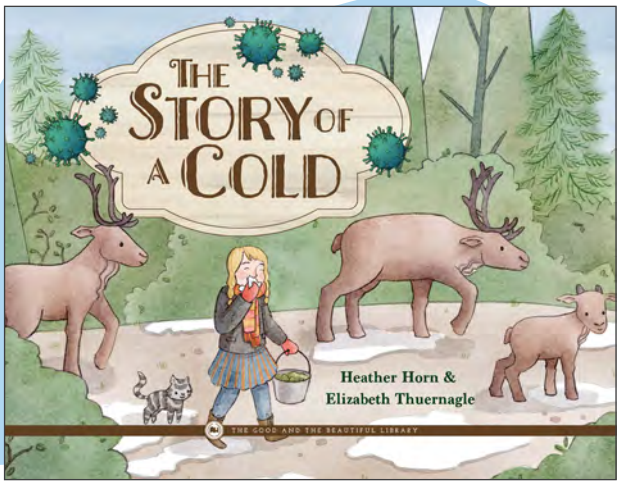
Versions

New discoveries are being made on an ongoing basis. This course is reviewed and revised periodically to keep information as up-to-date as possible. This version is the first edition of this unit.

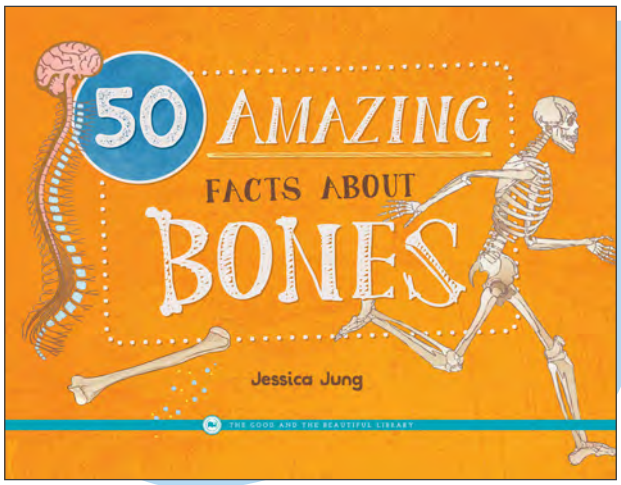
© Good and Beautiful

Read-Aloud Book Pack

The books below are optional read-aloud books that complement this unit. These books can be purchased as a book pack by going to **goodandbeautiful.com/science** and clicking on the *Health and the Physical Body* link.



The Story of a Cold
by Heather Horn and Elizabeth Thuernagle



50 Amazing Facts About Bones
by Jessica Jung

CORRELATED BOOKS

The Good and the Beautiful Library has several books that correlate well with the *Health and the Physical Body* unit. It can be a wonderful experience for children to read books on their level related to the subjects they are learning in science. The library includes both fiction and nonfiction books organized according to reading level. Find these correlated books by going to **goodandbeautiful.com/science** and clicking on the *Health and the Physical Body* science unit product page.

© Good and Beautiful

GRADES 7–8

Lesson Extensions

How the Extensions Work

Each lesson has an optional lesson extension for children in grades 7–8. Complete the lesson with all the children, and then have the older children complete the self-directed lesson extension. These extensions are located in the *Grades 7–8 Health and the Physical Body Student Journal*.

Answer Key

The answer key for the lesson extensions can be found on the free Good and Beautiful Homeschool app in the science section. Visit **goodandbeautiful.com/apps** for information on accessing the app. The app can be accessed from a computer, phone, or tablet.

Flexibility

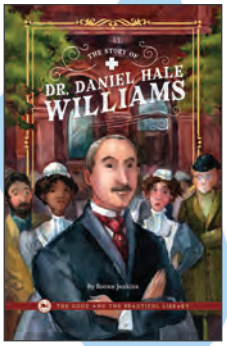
The amount of time it will take to complete each lesson extension will vary for each child. The average time is about 10–15 minutes per extension. Parents/teachers and children may choose to omit parts of the lesson extension if desired. Encourage the children to stretch their capabilities, but also reduce work if needed.

Taking Notes

Some of the grades 7–8 lesson extensions have the children summarize the material read. Teach the children to look for key information and then to summarize the most important points. Students can also add notes with their thoughts and the facts that are most interesting to them.

Optional Grades 7–8 Reading Book

We recommend *The Story of Daniel Hale Williams* by Boone Jenkins as extra reading for students in grades 7–8. This book can be purchased by going to **goodandbeautiful.com/science** and clicking on the *Health and the Physical Body* unit link.



The Story of Daniel Hale Williams
by Boone Jenkins

© Good and Beautiful

Supplies Needed

You will need the following supplies for **activities**. There are no experiments in this unit.

Lesson 1

- 1-cup measuring cup
- Sand (optional)
- Scissors

Lesson 2

- Small mirror or access to larger mirror
- Apple or other piece of fruit, such as a banana or peach, per child
- Glue stick
- Colored pencils or crayons
- Scissors

Lesson 3

- Saltine cracker for each child
- 1 piece of sandwich bread
- Quart-sized zipper bag
- ¼ cup vinegar, any kind
- Clear drinking glass or bowl
- 2 Tbsp cooking oil, any kind
- 1 Tbsp green dishwashing liquid soap
- Spoon or something to stir with

Lesson 4

- Glue stick

Lesson 5

- Paper clip
- Pencil, pen, or colored pencils (optional) for each child
- Two bowls of the same size
- Two or three packages of children's favorite snacks that include nutrition labels
- Kitchen measuring utensils

Lesson 6

- 2 clear glasses or jars
- Water
- 2–3 drops of red food coloring
- 1 Tbsp of sand or small pebbles
- 1 coffee filter
- 1 rubber band

Lesson 7

- Empty toilet paper roll

Lesson 8

- Pint-sized jar
- 1-cup, ¼-cup, ½-cup, and 1-tablespoon measuring utensils
- Light corn syrup
- Red Hots® cinnamon candies
- Uncooked white beans
- Uncooked split peas

Lesson 9

- 2 bendy straws
- Electrical tape
- Scissors
- Rubber bands
- 3 large, uninflated balloons
- 64-ounce plastic fruit juice bottle
- Clay or play dough
- Glue stick

Lesson 10

- Pen or pencil

Supplies Needed

You will need the following supplies for **activities**. There are no experiments in this unit.

Lesson 11

- Crayons or colored pencils
- 2–3 plastic straws per child
- String or yarn
- Tape or 5 paper clips per child
- Scissors

Lesson 12

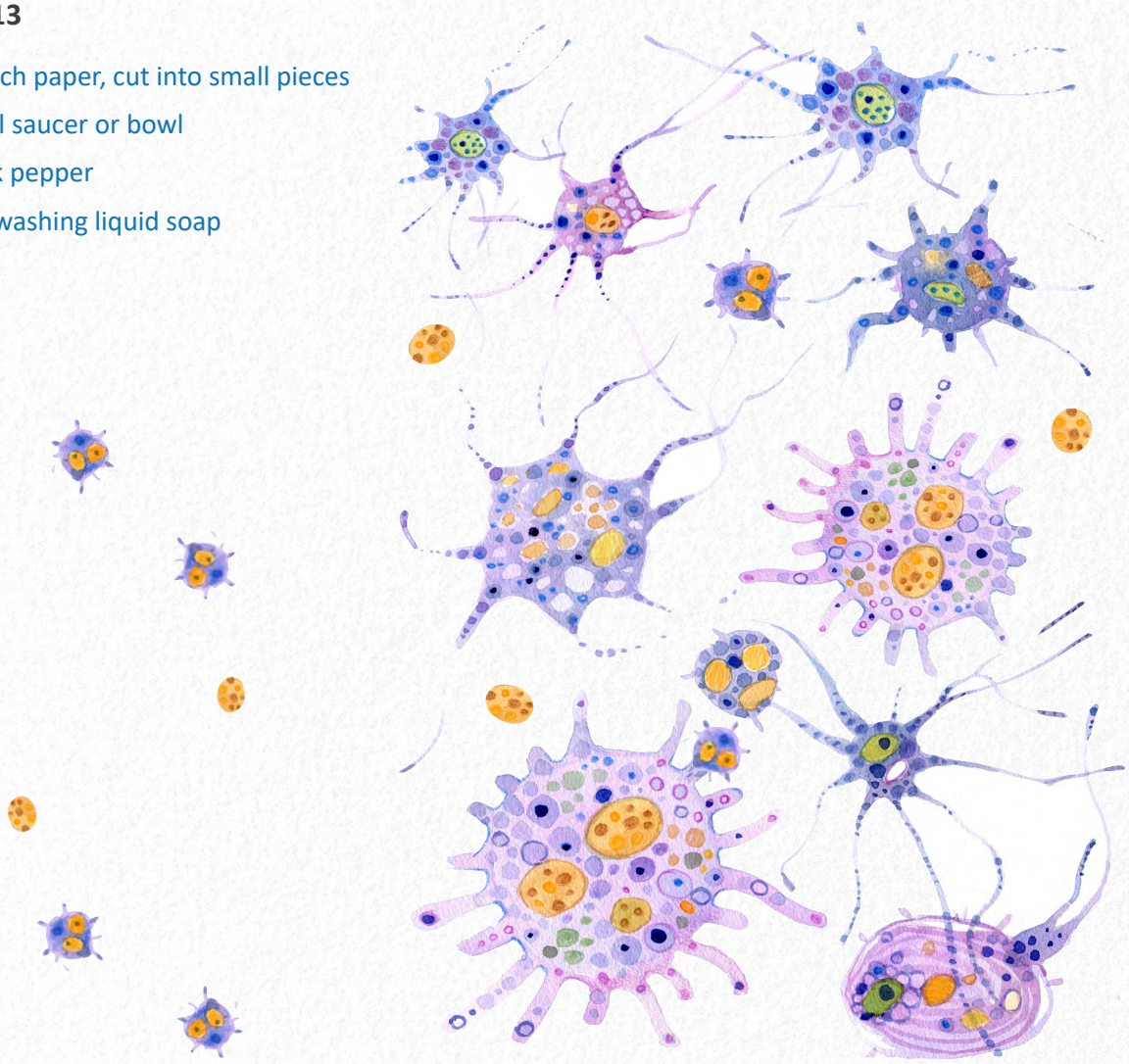
- Crayons or colored pencils

Lesson 13

- Scratch paper, cut into small pieces
- Small saucer or bowl
- Black pepper
- Dishwashing liquid soap

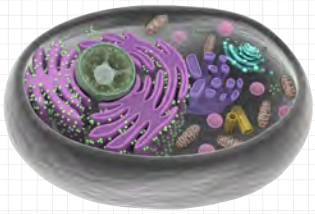
Lesson 14

- 1 red pipe cleaner per child
- 1 blue pipe cleaner per child
- 1 white pipe cleaner per child
- Pony beads, 4 different colors per child
- A pencil
- Transparent tape
- Scratch paper
- Mirror



Vocabulary

Instructions: Cut out the vocabulary cards in this section. Place them on your science wall when prompted to do so in the lessons. Review the vocabulary words several times during this unit and, if desired, at various times throughout the school year.



Cells

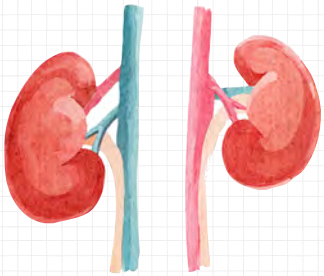
the smallest functional units of an organism

Tissues

groups of cells that are the same and work together to do a job in the body

Organs

self-contained groups of tissues that perform a specific job in the body

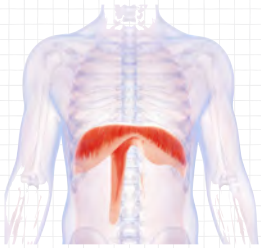


Nephrons

tiny filters in the kidneys that trap and remove waste from the blood

Blood Vessels

Very tiny tubes that form a network throughout the body to exchange oxygen, nutrients, and waste between blood and tissues. Three types of blood vessels are arteries, veins, and capillaries.



Diaphragm

the thin muscle that separates the chest and abdominal cavities and is the principal muscle of respiration

How the Body Is Formed

Objective

Help the children learn about the structure and function of cells and how the human body is formed.

Preparation:

- ☐ Cut out the "Parts of a Cell" cards.

Activity Supplies:

- 1-cup measuring cup
- Sand (optional)
- Scissors

☐ Travel Through a Cell Activity

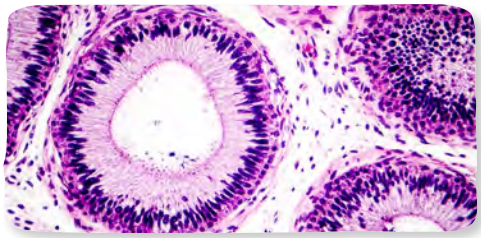
Read to the children: The human body comes in all different shapes and sizes. We have different colors of hair and eyes, different heights, and different skin tones. But underneath all these differences, we have exactly the same basic makeup. We are all made of ***cells***.

Have you ever put a puzzle together to create a beautiful picture? Cells are much like puzzle pieces. They are extremely small units that form the organs and tissues of the human body.

Let's do an activity to learn more about a cell.

1. **Place the "Travel Through a Cell" activity page in front of the children.**
2. **Shuffle the "Parts of a Cell" cards.**
3. **Place the "Parts of a Cell" cards facedown along the top of the "Travel Through a Cell" page.**
4. **Have each child take turns flipping over a card and reading what is on the card. Have that child point to the part of the cell that the card refers to on the "Travel Through a Cell" page.**

Optional: When all cards have been read, flip the cards back over. Take turns drawing a card and reading only the description of the cell part without showing the picture. Have the other children guess which part the description refers to by pointing to that part on the "Travel Through a Cell" page.



© Good and Beautiful

Cell Division and Development of a Baby

Have the children turn to the "Cell Division and Development of a Baby Cards" in Lesson 1 of their student journals and cut out the cards.

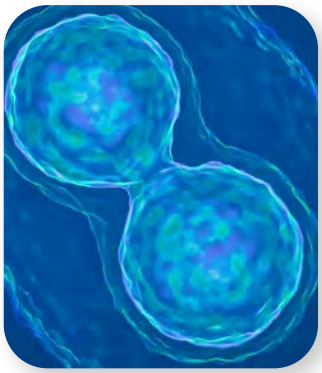
Read to the children: You have trillions of cells in your body. A trillion is a huge number that is hard to imagine. **Show the children the 1-cup measuring cup.** If we filled this cup with sand, it would hold about 8 million grains of sand. **Fill the cup with sand (optional).** It would take 125,000 cups to get 1 trillion grains of sand!

Have the children turn to the "Cell Division and Development of a Baby" page in Lesson 1 of their student journals. When you come to a bold blue word, have the children glue the corresponding card onto the page.

Read to the children: Follow along on your student journal page as I read, and then find the matching "Cell Division and Development of a Baby Cards" card to glue into place.

A baby begins life as a single cell called a **zygote**. This cell has all the genetic information from the mother and the father that join together inside the mother's womb, where the baby begins growing.

All cells grow and multiply through division. What happens when you divide a cookie in half? [You get two pieces of a cookie.] What if we divide those two pieces in half again? We get four pieces! Cell division works *almost* the same way.



The single zygote cell divides, creating two cells. Those two cells divide, creating four cells. Then the four cells divide, creating eight cells, and so on. Unlike the cookie, which gets smaller when we divide it, when cells of a zygote divide, there are more and more cells of almost the same size—so it grows!

As the zygote cell divides over and over, different **types of cells** with different shapes, sizes, and functions begin to form. We have about 200 different kinds of cells, and each kind has a specific job.

Some of these cells become **tissues**, but not the kind of tissue you sneeze into! ***Tissues*** in your body are groups of cells that are the same and work together to do a job in the body. Your entire body is covered with a kind of tissue. Do you know what it's called? Skin tissue! Your skin is really millions of flat skin cells that have all come together to form the skin tissue. We also have muscle tissue, nerve tissue, and even blood tissue.

As the baby continues to grow, an **embryo** is formed. It is at this stage that the tiny heart forms and begins to beat, pumping blood through all the developing parts and organs of the baby's body.

The cells continue dividing, tissues continue growing, and ***organs,*** self-contained groups of tissues that perform a specific job in the body, begin to take shape. Liver cells come together to form the tissues of the liver, intestinal cells come together to form the tissues of the intestines, nerve cells form the nerve tissue, and muscle cells form muscle tissue.

As the embryo continues to grow, the organs begin working together in systems. The systems continue developing into full maturity until the baby goes from being an embryo to a **fetus**. Then, at just the right time, the **baby** is born!

© Good and Beautiful

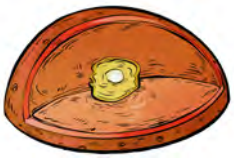
Parts of a Cell

Cytoplasm is a jelly-like substance that is mostly composed of water and fills the cell.

The cell membrane is a thin outer layer that holds the cell together and separates it from its environment. It lets in nutrients and lets out waste.

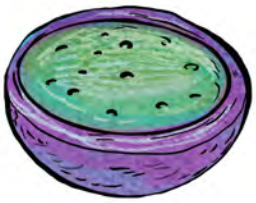
Energy for the cell is made in the mitochondria.

The nucleus is the control center of the cell that contains DNA (hereditary information) and tells the cell what to do.



The endoplasmic reticulum transports the protein needed for the cell's growth and repair.

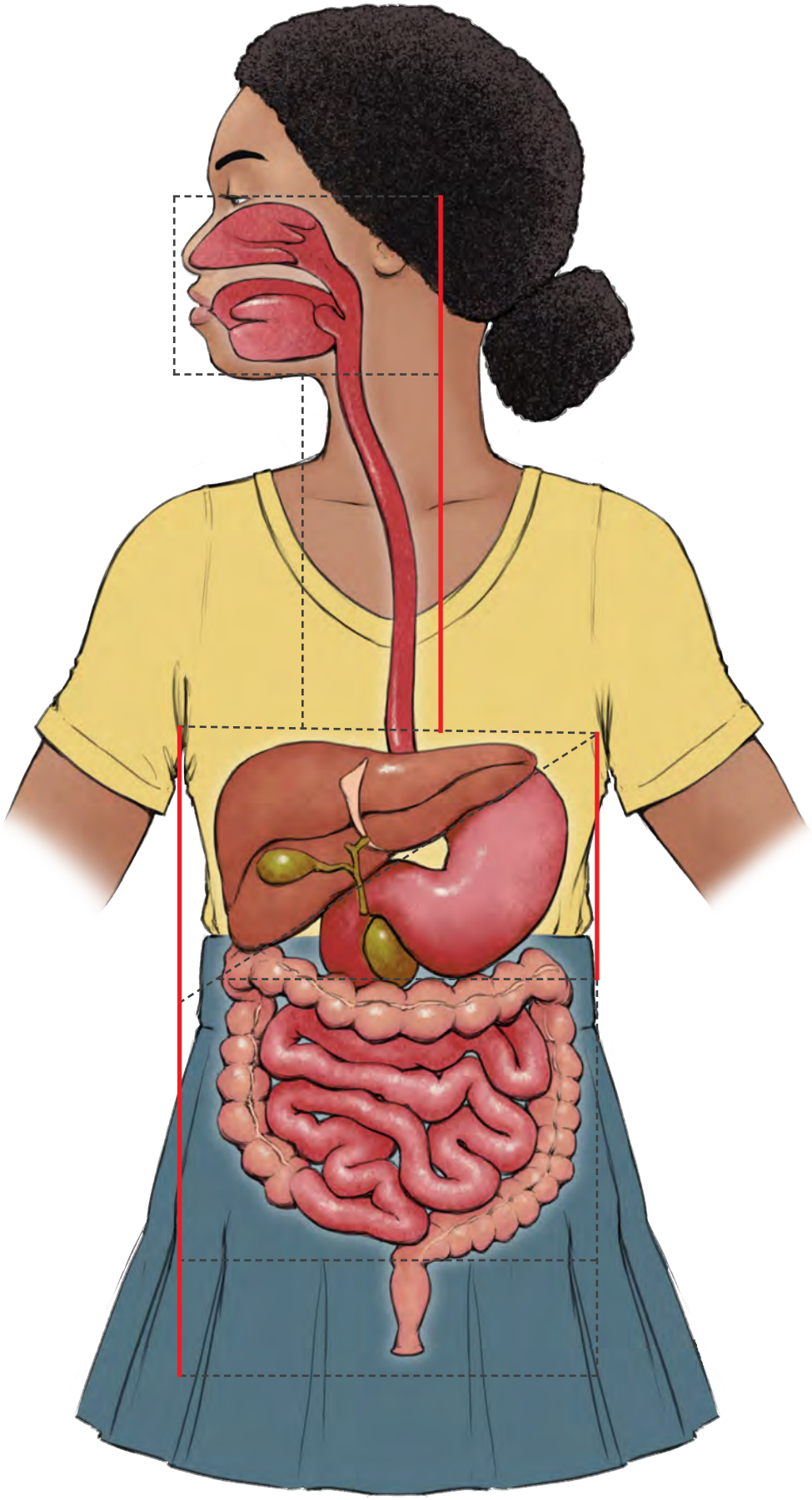
Lysosomes are the cleaners of the cell. They destroy harmful substances and old, worn-out cell parts.



In the Golgi apparatus, proteins and lipids are packaged and tagged with markers that determine their destination.

Ribosomes are small protein factories that can be attached to the endoplasmic reticulum or float around in the cytoplasm.

Digestive System Lift-a-Flap



The Digestive System: Part 2

Objective

Help the children understand the process of digestion and the organs involved.

Preparation:

- ☐ None

Activity Supplies:

- Saltine cracker for each child
- 1 piece of sandwich bread
- Quart-sized zipper bag
- ¼ cup vinegar, any kind
- Clear drinking glass or bowl
- 2 Tbsp cooking oil, any kind
- 1 Tbsp green dishwashing liquid soap
- Spoon or something to stir with

☐ Where It All Begins

Read to the children: In our last lesson, we learned that digestion begins in the mouth, where food is broken down by chewing and the tongue pushes the food to the throat.

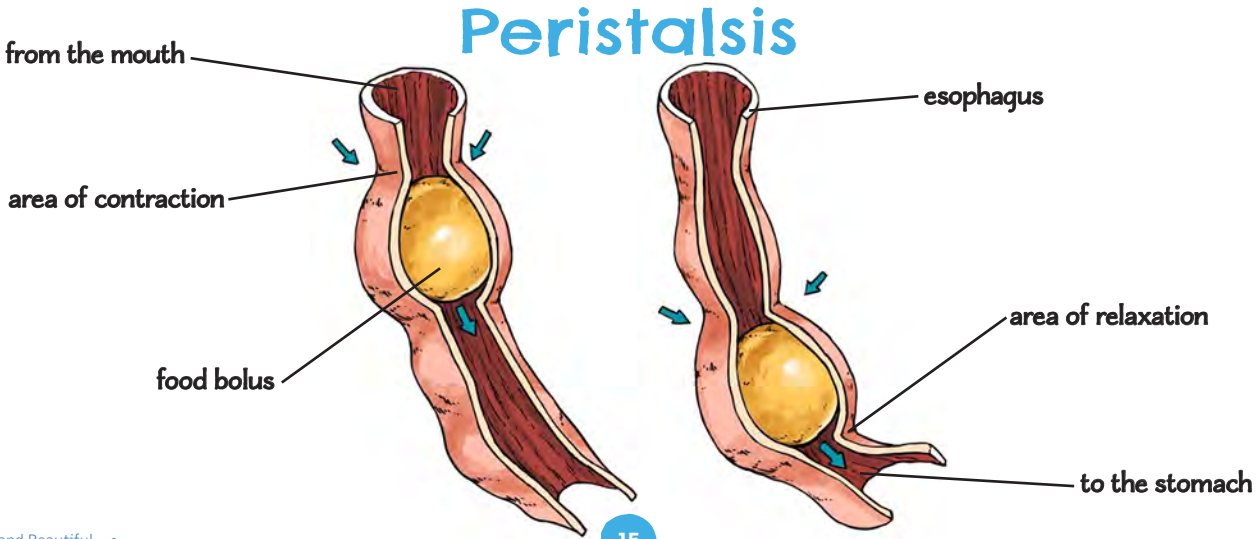
But then what happens?

Give each child a cracker. Have the children chew the cracker and swallow, paying close attention to what happens when they swallow.

How do you think the food goes down our throats?

Once food leaves your mouth, it enters the ***esophagus***, which is a muscular tube in your throat that ends at your stomach. As food goes down the esophagus, muscles below the food relax while muscles above the food contract. This is a muscular process called *peristalsis* [peh–ruh–STAAL–suhs], which pushes the food down the esophagus into the stomach.

This muscular movement can be found throughout the digestive system, including in your stomach and intestines.



© Good and Beautiful

The sloshing and squeezing simulate what the stomach does as it churns the food. **Discuss the following questions with the children:**

1. Why do you think we broke up the bread instead of just putting the whole piece into the bag? [to simulate chewing]

2. What did the vinegar do to the bread? What substance does the body produce that does the same thing to food as the vinegar? [The vinegar soaked into the bread and continued to break it down. Gastric acid.]

3. What happened when we sloshed and squeezed the contents of the bag? What does the stomach do to food that is similar to the sloshing and squeezing? [The bread broke down. The stomach squeezes the food and, along with gastric acid, breaks it down.]

Bile Activity

Read to the children: When the stomach is finished churning and breaking down the food, it is not quite ready to be used by the body as fuel. This is because it is still partially made of fatty substances called lipids, which can't mix with water-based substances like your blood. The food moves to the small intestine where it mixes with a greenish-brown liquid from the liver called ***bile*** that helps the lipids and water-based substances mix with each other. Let's simulate what happens in the small intestine when bile mixes with the partially digested food.

Have the children turn to the "Bile Activity" page in Lesson 3 of their student journals. Have the children complete the "Hypothesis" questions at the top of the page. Read to the children: A hypothesis is a guess of what one thinks might happen before doing an experiment or activity.

Supplies:

- Clear drinking glass or bowl
- 2 Tbsp cooking oil, any kind
- 1 Tbsp green dishwashing liquid soap
- Spoon or something to stir with

Instructions:

1. **Add water to the glass. Leave about one inch of space at the top. Ask the children the following questions:** What part of your body does the jar represent? [the small intestine] What does the water represent? [blood]

2. **Add oil (which will represent fat) to the glass. Ask the children the following question:** Which liquid represents the lipids in your food? [cooking oil]

3. **Add dishwashing soap (which represents bile) to the water and oil mixture. Stir. Ask the children the following questions:** Which liquid represents the bile? [dish soap] Were the oil and water able to mix before we added the dish soap? [no] What happened to the oil and water when we added the dish soap and stirred them? [They were able to mix.]

Vitamins and Hydration

Objective

Help the children understand what vitamins and minerals are, how they're used by the body, and what their dietary sources are.

Preparation:

- ☐ Cut out the "Vitamin Game Cards."
- ☐ Read the nutrition labels for the snacks chosen for this lesson and assemble the kitchen measuring utensils needed to measure out one serving of each snack.

Activity Supplies:

- Paper clip
- Pencil, pen, or colored pencils (optional) for each child
- Two bowls of the same size
- Two or three packages of the children's favorite snacks that include nutrition labels
- Kitchen measuring utensils

☐ Introduction

Read to the children: Cars have a lot of moving parts. What liquid do most cars require in order to use their moving parts to drive? [gas or fuel] Just like a car, your body needs fuel to keep moving, thinking, and learning each day. The fuel that your body requires comes in the form of nutrients, such as ***vitamins*** and ***minerals***—substances found in nutritious foods. They help keep your bones, muscles, skin, and organs healthy. Nutrients also help improve your vision and battle infections.

Our bodies can best use vitamins and minerals from eating nutritious, whole foods as close to their original form as possible. God gave us foods to nourish our bodies, and it's important to eat foods full of vitamins and minerals.

☐ Science Wall: Vocabulary Words

Place the vocabulary cards VITAMINS and MINERALS on your science wall. Read and discuss the words and definitions.

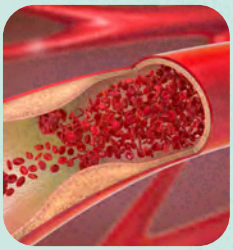
© Good and Beautiful

Spin-a-Vitamin Spinner

The Circulatory System Part 2: Blood

Objective

Help the children learn about blood and how it flows through the body.



Preparation:

- ☐ None

Activity Supplies:

- Pint-sized jar
- 1-cup, ¼-cup, ½-cup, and 1-tablespoon measuring utensils
- Light corn syrup
- Red Hots® cinnamon candies
- Uncooked white beans
- Uncooked split peas

☐ Introduction

Read to the children: Hold your arm so that your palm is facing up and take a look at the skin of your lower arm. Do you see the blue lines just under your skin? These are some of the vessels carrying a substance to every part of your body and delivering the oxygen and nutrients you need to function and stay healthy—blood!

Pulsing through the blood vessels of the average adult is more than 10 pints of blood. Thanks to the heart, blood circulates through the entire body in less than a minute. Let's learn more about this life-giving substance.

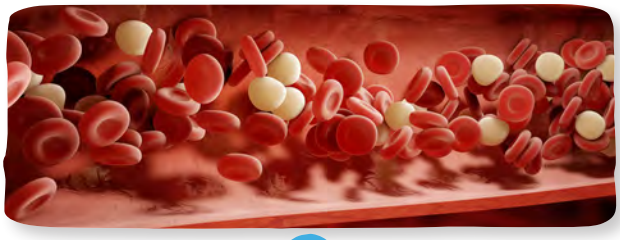
☐ Blood Model Activity

Gather the "Blood Model Activity" supplies. As you read the information to the right, have the children follow the directions to create the blood model. Allow the children to complete the activity without your help, if possible.

Read to the children: What if you could use a microscope to see the tiny particles that make up our blood? What do you think you would see? To give you an idea of what makes up our blood, you're going to make a model in a jar. Let's get our supplies together!

Help the children gather the supplies needed for this activity. You will need the following items:

- **Pint-sized jar**
- **1-cup, ¼-cup, ½-cup, and 1-tablespoon measuring utensils**
- **Light corn syrup**
- **Red Hots® cinnamon candies**
- **Uncooked white beans**
- **Uncooked split peas**

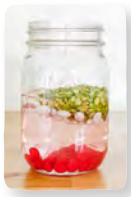


© Good and Beautiful

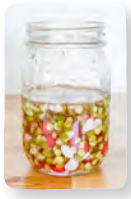
Steps:

1. **Help the children measure ½ cup of the corn syrup and pour it into the jar. Rinse the ½-cup measuring cup in hot water. Read to the children:** The corn syrup represents plasma, the liquid part of our blood.

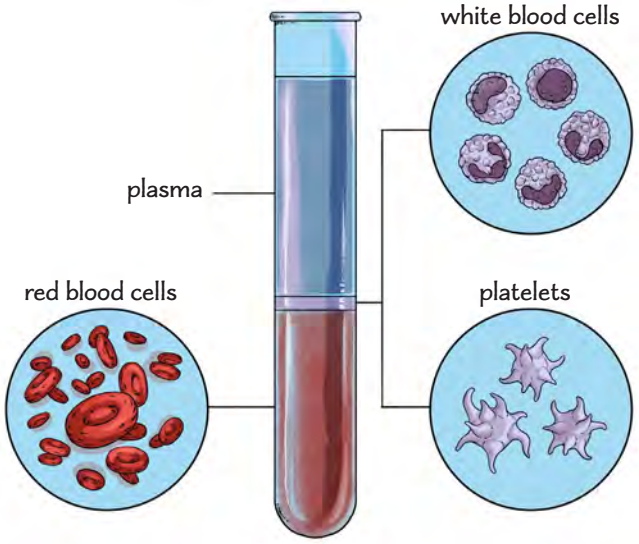
2. **Help the children fill the ½-cup measuring cup with cinnamon candies and pour them into the jar. Read to the children:** The cinnamon candies represent disc-shaped red blood cells.
3. **Help the children fill the tablespoon with uncooked white beans and pour them into the jar. Read to the children:** The white beans represent white blood cells.



4. **Help the children fill the ¼-cup measuring cup with uncooked split peas and pour them into the jar. Read to the children:** The split peas represent platelets.
5. **Have the children stir the contents of the jar to mix all the parts.**



6. **Have the children place the lid on the jar and make sure that it's closed tightly.**
7. **Review the contents of the jar and help the children to identify the plasma, red blood cells, white blood cells, and platelets.**



Parts of the Blood

Read to the children: Our blood is made up of many vital components that assist our bodies in a variety of ways. From fighting off infections to controlling bleeding, our blood is truly an incredible substance. Let's learn more about a few of blood's components.

- **Plasma** is the "liquid" part of our blood that carries proteins, nutrients, hormones, and blood cells through the circulatory system to all parts of the body. It is more than just a carrier, however. Plasma also contains minerals your body needs for many processes, helps blood stop flowing when you're injured, and can be donated to others who have severe injuries. The diagram below shows how our blood would look if it were separated into its different components.
- **Red blood cells** deliver oxygen to our body's tissues and carry away carbon dioxide. The liver and spleen, along with the rest of a body system called the lymphatic system, filter out dead red blood cells from the blood. Unlike most other cells in our bodies, red blood cells do not have a nucleus. This gives them more room to carry hemoglobin, but it also means they cannot divide to create more cells. After about 120 days, they eventually get worn out and die. New red blood cells are created by our bone marrow.

Fun Fact!

There are over 5 million red blood cells in a single drop of blood!

- **White blood cells** are a very important part of our immune system that help our bodies fight off infection and sickness. Unlike red blood cells, white blood cells have a nucleus and mitochondria. There are five different types of white blood cells in our bodies, and each serves a specific purpose. **Read the information in the yellow box on the next page to the children to learn more about each type of white blood cell.**

© Good and Beautiful

The Respiratory System

Objective

Help the children understand the features of the respiratory system, how the human body breathes, and the importance of the lungs.

Preparation:

- ☐ Remove the "Breathe In, Breathe Out" activity page.
- ☐ Cut out the "Breathe In, Breathe Out Cards."

Activity Supplies:

- 2 bendy straws
- Electrical tape
- Scissors
- Rubber bands
- 3 large, uninflated balloons
- 64-ounce plastic fruit juice bottle
- Clay or play dough
- Glue stick

☐ Balloon Blowing Activity

Hand each child a deflated balloon. Have each child blow up his or her balloon, pinch the open end closed, and then release it. Do this a few times. If the child is too young or unable to blow up the balloon on his or her own, you can demonstrate by blowing up the balloon instead.

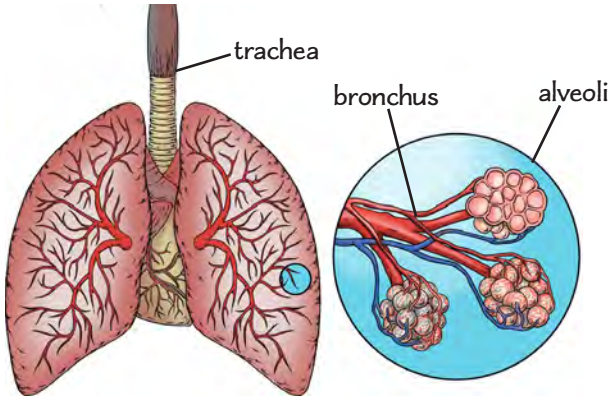
Read to the children: What caused the balloon to inflate, or get bigger, when you blew into it? When you blew into the balloon, you forced tiny air particles from your lungs into the balloon, which then bounced around the inside walls of the balloon and created enough air pressure to force the balloon to grow larger and inflate. What happened when you released the balloon? All the air came out, and the balloon deflated.

The air that you blew into your balloon came from your lungs, which are a very important part of your respiratory system. God has designed your lungs to keep your body alive and healthy from the very moment you are born into this world. Your lungs are hard at work every time you cough, sneeze, or hiccup. They are even working when you take a big breath to smell Mom's delicious cookies baking in the oven! Not only that, but without a continual supply of air containing a gas called oxygen, you could not live. Let's take a closer look at how your entire respiratory system functions and why your lungs are so important.

☐ The Respiratory System Video

WATCH ONLINE

Watch the video titled "The Respiratory System" at goodandbeautiful.com/sciencevideos or on the Good and Beautiful Homeschool app.



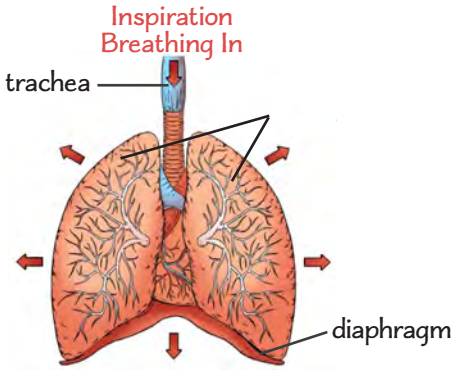
© Good and Beautiful

Breathe In, Breathe Out Cards

1 INSPIRATION

Also called inhalation, this is the process of breathing in oxygen, which is then delivered to all parts of our bodies. A muscle below the lungs called the *diaphragm* pulls downward when you breathe in, allowing the lungs and muscles between the rib cage to expand, drawing air in through your nose (or mouth) and down the trachea to fill the lungs.

Touch your stomach area as you breathe. Feel how your diaphragm causes your lungs to expand.



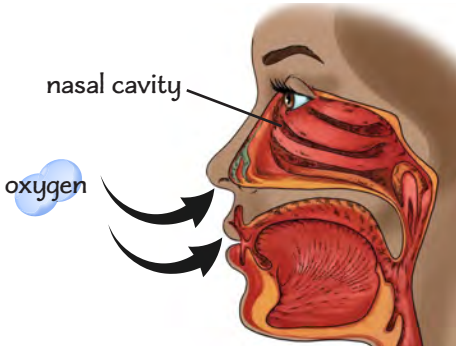
2 NASAL CAVITY OR MOUTH

When air is drawn into your nose, it enters an area called the nasal cavity. Here very small hairs help collect any dust or unwanted particles that come in with the air.

Place your hand under your nostrils to feel the air flow in and out of your nasal cavity.

When air is drawn into your mouth, the air goes directly into your trachea.

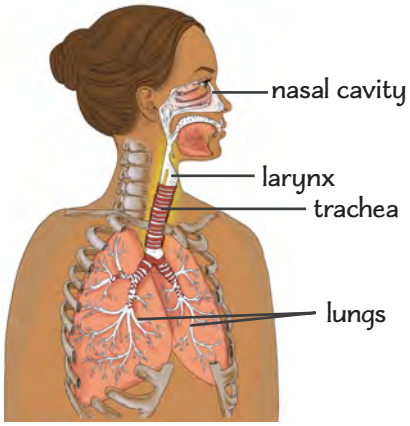
Place your hand in front of your mouth and breathe onto it to feel the air flowing.



3 LARYNX & TRACHEA

From your nasal cavity, air travels through your larynx [LEH–rings] (voice box) and trachea [TRAY–kee–uh]. The trachea is a tube lined with ring-shaped pieces of cartilage.

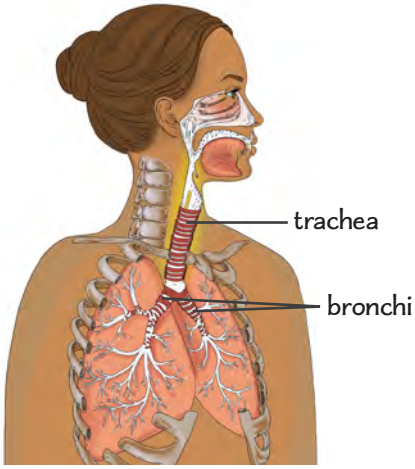
Feel the front of your neck. Do you feel the lumps of the ring-shaped cartilage? These pieces of cartilage help keep the trachea open so that air can flow freely through it.



4 BRONCHI

When the air reaches the base of your trachea, it splits into two tubes, one leading to the left lung and the other to the right lung. These tubes are called the bronchi (singular: bronchus).

Place your hand on your chest to feel it move as you slowly take in a breath of air.



© Good and Beautiful

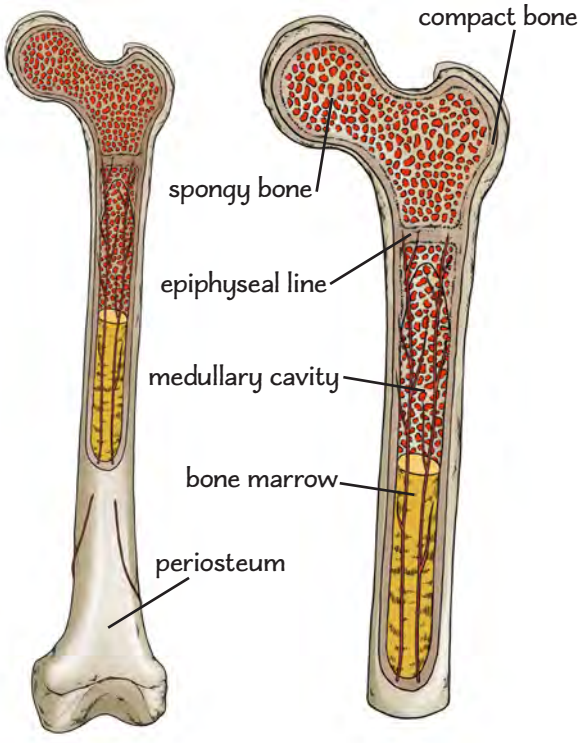
Read to the children: While there are lots of different bone sizes and shapes in our bodies, bones are all made of the same materials.

- The outside of our bones has a hard outer cover called the **periosteum** [pair–ee–AH–stee–uhm] protecting it.
- The next layer is called **compact bone**. It is a very dense layer that provides strength and protection.
- Beneath the compact bone is a porous layer of **spongy bone** that is softer and weaker than compact bone because it has bigger holes.

Most bones in our bodies have only these three parts, but long bones have some additional parts.

- The **medullary** [muh–DOO–luh–ree] **cavity** is a long, narrow column inside the spongy bone that holds bone marrow.
- This soft **bone marrow** tissue is where red blood cells, white blood cells, and platelets are created.

The **epiphyseal** [eh–puh–FIH–zee–uhl] **line** is an area of the bone that allows it to grow in length. After children finish growing, this area hardens and becomes the epiphyseal plate.



Healthy Bone Growth

Read to the children: Our bones grow all through childhood. While children are growing, they need a lot of calcium, which is found in foods like milk, broccoli, oranges, leafy greens, canned salmon and other canned fish, and soybeans. Calcium helps bones grow, so if there isn't enough calcium in a child's diet, his or her bones could become weak or brittle or not grow as they should.

Remodeling is a process where new bone tissue is formed after older bone is broken down and enters the bloodstream. Remodeling never stops. In fact, your skeleton will completely regenerate every ten years or so!

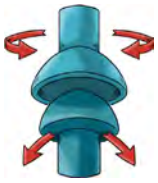
Something else that is very important for having strong bones is exercise. Just like muscles, which respond to the stress exercise puts on the body by becoming stronger, bones respond to lifting and carrying extra weight by becoming denser and stronger.

Types of Joints

Read to the children: There is one more very important part of the skeletal system—the joints! A ***joint*** is a special structure of the body where two or more bones come together.

Our bodies would be very stiff if we didn't have joints. They allow the bones of the skeletal system to work together so that we can dance, walk, flip, run, and move around in hundreds of different ways. Let's take a closer look at the different types of joints found in the body.

- The **ball-and-socket joint** is found in our hips and shoulders. One of the bones in the joint is round on the end, like a ball. The end of the other bone is concave, making a cup to fit around the first bone, allowing it to move freely. This joint allows the greatest range of motion.

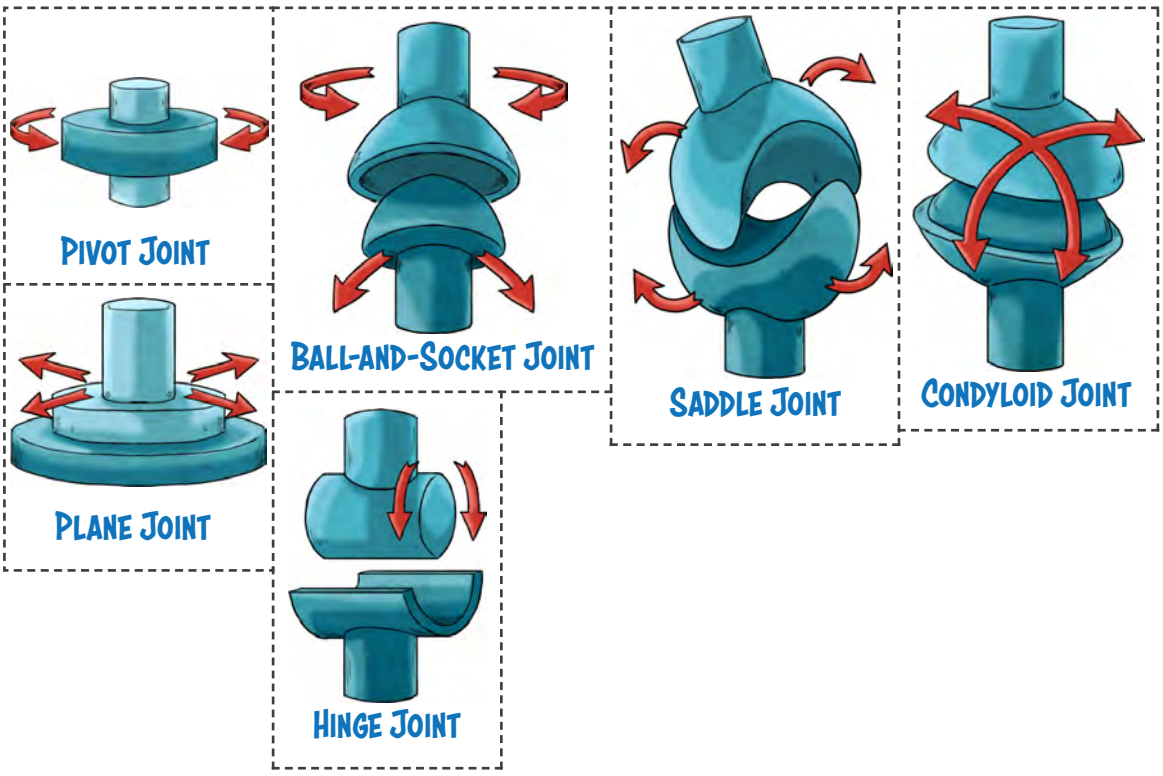


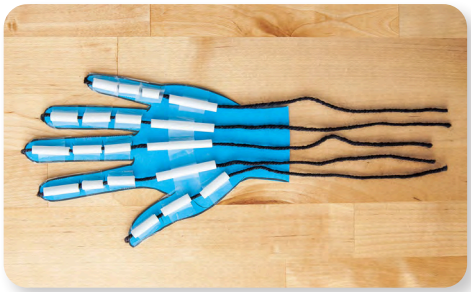
© Good and Beautiful

Bones Matching Cards

Skull	Clavicle also called the collarbone	Humerus long, straight bone in the top of the arm	Tarsals the small bones of the ankle
Ribs protect the vital organs	Ulna & Radius the two bones in the lower arm	Tibia & Fibula the shin and calf bones of the lower leg	
Sternum also called the chest bone	Spine runs down the center of the back	Pelvic Bone base of the spine connects to it	
Femur longest and strongest bone in the body	Carpals small bones of the wrist	Patella also called the kneecap	
Metacarpals & Phalanges the small bones in the hand and fingers	Metatarsals & Phalanges the small bones in the foot and toes		

Joints Matching Cards





Let's do an activity that will help us see how the tendons in your palms work.

Have the children turn to the "Hand Model" page in Lesson 11 of their student journals and complete the hand model by following these instructions:

1. **Cut out the hand and lay it on a flat surface.**
2. **Using the lines on the "Hand Model" page as a guide, cut the straws into three shorter pieces per finger and thumb and four longer pieces for the tendons in the hand.**
3. **Tape the straw pieces onto the hand model, leaving a small space between them. Make sure they are straight on the finger.**
4. **Cut the string into 5 pieces, each long enough to go from the tips of the fingers to a few centimeters past the bottom of the hand. Thread the string down each finger through the pieces of straw, going from the fingertip and down through the hand past the wrist. Be careful not to pull the string all the way through.**
5. **Use a piece of tape or a small paper clip on the end of the string to secure it at the top of each finger.**

The strings in our hand model represent the tendons in our wrists and palms that help our fingers curl in, and the straws represent the bones. What happens to the fingers when you pull the strings? [They should curl in.] Do you remember what pulls on those tendons to make the fingers move? [muscles] There are skeletal muscles at the base of the thumb and in the palm of the hand that help move the fingers, as well as important muscles in the forearm where most finger and arm movements begin.

Science Wall: Vocabulary Word

Place the vocabulary card TENDON on your science wall. Read and discuss the word and definition.

Exercise Adventures Videos (Optional Activity)

WATCH ONLINE

Have the children follow along with The Good and the Beautiful's *Exercise Adventures for Kids* videos by viewing them on The Good and the Beautiful Kids YouTube channel.

Lesson 11 Extension

7–8

Have children grades 7–8 complete the self-directed Lesson 11 extension titled "Muscle Fatigue" in their student journals.

© Good and Beautiful

Healthy Lifestyle Seek & Find Key

Discussion Points:

Eating a healthy meal
Eating lots of fruits, vegetables, grains, proteins, and healthy fats will help you stay strong and regain health quickly when sick.

Exercising
Regular exercise keeps your body strong and working its best.

Sleeping
Getting plenty of sleep helps your body restore itself and heal.

Praying
Times of peace can help restore both soul and body.

Playing outside
Our bodies create Vitamin D naturally when out in the sunshine, which strengthens our bodies' ability to fight off sickness. The fresh air is also good for keeping our lungs clean and healthy.

Washing hands
Keeping your hands clean can help cut down on the spread of germs.

Studying God's word
Life has challenges and stresses for everyone, which can weaken the body. Studying God's word every day brings us joy and peace that restore our minds and bodies.

in the video, every living thing contains DNA. DNA is made up of three things that provide the structure of the DNA strands.

1. A phosphate group—represented by the red pipe cleaner
2. A sugar group—represented by the blue pipe cleaner
3. Nucleotide base pairs—represented by the beads

There are four different types of bases that make up the two base pairs.

(1) Adenine and (2) thymine are always paired together, and (3) cytosine and (4) guanine are always paired together. **Write these base names down on small pieces of paper and label each pile of beads.**

We are going to create a DNA model so that you can see how the different parts come together.

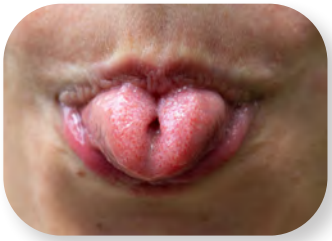
Help the children complete each step below:

1. **Select two beads to form a base pair. Slide the beads onto a white pipe cleaner.**
2. **Lay out a red pipe cleaner and a blue pipe cleaner parallel to each other on the table. Lay the white pipe cleaner with the beads between the red and blue pipe cleaners.**
3. **Twist one end of the white pipe cleaner around the red pipe cleaner and the other end around the blue pipe cleaner.**
4. **Continue creating base pairs, securing them along the sugar (blue) and phosphate (red) strands.**
5. **When finished, twist the model into a double helix formation.**

Dominant & Recessive Gene Tests

Have the children turn to the "Genetic Tests & Fingerprints" page in Lesson 14 of their student journals and complete the questions or activities as you read. Read to the children: Let's look at some examples of traits in humans that are dominant or recessive.

1. Brown eyes are most dominant, green eyes are more dominant than blue eyes, and blue eyes will always be recessive. Answer question #1 on your journal page.
2. Dark hair shades, such as brown and black, are dominant, while lighter hair shades, including blonde and red, are recessive. Answer question #2 on your journal page.
3. Unattached earlobes are dominant over attached earlobes. Look at your earlobes in the mirror. Answer question #3 on your journal page.



4. Being able to curl your tongue is dominant over not being able to curl your tongue, which is recessive. Answer question #4 on your journal page.

Fingerprint Activity

Read to the children: Much like your DNA, your fingerprints are completely unique to you. Each person is born with a unique fingerprint pattern that never changes. As you touch and handle surfaces, sweat and oil from your sebaceous glands leave a trace of your fingerprint pattern behind.

1. **Have the children use pencils to color a 1" square on a piece of scratch paper. Make sure that they color the square fully and bear down a bit on the pencil to leave behind as much graphite as possible.**
2. **Tear off 5 pieces of transparent tape about 1½–2 inches long per child. Lay them on the table sticky side up.**

© Good and Beautiful

HEALTH AND THE PHYSICAL BODY

Grades 3-6

STUDENT JOURNAL

This journal belongs to:

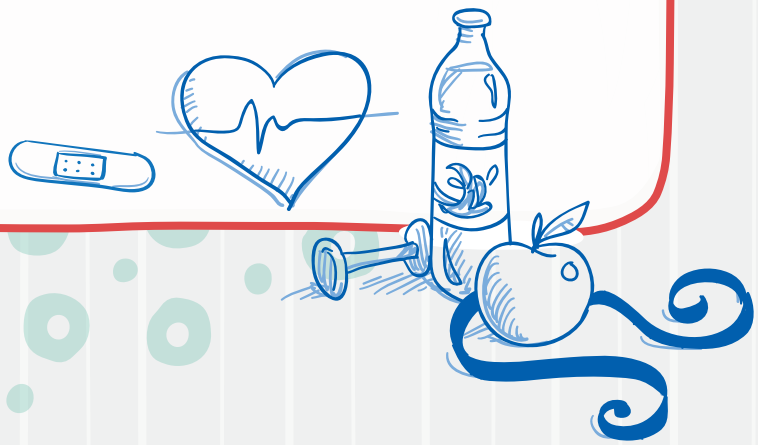
THE GOOD AND THE BEAUTIFUL

INSTRUCTIONS

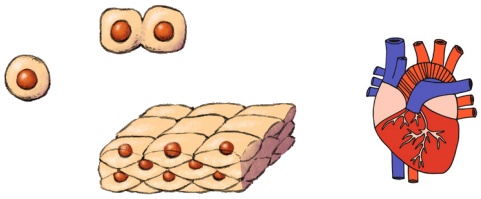
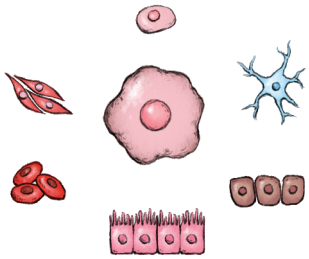
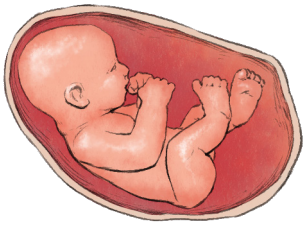
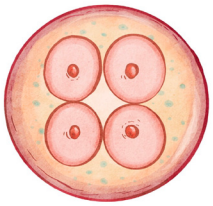
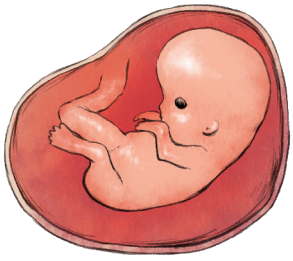
This Student Journal accompanies *The Good and the Beautiful Health and the Physical Body* science unit. It contains all the worksheets and journal pages that are needed to complete the unit. Each student will need his or her own copy of the science journal.

Have each student take his or her time to create high-quality work as the activities and worksheets are completed. Students may enjoy looking back on their past discoveries when they've finished.

TABLE OF CONTENTS



Cell Division and Development of a Baby Cards

Tissues and Organs 	**Baby** 
Types of Cells 	**Fetus** 
Zygote 	**Embryo** 

© Good and Beautiful

Cell Division and Development of a Baby

1. All human life begins as a single cell called a zygote.

2. As the zygote cell continues to divide and multiply, different kinds of cells begin to form. Each kind has a different job.

3. Some of these cells become tissues and organs, which are groups of cells that are the same and work together to do a job in the body.

4. As these tissues continue to grow, an embryo is formed.

5. The cells continue dividing, tissues continue growing, and organs continue developing into full maturity until the embryo becomes a fetus.

6. As the fetus continues to grow, the organs begin working together in systems that keep our bodies working. Then, at just the right time, a baby is born.

© Good and Beautiful

BILE ACTIVITY

HYPOTHESIS

1. Draw what you think the jar will look like when we add the oil to the water.

2. Circle what you think will happen when we add the dishwashing soap to the oil and water.

a. The oil and water will stay the same.

b. The oil and water will mix.

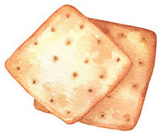
RESULTS

Draw lines to match the materials we used with the things they represent in our bodies.

jar	lipids
water	small intestine
oil	bile
dishwashing soap	blood

© Good and Beautiful

FOOD CARDS

○ Carb ○ Fat ○ Protein  Almonds	○ Carb ○ Fat ○ Protein  Muffin	○ Carb ○ Fat ○ Protein  Bagel	○ Carb ○ Fat ○ Protein  Banana	○ Carb ○ Fat ○ Protein  Beans
○ Carb ○ Fat ○ Protein  Beef	○ Carb ○ Fat ○ Protein  Orange	○ Carb ○ Fat ○ Protein  Pancake	○ Carb ○ Fat ○ Protein  Broccoli	○ Carb ○ Fat ○ Protein  Brownie
○ Carb ○ Fat ○ Protein  Pasta	○ Carb ○ Fat ○ Protein  Carrots	○ Carb ○ Fat ○ Protein  Peanuts	○ Carb ○ Fat ○ Protein  Cheese	○ Carb ○ Fat ○ Protein  Pineapple
○ Carb ○ Fat ○ Protein  Chicken	○ Carb ○ Fat ○ Protein  Potato	○ Carb ○ Fat ○ Protein  Shrimp	○ Carb ○ Fat ○ Protein  Sunflower Seeds	○ Carb ○ Fat ○ Protein  Crackers
○ Carb ○ Fat ○ Protein  Croissant	○ Carb ○ Fat ○ Protein  Yogurt	○ Carb ○ Fat ○ Protein  Waffle	○ Carb ○ Fat ○ Protein  Eggs	○ Carb ○ Fat ○ Protein  Fish
○ Carb ○ Fat ○ Protein  Fries	○ Carb ○ Fat ○ Protein  Bread	○ Carb ○ Fat ○ Protein  Ham	○ Carb ○ Fat ○ Protein  Ice Cream	○ Carb ○ Fat ○ Protein  Milk

© Good and Beautiful

KIDNEY FILTRATION ACTIVITY

Draw lines to match the supplies we used in this activity to the parts of the body they represent.

red liquid	waste
sand or pebbles	nephrons
coffee filter	blood

Draw what the coffee filter looked like after it filtered out the sand or pebbles.

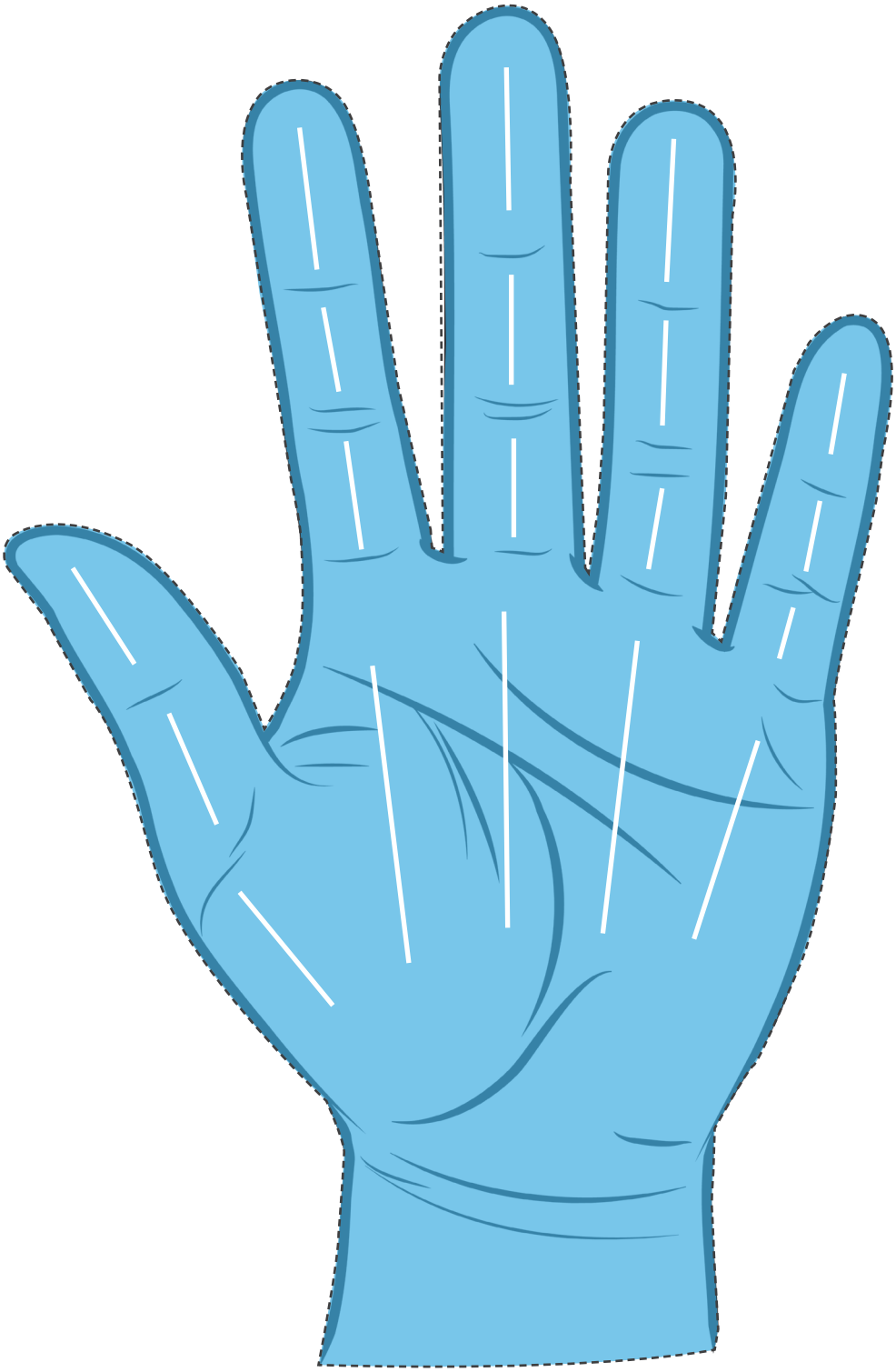
Question:

What do you think would happen in our bodies if our kidneys didn't filter out the waste?

kidney

© Good and Beautiful

Hand Model



© Good and Beautiful

Healthy Lifestyle Seek & Find

Find and circle all the ways that these children are practicing healthy lifestyle choices.
Cross out the unhealthy choices.

© Good and Beautiful

HEALTH AND THE PHYSICAL BODY

Grades 7-8

STUDENT JOURNAL

This journal belongs to:

THE GOOD AND THE BEAUTIFUL

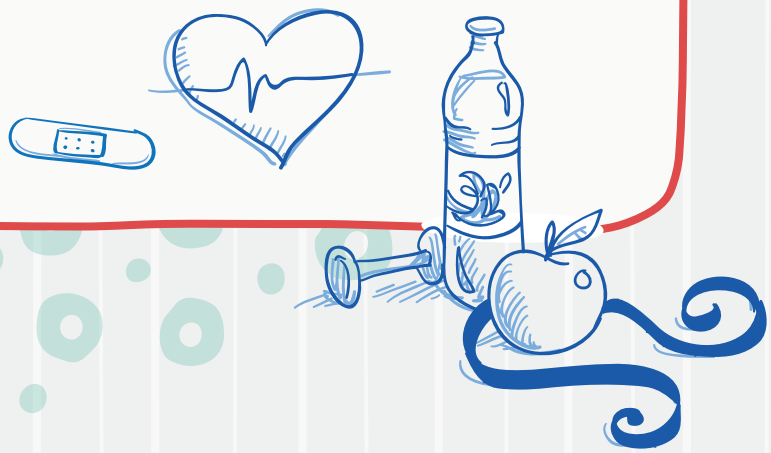
INSTRUCTIONS

This Student Journal accompanies *The Good and the Beautiful Health and the Physical Body* science unit. It contains all the worksheets and journal pages that are needed to complete the unit. Each student will need his or her own copy of the science journal.

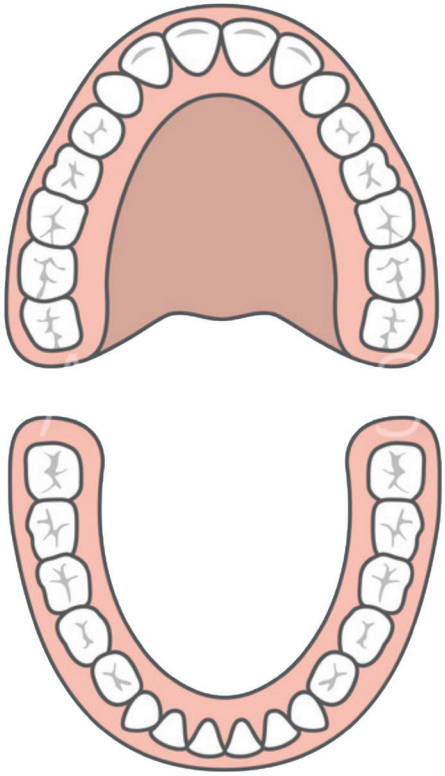
The Health and the Physical Body lesson extensions are also found here. These extensions are optional for older students (grades 7–8) to complete on their own. Each extension is accompanied by lined paper so the student can keep his or her work in one place.

Have each student take his or her time to create high-quality work as the activities and worksheets are completed. Students may enjoy looking back on their past discoveries when they've finished.

TABLE OF CONTENTS



BREAK IT DOWN



Used to bite
(color blue)

Used to cut and tear
(color green)

Used to grind
(color red)

1 What happened to the apple when you chewed it? Describe how it changed.

PARTS OF A TOOTH

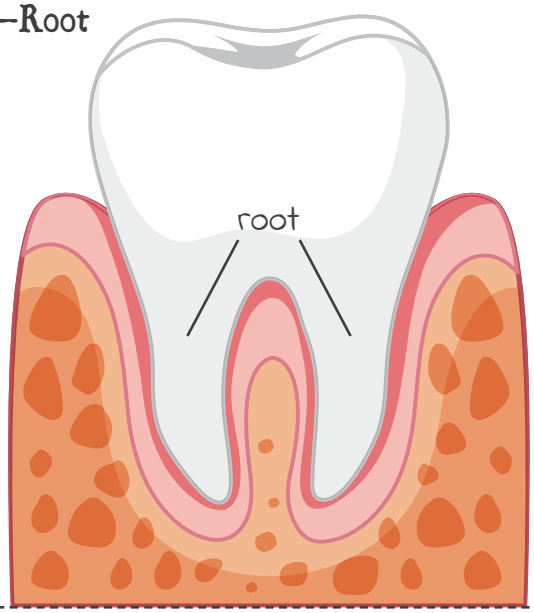
2 What did your tongue do as you chewed?

3 What did your tongue do once the apple was broken down and ready to be swallowed?

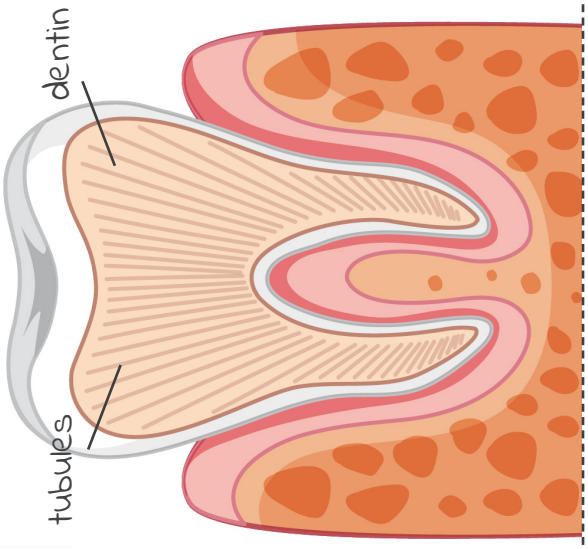
© Good and Beautiful

PARTS OF A TOOTH LAYERED BOOK

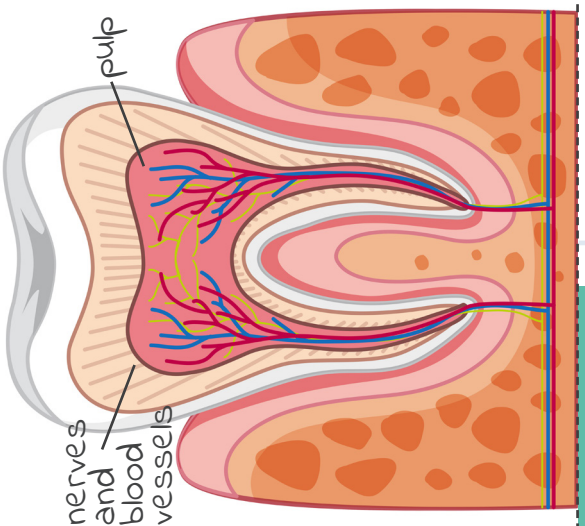
1–Root



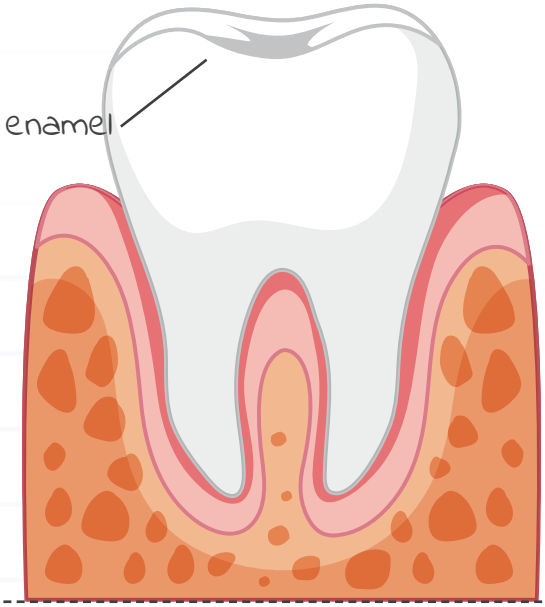
2–Dentin



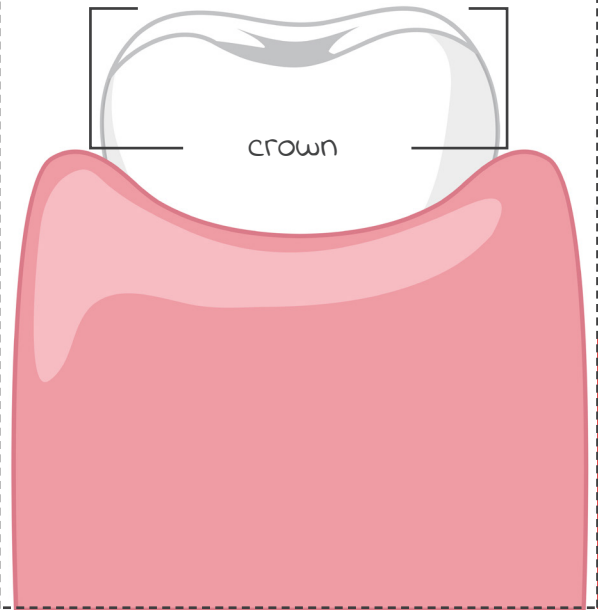
3–Pulp



4–Enamel



5–Crown



© Good and Beautiful

BILE ACTIVITY

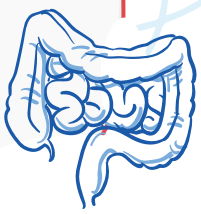
HYPOTHESIS

1. What do you think will happen when the oil is added to the water?

2. What do you think will happen when dishwashing liquid is added to the oil and water?

RESULTS

- What did the oil do when added to the water?
- What happened to the oil after the dishwashing liquid was stirred in? Write down what you observed.
- How does this activity demonstrate the way lipids are broken down in the body?



© Good and Beautiful

EXTENSION

Instructions:

1. Read the information below.
2. On the next page, list and explain at least three things that can happen when the body is dehydrated.
3. List three healthy habits you can start today to stay hydrated.

Dangers of Dehydration

Did you know that a human can live up to 40 days without food but only around seven days without water? Water is such a vital part of our well-being. Dehydration causes an imbalance in the body's internal sodium and electrolyte levels, affecting all major systems of the body in these ways:

- Lack of physical coordination
- Lowered ability to pay attention
- Impairment of decision-making abilities
- Impairment of executive function abilities, or the ability to think clearly and make good decisions
- Risk of seizures, brain swelling, kidney failure, shock, coma, and even death

What is the progression of symptoms when becoming dehydrated?

Our bodies lose water every day through breathing, urinating, and sweating. That water must be replaced through the foods that we eat and by drinking enough water every day.

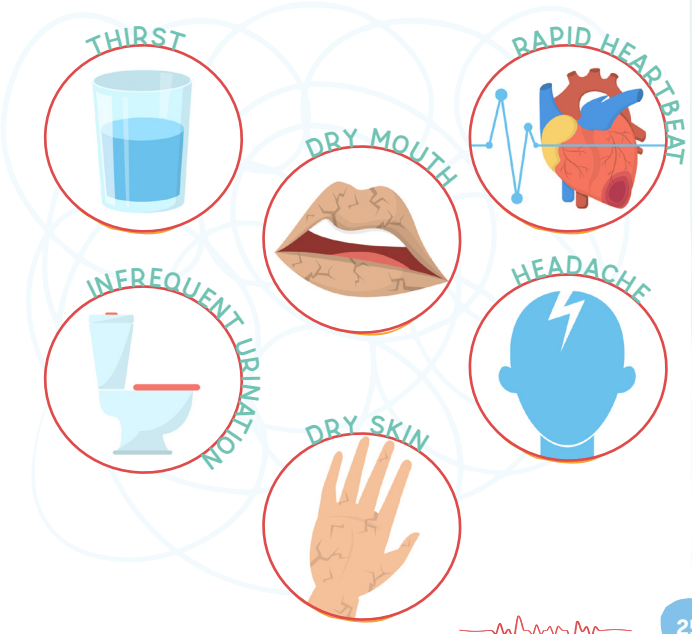
You may have heard it said before—when you are thirsty, you are already dehydrated! Our bodies have ways of telling us when we are dehydrated. At first, we might feel thirsty or tired and may even begin to develop a headache. This is often followed by feelings of grouchiness and a decline in mental and physical capabilities.

What happens inside our bodies when we become dehydrated?

As your body loses water, it sends a signal to your kidneys to hold onto any water they can. This means you urinate less, and urinating less means that your body is not eliminating toxic waste products that can cause illness. Your blood becomes thicker, making it harder for your cardiovascular system to function properly.

Dehydration increases the risk of exhaustion and hinders your body's ability to regulate internal body temperature. This can cause your body temperature to rise above normal, also known as hyperthermia, which can cause damage to the brain and organs.

Signs of Dehydration



How to Prevent Dehydration

It's important to recognize the early signs of dehydration and respond quickly to them by replacing fluids that have been lost. Plain water is always the best option for replenishment, and drinking plenty every day is the best way to avoid dehydration, especially on hot or humid days. If you suspect you or someone you're with is dehydrated, seek help from an adult or a medical professional.

- Periodically rest in a cool, shaded spot.
- Dress appropriately on warm or humid days in loose-fitting clothes and even a hat if possible.
- Drink extra water before beginning any sport or activity, and drink more water every 20 minutes or so.
- Avoid exercising or playing sports during the hottest part of the day.
- Stay away from too much caffeine.

© Good and Beautiful

EXTENSION

Instructions:

1. Read the information below.
2. Write a list of reasons that a person might need a kidney transplant.
3. In your own words, explain the kidney donation process in at least four sentences.

Kidney Transplants

Can you believe that there are more than 100,000 adults and children who are waiting for a kidney donation in the United States? According to the National Kidney Foundation, one person is added to the waitlist every nine minutes.

Why are so many people waiting for a kidney donation?

We can live with one kidney, but when both fail, a new one is needed. There are many reasons that kidneys can fail, including diabetes, kidney diseases such as polycystic kidney disease, or chronic glomerulonephritis, which causes the kidney to become inflamed and leads to scarring of the nephrons.

When a kidney isn't functioning as it should, or fails to work at all, a treatment called dialysis can be used to rid the body of toxins, waste, and excess water. Dialysis takes the place of many functions of a healthy kidney and can help people with kidney disease live. But there are some cases where a new kidney is needed. People of all ages need kidney donations—even children as young as one year old have been recipients of a donor kidney.

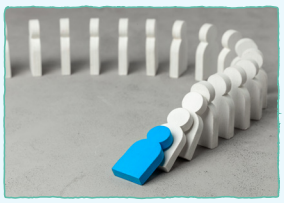
There are two major types of kidney donations.

- A **deceased-donor transplant** is when a person has recently died and has consented, or the family has consented, to donate organs, such as his or her kidney.
- A **living-donor transplant** is when a kidney is taken from a living person. Only one kidney is needed to replace the two kidneys in the patient.

In the US, about two-thirds of kidney donations are from deceased donations, and the remaining one-third are from living donors.

A matching process helps to find the best possible option for each patient that needs a kidney transplant. Things such as the most urgent need, blood type, body size, and location help to make a good match, hoping to ensure the kidney is not rejected by the recipient's body.

Dylan's Story



On the Johns Hopkins Medicine website, there is an amazing story of a kidney donor, Dylan. While attending college, Dylan read an article about kidney donation, specifically people donating a kidney to a stranger. He decided that if he could do something to help someone else, he should. After lots of research and talking with other people who were also kidney donors, Dylan decided he wanted to donate a kidney. There is a process to go through that includes a thorough medical and psychological screening, which Dylan underwent.

Dylan's donation created what is referred to as a domino effect. Sometimes a person is willing to be a living kidney donor for someone he or she knows who needs a kidney, but the two are not compatible. When this happens, that donor's information is placed into a database that tracks donors and recipients. When Dylan agreed to be a donor to anyone who needed a kidney, his information was entered into that database. From there, it was determined that Dylan could donate to patient #1, and patient #1's donor could donate to patient #2, and so on. When Dylan received the phone call that a match had been found for his kidney, he learned that his donation initiated a chain of donations that would help four patients! Dylan wanted to help someone in need, and through his sacrifice he helped four people increase their quality of life and even saved lives!

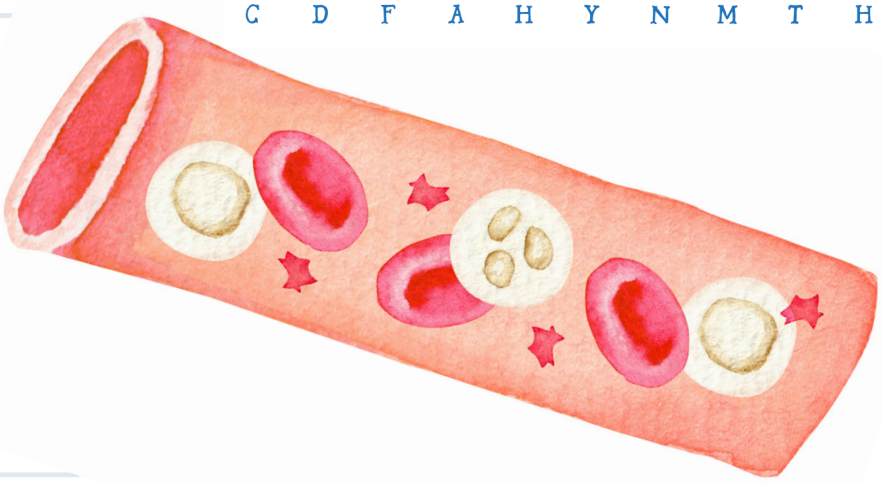
© Good and Beautiful

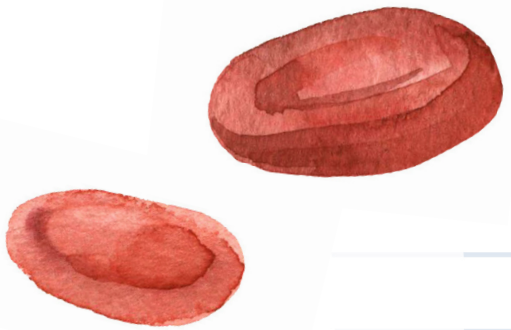
PARTS OF THE BLOOD WORD SEARCH

Find the words in the box below in the word search.

BLOOD VESSEL CLOT PLATELETS
PLASMA RED BLOOD CELLS WHITE BLOOD CELLS

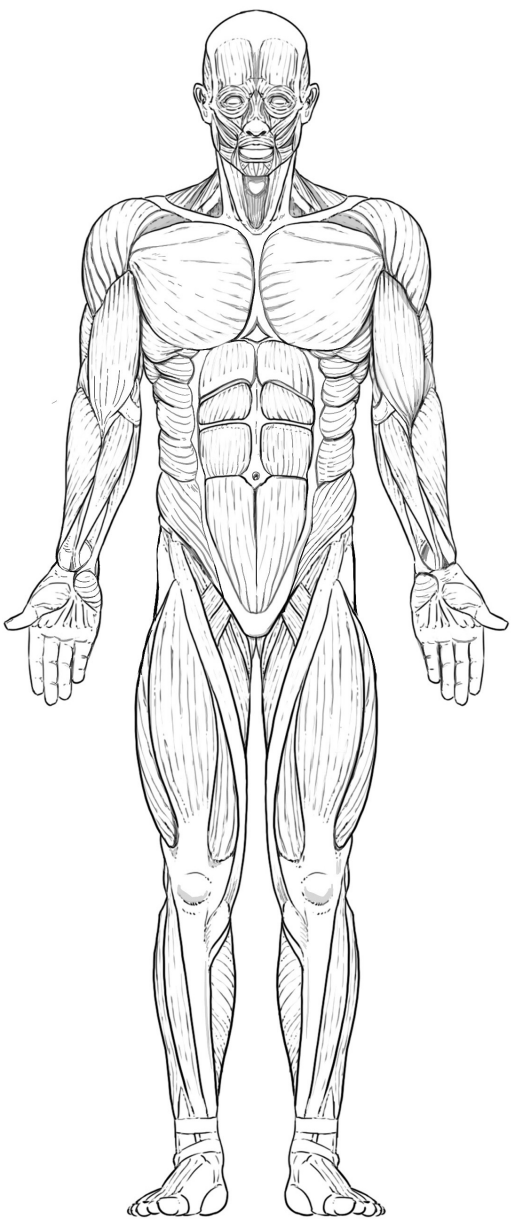
P C W C O S H Q M C F X S J A
L H M L W W G V D G Q C T B E
A E A O R Y I N A B Z M S C P
T I W T Q N D K R L O U F F L
E R E D B L O O D C E L L S B
L U U X B D I T F J X H Z C T
E T A C W N X B N Q J X B M G
T W X K H A G Z X D U M N E R
S T G V E N H X G L L F K O Q
W H I T E B L O O D C E L L S
B T A K G E I E P P U T G L C
U B L O O D V E S S E L W E R
C X R T H S Q Z P L A S M A S
C D F A H Y N M T H G R I J M

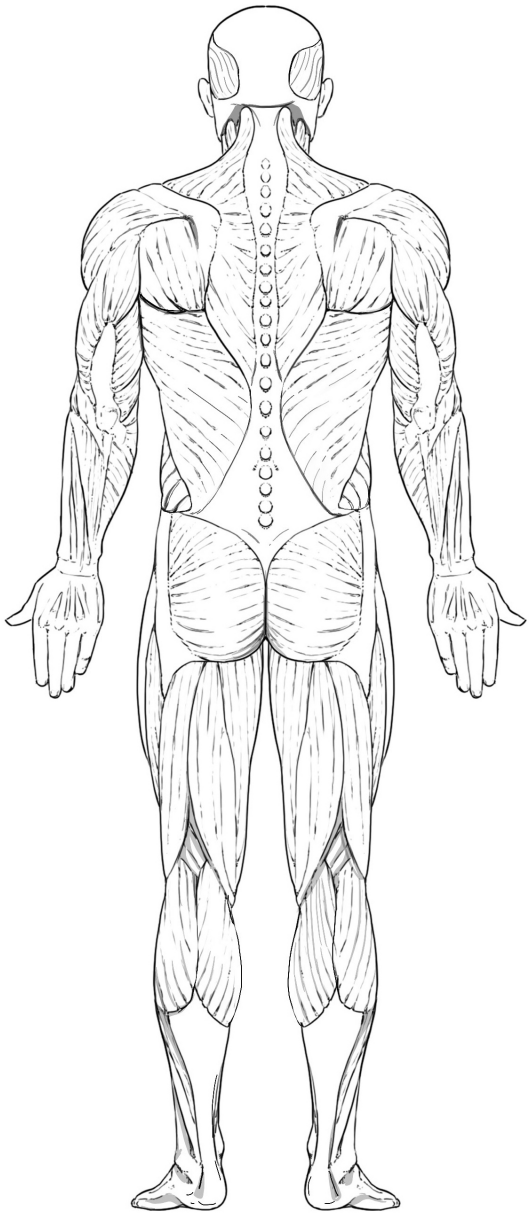




© Good and Beautiful

MAJOR MUSCLE GROUPS





Muscle Group Key

- Biceps
- Triceps
- Abdominal Muscles
- Quadriceps
- Hamstrings
- Pectorals
- Obliques
- Deltoids
- Gastrocnemius
- Gluteals

© Good and Beautiful

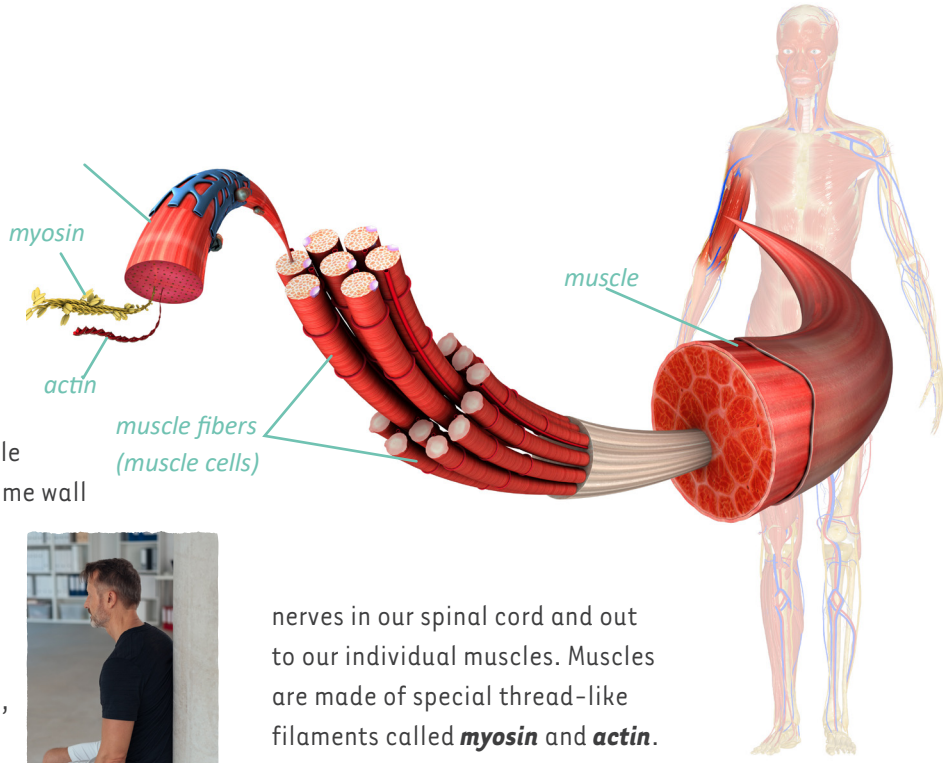
EXTENSION

Instructions:

1. Read the information below.
2. On the next page, write a definition for muscle fatigue.

Muscle Fatigue

Have you ever gone on a really long walk, rode your bike for a great distance, or skied down the slope of a mountain? When you were done, did your legs, arms, or other parts of your body feel tired and even shaky? If so, that feeling is called ***muscle fatigue***.



Exercise Experiment

To test out muscle fatigue, if you are able to, exercise your quadriceps by doing some wall squats. Complete these steps:

1. Stand up against a wall with your back to the wall.
2. With your back still against the wall, move your feet out in front of you (away from the wall). Place your feet shoulder-width apart.
3. Squat down like you are about to sit in a very small chair until your knees form a 90-degree angle.
4. Rise up, keeping your back straight.
5. Repeat until you are too tired to continue. (10–20 squats may be a good goal.)

Do your legs feel shaky? If not, see if you can do a few more. Once you feel like there is no way your muscles could allow you to do another squat, you're experiencing muscle fatigue.

What Is Muscle Fatigue?

Why do you think your muscles tire and cannot produce as much force as they could originally? In the experiment, your first few squats were the most powerful, but additional squats became increasingly difficult.

Our muscles contract and relax when our brain sends a message (as an electrical impulse) down through nerves in our spinal cord and out to our individual muscles. Muscles are made of special thread-like filaments called ***myosin*** and ***actin***. When a nerve gives the electrical signal to contract, myosin filaments pull actin filaments closer together and shorten the muscle fiber. When the nerves can no longer generate signals or the muscle fibers weaken in their ability to contract, this is muscle fatigue. Our bodies were purposefully designed to feel muscle fatigue so we can recognize our physical limits.

Muscle Soreness

Our muscles become larger as we continually challenge them through exercise and other use. When we exercise strenuously, sometimes our muscles get tiny tears that can cause soreness for a few days. As our bodies repair these tears, the muscle tissues become stronger, which leads to bigger and stronger muscles overall.

Chronic Muscle Fatigue

Usually as we rest, our muscle fatigue ends. However, some people have chronic fatigue. This is where the fatigue does not stop, even after a lot of rest. Scientists, doctors, and other researchers are working to better understand these conditions to help those with chronic muscle fatigue.

© Good and Beautiful

Lesson 14

GENETIC TESTS & FINGERPRINTS

1. What color are your eyes? _____

   Is this a dominant or recessive trait? _____

2. What shade is your hair? _____

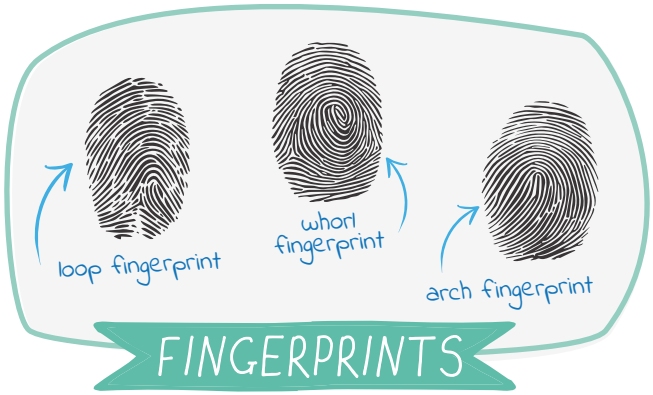
   Is this a dominant or recessive trait? _____

3. Are your earlobes attached or unattached? _____

   Is this a dominant or recessive trait? _____

4. Are you able to curl your tongue? _____

   Is this a dominant or recessive trait? _____



Thumb | Index Finger | Middle Finger | Ring Finger | Pinky Finger

© Good and Beautiful