

# LIFE SCIENCE

# GRADE 5

## ASSESSMENT PACKET

A comprehensive course that teaches the fundamental concepts in human physiology and anatomy. Discover how to build a working robotic hand, measure your lung capacity, filter blood, detect genetic traits, chemically fingerprint your friends, and make a frog totally disappear.



Created by Aurora Lipper, Supercharged Science

**[www.SuperchargedScience.com](http://www.SuperchargedScience.com)**

This curriculum is aligned with the California State Standards and STEM for Science.

# Educational Goals

Your body does a tremendous number of things all the time. You're going to learn about your skeleton, bone joints, muscle tension, blood cells, lungs, ears, and eyes! Some of the experiments you'll be creating include: a working lung model so you can see how pressure differences affect the lungs and diaphragm; a robotic hand model with real tendons; working eye model which you can adapt for near- and farsighted conditions; how to do chemical fingerprinting... and so much more!

We will go over integumentary, skeletal, and muscular systems by beginning with a general overview of the body. We'll also learn about what we should eat and discover what happens to food once we swallow it. Another system we'll cover is the respiratory system, which is responsible for providing your organs with the oxygen they need and removing the carbon dioxide they don't. Speaking of things your body doesn't need, our next topic will be the excretory system, the one responsible for getting rid of all waste from the body. We'll talk about how your body allows you to do all the things you do. In order to do those things, your body must stay healthy, and keeping you healthy is the job of the immune system.

## **Here are the scientific concepts:**

- An inherited trait can be determined by one or more genes.
- The sequential steps of digestion, and the roles of teeth and mouth, esophagus, stomach, small intestine, large intestine, and colon in the function of the digestive system.
- Organ systems function because of the contributions of individual organs, tissues, and cells. The failure of any part can affect the entire system.
- How bones and muscles work together to provide a structural framework for movement.
- How to relate the structures of the eye and ear to their functions.
- How to compare joints in the body (wrist, shoulder, thigh) with structures used in machines and simple devices (hinge, ball-and-socket, and sliding joints).
- How blood circulates through the heart chambers, lungs, and body, and how carbon dioxide (CO<sub>2</sub>) and oxygen (O<sub>2</sub>) are exchanged in the lungs and tissues.
- How levers confer mechanical advantage and how the application of this principle applies to the musculoskeletal system.
- How kidneys remove cellular waste from blood and convert it into urine, which is stored in the bladder.
- Contractions of the heart generate blood pressure, and heart valves prevent backflow of blood in the circulatory system.
- How the five senses (sight, smell, sound, taste, and touch) work together.
- The energy released [from] food was once energy from the sun that was captured by plants in the chemical process that forms plant matter.
- Food provides animals with the materials they need for body repair and growth and the energy they need to maintain body warmth and for motion.
- Plants acquire their material for growth chiefly from air and water.

- The food of almost any kind of animal can be traced back to plants. Organisms are related in food webs in which some animals eat plants for food and other animals eat the animals that eat plants. Some organisms, such as fungi and bacteria, break down dead organisms (both plants or plants parts and animals) and therefore operate as “decomposers.” Decomposition eventually restores (recycles) some materials back to the soil. Organisms can survive only in environments in which their particular needs are met. A healthy ecosystem is one in which multiple species of different types are each able to meet their needs in a relatively stable web of life. Newly introduced species can damage the balance of an ecosystem.
- Matter cycles between the air and soil and among plants, animals, and microbes as these organisms live and die. Organisms obtain gases, and water, from the environment, and release waste matter (gas, liquid, or solid) back into the environment.

**By the end of the labs in this unit, students will be able to:**

- Design and build a working robotic hand by understanding how tendons work to create movement.
- Know how to demonstrate how the eye works, and demonstrate common eye problems.
- Understand how to determine lung capacity, monitor heart rate, and several other measurable functions of the body.
- Demonstrate how the body can be modeled by simple machines and joint models.
- Differentiate observation from inference (interpretation) and know scientists’ explanations come partly from what they observe and partly from how they interpret their observations.
- Measure and estimate the weight, length and volume of objects.
- Formulate and justify predictions based on cause-and-effect relationships.
- Conduct multiple trials to test a prediction and draw conclusions about the relationships between predictions and results.
- Construct and interpret graphs from measurements.
- Follow a set of written instructions for a scientific investigation.

# Life Science Grade 5 Evaluation

## Teacher Section

**Overview:** Kids will demonstrate how well they understand important key concepts from this section.

**Suggested Time:** 45-60 minutes

**Objectives:** Students will be tested on the key concepts of Human Anatomy:

- How levers confer mechanical advantage and how the application of this principle applies to the musculoskeletal system.
- The sequential steps of digestion, and the roles of teeth and mouth, esophagus, stomach, small intestine, large intestine, and colon in the function of the digestive system.
- How levers confer mechanical advantage and how the application of this principle applies to the musculoskeletal system.
- How kidneys remove cellular wastes from blood and convert it into urine, which is stored in the bladder.
- How blood circulates through the heart chambers, lungs, and body, and how carbon dioxide (CO<sub>2</sub>) and oxygen (O<sub>2</sub>) are exchanged in the lungs and tissues.
- How contractions of the heart generate blood pressure, and heart valves prevent backflow of blood in the circulatory system.

Students will also demonstrate these principles:

- Know how to demonstrate how the eye works, and demonstrate common eye problems.
- Demonstrate how the body can be modeled by simple machines and joint models.

### Materials (one set for entire class)

- Biconvex lens
- Balloon
- Candle
- Matches (you will light the candle when the student asks you to)
- Paper
- Clay
- Pencil
- Ruler

### Lab Preparation

1. Print out copies of the student worksheets, lab practical, and quiz.
2. Have a tub of the materials in front of you at your desk. Kids will come up when called and demonstrate their knowledge using these materials.

### Lesson

The students are taking two tests today: the quiz and the lab practical. The quiz takes about 20 minutes, and you'll find the answer key to make it easy to grade.

## **Lab Practical**

Students will demonstrate individually that they know how to model certain parts of the body using scientific principles. While other kids are waiting for their turn, they will get started on their homework assignment. You get to decide whether they do their assignment individually or as a group.

# Life Science Grade 5 Evaluation

## Student Worksheet

**Overview:** Today you're going to take two different tests: the quiz and the lab practical. You're going to take the written quiz first, and the lab practical at the end of this lab. The lab practical isn't a paper test – it's is where you get to show your teacher that you know how to do something.

### Lab Test & Homework

1. Your teacher will call you up so you can share how much you understand about human anatomy and how it works. Since science is so much more than just reading a book or circling the right answer, this is an important part of the test to find out what you really understand.
2. While you are waiting for your turn to show your teacher how much of this stuff you already know, you get to choose which homework assignment you want to complete. The assignment is due tomorrow, and half the credit is for creativity and the other half is for content, so really let your imagination fly as you work through it. Choose one:
  - a. Write a short story or skit about human anatomy from the perspective of the muscle, bone, heart, lungs, or one of the five senses (taste, touch, sight, sound, or smell). You'll read this aloud to your class.
  - b. Make a poster that teaches the main concepts of human anatomy. When you're finished, you'll use it to teach to a class in the younger grades and demonstrate each of the principles that you've learned.
  - c. Write and perform a poem or song about the most fascinating part of human anatomy. This will be performed for your class.

# Life Science Grade 5 Quiz

## Teacher's Answer Key

1. What are ways that the human body can detect temperature? (Thermoreceptors are the nerve endings in our skin that detect changes in temperature. They're located in the dermis, or second layer of skin, and we have both cold receptors and warm receptors.)
2. What are the two main types of muscles? (voluntary and involuntary)
3. Give two examples of a muscle group. (Example: cardiac muscles, smooth muscles)
4. What is the smooth, hard, protective layer on the outside of bones called? (cortical bone)
5. What is the inside spongy, porous, honeycombed bone called? (cancellous bone)
6. Which body system is the heart a part of? (cardiovascular system) What are some of the jobs? (delivering nutrients and oxygen, disposing of waste, regulating body temperature, fighting disease, maintaining homeostasis)
7. Which body system are your lungs a part of? (respiratory system) What are some other parts in this system? (trachea, diaphragm, nose, mouth, etc.)
8. What is pH and how is it useful? (a measurable scale that lets us know how acidic or basic something is) What pH is considered acidic? (1-4)
9. What is the process called that moves food along the digestive tract and how does it work? (Peristalsis occurs when smooth muscles along the digestive tract expand and contract to move food.)
10. What do your kidneys do, and how do they do it? (The kidneys remove waste material, minerals, and fluids from the blood and put it in the urine by acting as a filter.)

# Life Science Grade 5 Quiz

## Student Worksheet

Name\_\_\_\_\_

1. What are ways that the human body can detect temperature?
2. What are the two main types of muscles?
3. Give two examples of a muscle group.
4. What is the smooth, hard, protective layer on the outside of bones called?
5. What is the inside spongy, porous, honeycombed bone called?
6. Which body system is the heart a part of? What are some of the jobs?
7. Which body system are your lungs a part of? What are some other parts in this system?
8. What is pH and how is it useful? What pH is considered acidic?
9. What is the process called that moves food along the digestive tract and how does it work?
10. What do your kidneys do, and how do they do it?

# Life Science Grade 5 Lab Practical

## Teacher's Answer Key

**This is your chance to see how well your students have picked up on important key concepts, and if there are any holes. Your students also will be working on their homework assignment as you do this test individually with the students.**

### Materials:

Double convex lens

- Balloon
- Candle
- Matches (you will light the candle when the student asks you to)
- Paper
- Piece of clay
- Pencil
- Ruler

**Lab Practical:** Ask the student *Note: Answers given in italics!*

- Design an experiment that shows how the shape of the eye will make people near- or far-sighted. *Blow up the balloon and insert the lens into the mouth of the balloon. The student will bring the balloon close to a lit candle and show the image of the candle that appears on the back of the balloon. Squish the balloon slightly on the top to make a near-sighted eyeball, and then gently push in the front and back of balloon to make it a far-sighted balloon.)*
- Design an experiment that shows how a first-class lever works, and also show where in your body you can find this type of lever. *(Student will balance the middle of the ruler on their finger and then play a piece of clay at one end, and then push down on the other end of the ruler to lift the clay like a see-saw or teeter-totter. The neck joint in the middle is the fulcrum, with load and effort on either side.)*

# Life Science Grade 5 Lab Practical

## Student Worksheet

**This is your chance to show how much you have picked up on important key concepts, and if there are any holes. You also will be working on a homework assignment as you do this test individually with a teacher.**

### **Materials:**

- Double convex lens
- Balloon
- Candle
- Matches (you will light the candle when the student asks you to)
- Paper
- Piece of clay
- Pencil
- Ruler

### **Lab Practical:** Ask the student

- Design an experiment that shows how the shape of the eye will make people near- or far-sighted.
  
- Design an experiment that shows how a first-class lever works, and also show where in your body you can find this type of lever.