

# LIFE SCIENCE

# GRADE 7

## ASSESSMENT PACKET

Cells make up all living things. In order to understand how living things like animals, plants, and bacteria live and grow, you must understand cells. We'll also look at DNA, genetics, mitosis, microscopes, muscles, skeletons, earwax, cardiovascular systems, lung capacity, tendons, nostrils, and more.

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

# Educational Goals

This section is all about cells, which are the tiny things that everything is made of. We'll start off by talking about the scientists who first observed and described cells. Then we'll talk about cells themselves. We'll learn about things even smaller than cells that are inside of them, and what they do to help cells survive and do their jobs. We'll also talk about how things get in and out of cells. Finally, we'll take a look at how cells reproduce. All of this is important because cells make up all living things. In order to understand how living things like animals, plants, and bacteria live and grow, we must understand cells.

A section of activities also focus on genetics that relate to animal life as well. Students will learn to use a Punnett square to determine genotypes and phenotypes of offspring. At the completion of this section, students will understand the elements of the food web, as well as introductory genetics.

Students will also discover how the skeleton, bone joints, muscle tension, blood cells, lungs, ears, and eyes work together by creating 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!

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

- All living organisms are composed of cells, from just one to many trillions, whose details usually are visible only through a microscope.
- Cells function similarly in all living organisms.
- The characteristics that distinguish plant cells from animal cells, including chloroplasts and cell walls.
- The nucleus is the repository for genetic information in plant and animal cells.
- Mitochondria liberate energy for the work that cells do, and chloroplasts capture sunlight energy for photosynthesis.
- Cells divide to increase their numbers through a process of mitosis, which results in two daughter cells with identical sets of chromosomes.
- As multicellular organisms develop, their cells differentiate.
- A typical cell of any organism contains genetic instructions that specify its traits. Those traits may be modified by environmental influences.
- The differences between the life cycles and reproduction of organisms.
- Reproduction produces offspring that inherit half their genes from each parent.
- An inherited trait can be determined by one or more genes.
- Plant and animal cells contain many thousands of different genes, and typically have two copies of every gene. The two copies (or alleles) of the gene may or may not be identical, and one may be dominant in determining the phenotype while the other is recessive.
- DNA is the genetic material of living organisms, and is located in the chromosomes of each cell.

- Plants and animals have levels of organization for structure and function, including cells, tissues, organs, organ systems, and the whole organism.
- Organ systems function because of the contributions of individual organs, tissues, and cells.
- 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 levers confer mechanical advantage and how the application of this principle applies to the musculoskeletal system.
- Contractions of the heart generate blood pressure, and heart valves prevent backflow of blood in the circulatory system.

**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 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:

- 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.

Students will also demonstrate these principles:

1. Collecting and interpreting data from an experiment
2. Making valid observations based on their actions in lab

### Materials (one set for entire class)

- |                               |   |
|-------------------------------|---|
| • a few strands of human hair | • pencil                                    |
| • string                      | • uninflated balloon (one for each student) |
| • index cards                 | • double convex lens                        |
| • brass fasteners             | • double concave lens                       |
| • scissors                    | • spoon                                     |
| • tape                        | • tennis ball                               |

### 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.

# Life Science Grade 7 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 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 life science. 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 get started on your homework assignment. The assignment is due next week, 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 cells from the perspective of inside a particular area of the body. You'll read this aloud to your class.
  - b. Make a poster that teaches the main concepts of the eye. This can be about how the eye works, different parts of the eye, problems that occur with the eye, and improvements you'd make to the eye if you were designing a new one. 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 DNA. This will be performed for your class.

# Life Science Grade 7 Quiz

## Teacher's Answer Key

1. A microscope uses a \_\_\_\_\_ lens to make images appear larger. (convex)
2. \_\_\_\_\_ make up every living thing. (cells)
3. One way substances get into cells is called \_\_\_\_\_. (osmosis)
4. The part of a cell that allows substances to pass through are \_\_\_\_\_. (membranes)
5. \_\_\_\_\_ is the process where light energy is changed into chemical energy. (photosynthesis)
6. Mass and \_\_\_\_\_ are always conserved. (energy)
7. The DNA is located inside the \_\_\_\_\_ of a cell if present. (nucleus)
8. DNA is the \_\_\_\_\_ material that contains all the information about a \_\_\_\_\_. (genetic, cell)
9. \_\_\_\_\_ is a long molecule formed by two strands of \_\_\_\_\_. (DNA, genes)
10. The \_\_\_\_\_ is the supporting structure of your body. (skeleton)
11. \_\_\_\_\_ are involuntary responses you can't control, but are there for your \_\_\_\_\_.  
(Tendon reflex, survival)
12. Not all \_\_\_\_\_ are the same strength, because groups are designed for different and specific functions. (muscles)
13. In your fingers, you have \_\_\_\_\_ which can detect touch, pressure, texture, and more. (receptors)
14. Being exposed to high \_\_\_\_\_ causes your skin's pores to open up and release sweat onto your body which helps cool you off by the process of \_\_\_\_\_. (temperature, evaporation)
15. Digestion starts in your \_\_\_\_\_ as soon as you start to \_\_\_\_\_. (mouth, chew)
16. The \_\_\_\_\_ has \_\_\_\_\_ different receptors for over 10,000 different types of tastes.  
(tongue, four)
17. A \_\_\_\_\_ is a scientific instrument used to amplify sounds like your heart and lungs. (stethoscope)
18. When you exercise, your body requires more \_\_\_\_\_ in order to burn the fuel stored in your \_\_\_\_\_. (oxygen, muscles)
19. Oxygen is moved through the body by \_\_\_\_\_. (red blood cells)
20. Both food and air enter your body through the mouth, but food to the gastrointestinal tract through the \_\_\_\_\_ and air travels to the lungs through the \_\_\_\_\_. (esophagus, trachea)
21. Cells in your body use oxygen and \_\_\_\_\_ is produced as a waste material, which is carried by \_\_\_\_\_. (carbon dioxide, red blood cells)
22. The wavelike movement of muscles that move food through your gastrointestinal tract is called \_\_\_\_\_. (peristalsis)
23. The way smells move through the air is called \_\_\_\_\_. (diffusion)
24. The optic nerve in your eye is like a data cord that is plugged into the back of each eye and connects to your brain, and where it plugs into the eye creates a \_\_\_\_\_. (blind spot)
25. There are two different light \_\_\_\_\_ in the back of the eyeball, called \_\_\_\_\_ (which detect black, white and gray) and \_\_\_\_\_ (which see color). (receptors, rods, cones)
26. Sound is \_\_\_\_\_ that are vibrating. (molecules)
27. The external part of the ears that detect sound first are called the \_\_\_\_\_. (pinna)
28. \_\_\_\_\_ provide information about our environment by being the wires that carry signals from the skin to the brain. (nerves)
29. \_\_\_\_\_ is sterile although it contains hundreds of different kinds of waste from the body. (urine)
30. Sound vibrations vibrate the \_\_\_\_\_ which in turn vibrate the \_\_\_\_\_ and then the \_\_\_\_\_. (tympanic membrane, ossicles, cochlea)

# Life Science Grade 7 Quiz

## Student Quiz Sheet

Name \_\_\_\_\_

Fill in the blank:

1. A microscope uses a \_\_\_\_\_ lens to make images appear larger.
2. \_\_\_\_\_ make up every living thing.
3. One way substances get into cells is called \_\_\_\_\_.
4. The part of a cell that allows substances to pass through are \_\_\_\_\_.
5. \_\_\_\_\_ is the process where light energy is changed into chemical energy.
6. Mass and \_\_\_\_\_ are always conserved.
7. The DNA is located inside the \_\_\_\_\_ of a cell if present.
8. DNA is the \_\_\_\_\_ material that contains all the information about a \_\_\_\_\_.
9. \_\_\_\_\_ is a long molecule formed by two strands of \_\_\_\_\_.
10. The \_\_\_\_\_ is the supporting structure of your body.
11. \_\_\_\_\_ are involuntary responses you can't control, but are there for your \_\_\_\_\_.

12. Not all \_\_\_\_\_ are the same strength,  
  
because groups are designed for different and  
  
specific functions.

13. In your fingers, you have \_\_\_\_\_ which  
  
can detect touch, pressure, texture, and more.

14. Being exposed to high \_\_\_\_\_ causes  
  
your skin's pores to open up and release sweat  
  
onto your body which helps cool you off by the  
  
process of \_\_\_\_\_.

15. Digestion starts in your \_\_\_\_\_ as soon  
  
as you start to \_\_\_\_\_.

16. The \_\_\_\_\_ has  
  
\_\_\_\_\_ different receptors for over  
  
10,000 different types of tastes.

17. A \_\_\_\_\_ is a scientific instrument used  
  
to amplify sounds like your heart and lungs.

18. When you exercise, your body requires more  
  
\_\_\_\_\_ in order to burn the fuel stored  
  
in your \_\_\_\_\_.

19. Oxygen is moved through the body by  
  
\_\_\_\_\_.

20. Both food and air enter your body through the  
  
mouth, but food to the gastrointestinal tract  
  
through the \_\_\_\_\_ and air travels to  
  
the lungs through the \_\_\_\_\_.

21. Cells in your body use oxygen and  
  
\_\_\_\_\_ is produced as a waste material,  
  
which is carried by \_\_\_\_\_.



22. The wavelike movement of muscles that move food through your gastrointestinal tract is called \_\_\_\_\_.

23. The way smells move through the air is called \_\_\_\_\_.

24. The optic nerve in your eye is like a data cord that is plugged into the back of each eye and connects to your brain, and where it plugs into the eye creates a \_\_\_\_\_.

25. There are two different light \_\_\_\_\_ in the back of the eyeball, called \_\_\_\_\_ (which detect black, white and gray) and \_\_\_\_\_ (which see color).

26. Sound is \_\_\_\_\_ that are vibrating.

27. The external part of the ears that detect sound first are called the \_\_\_\_\_.

28. \_\_\_\_\_ provide information about our environment by being the wires that carry signals from the skin to the brain.

29. \_\_\_\_\_ is sterile although it contains hundreds of different kinds of waste from the body.

30. Sound vibrations vibrate the \_\_\_\_\_ which in turn vibrate the \_\_\_\_\_ and then the \_\_\_\_\_.

# Life Science Grade 7 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:

- a few strands of human hair
- string
- index cards
- brass fasteners
- scissors
- tape
- pencil
- uninflated balloon (one for each student)
- double convex lens
- double concave lens
- spoon
- tennis ball

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

You will demonstrate two of the following:

1. Design an experiment that will measure the humidity in the air using the materials provided.
  - a. *Refer to "Hair Hydrometer" experiment, where the hair is gently stretched out and we can measure if the hair changes length after a period of time using a lever arm indicator.*
2. Using the image above, find a first, second and third class level in the human body and describe how each works using the materials provided.
3. Using the materials provided, demonstrate answers to the following: *Refer to "Eyeballoon" experiment*
  - a. How does your eye work like a camera?
  - b. Where are the light receptors located, and what do each do?
  - c. How can you tell if an eye is near-sighted? Far-sighted?

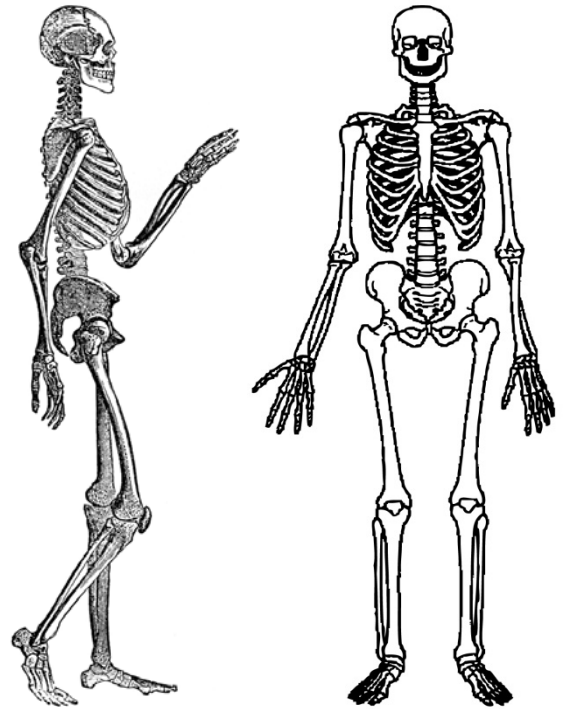
# Life Science Grade 7 Lab Practical

## Student Exam

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:

- a few strands of human hair
- string
- index cards
- brass fasteners
- scissors
- tape
- pencil
- uninflated balloon (one for each student)
- double convex lens
- double concave lens
- spoon
- tennis ball



**Lab Practical:** Ask the student to complete two of the following:

1. Design an experiment that will measure the humidity in the air using the materials provided.
2. Using the image above, find a first, second and third class level in the human body and describe how each works using the materials provided.
3. Using the materials provided, demonstrate answers to the following:
  1. How does your eye work like a camera?
  2. Where are the light receptors located, and what do each do?
  3. How can you tell if an eye is near-sighted? Far-sighted?