

LIFE SCIENCE

GRADE 6

ASSESSMENT PACKET

Beginning with plant science and ending with DNA study, students will discover the science behind the barely visible parts of life and the environment, such as plant structure, plant processes, tiny insects, cell division, and genetics. They will also learn proper use and care of sophisticated equipment such as the compound microscope to further observe and record data in the living world around us.

Created by Aurora Lipper, Supercharged Science

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

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Educational Goals

In the beginning of this section, there are several labs that will teach students the anatomy of a microscope, as well as its proper usage and care. Students will practice mounting different types of slides, and then record the data viewed through the microscope. Finally, students will understand how to calculate magnification power using the objective lens and the eye piece.

Labs in this unit focus in plant life, including plant structure, needs and functions. Students will learn names and functions of plant parts such as stem, root, leaves, and flower and their relationship to plant survival. Focus will also be on the movement of water and nutrients into and out of a plant, as students learn the processes of osmosis and photosynthesis. In these labs, students will build tools such as the Berlese Funnel, the Insect Aspirator, and several columns for observation of plant and insect life in different eco systems.

Here are the scientific concepts:

- Organisms in ecosystems exchange energy and nutrients among themselves and with the environment.
- Energy entering ecosystems as sunlight is transferred by producers into chemical energy through photosynthesis, and then from organism to organism in food webs.
- Over time, matter is transferred from one organism to others in the food web, and between organisms and the physical environment.
- Populations of organisms can be categorized by the functions they serve in an ecosystem.
- Different kinds of organisms may play similar ecological roles in similar biomes.
- The number and types of organisms an ecosystem can support depends on the resources available and abiotic factors, such as quantity of light and water, range of temperatures, and soil composition.

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

- Design and build a water cycle column, a terrarium column, an insect aspirator, a Berlese funnel, a waterscope, a hydrometer, an eco column, and a carnivorous greenhouse.
 - Know how to demonstrate how to use and care for a microscope, how to mount slides, and how to record data viewed through a microscope.
 - Understand how to determine the parts and functions of plants, the effects of osmosis, the stages of mitosis, the components of an eco system, the characteristics of worms and the genotypes and phenotypes of offspring.
 - 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 6 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 to use and care for a microscope, how to mount slides, and how to record data viewed through a microscope.

Students will also demonstrate these principles:

- Understand how to determine the parts and functions of plants
- The effects of osmosis
- The components of an eco system
- Characteristics of worms
- Knowledge of the cell and transport mechanisms

Materials (one set for entire class)

- compound microscope
- slides
- cover slips
- 1 wet mount specimen, such as pond water
- tweezers
- an eye dropper
- celery stalk
- 2 slices of potato
- two glasses of water
- salt

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 6 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 life science and scientific equipment (hint: like a microscope). 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 a carnivorous plant from the perspective of the plant itself. You'll read this aloud to your class.
 - b. Make a poster that teaches the main concepts of handling and using a compound microscope. 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 osmosis. This will be performed for your class.

Life Science Grade 6 Quiz

Teacher's Answer Key

1. Why do we use a wet mount slide? (Samples look better when you place a drop of water on the slide, because the water helps support the sample and fills in the spaces so light can pass easily through the slide. You can also view the sample live in its environment.)
2. If you are going to look at bacteria, what kind of slide would you prepare? (Heat fix with a stain.)
3. What two types of transport move substances into a cell? (Active and passive)
4. How does water get into celery when you place it in a cup of water? (osmosis)
5. What would happen to a surfer who spent all day in the ocean without drinking water? (The water in his cells would move out to the ocean, where the concentration of water is lower. Eventually, the surfer would dehydrate).
6. What are all living things made of? (Cells, which are mostly water)
7. What is the process by which water crosses membranes by itself, and in which direction does water move? (Osmosis, and water moves from highest to lowest concentration).
8. What are 3 types of worms, and what are the characteristics of each? (flat, round, segmented; flat worms have an incomplete digestive system and no body cavity; round worms have a body cavity and a complete digestive system; and segmented worms have a body cavity and repeating segments)
9. What are parts of the eco system, and give an example of each? (Water, producers, decomposers, consumers; water-precipitation from rain water; producers-fruit; decomposers-fruit flies; predators-insects like spiders).
10. What are three things plants and animals need to survive? (plants: water, soil, light; animals: food, water)
11. Do fruit flies eat fruit? (No, they eat the yeast that grows on fruit.)
12. What is a cell, and why is it so small? (A cell is a tiny structure that is the “building block” of life. It is the smallest object that can do all the things needed for life. It’s so small so it can get nutrients in and waste out efficiently. Otherwise they would starve or poison themselves.)
13. Why do we use microscopes? (To see into the tiny world of microorganisms)
14. What’s the highest power of magnification on your microscope? Lowest? (Answers vary. Make sure students calculate magnification power properly: multiply the objective lens by the eyepiece power)
15. Where are the two places you should NEVER touch on your microscope?(the glass part of the objective lens or the glass part of the eyepiece).
16. What’s the proper way to use the coarse adjustment knob so you don’t crack the objective lens? (Look at the stage as you raise it with the coarse adjustment knob, and don’t allow the stage to touch the objective lens.)
17. Briefly describe how to dry mount a slide. (Put the object on the slide. Tape it down on the sides if it curls up too much. Put a cover slip on it, if the object is not too bumpy or bulky).
18. How could you view a copper penny with your microscope? (Put the penny on a slide without a cover slip. Tape it down on the sides.)
19. What should you always clean your microscope lenses with? (Optical wipes. Do not use your fingers, toilet paper or paper towels.)
20. What is the name of a small piece of plastic that is used to hold objects to the microscope slide?(coverslip)
21. Name the chemical solution used to darken cells so that they are easier to see. (stain)

22. Why is there a hole in the middle of the stage? (to allow the light from the mirror or lamp below to shine through the iris)
23. What are the four things you need for a proper microscope drawing? (refer to answers below)
- Title
 - Boundary (circle drawn to represent the field of view)
 - Drawing of the Object
 - Power of magnification
24. Find the power of magnification for viewing with a 10X eyepiece and a 40X objective. ($40 \times 10 = \underline{400}$)
25. What is the correct order for the directions below on using a microscope? Place a number in the space next to the step so that they are in proper sequence:

2. Place the slide over the aperture on the stage

1. Use the coarse adjustment knob to lower the stage or raise the eyepiece all the way

4. Look into the eyepiece

3. Set the microscope on the lowest power

5. Use the coarse adjustment knob to bring the object into focus

26. When would you use a heat fix technique for making a slide?

For cells or organisms that move, it allows you to keep it in one place for easier viewing and staining.

27. What are the things you need to do in order to make a heat fix slide?

- Place the specimen on the slide.*
- Wave the slide over a candle to dry out the cells.*
- Add a drop of stain to the slide.*
- After ten seconds, rinse the slide with water by passing it gently through the stream once.*
- Place a drop of water on the slide and add a cover slip.*

Life Science Grade 6 Quiz

Student Worksheet

Name_____

1. Why do we use a wet mount slide?
2. If you are going to look at bacteria, what kind of slide would you prepare?
3. What two types of transport move substances into a cell?
4. How does water get into celery when you place it in a cup of water?
5. What would happen to a surfer who spent all day in the ocean without drinking water?
6. What are all living things made of?
7. What is the process by which water crosses membranes by itself, and in which direction does water move?
8. What are 3 types of worms, and what are the characteristics of each?
9. What are parts of the eco system, and give an example of each?

10. What are three things plants and animals need to survive?
11. Do fruit flies eat fruit?
12. What is a cell, and why is it so small?
13. Why do we use microscopes?
14. What's the highest power of magnification on your microscope? Lowest?
15. Where are the two places you should NEVER touch on your microscope?
16. What's the proper way to use the coarse adjustment knob so you don't crack the objective lens?
17. Briefly describe how to dry mount a slide.
18. How could you view a copper penny with your microscope?
19. What should you always clean your microscope lenses with?
20. What is the name of a small piece of plastic that is used to hold objects to the microscope slide?
21. Name the chemical solution used to darken cells so that they are easier to see.

22. Why is there a hole in the middle of the stage?

23. What are the four things you need for a proper microscope drawing?

a.

b.

c.

d.

24. Find the power of magnification for viewing with a 10X eyepiece and a 40X objective.

25. What is the correct order for the directions below on using a microscope? Place a number in the space next to the step so that they are in proper sequence:

___ Place the slide over the aperture on the stage

___ Use the coarse adjustment knob to lower the stage or raise the eyepiece all the way

___ Look into the eyepiece

___ Set the microscope on the lowest power

___ Use the coarse adjustment knob to bring the object into focus

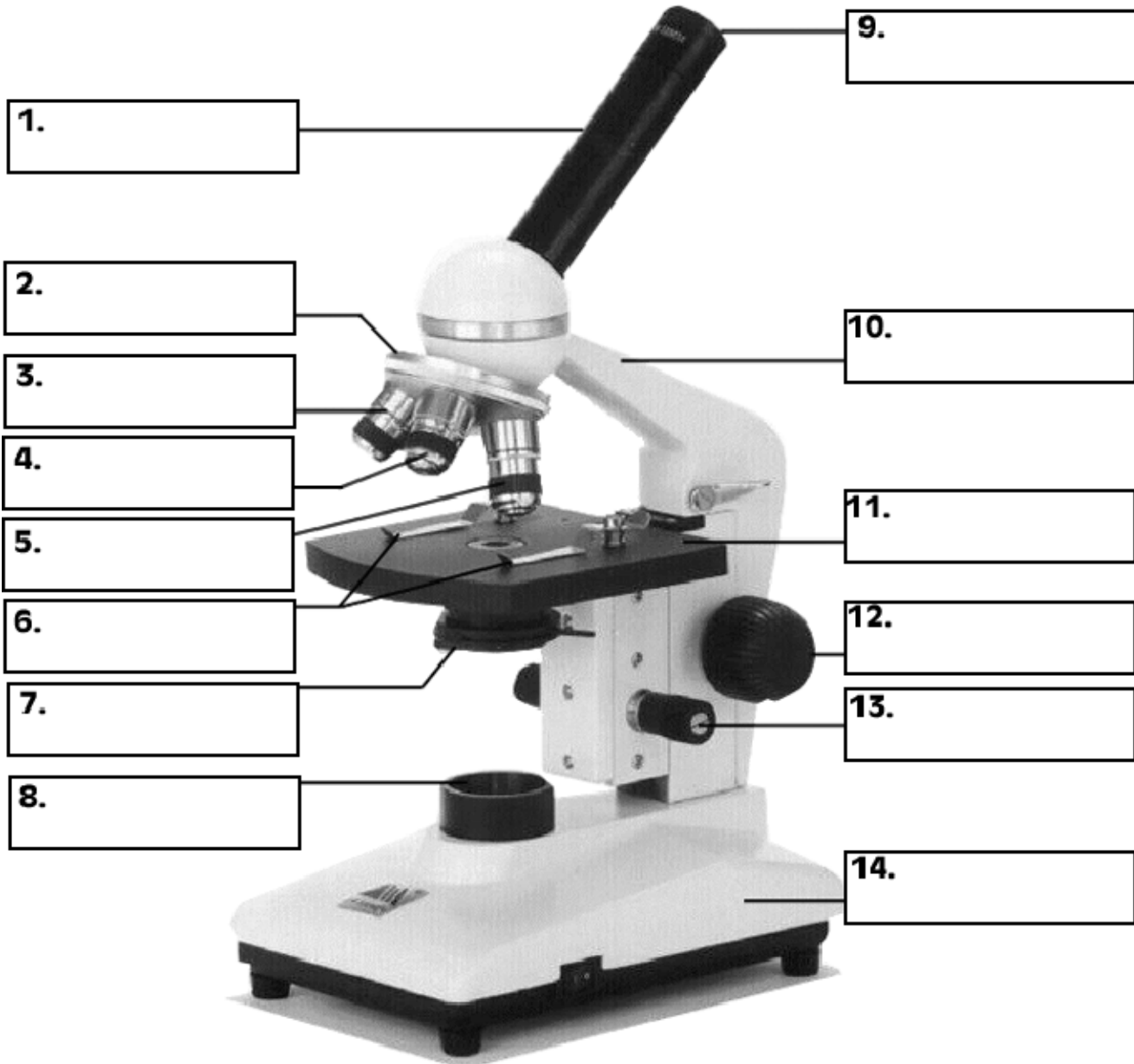
26. When would you use a heat fix technique for making a slide?

27. What are the things you need to do in order to make a heat fix slide?

Life Science Grade 6 Quiz

Student Quiz Sheet

1. Write the names for each part of the microscope in the image below:

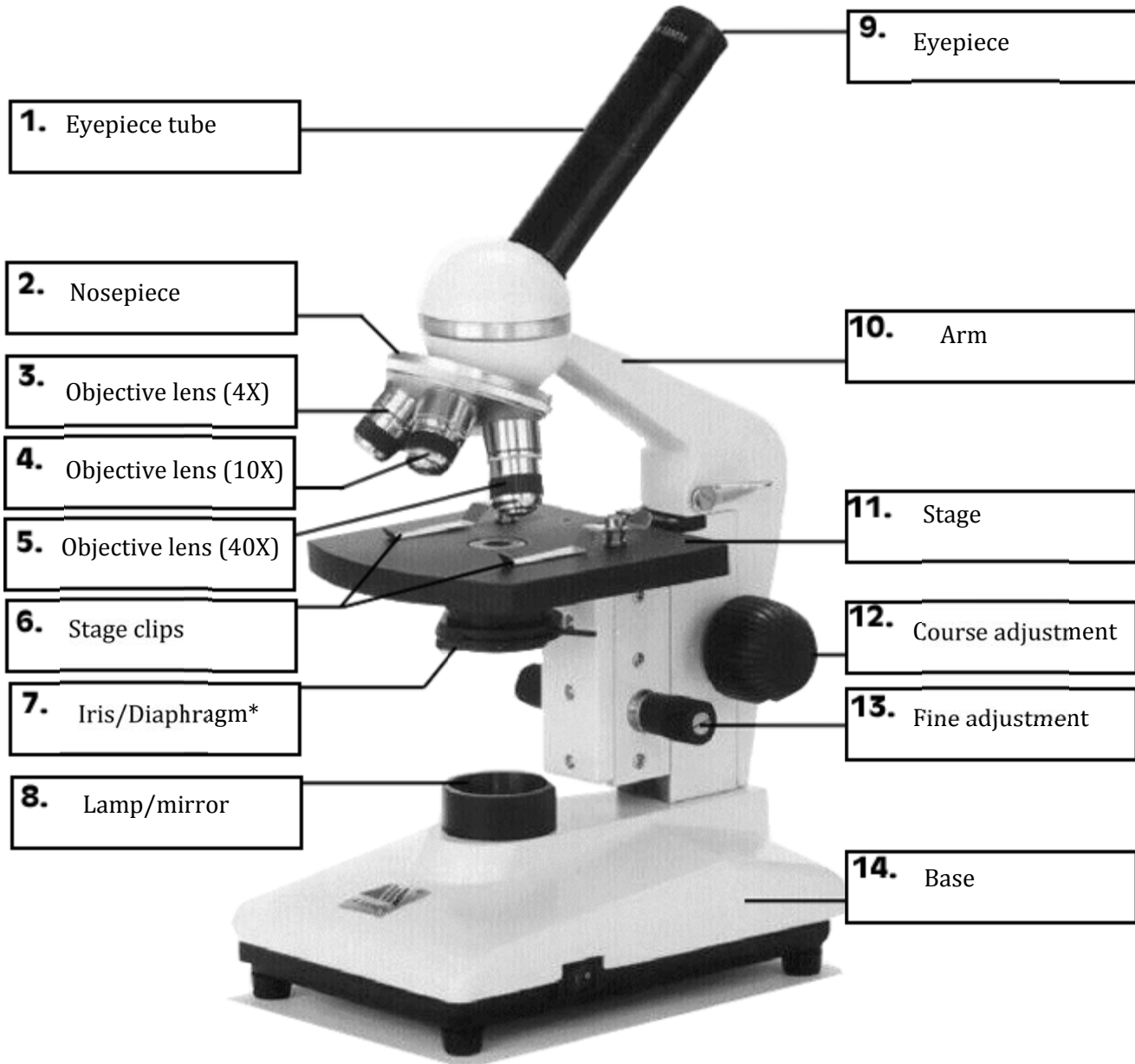


Life Science Grade 6 Quiz

Teacher's Answer Key

Note: If your student doesn't answer all of these correctly, don't worry! Consider it part of their learning experience and help them fill in the gaps.

1. Write the names for each part of the microscope in the image below:



*The hole in the middle of the stage is the *aperture* and the round disk under the stage with different sizes of holes is the *diaphragm*. The one shown in the image above is called an *iris* which is a different design but does the same thing as a diaphragm (changing the amount of light that passes through to the slide).

Life Science Grade 6 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:

- microscope
- slides
- cover slips
- 1 wet mount specimen, such as pond water
- tweezers
- an eye dropper
- celery stalk
- 2 slices of potato
- two glasses of water
- salt

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

- Demonstrate the proper way to view pond water. *(Student should use eye dropper to put one drop of pond water on a slide. Student should then use tweezers to put a cover slip on one end of the drop, then carefully lower the cover slip onto the whole drop. Finally, student should gently press out any bubbles and use a paper towel to dab any excess water off of the slide.)*
- Design an experiment that shows how osmosis works. *Students place a piece of celery in the cup and then explain how water enters a plant through a passive transport process called osmosis. It travels through the xylem, from most concentrated to least concentrated area. Thus, it travels from bottom to top. Once at the top, it evaporates, making room for new water flow...OR...Students place a slice of potato in a cup of fresh water and salt water, and explain why one potato becomes stiff while the other becomes flimsy: the water moved from areas of low salt concentration to high. Therefore, it moved from the potato into the salt water, making the potato in the salt water flimsy. In the glass without salt water, water moved from low salt concentration (outside of the potato) to high salt concentration (inside the potato), making it firm.*

Life Science Grade 6 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:

- microscope
- slides
- cover slips
- 1 wet mount specimen, such as pond water
- tweezers
- an eye dropper
- celery stalk
- 2 slices of potato
- two glasses of water
- salt

Lab Practical: Ask the student:

- Demonstrate the proper way to view pond water.
- Design an experiment that shows how osmosis works.