

# LIFE SCIENCE

## GRADE 3

### ASSESSMENT PACKET

This is an introduction to the microscope, and we're going to not only how to use a microscope but also cover the basics of optics, slide preparation, and why we can see things that are invisible to the naked eye. Microscopes are basically two lenses put together to make things appear larger, and there are several tips and tricks to making viewing virtually invisible specimens.



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 for Life Science Grade 3

This is an introduction to the microscope, and we're going to not only how to use a microscope but also cover the basics of optics, slide preparation, and why we can see things that are invisible to the naked eye. Microscopes are basically two lenses put together to make things appear larger.

The first thing you need to do is select a compound microscope. While you can do these lessons without one, it's really a totally different experience doing it with a scope. Cheap microscopes are going to frustrate you beyond belief, so here are the ones we recommend that will last your kids through college. You'll want one with the optional mechanical stage (instead of stage clips), fine and coarse adjustment knobs, and at least three objectives. (Check our website for microscope equipment recommendations.)

If you've just purchased a microscope, keep it in its packaging until you watch the videos in this section. We'll show you how to handle it, store it, and where not to touch. Your first job is to start collecting as many interesting windowsill insects as you can find.

Here are the scientific techniques we're going to cover:

- The compound microscope is really just a set of lenses stacked so they work together to make things look bigger. For example, if you're using a 10x eyepiece (where your eye looks into) and a 40x objective (the lens near the slide), then you're using a 400x power setting.
- Not only is it important to learn how to work the scope, but you need to learn how to sketch what you see, or the information on the slide is only useful to one person – you. Make sure you always add a border (so your viewer knows where your drawing starts and ends), title (so you know what you were looking at), power of magnification (so you can do it again if needed), and keep your proportions accurate when you draw the image.
- You can use either a dry or wet mount to get your specimens ready for viewing. A dry mount doesn't use any chemicals, water, or glue... and sometimes not even a coverslip. Just stick it on the slide and you're good to go. This is a great place to start when first using a scope.
- A wet mount is used for living things, like the stuff found in pond scum. By keeping the organisms wet (and in their environment), you can watch how they move, eat, breathe, and interact. When specimens are hard to see (even after adjusting your diaphragm) you can use staining (like Lugol's stain or dark iodine) to add contrast and bring it into view. Protoslo can be used when specimens move too fast to view.
- Heat fixes are used when the specimens move all over the place when stained (like yeast). By drying out the specimen and fixing it to the slide, you can easily stain it several times to bring out the contrast and view the structure. (Very good for viewing bacteria.)
- When you want to keep your specimens for a longer time (like a couple of months), apply a drop of superglue to the top of the slide before adding the coverslip. Press gently with a toothpick (not your fingers!) to squish out any bubbles.
- For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all.
- Populations live in a variety of habitats, and change in those habitats affects the organisms living there.

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

- Properly handle and care for a compound microscope.
- Identify the parts and optics of a microscope.
- Prepare a slide for observation using various slide preparation techniques.
- Differentiate observation from inference (interpretation) and know scientists' explanations come partly from what they observe and partly from how they interpret their observations.
- Formulate and justify predictions based on cause-and-effect relationships.
- Follow a set of written instructions for a scientific investigation.

# Life Science Grade 3 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 Life Science:

- How the optics of a compound microscope work to make things look bigger.
- How to prepare different types of mounts depending on the specimens you are viewing.
- Populations live in a variety of habitats, and change in those habitats affects the organisms living there.
- Proper recording of data viewed through a microscope.

### Materials (one set for entire class)

- microscope
- slides
- cover slips
- 1 dry mount specimen, such as a thread
- 1 bumpy dry mount specimen, such as a coin
- 1 wet mount specimen, such as pond water
- tweezers
- an eye dropper

### 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 mount slides for viewing with a microscope, demonstrate an understanding of the process of osmosis, and simulate inheritance of genetic traits. 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 3 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

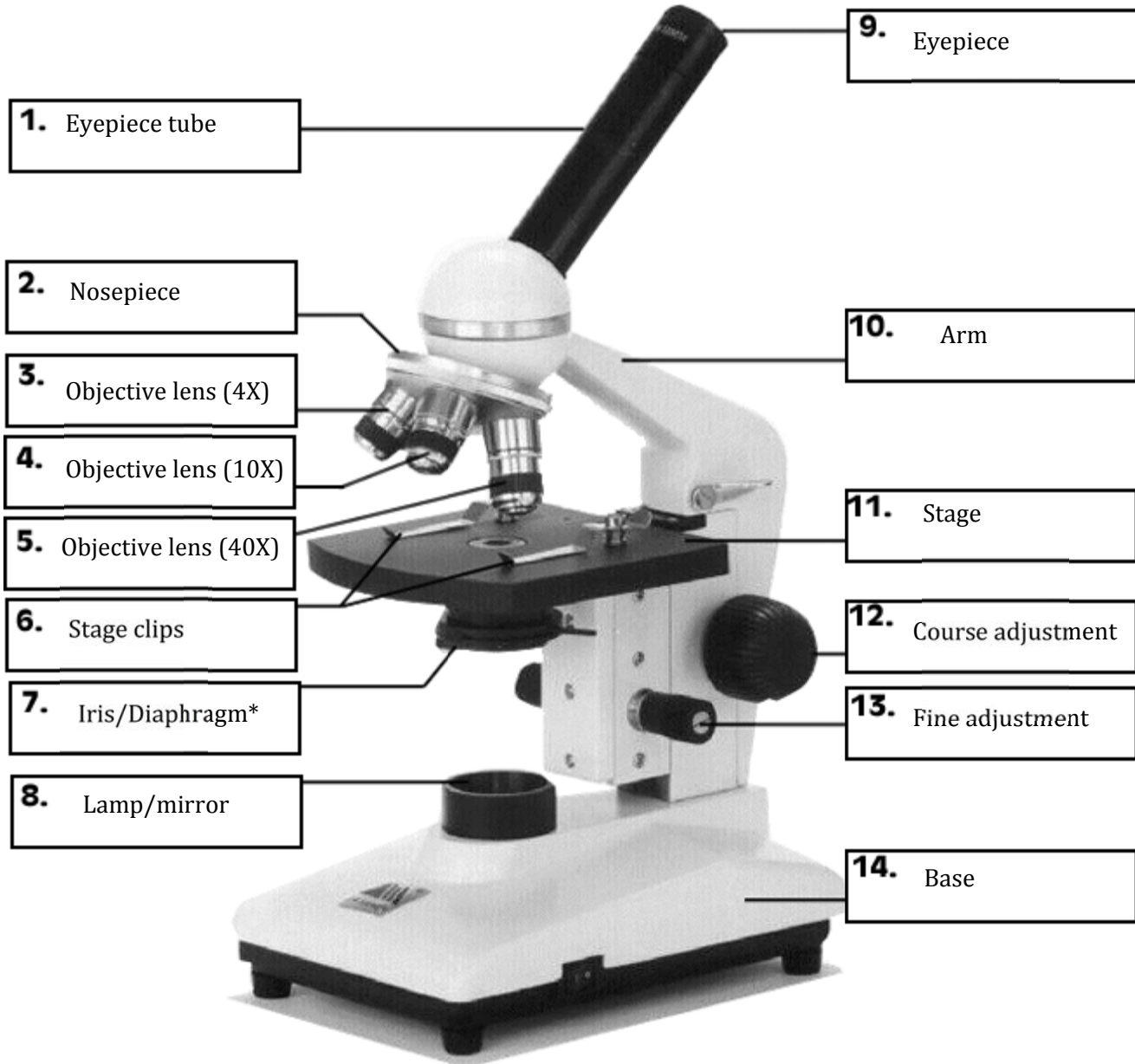
1. Your teacher will call you up so you can share how much you understand about life science and how it works. Since science is so much more than just reading a book or circling the right answer, this is an important part of the test to find out what you really understand.
2. While you are waiting for your turn to show your teacher how much of this stuff you already know, you get to 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. a short story or skit about the microscope from the perspective of the specimen (don't get too carried with this so you gross out your audience... just imagine you're a protozoa or a daphnia). You'll read this aloud to your class.
  - b. Make a poster that teaches one of the main concepts of microscope optics. When you're finished, you'll use it to teach to a class of younger students and demonstrate the principles that you've learned. You can include magnifiers or different lenses to make it more hands-on.
  - c. Write and perform a poem or song about exploring our world with a microscope. This will be performed for your class.

# Life Science Grade 3 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).

Answer the questions below:

1. What is the name of a small piece of plastic that is used to hold objects to the microscope slide?(coverslip)
2. Name the chemical solution used to darken cells so that they are easier to see. (stain)
3. 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)
4. What are the four things you need for a proper microscope drawing? (refer to answers below)
  - a. Title
  - b. Boundary (circle drawn to represent the field of view)
  - c. Drawing of the Object
  - d. Power of magnification
5. Find the power of magnification for viewing with a 10X eyepiece and a 40X objective. ( $40 \times 10 = 400$ )
6. 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

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

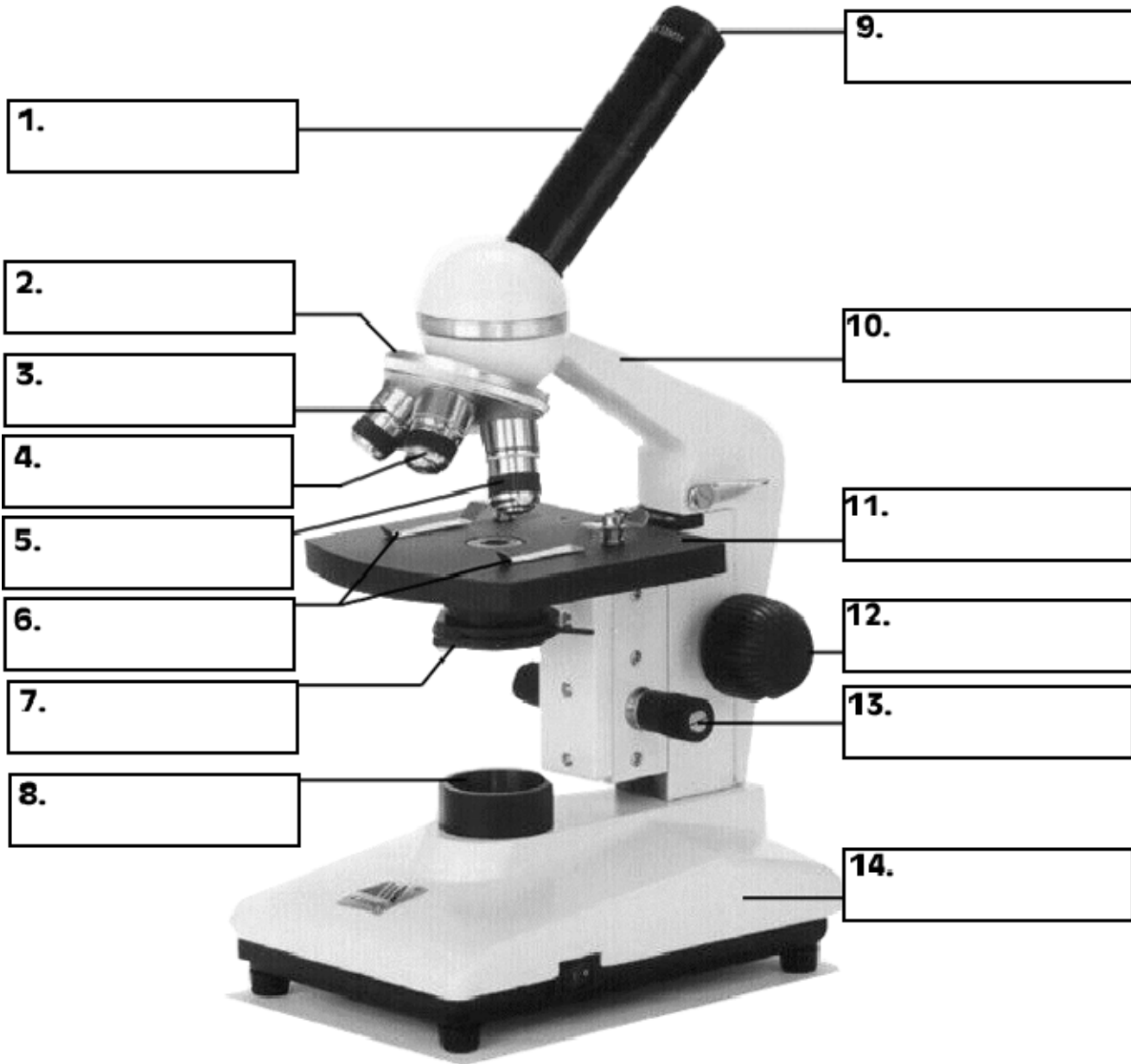
*For cells or organisms that move, it allows you to keep it in one place for easier viewing and staining.*

8. What are the things you need to do in order to make a heat fix slide?
  - a. *Place the specimen on the slide.*
  - b. *Wave the slide over a candle to dry out the cells.*
  - c. *Add a drop of stain to the slide.*
  - d. *After ten seconds, rinse the slide with water by passing it gently through the stream once.*
  - e. *Place a drop of water on the slide and add a cover slip.*

# Life Science Grade 3 Quiz

## Student Quiz Sheet

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





**Answer the questions below:**

1. What is the name of a small piece of plastic that is used to hold objects to the microscope slide?
2. Name the chemical solution used to darken cells so that they are easier to see.
3. Why is there a hole in the middle of the stage?
4. What are the four things you need for a proper microscope drawing?
  - a.
  - b.
  - c.
  - d.
5. Find the power of magnification for viewing with a 10X eyepiece and a 40X objective.
6. 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
7. When would you use a heat fix technique for making a slide?
8. What are the things you need to do in order to make a heat fix slide?

# Life Science Grade 3 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 dry mount specimen, such as a thread
- 1 bumpy dry mount specimen, such as a coin
- 1 wet mount specimen, such as pond water
- tweezers
- an eye dropper

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

- Demonstrate the proper way to mount a copper penny. *(Student should put the penny on a slide with no cover slip, then clip the slide on the base. Student should then look at base while adjusting coarse adjustment knob, then look through eye piece while doing fine adjustment.)*
- 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.)*

# Life Science Grade 3 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 dry mount specimen, such as a thread
- 1 bumpy dry mount specimen, such as a coin
- 1 wet mount specimen, such as pond water
- tweezers
- an eye dropper

### Lab Practical:

- Demonstrate the proper way to mount a copper penny or a thread.
- Demonstrate the proper way to view a pond water sample.