

Microscope Activities

Name _____ Date _____

PURPOSE

Learn how to use a microscope as a tool to investigate microscopic life and other things you can't see with your eyes alone.

HOW TO DO THIS COURSE: Do the steps in order. Initial and date each when done. Where there are two sign-off lines, get the step checked and initialed on the second line by another student or, if stated, by your academic supervisor. All written work is turned in to your supervisor.

ESTIMATED TIME: 10 hours

BOOKS AND REFERENCES:

Microscope Activities, Heron Books

The World of the Microscope (any edition), Chris Oxlade and Corinne Stockley, Usbourne Publishing, Ltd.

A. UNDERSTANDING THE MICROSCOPE

1. READ: Chapter 1 The Light Microscope. _____
2. ACTIVITY: Look at additional illustrations and explanations of microscope parts in *The World of the Microscope* pages 8–9, “Types of microscope.” _____
3. ACTIVITY: With objects, show how a compound microscope works. _____
4. READ: Chapter 2 Parts of the Microscope _____
5. ACTIVITY: Using the chart and microscope illustration in chapter 2, have another student point out numbered parts on the illustration. You name each part until you can identify all the parts easily. _____
6. READ: Chapter 3 Using the Microscope _____
7. ACTIVITY: Using the chart and microscope illustration in chapter 2, have another student point out numbered parts on the illustration. You

name the microscope part and also briefly explain its use. You pass when this can be done easily.

8. ACTIVITY: Get a compound microscope you will be using that has coarse and fine adjustment knobs, and compare it to the microscope illustration in chapter 2. See if it has all the features shown (it might not) or if any of the parts are shaped or positioned differently. Then identify the parts that microscope does have and have another student check you.

9. READ and ACTIVITY: Read the introduction and do Activity #1A in Chapter 4 Practice Using a Compound Microscope.

10. ACTIVITY: Do Activity #1B in chapter 4 as many times as you like using different prepared slides.

Supervisor pass on the focus and lighting steps.

11. ACTIVITY: Do Activity #1C in chapter 4.

Supervisor pass on the focus and calculation of magnification steps.

12. ACTIVITY: Do Activity #1D in chapter 4.

Supervisor pass on the answers on step 4.

13. READ: Chapter 5 Keeping Your Microscope Clean and Working.

14. ACTIVITY: Using a microscope, show someone else each of the steps for keeping the microscope clean and working.

B. WORKING WITH SLIDES

1. READ: Chapter 6 Wet Mount Slides.

2. ACTIVITY: For practice, create wet mount slides with water only. Use the correction actions in step 5 of the chapter, as needed. Make enough practice slides so that you have a good feel for creating them and can make corrections as needed. (If you haven't seen an air bubble yet, trap an air bubble under the cover slip by making a wet mount without enough water, and identify it under the microscope.) Go through the action of disposing of your slide at least once.

3. ACTIVITY: Do Activity #2A in Chapter 7 Practice Creating Slides.

4. ACTIVITY: Do Activity #2B in chapter 7.

Have another student who knows the data check your work.

C. A FIRST LOOK AT CELLS

1. READ: Chapter 8 Wet Mount Simple Stain.

2. ACTIVITY: Make a wet mount slide from a natural source of dirty water (such as a pond, ditch, or the bottom of an aquarium) following the steps given. Look at it under the microscope under low power and high power.

3. ACTIVITY: Make another wet mount using a natural source of dirty water. This time add a drop of stain before placing the cover slip on the slide. Look at the slide under low and high power and compare the visibility of the objects with the results of the previous step.

4. ACTIVITY: Using Chapter 9 Cells Under the Microscope, section “Onion Cells,” do all the steps for making a slide of onion cells and observing the parts of the cells under the microscope. Turn in your sketches to your supervisor.

5. ACTIVITY: Using chapter 9, section “Human Cells,” do all the steps for making a slide of cheek cells and observing the parts of the cells under the microscope. Turn in your sketches to your supervisor.

6. READ: *The World of the Microscope*, pages 38–41, “Uses of the Microscope.”

7. ACTIVITY: Using objects, show uses of the microscope in four different areas of science or study. (4 demonstrations.)

8. READ: In section E of this learning guide, read step E.1 now. With your supervisor, plan which activities you will do. Schedule them out so all will be finished before you reach the end of this course. Work with your supervisor to determine what additional materials you will need to provide.

D. MICROBES

1. READ: Chapter 10 Beginning the Study of Microscopic Life. As you read, you can look at pictures in Google Images, *The World of the Microscope* (pages 16-23), or any other references with good illustrations. _____
2. ACTIVITY: This will help prepare you to identify microscopic life in water samples. Using any references with good illustrations on freshwater life, look at the pictures and write down what is distinctive about each group below. Then draw an illustration of at least one example from each group next to each description.
 - a) bacterial cells _____
 - b) blue-green algae: two different types _____
 - c) green algae: a single-celled type and a filamentous type _____
 - d) diatoms _____
 - e) flagellated algae _____
 - f) an amoeba _____
 - g) ciliates: Paramecium and one other _____
 - h) a rotifer _____
 - i) a worm _____
 - j) tiny crustacean __________
3. ACTIVITY:
 - a) Using Chapter 11 Observing Bacteria Under a Microscope, do Activity #3A. _____
 - b) Using chapter 11, do Activity #3B. _____
 - c) Point out from either activity recognizable bacteria under high power to another student who knows what bacteria look like. __________
4. READ: Chapter 12 Hanging Drop Mounts to heading "METHOD 1 Making a Hanging Drop Mount Without a Depression Slide." _____

5. ACTIVITY:

- a) Following the directions in chapter 12, section “METHOD 1,” make and view a hanging drop mount with two regular slides and flat toothpicks. ____
- b) Following the directions in chapter 12, section “METHOD 2 Making a Hanging Drop Mount Using a Depression Slide,” make and view another hanging drop mount using a depression slide and cover slip. ____

6. ACTIVITY: Get water samples and identify the organisms listed, using any microscope methods that you have learned on this course:

- a) a type of green algae ____
- b) a ciliate ____
- c) a specimen from one other group (write name below):

Supervisor pass.

E. OTHER APPLICATIONS OF THE MICROSCOPE

1. ACTIVITY: Choose two of the subjects listed below and do at least two activities with each of them that involve using a microscope. The pages where these are discussed in *The World of the Microscope* are shown in parentheses. Discuss with your supervisor which activities you plan to do, as some require special tools which you may not have or materials that need to be ordered. Check the box of the subjects you pick.

Note: Some activities require a wait of 24–48 hours once started. If you plan to do any of these, work on them until you reach the stage where you have to wait. Then, while you are waiting, work on another activity.

- ☐ Simple organisms (bacteria) (WM, pages 16-17)
Activity 1 ____ Activity 2 ____
- ☐ Fungi (WM, pages 18-19)
Activity 1 ____ Activity 2 ____
- ☐ Microscopic life in the sea (WM, pages 20-21)
Activity 1 ____ Activity 2 ____
- ☐ Looking at plants (WM, pages 26-27)
Activity 1 ____ Activity 2 ____

☐ Looking at insects (WM, pages 28–29)

Activity 1 ____ Activity 2 ____

☐ Rocks and minerals (WM, pages 32-33)¹

Activity 1 ____ Activity 2 ____

☐ Crystals (WM, pages 34-35)²

Activity 1 ____ Activity 2 ____

Explain in writing which topics you chose and what you learned in each activity. **Supervisor pass.** _____

I have completed the steps of this course. I understand what I studied and can use it.

Student _____ Date _____

The student has completed the steps of this course and knows and can apply what was studied.

Academic Supervisor _____ Date _____

The student has passed the exam for this course.

Examiner _____ Date _____

FOR FACULTY

ADDITIONAL RESOURCES

Exams and answers

Materials list

- 1 The term “vols strength” is used in WM, p. 33, 2nd column, 1st paragraph. **Vols strength** is a unit for hydrogen peroxide concentration used in Great Britain. Where it says “20 vols strength,” a 6% hydrogen peroxide solution is intended. (Hydrogen peroxide from an American drugstore is only 3% strength but can be used instead.)
- 2 Another possible activity: Place a drop of saturated Epsom salts on a microscope slide. (Saturated Epsom salt solution can be prepared by dissolving Epsom salts in a small amount of warm water until no more will dissolve.) Focus on the edge of the drop at 100× and watch the Epsom salt crystals re-form. Then have someone blow on the drop. Water will evaporate faster and the crystals will grow faster.