

## LABORATORY SKILLS 4

### ***Applying the Scientific Method***

#### **Pre-Lab Discussion**

The scientific method is a procedure used to gather information and test ideas. Scientists use the scientific method to answer questions about life and living organisms. Experimentation is an important part of the scientific method. In order to ensure that the results of an experiment are due to the variable being tested, a scientist must have both an experimental setup and a control setup. The experimental setup contains the variable that is being tested. The control setup is exactly like the experimental setup except it does not contain the variable being tested.

In this investigation, you will form a hypothesis, test it, and draw a conclusion based on your observations.

#### **Problem**

Is light necessary for the sprouting of a potato?


#### **Materials (per group)**

- 1 medium-sized potato
- 2 plastic bags with twist ties
- Knife
- 2 paper towels

#### **Safety**

Put on a laboratory apron if one is available. Be careful when handling sharp instruments. Note all safety alert symbols next to the steps in the Procedure and review the meanings of each symbol by referring to the symbol guide on page 10.

#### **Procedure**

1. With the members of your group, discuss whether or not the potato needs light to sprout. Based on your discussion, record your hypothesis in Observations.
-  2. Carefully cut the potato in half lengthwise. Count the number of eyes on the potato half to be put in the dark and the half to be put in the light. Record this in Data Table 1.
3. Fold each paper towel repeatedly until you have a rectangle about the same size as your potato halves. Moisten the towels with water. Place a folded paper towel in each plastic bag.

- Place a potato half in each plastic bag with the cut surface on the paper towel. Tie each bag with a twist tie. See Figure 1.

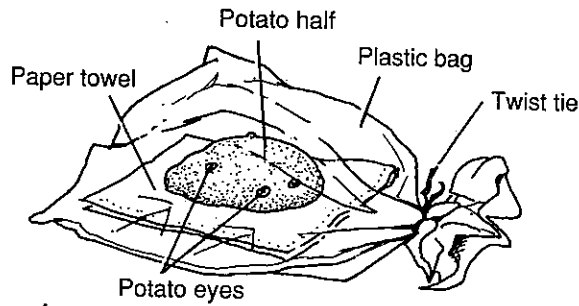


Figure 1

- Place one of the plastic bags in a place that receives light. Place the other plastic bag in a dark place. Be sure that the potato halves remain on top of the paper towels and that both potato halves are kept at the same temperature.
- After one week, open each plastic bag and count the number of sprouts. Record this information in Data Table 2.
- To calculate the percentage of eyes sprouting, divide the number of sprouts by the number of eyes and multiply the result by 100. Record your answers in Data Table 3.
- Have one person from your group go to the chalkboard to record your group's data in the table that has been drawn by your teacher.

### Observations

Hypothesis \_\_\_\_\_  
 \_\_\_\_\_

Data Table 1

Number of Eyes	
Potato in dark	
Potato in light	

Data Table 2

Number of Sprouts	
Potato in dark	
Potato in light	

Data Table 3

Percentage of Eyes Sprouting	
Potato in dark	
Potato in light	

### Analysis and Conclusions

- Did the most sprouts grow in the light or in the dark? \_\_\_\_\_  
 \_\_\_\_\_

2. What was the control setup in this investigation? \_\_\_\_\_  
\_\_\_\_\_

3. What was the experimental setup in this investigation? \_\_\_\_\_  
\_\_\_\_\_

4. What conclusion can you draw from this investigation? \_\_\_\_\_  
\_\_\_\_\_

5. How does your hypothesis compare with your results after completing the investigation?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

### Critical Thinking and Application

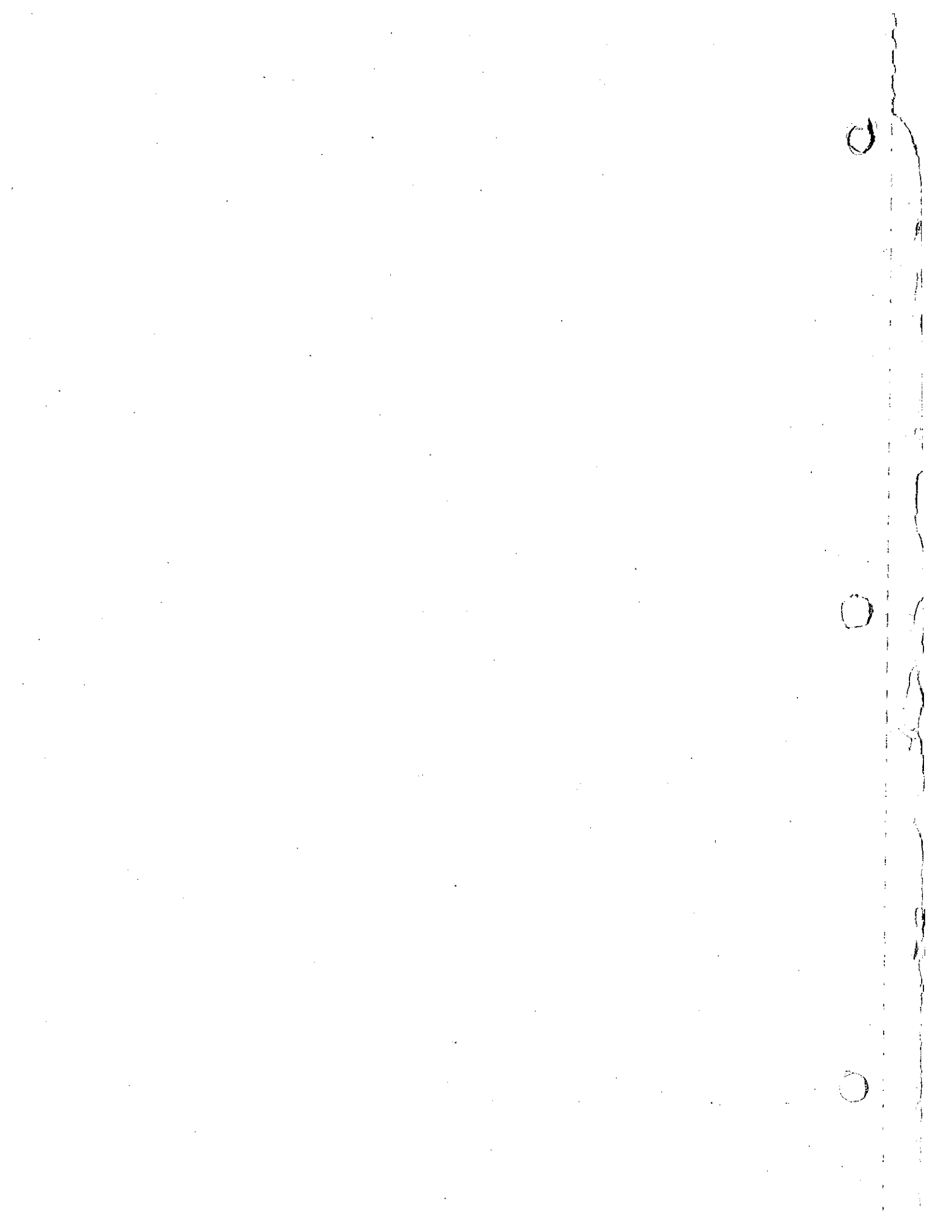
1. Why was it important to keep both the control setup and the experimental setup at the same temperature throughout the experiment? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

2. Why were the plastic bags sealed? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

3. Why was it necessary to keep the potato halves on moist paper towels?  
\_\_\_\_\_  
\_\_\_\_\_

### Going Further

Devise an experiment to see if another variable, such as temperature or water, affects the number of sprouts a potato produces.



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## LABORATORY SKILLS 2

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### ***Identifying Laboratory Equipment***

#### **Pre-Lab Discussion**

Scientists use a variety of tools to explore the world around them. Tools are very important in the advancement of science. The type of tools scientists use depends on the problems they are trying to solve. A scientist may use something as simple as a metric ruler to measure the length of a leaf. At another time, the same scientist may use a complex computer to analyze large amounts of data concerning hundreds of leaves.

In this investigation, you will identify pieces of laboratory equipment likely to be found in a biology laboratory. You will also learn the function of each piece of laboratory equipment.

#### **Problem**

What are the names and functions of some of the pieces of laboratory equipment found in a typical biology laboratory?

#### **Materials** (*per group*)

Equipment shown in this activity (for inspection and demonstration)

#### **Safety**


Handle all glassware carefully. Be careful when handling sharp instruments. Always handle the microscope with extreme care. You are responsible for its proper care and use. Use caution when handling glass slides as they can break easily and cut you. Note all safety alert symbols next to the steps in the Procedure and review the meanings of each symbol by referring to the symbol guide on page 10.

#### **Procedure**

##### **Part A. Identifying Laboratory Equipment**

1. Look at the drawings of the laboratory equipment. In Observations, write the letter of the drawing next to the name that correctly identifies it.

##### **Part B. Identifying the Function of Certain Types of Laboratory Equipment**

-  1. Carefully inspect the different types of laboratory equipment that have been set out by your teacher.
2. In Observations, identify the function of each piece of laboratory equipment.

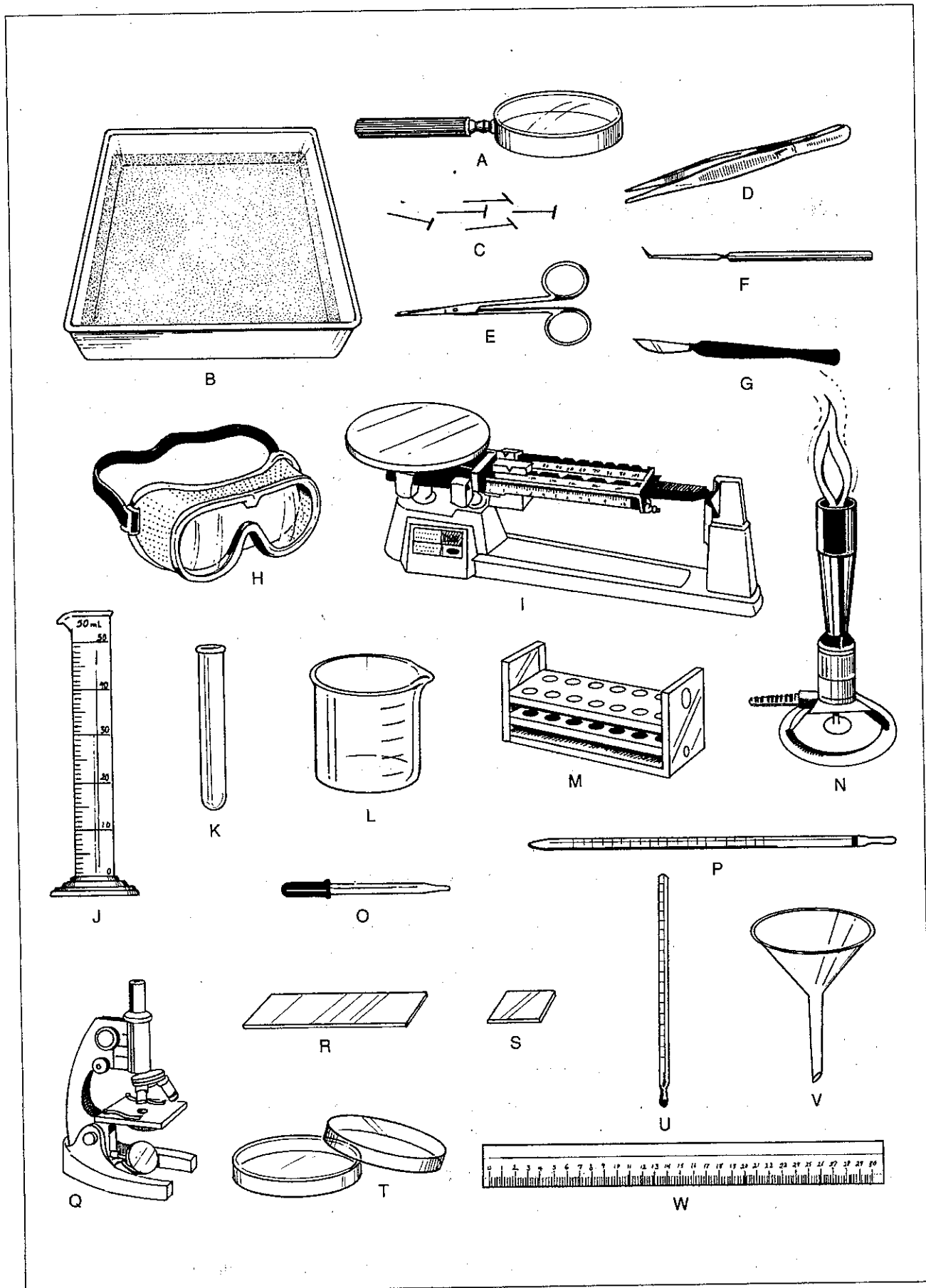


Figure 1

**Observations**

**Part A. Identifying Laboratory Equipment**

- |                              |                               |
|------------------------------|-------------------------------|
| _____ 1. beaker              | _____ 13. glass slide         |
| _____ 2. Bunsen burner       | _____ 14. petri dish          |
| _____ 3. coverslip           | _____ 15. pipette             |
| _____ 4. dissecting pins     | _____ 16. probe               |
| _____ 5. dissecting scissors | _____ 17. metric ruler        |
| _____ 6. dissecting tray     | _____ 18. safety goggles      |
| _____ 7. medicine dropper    | _____ 19. scalpel             |
| _____ 8. forceps             | _____ 20. test tube           |
| _____ 9. funnel              | _____ 21. test tube rack      |
| _____ 10. graduated cylinder | _____ 22. thermometer         |
| _____ 11. hand lens          | _____ 23. triple-beam balance |
| _____ 12. microscope         |                               |

**Part B. Identifying the Function of Certain Types of Laboratory Equipment**

- 1. beaker \_\_\_\_\_
- 2. Bunsen burner \_\_\_\_\_
- 3. coverslip \_\_\_\_\_
- 4. dissecting pins \_\_\_\_\_
- 5. dissecting scissors \_\_\_\_\_
- 6. dissecting tray \_\_\_\_\_
- 7. medicine dropper \_\_\_\_\_
- 8. forceps \_\_\_\_\_
- 9. funnel \_\_\_\_\_
- 10. graduated cylinder \_\_\_\_\_
- 11. hand lens \_\_\_\_\_
- 12. microscope \_\_\_\_\_
- 13. glass slide \_\_\_\_\_
- 14. petri dish \_\_\_\_\_
- 15. pipette \_\_\_\_\_
- 16. probe \_\_\_\_\_
- 17. metric ruler \_\_\_\_\_

- 18. safety goggles \_\_\_\_\_
- 19. scalpel \_\_\_\_\_
- 20. test tube \_\_\_\_\_
- 21. test tube rack \_\_\_\_\_
- 22. thermometer \_\_\_\_\_
- 23. triple-beam balance \_\_\_\_\_

**Analysis and Conclusions**

1. Which laboratory tools can be used to magnify small objects so they can be seen more easily?

\_\_\_\_\_  
\_\_\_\_\_

2. Which laboratory tools are useful when looking at the internal organs of an earthworm?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Critical Thinking and Application**

1. What tool or tools would you use to make each of the following measurements?

- a. amount of milk in a small glass \_\_\_\_\_
- b. length of a sheet of paper \_\_\_\_\_
- c. temperature of a swimming pool \_\_\_\_\_
- d. mass of a baseball \_\_\_\_\_

2. How do laboratory tools improve the observations made by a scientist?

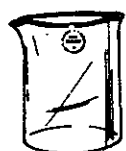
\_\_\_\_\_  
\_\_\_\_\_

**Going Further**

Examine other types of laboratory equipment that you will be using in the biology laboratory. Try to determine the function of each piece of equipment.



# COMMONLY USED LABORATORY EQUIPMENT



Beaker



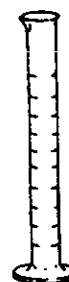
Erlenmeyer Flask



Florence Flask



Funnel



Graduated Cylinder



Crucible

Crucible Cover



Evaporating Dish



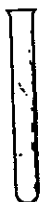
Mortar and Pestle



Watch Glass



Stirring Rod



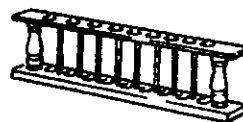
Test Tube



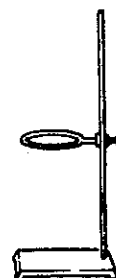
Test Tube Brush



Test Tube Holder



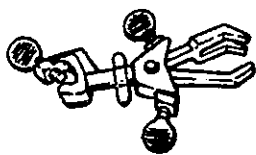
Test Tube Rack



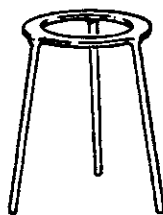
Ring Stand and Ring



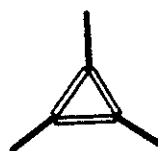
Pinch Clamp



Utility Clamp



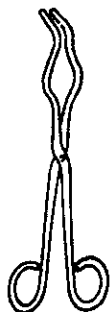
Tripod



Clay Triangle



Wire Gauze



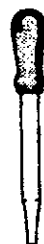
Crucible Tongs



Beaker Tongs



Forceps



Medicine Dropper



Nichrome Wire



Spatula

