Name_____Class_____Date_____

IDENTIFYING LABORATORY APPARATUS. When you work in the laboratory, you will be required to know the names of your laboratory apparatus (equipment) and how they are used. Some common biology laboratory apparatus and their uses are shown in Figure 2-1.

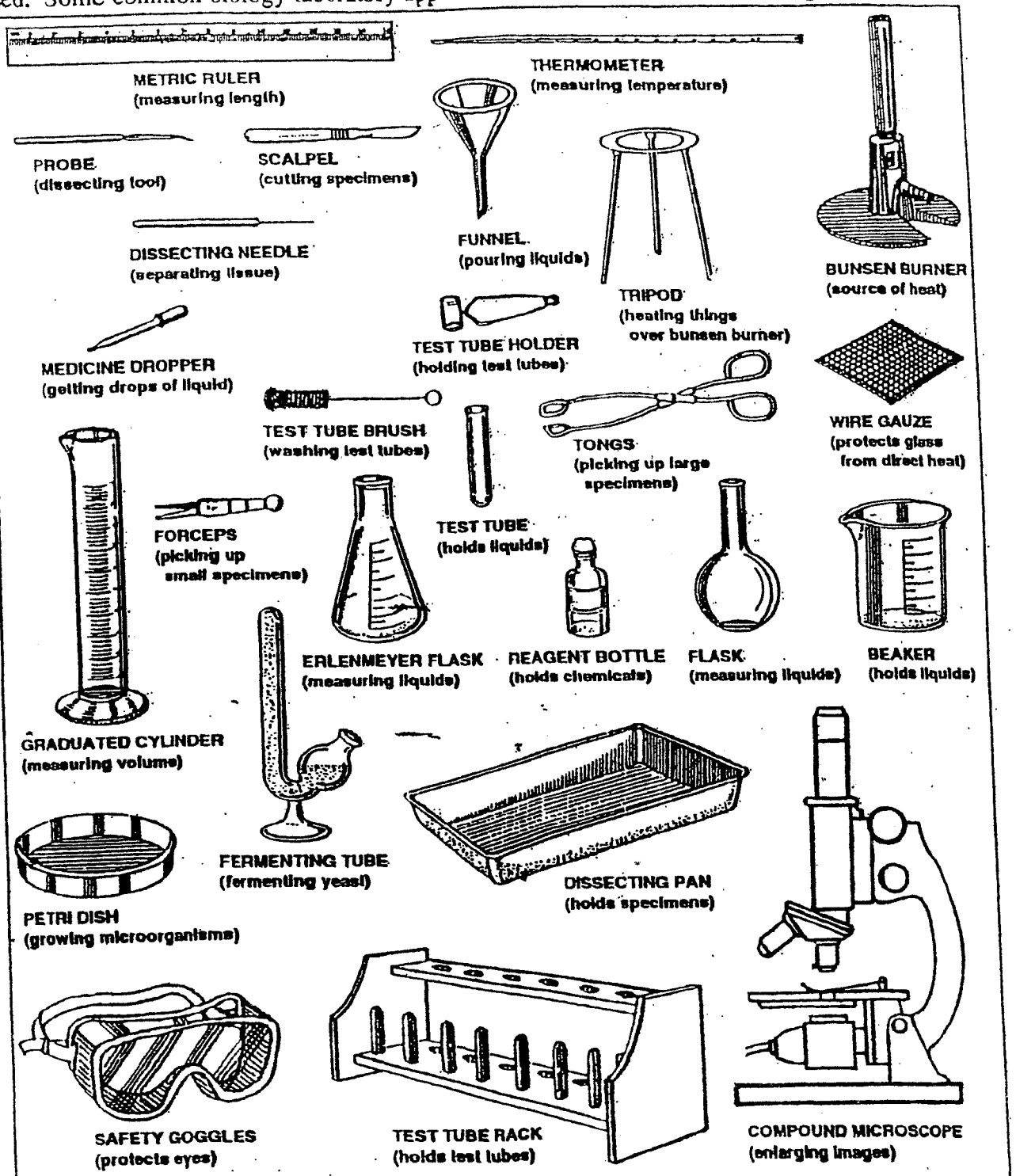
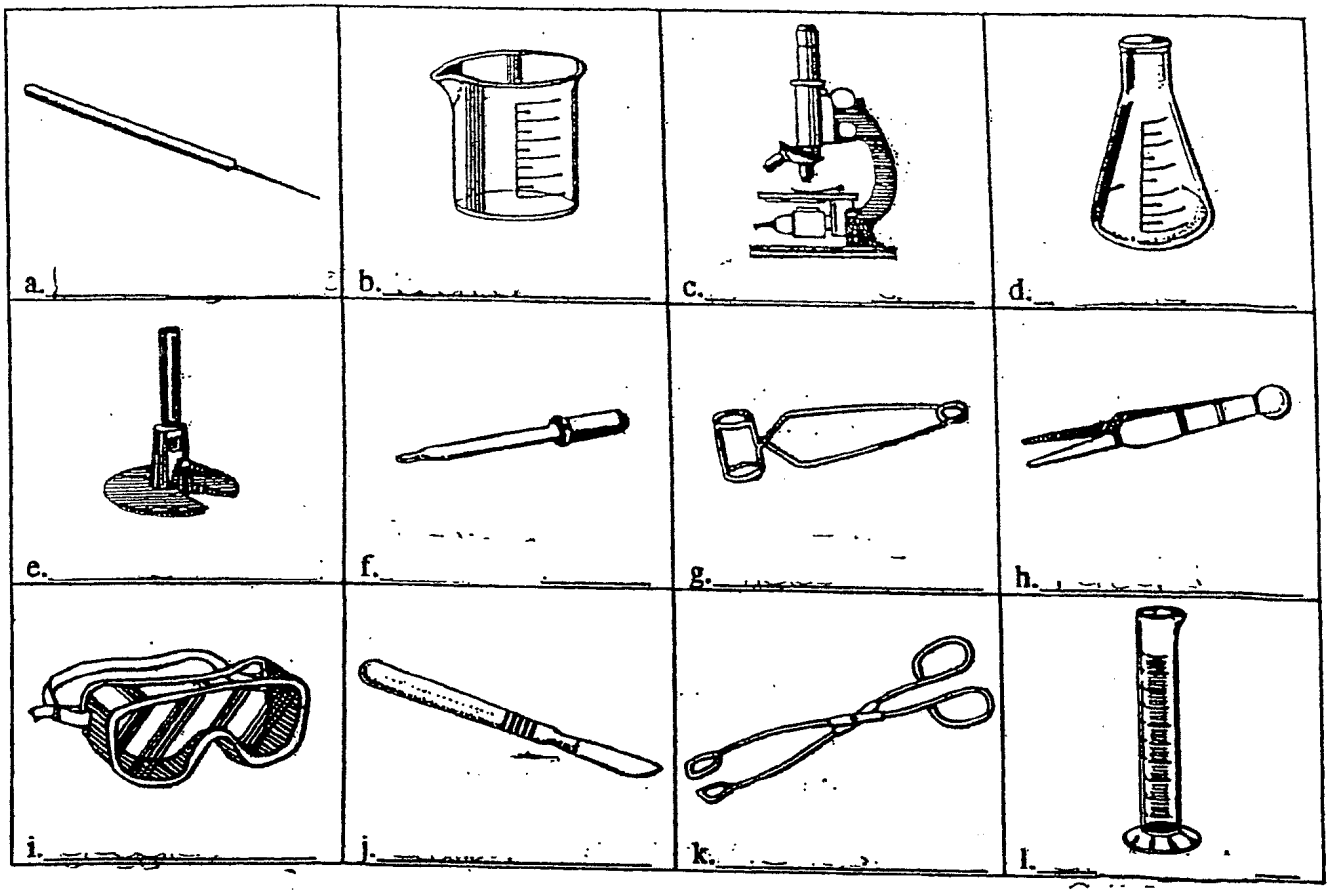


FIGURE 2-1. COMMON LABORATORY APPARATUS.

Name_____ Class_____ Date_____

REVIEW QUESTIONS

1. On the line provided, identify the following laboratory equipment.



2. On the line provided, name the piece of laboratory equipment you would use to perform each the following tasks.

a. measure length_____

b. measure volume_____

c. measure temperature_____

d. holds liquids_____

e. observe a cell_____

f. heat a test tube_____

g. pick up a beaker_____

h. cut open a frog_____

i. protect your eyes_____

j. place water on a slide_____

k. pick up an earthworm_____

l. wash out a test tube_____

Name _____ Class _____ Date _____

Making Metric Measurements

Introduction

In many biology investigations, precise measurements must be made before observations can be interpreted. For everyday measuring, we still use English units such as the inch, quart, and pound. For scientific work, and for everyday measuring in most countries, the International System of Units (SI) is used. Eventually our country will use SI units for everyday measuring too.

Like our money system, SI is a metric system. All units are based on the number 10. In the SI system it is easy to change one unit to another because all units are related to one another by a power of 10.

In this investigation, you will review SI units for measuring length, liquid volume, and mass. You will also learn how to use some common laboratory equipment used for measuring.

Problem

How are metric units of measurement used in the laboratory?

Pre-Lab Discussion

Read the entire investigation. Then, work with a partner to answer the following questions.

1. Why do scientists and other people in most countries use the metric system for measurements?

_____

_____

2. Why is it easy to change from one unit to another in the SI system?

_____

3. What connections can you identify between the metric units for length and volume?

_____

_____

_____

_____

4. Why is it difficult to convert miles to yards or feet?

_____

_____

5. Name several aspects of everyday life that will change when our country converts to SI units.

_____

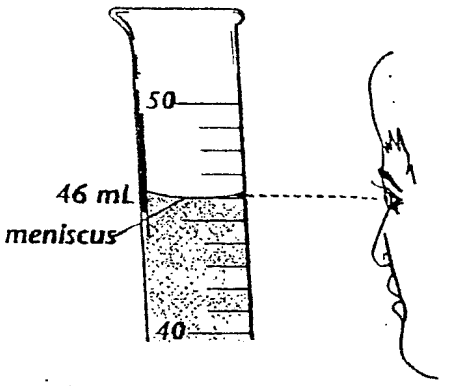
_____

Name _____ Date _____ Class _____

SKILLS PRACTICE

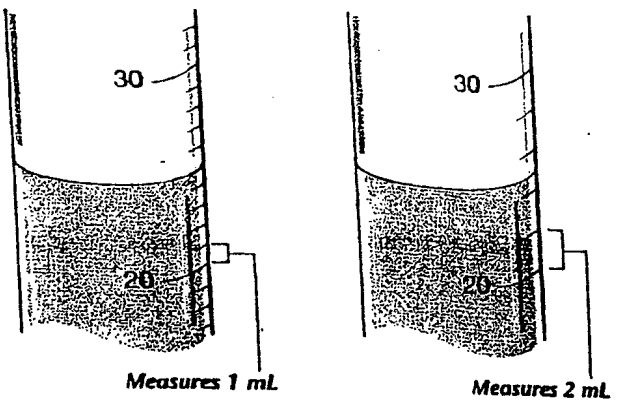
Measuring: Liquid Volume

Write your answers to the questions below in the spaces provided. If you need more space, use the back of this sheet.

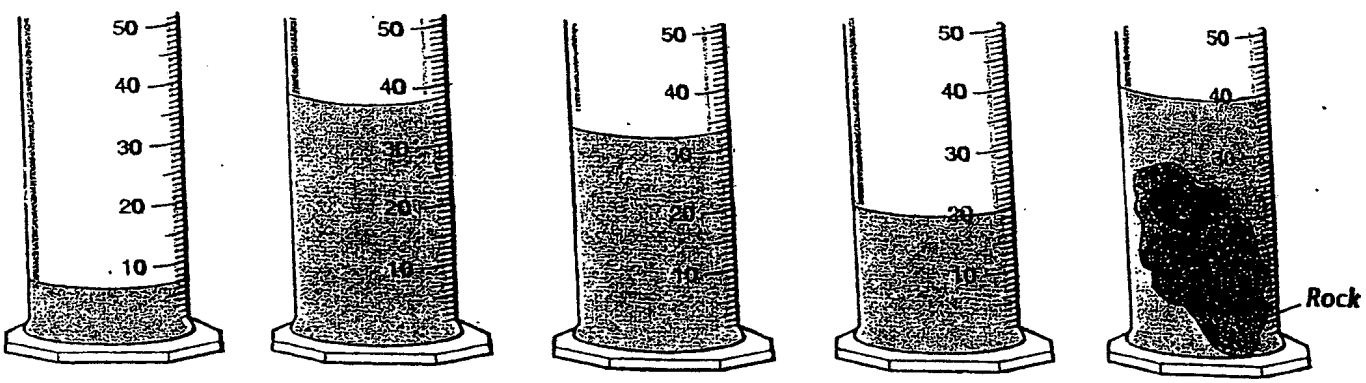


The volume of an object is the amount of space it takes up. You will often measure the volume of liquids using a graduated cylinder. ("Graduated" means that the cylinder is marked with measurement units.) Always read a graduated cylinder at eye level. Also, water in a graduated cylinder has a curved surface called the meniscus. Read the volume at the bottom of the meniscus.

Hints: Always check the unnumbered marks on a graduated cylinder to see how many sections there are and what they measure. Also, sometimes you have to estimate a measurement between two marks. Prove to yourself that both graduated cylinders on the right contain 25 mL.



What is the volume of the liquid shown in graduated cylinders 1–4 below? What is the total volume in graduated cylinder 5?



1. _____ 2. _____ 3. _____ 4. _____ 5. _____

6. If the diagrams for Questions 4 and 5 show the same graduated cylinder before and after the rock was added, what can you infer about the volume of the rock?

_____

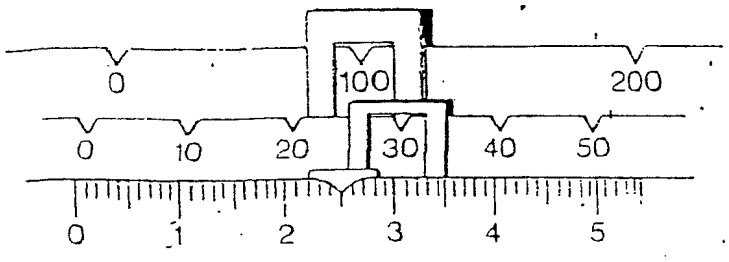
7. **Think About It** Describe how you can use a graduated cylinder to measure the volume of an irregular object.

Reading a Triple Beam Balance

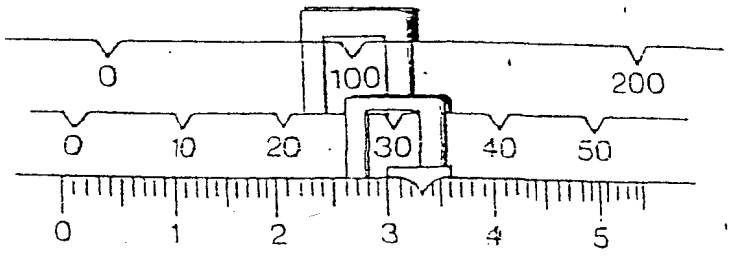
Name _____

To determine the mass or weight of an object using a triple beam balance, find the sum of the masses shown on all the riders.

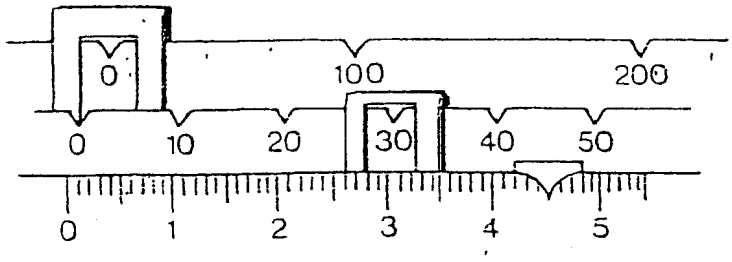
Find the mass indicated on each of the triple beam balances pictured below.



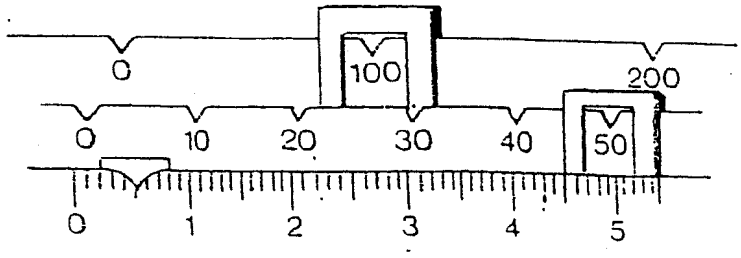
1. _____



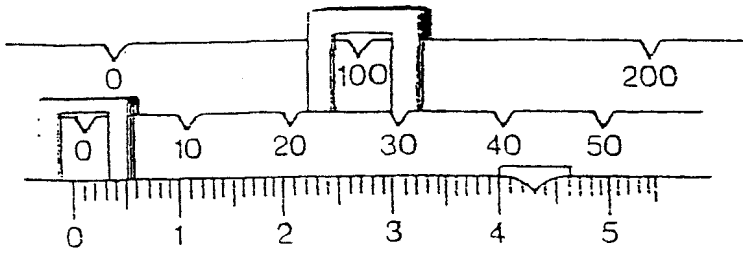
4. _____



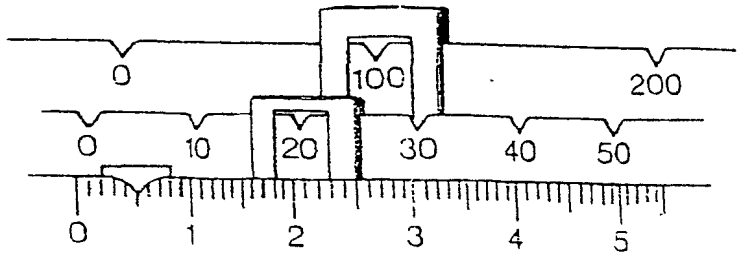
2. _____



5. _____



3. _____



6. _____

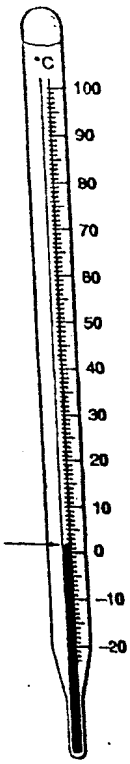
Name _____ Date _____ Class _____

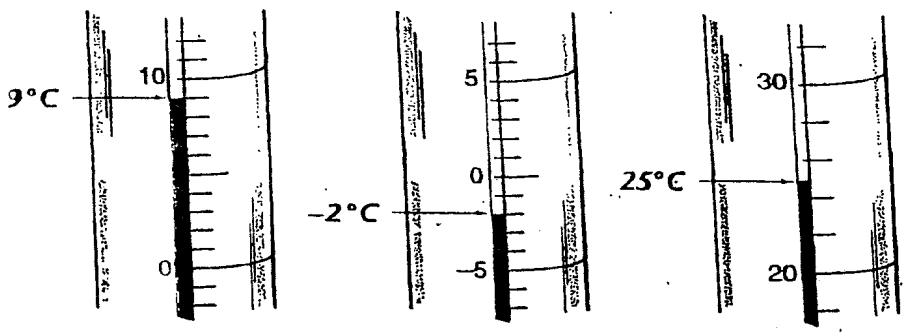
SKILLS PRACTICE

Measuring: Temperature

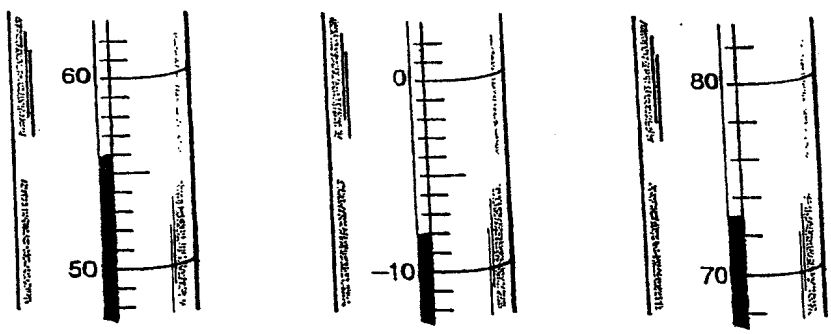
Write your answers to the questions below in the spaces provided. If you need more space, use the back of this sheet.

Temperature is a measure of how hot or cold something is. In science, you will measure temperature with a Celsius thermometer like the one at the right. The correct unit for readings on this thermometer is °C. As you read the temperatures in the first three diagrams below, notice which thermometer marks are labeled and unlabeled, and determine what the unlabeled marks represent. Also, always check whether you are reading temperatures above or below zero. Temperatures below zero should be shown with a minus sign.





What temperature is shown in each of the diagrams below?



1. _____ 2. _____ 3. _____

4. Suppose that at 9:00 A.M. the temperature of a room is 18°C, and at noon it is 24°C. What was the increase in temperature? _____

_____

5. If you add ice to water that is at 65°C and the water temperature drops to 40°C, what was the temperature decrease? _____

_____

6. **Think About It** Describe how you found the temperature increase and temperature decrease in Questions 4 and 5.

Name_____ Class_____ Date_____

F. MEASURING LENGTH. The metric ruler is used in the laboratory to measure length. The most common units used to measure length are the centimeter and millimeter. The worm in Figure 2-3 measures 9 centimeters, or 90 millimeters.

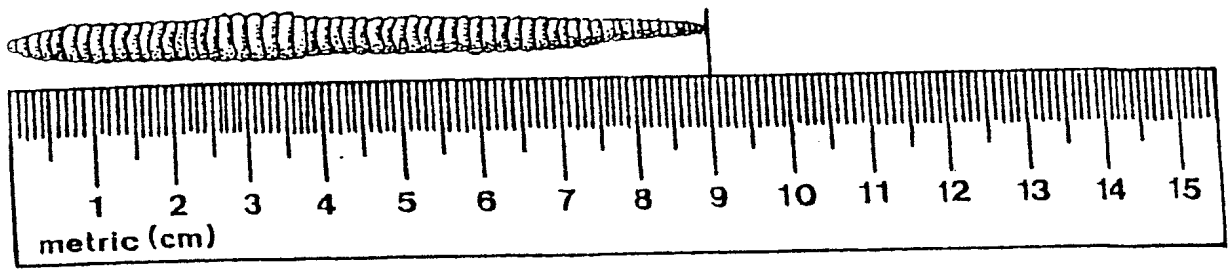
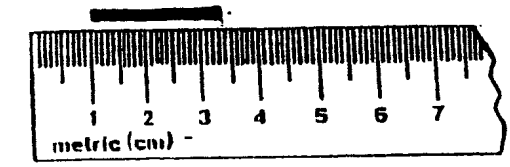


FIGURE 2-3. MEASURING LENGTH WITH A METRIC RULER.

REVIEW QUESTIONS

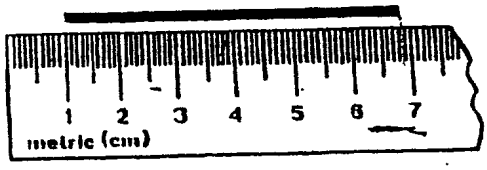
1. The _____ is used in the laboratory to measure length.

2. Below are drawings of metric rulers. Write the length of each object in the space provided.

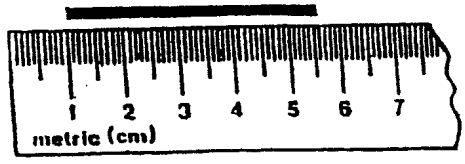


a._____

b._____



c._____



d._____