

Using a Ruler

BROWARD COUNTY ELEMENTARY SCIENCE BENCHMARK PLAN

Grade 1—Quarter 1

Activity 10

SC.A.1.1.1

The student knows that objects can be described, classified, and compared by their composition (e.g., wood or metal) and their physical properties (e.g., color, size, and shape).

SC.H.1.1.3

The student knows that in doing science, it is often helpful to work with a team and to share findings with others.

SC.H.1.1.5

The student uses the senses, tools, and instruments to obtain information from his or her surroundings.

SC.H.3.1.1

The student knows that scientists and technologists use a variety of tools (e.g., thermometers, magnifiers, rulers, and scales) to obtain information in more detail and to make work easier.

ACTIVITY ASSESSMENT OPPORTUNITIES

The following suggestions are intended to help identify major concepts covered in the activity that may need extra reinforcement. The goal is to provide opportunities to assess student progress without creating the need for a separate, formal assessment session (or activity) for each of the 40 hands-on activities at this grade level.

1. Tell students that in this activity, they were doing something that scientists do—in this case, measuring. Ask, *Do you think the ruler you used is a tool?* (Yes, a ruler is a tool.) Then ask, *Why do you think scientists find it helpful to use a ruler?* (A ruler makes work easier; the scientists can be more accurate; different scientists who use a ruler to measure the same thing will get the same answer.) Using pencils of different lengths, have individual students or small groups measure a pencil to the nearest whole inch (and centimeter, if you wish) and report their measurement to the class. Record their measurements in a chart on the board. Have students then sequence the measurements from shortest to longest.
2. Use the Activity Sheet(s) to assess student understanding of the major concepts in the activity.

In addition to the above assessment suggestions, the questions in bold and tasks that students perform throughout the activity provide opportunities to identify areas that may require additional review before proceeding further with the activity.

Using a Ruler

OBJECTIVES

Students are introduced to measurement of length in inches and centimeters. They then use a ruler to measure and compare the lengths of pipe-cleaner “worms.”

The students

- ▶ examine the information on a ruler
- ▶ compare and order pipe-cleaner “worms” according to their appearance
- ▶ measure the lengths of the “worms” in inches and centimeters

SCHEDULE

About 40 minutes

VOCABULARY

centimeter
inch
length
ruler
unit

MATERIALS

For each student

- 1 Activity Sheet 10
- 1 ruler
- 1 pair safety goggles*



For each group of four

- 1 bag, plastic, small
- 1 set pipe-cleaner “worms”

For the class

- 1 pipe cleaner (any color)
- 1 pair scissors* or wire cutters

*provided by the teacher

PREPARATION

- 1 Make a copy of Activity Sheet 10 for each student.
- 2 Prepare a set of five pipe-cleaner “worms” for each group of four students. Use sharp scissors or wire cutters to cut pipe cleaners into the following lengths: red—10 inches long, green—8 inches long, blue— $6\frac{1}{4}$ inches long, yellow— $4\frac{3}{4}$ inches long, and pink—2 inches long. Place each set of five worms in a small plastic bag. (**Note:** If your students are just beginning to learn how to use a ruler, cut the blue and yellow pipe cleaners into whole-inch lengths.)

BACKGROUND INFORMATION

All objects take up space and can be measured. The linear dimensions of **length**, **width**, and **height** of a three-dimensional object, such as a book, can be measured with a **ruler**. **Distance**, the space between two points, can also be measured linearly.

For a measurement to be useful, it must include both a number and a **unit**. For centuries, units of measurements were inexact. For example, the length of a field might have been measured by counting the

number of paces needed to walk from one end of the field to the other. Such inexact measurements could not be used in scientific measurements, however. Standard units were needed. In 1795, French scientists developed and adopted a system of standard units called the metric system.

Today, different systems of measurements are used in different parts of the world. In the United States, units of inches (in.), feet (ft), yards (yd), and miles (mi) are familiar linear units. Most other countries, however, use the metric system, in which linear measurements are expressed in units of kilometers (km), meters (m), centimeters (cm), and millimeters (mm). Metric units are also exclusively used by scientists worldwide.

▼ Activity Sheet 10

Using a Ruler

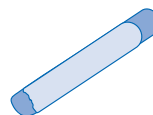
1. Measure the pipe cleaner "worms." Record each measurement in this chart.

	Red Worm	Blue Worm	Green Worm	Yellow Worm	Pink Worm
Length to nearest inch (in.)	10	6	8	5	2
Length to nearest centimeter (cm)	25	16	20	12	5

2. Measure the length of each object in the pictures. Be sure to measure with the correct units. Measure to the nearest whole unit. Write each answer on the line below the picture.



3
centimeters (cm)



2
inches (in.)



4
centimeters (cm)

Guiding the Activity

1

Tell students that a long time ago, people measured things with their hands, arms, or feet. Demonstrate measuring the length of your desk with your hands by placing one hand next to the other while counting aloud. Write the measurement on the board in units of hands. Have a student volunteer repeat the measurement using his or her hands. Record this measurement on the board. Ask, **Why are the measurements different?**

Ask, **Is using your hands a good way to measure something?**

Tell students that all measurements need both a number and a **unit** if people are to understand what the measurement means. Write the word *unit* on the board.

Explain that *hands* is a unit of measurement but that it is not a very good unit because everyone's hands are a different size. We need a unit of measurement that is the same size for all people. Ask, **Do you know any units that we could use to measure the desk?**

Tell students that they are going to learn how to measure with a ruler using two different units. A **ruler** is a tool used for measuring. Ask students if they know any other tools for measuring.

2

Distribute a ruler to each student, and let students examine it. Then have students hold their rulers so the inch scale is showing and is right-side-up. Explain that an **inch** is a unit used in this country to measure length. Write *inch* and its abbreviation *in.* on the board. Tell students that the space between two numbers on this side of the ruler equals one inch. Other rulers might show inches divided into smaller parts, but an inch is always the same size on all rulers.

Additional Information

Students may suggest that you and the student have different sized hands.

Students will probably say no.

Accept all answers.

Students may mention tape measures, meter sticks, or yardsticks. Accept all answers.

Guiding the Activity

3

Demonstrate how to measure a pipe cleaner by aligning one end of the pipe cleaner with the left (zero) end of the inch scale (see Figure 10-1). Point out that the zero end is always the left end of a ruler and it is not marked with a number.

Tell students that you want to measure the pipe cleaner to the nearest inch. You can do this by seeing which number the other end of the pipe cleaner is closest to. Write the measurement on the board.

4

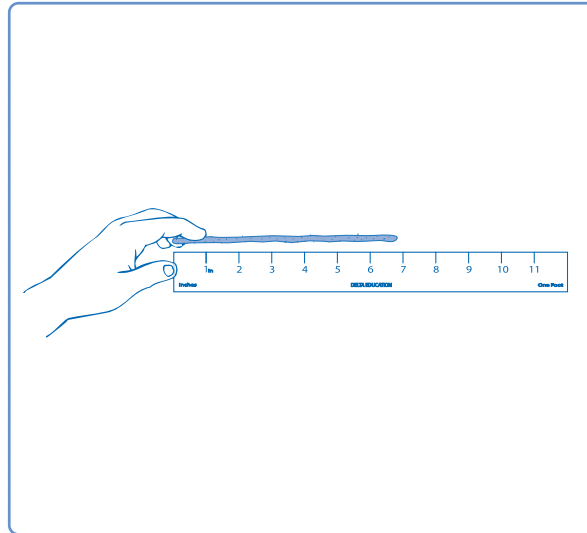
Now have students turn their rulers over so the centimeter scale shows and is right-side-up. Tell them that although we use inches in the United States to measure things, most of the world measures things in different units. Have students examine the metric scale on their rulers. Explain that each space between lines on this side of the ruler is one **centimeter**. Write *centimeter* and its abbreviation *cm* on the board.

Demonstrate how to measure your pipe cleaner in centimeters. Write the measurement on the board.

Ask, **Which is larger—an inch or a centimeter?**

Additional Information

If an overhead projector is available, you can make a transparency of the ruler and do the demonstration on the overhead projector.



▲ *Figure 10-1. Measured to the nearest inch, this pipe cleaner is 7 inches long.*

Again, use a transparency and an overhead projector if available.

Students should say that an inch is larger.

Guiding the Activity

Additional Information

- 5** Distribute a bag of pipe-cleaner “worms” to each group and a copy of **Activity Sheet 10** to each student. Instruct students to empty the worms onto the desk.

Ask, **Which worm looks the longest? Which looks the shortest? How could you tell for sure?**

The red worm seems to be the longest. The pink worm seems to be the shortest. Students could tell for sure by measuring them with the ruler.

- 6** Have students arrange the worms on the desk in order from longest to shortest.

Worms should be arranged from longest to shortest as follows: red, green, blue, yellow, pink.

- 7** Tell students that they will measure the length of each worm. Explain that **length** is the longest measurement of an object. Have students use the inch scale of their rulers to measure each worm to the nearest inch. Have them record this measurement on the activity sheet. Review the procedure of deciding which number on the ruler is closest to the end of the worm.

Make sure students record the measurement in the correct column and the correct row.

- 8** Next, have students measure each worm to the closest centimeter and record that measurement on the activity sheet.

- 9** When every student has measured all five worms in the set, ask, **How long is the blue worm?**

Students may ask what units you want the answer in, or they should say 6 inches or 16 centimeters.

- 10** Have students complete their activity sheets by measuring the objects shown in the pictures. Remind them that length is the longest measurement of an object. Also tell them to make sure they measure the objects in the correct units.

When students measure the leaf, tell them to measure it from the end of its stem to its pointed tip.

REINFORCEMENT

Have students share their measurements with the rest of the class and compare them. If there are any discrepancies, ask students if they can explain why. Students may want to repeat some measurements.

SCIENCE JOURNALS

Have students place their completed activity sheets in their science journals.

CLEANUP

Have students place all their “worms” in the bag and return the bags and rulers to the kit.

Connections

Science Extension

- ▶ Repeat the activity, but first bend the worms into curly, squiggly shapes so their lengths are not obvious. Ask students if they can measure the worms while they are curled. Have them suggest ways to measure the lengths of curled worms. (Students should suggest uncurling the worms and then measuring them.)
- ▶ Challenge students to find ways to measure curved objects that cannot be straightened, as pipe cleaner worms can. Give students a can from food, some yarn or string, and a ruler. Ask them to find a way to measure the distance around the can (the circumference). Have students experiment with their materials. They should discover that they can use the string to measure around the can and then measure the length of the string.

Science and Math

Have students make a simple bar graph of their results. Provide graph paper with an inch scale from 1 to 10 on the left side. Draw the markings to match the rulers students used in the activity so they are familiar. Label the horizontal axis with the five colors of worms. Have students draw bars to represent the lengths of the five worms they measured. They can color their bars the same colors as the worms.

Science and Language Arts

Tell students that *cent-* means “hundred.” Explain that there are 100 centimeters in a meter, another unit of measurement in the metric system. Have students think of other examples of the word (or word part) *cent*. They may suggest that there are 100 cents in a dollar and 100 years in a century. Students may also know that a centigrade (Celsius) thermometer shows the freezing point of water as 0 degrees and the boiling point as 100 degrees.

