

INTRODUCTORY MODULE

(Teacher Lesson Plan and Student Activity Pages)

DAYS EIGHT AND NINE

I. Objectives

1. TLW use and compare non-standard and metric (SI) tools to measure length.
2. TLW listen to a story about the importance of standardized measuring tools and demonstrate proficiency in linear measurement to the nearest centimeter.
3. TLW demonstrate scientific observation and communication techniques during an activity.
4. TLW apply laboratory, safety and cooperative group procedures.

II. TEKS/TAKS

TEKS – 3.1A; 3.2; 3.3A&C-E; 3.4; 2.4; 2.7A

TAKS Obj. – 1

III. Materials

Literature book on linear measurement (i.e., Measuring Penny by Loreen Leedy, Jim and the Beanstalk by Raymond Briggs, Twelve Snails to One Lizard: A Tale of Mischief and Measurement by Susan Hightower, etc.); student activity sheets

Teacher lab box: metric ruler, meter stick, metric tape measure, pieces of string, paperclips and other objects to demonstrate non-standard measuring (i.e., pencils, shoes, jewelry, books, blocks, etc.)

Student lab boxes: metric ruler, meter stick, metric tape measure

IV. Procedures

Teacher note: Prior to class choose a short literature book that focuses on linear measurement and makes a comparison between the use of standard and non-standard measuring tools. The 3 books suggested above are excellent choices.

Prepare the lab boxes and duplicate the student activity page.

1. Begin the lesson by gathering the students together on the classroom rug or other story sharing area.
2. Pose the questions,
 - a. “Who can tell us about the kind of measuring unit and tools we used to prepare our bubble solution?” (Measuring liquid volume using mL in beakers and graduated cylinders)
 - b. “If we were to measure distance, would you use the same type of tools and the same unit of measurement?” (No) Why not? (You cannot put distance

inside of a beaker or graduated cylinder because that is for measuring volume. Milliliters (mL) are a metric unit for volume, not distance)

- c. “Does anyone know what type of tools and units we use for measuring distance or length?” (Tools: rulers, tape measures, yard sticks, meter sticks and other non-standard objects; Units: centimeters and meters in SI and inches, feet and yards in customary)

Teacher note: Remind students that, in science, all measurements will be done using the metric (SI) system. Students should be familiar with centimeters and the use of metric rulers and meter sticks from 2nd grade; but if not, introduce or review this with them.

3. Explain that in the story, the main character will be using some of these tools and units, as well as, some other interesting objects.
4. Ask them to observe (by listening) which measuring technique seems to work best. Explain that you will be asking them about the methods that the character used after reading the story.
5. Read and discuss the story with the class and ask the students to point out all the times the character used measurement, as well as, the variety of tools (both regular measuring tools and non-standard objects) that were used.
6. After the story, display all of the measuring tools and non-standard measuring objects from the teacher lab box.
7. Pose some scenarios and question students as to which items they might use to measure a variety of things, such as:
 - a. Circumference of a sphere (i.e., head or ball) – metric tape measure, string, strip of paper, etc.
 - b. Distance from elbow to tip of finger – tape measure, meter stick, string of paper clips, etc.
 - c. Width of a door – metric ruler, meter stick, pencil, CD case, etc.
 - d. Thickness of a book – metric ruler, paper clips, string, tape measure, etc.
8. Finally, tell students that in tomorrow’s lesson the cooperative groups will be using tools to measure a variety of items.
9. To prepare for this activity, each student should choose one object at home to measure. They will choose “the best” non-standard item as a measuring tool (i.e., shoe, bracelet, necktie, jump rope, coins, paper clips, flashlights, etc.). They will record this data (information) in their journals to report back to the class. For example: “The length of my hallway is 10 neckties long; my door is 18 tennis shoes high, etc.”

Teacher note: The purpose of asking students to complete this exercise is to make it clear as to why standard units of measurement such as centimeters, meters, inches, feet, etc. are useful and important. Be sure to use scientific vocabulary with the students. In this case, check for understand of the term “data”. Tell them that data is simply information they collect and record in a scientific manner.

During tomorrow’s leading discussion, ask guiding questions to point out that it is very unclear as to just how long something is if, for instance, you say “5 paper clips long or 3 jump ropes long”. Are the paper clips large or small? Are all the jump ropes the same length? What would happen if 2 carpenters building a house went to

different lumber stores and asked for pieces of wood 25 shoes long? Guide them to understand that the wood probably would not be the same length because shoes come in many sizes. Then ask them what they could do to make sure that the wood was exactly the same length. Guide them to realize that standard measurements are used and understood everywhere and that standard measuring tools help to insure accuracy.

10. **Begin Day 2**, by asking volunteers to report on the objects and non-standard measuring tools they used. After a few students have shared their findings, ask students if they know exactly how long the described objects are. Discuss points from the above “teacher note” to help students understand why it is so important to measure exactly when completing tasks where accuracy is vital (building a table, measuring carpet, following a recipe, etc.).
11. Have the materials managers check out the lab boxes with the measurement tools and the activity sheets. Ask them to identify each tool as they remove it from the lab box.
12. Review the activity sheets with the students and model the correct technique for using each measuring tool.
13. Task the cooperative groups by showing them the items to be measured. Explain that each group will decide on the best measuring tool to use for each item. Members of the group will take turns to measure the distance of the designated item to the nearest centimeter. They will measure each item 3 times (3 Trials) to help insure accuracy. The **recorder** will then record each trial onto the Data Chart.

Teacher note: Make sure the students understand that the term “trial” means the number of times the exact same activity is repeated in exactly the same way.

14. Tell the groups that they will have 10 minutes to measure the items listed and to record the data. (After the activity is complete, the **recorder** will share the measurement data with the other members of the group so they can copy it onto their charts.)

Teacher note: Walk around while groups are working to identify which students are measuring cm and meters correctly and those who need assistance. This activity can be used as a great diagnostic tool.

15. Have cooperative groups complete the activity and record the data on the charts.
16. After all measurements have been taken and recorded, hold a class discussion to share groups decisions as to which tools were used and the data from the charts.
17. Finally, instruct **material managers** to return lab boxes, **leaders** to collect the activity sheets for placement in the group folders, and the **maintenance manager** to make sure work areas are clean.

V. Evaluation

1. Teacher observation
2. Student work

NAME _____ DATE _____

HOW FAR IS IT?

1. Remove the measuring tools from the lab box and name each tool.
2. Write the name of the first item to be measured in the chart below.
3. Which tool would be best to measure this? Record this in the chart.
4. Take turns and measure the item 3 times to the nearest cm. The **Recorder** will write each measurement in the chart below.
5. Measure and record the data for the other items.
6. All group members will copy the measurement data from the **Recorder**.

DISTANCE DATA

NAME OF ITEM	TOOL USED	TRIAL #1	TRIAL #2	TRIAL #3
		cm	cm	cm
		cm	cm	cm
		cm	cm	cm