

Mathematics Lesson 4: Measurement: It's Important!
GED: Beyond the Basics

Sample Occupations That Require These Skills: Seamstress, Physician, Nurse, Carpenter, Construction Worker, Architect, Surveyor, Manufacturer

Lesson Objective(s)

Students will be able to:

- Accurately measure several common objects
- Determine whether a product meets correct specifications
- Use math to solve workplace problems and communicate effectively

Materials Required for This Lesson

- Handout A: Does It Fit?
- Handout B: Using Measurement in the Workplace
- Pairs of items for students to assess their measurement accuracy, such as a bracket and a bolt, two sizes of boxes, a book and a cover, etc.
- Six-inch shop rulers divided into 1/32 of an inch

Concepts/Skills Covered in This Lesson

- Measurement
- Number operations and number sense
- Problem-solving skills
- Visualization skills

Instructional Activities

Begin the lesson by asking students the following questions and recording their answers on the board or chart paper:

- Why is the correct measurement of products important?
- Have you ever purchased a product that was not correctly measured?
- What are some difficulties or consequences resulting from “imperfect” manufactured products?

Give each student a six-inch shop ruler and several objects to be measured, such as two different boxes, bolts and nuts, nails and boards, etc. Discuss that each inch on a six-inch shop ruler is divided into 32 parts or 1/32 of an inch. When measuring products, accuracy is absolutely necessary. This means that measuring with a shop ruler will require that students add and subtract the marks to achieve a set dimension and dependent on the object, reduce fractional terms.

Distribute to students the objects to be measured. Have the students measure each item and write their measurements on a sheet of paper. Using their measurements, have students decide whether or not the items will “fit” by completing **Handout A: Does It Fit?** To evaluate their measuring skills, have each student try to “fit” the smaller item into the larger. Did they measure correctly?

Pair students to work on a real-life measurement scenario. Have each team complete **Handout B: Using Measurement in the Workplace**. Have the teams share their answers with the class and the process they used to solve the problem.

End the lesson with students listing the different ways in which measurement is used in the workplace.

Help students to identify both linear measurement, such as length and width, and liquid measurement, such as liters and milliliters. Health care professionals use measurement on a daily basis when prescribing or administering medicines and when taking a person's vital signs, such as heart rate and blood pressure.

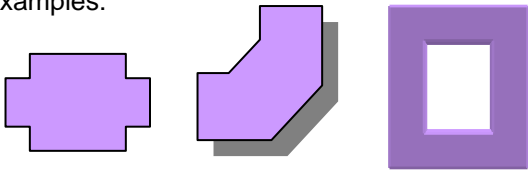
Evaluation

Check that students use measurement tools correctly and obtain accurate results within $\frac{1}{32}$ of an inch. Have students use their measurements to figure the perimeter and area of each shape. Teachers may wish to allow students to use calculators and the fraction key function or to change fractional measurements into their decimal counterparts.

Extension

In the workplace, items are often not squares or rectangles. Students need skills in measuring irregular shapes. Have students measure irregular shapes and calculate perimeter and area. Have students decide how best to partition a shape in order to obtain a more accurate measurement.

Examples:



References

Learning and Teaching Measurement (2003)
The National Council of Teachers of Mathematics, Inc.
Reston, VA.

Handout A: Does It Fit?

Box 1 is _____ high, _____ long, and _____ wide.

Box 2 is _____ high, _____ long, and _____ wide.

Will Box 1 fit into Box 2? _____

The head of the bolt is _____ in diameter.

The opening in the bracket is _____ in diameter.

Will the bolt fit into the opening? _____

Will the head of the bolt be large enough to keep the bolt from slipping into the opening? _____

The nail is _____ long.

The board is _____ thick

Will the nail go completely through the board? _____

The book is _____ long and _____ wide.

Will a front cover measuring _____ x _____ fit the book properly?

Handout B: Using Measurement in the Workplace

Danielle is self-employed as an interior decorator. A client is requesting a new set of curtains for her kitchen. Before Danielle quotes a price to her client, she needs to calculate the cost of the fabric that has been selected.

The window dimensions are: 6' wide, 4' long. The finished width of the curtains will be 3 times the window width. The curtains will have two gathered sections with a 3" hem at the bottom and a 1" hem on each side.

The uncut fabric is 54" wide and costs \$15.99 per yard. Fabric is sold by the yard with partials in $\frac{1}{2}$, $\frac{1}{4}$, or $\frac{1}{3}$ yard. Danielle will need to add $\frac{1}{2}$ inch for seam allowances (where the fabric is sewn together) on sides, top and bottom and an additional 6" for a curtain-rod pocket at the top.

Draw a picture to illustrate the problem.

How much fabric is needed?

What is the cost of the fabric needed?

Why is it important for Danielle to have accurate measurements of the window?

Handout B: Using Measurement in the Workplace Answer

The following is a step-by-step process for solving the problem:

Find the dimensions of the window in inches.

$$\text{Window width: } 6 \times 12 = 72''$$

$$\text{Window length: } 4 \times 12 = 48''$$

Multiply the width times three (curtain width is three times the width of the window) and divide by two for two curtain sections

$$72'' \text{ wide} \times 3 = 216'' \text{ total width of the curtains}$$

$$216'' \div 2 \text{ sections} = 108'' \text{ width of each section}$$

Add the side hems and seam allowances to the width of one section.

$$108'' + 2'' \text{ (2 side hems)} + 1'' \text{ (2 seam allowances)} = 111''$$

111'' represents the cut fabric width

Because the fabric width is 54'' long, 3 fabric widths will be required for one section (111 inches). This will add another seam or 2 additional seam allowances. The cut fabric width will now be $111'' + 1'' = 112''$.

To make the curtains, 5 fabric widths will be required. (2 widths plus a few inches for each section) Rather than buying 3 widths for each curtain, Danielle can buy 2 for each curtain and share the extra width.

Curtain length = window length + hem + seam allowance + rod pocket

$$48'' + 3'' + 1'' + 6'' = 58'' \text{ (fabric length per curtain)}$$

For the curtains, 5 lengths of fabric will be needed. Each length will be 58'' long.

$$58'' \times 5 = 290'' \div 36''/\text{yd} = 8 \text{ yards} + 2 \text{ inches}$$

Danielle must purchase 8.25 yards, since .25 is the smallest division possible

Cost of fabric: $8.25 \text{ yards} \times \$15.99 \text{ (cost per yard)} = \131.92