

SHAPE AND SPACE
GRADE 2
MANITOBA EDITION

hands-on
mathematics

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Introduction

Note: This module is divided into two sections:

1. Measurement
2. 3-D Objects and 2-D Shapes

Measurement

Measurement skills are important skills for students to gain, because they apply directly to their everyday lives. Lessons 1 through 5 comprise activities that are meaningful and relevant to students, with many hands-on and concrete experiences to build a strong foundation for future skills in measurement and spatial sense.

In these lessons, students will estimate, measure, and compare, using whole numbers and non-standard units of measure. As they take part in the investigations, they will begin to realize the importance of measurement in the world around them.

Note: The concept of number sense and the ability to count are both prerequisites for understanding measurement and for successfully participating in measurement activities. Students who are struggling with counting (1-20) or who do not yet have one-to-one correspondence (the ability to count objects by pointing to an object and saying “one,” then pointing to the next object and saying “two,” and so on) may find measurement activities challenging. Consider this when planning lessons, and modify according to student needs.

3-D Objects and 2-D Shapes

The study of geometry helps students represent and describe objects and their interrelationships. In lessons 6 through 9, students learn to manipulate concrete shapes as well as to visualize, name, describe, draw, build, and compare two-dimensional shapes and three-dimensional objects.

Mathematics Vocabulary

Throughout this unit, teachers should use, and encourage students to use, vocabulary such as: *estimate, measure, compare, length, height, distance around, unit of measure, mass, balance scale, yesterday, today, tomorrow, day, week, month, names of all the days of the week and all the months of the year, cube, sphere, cone, cylinder, pyramid, prism, face, edge, vertex, skeleton, two dimensional, and three dimensional.*

Continue to use your classroom Math Word Wall as a means of reinforcing new vocabulary. As new terms are introduced throughout the module, record these words on index cards, and display them on the wall under the appropriate alphabet letter. Students can then refer to the words when discussing, describing, and writing about their math experiences.

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Using Non-Standard Units to Measure Length

Materials

- interlocking cubes
- new, unsharpened pencils (one for each student)
- index cards
- chart paper
- markers
- bags (lunch or sandwich type)
- stir sticks
- lightweight tagboard (cut into small squares, approximately 20 cm by 20 cm)
- scissors
- pencils
- mural paper (Prior to the lesson, tear off one piece of mural paper, approximately 1.5 metres long, for each student.)
- chain links
- classroom chairs

Activity: Part One

Divide the class into pairs. Provide each pair of students with a bag of interlocking cubes and a new, unsharpened pencil. Have students connect cubes together to make trains. Ask:

- How many cubes do you think you would need to make a train the same length as the unsharpened pencil?

Encourage students to share their estimates, and record these on chart paper. Explain that these guesses of a measurement are called *estimates*. Now, have students test their estimates by making cube trains the same length as their pencils (or as close as possible to this length). Observe students as they do this, ensuring that they start the cube train right at the end of the pencil. Ask:

- How many cubes long is the pencil?

Explain to students that they used the cubes to measure the lengths of their pencils. Ask:

- What did you have to do to measure the length of the pencil?

Encourage students to describe this process in their own words. Again, stress the importance of the starting point when measuring an object. Ask:

- For what other objects could we use these cubes to measure their length?

Select eight classroom objects of standard length, such as notebooks, sheets of construction paper, scissors, glue bottles, and so on. Display the items and use index cards to record the name of each item.

Provide the pairs with Activity Sheet A (3.1.1). Have them record the names of the selected objects to measure, using the index cards for reference. Now, challenge them to estimate, and then measure, the lengths of all eight items. They should record both their estimates and the actual measurements on their activity sheets. Circulate as students measure, checking that they are estimating first and then accurately measuring the lengths of the objects.

Once all pairs have completed the task, have the class come together to share results. On chart paper, make a chart similar to the one on Activity Sheet A. Have each pair share their estimates and results. Record these on the class chart.

Discuss differences and similarities in results, and use this data as a means of stressing the importance of accuracy when measuring.

Note: If the same standard objects are used by all students, measurement results should be similar. If they are not similar, check the strategies that students used to measure.



1

Activity Sheet A**Directions to students:**

Record the names of the eight objects in the first column of the chart. Estimate the length of each object in cubes, and record this in the second column. Measure the length of each object, and record this in the third column. Then, answer the questions at the bottom of the sheet (3.1.1).

Activity: Part Two

To begin, distribute a small square of lightweight tagboard to each student. Have students place one of their hands in the middle of their squares, with their fingers touching together, and use pencils to trace around their hands, as shown below:



Note: Students may wish to have partners help them trace around their hands, if they find the task too challenging.

Once they have traced their hands, have students cut them out. Remind them to print their names on the backs of their hands so they do not get mixed up with those of their classmates.

Have students sit in a large circle. Explain that they are going to use their hand cutouts to measure different objects in the classroom. Using a sample hand cutout, demonstrate how to measure an object (e.g., the length of a desk). Say:

- Line up the wrist end of your hand cutout with the edge of the desk. Use your finger to mark where on the desk the hand ends (at

the tip of the longest finger). Lift up the hand and replace the wrist end where your finger marked the end of the first hand. Repeat this until you have measured all the way across the desk. Do not forget to count the number of hands as you go.

Now, distribute Activity Sheet B (3.1.2) to students. Review the chart they see on their activity sheets, discussing the terms *length*, *height*, and *width*. Have students estimate the width, length or height of each object (in hands), and then use their hand cutouts to get closer measurements.

Have students work in pairs for this activity. Have one student mark and move the hand cutout while the other counts the number of hands. Make sure the partners also reverse roles so that each student uses his/her own hand to measure each object.

Activity Sheet B**Directions to students:**

Working with a partner, look carefully at each object to measure and estimate how many “hands” wide, long, or high you think it is. Record your estimate on your activity sheet. Then, use your hand cutout to measure the object. Record the actual number of “hands” wide, long, or high the object is (3.1.2).

Activity: Part Three

Compare the results of Activity Sheet B together as a class. Ask:

- Were your measurements the same as those of your partner? Why or why not?
- Do you think your measurements were the same as those of everyone else in the class? Why or why not?

1

- If we want to measure certain objects in the classroom and all end up with the same results, what could we do? (All use the same hand cutout to measure each object.)

Activity: Part Four

Note: This activity is best done with a small group of students and adult supervision.

Explain to students that they will now trace their body prints onto mural paper and then use stir sticks to measure different parts of their bodies.

Select one student to demonstrate how to trace a body outline on mural paper. Then, divide the class into pairs of students and give each student a sheet of mural paper approximately 1.5 metres long. Have one student lie down on the piece of paper while his/her partner traces around his/her body with a pencil. Then, have the partners switch roles.

Once students have traced their body outlines, have them add facial features (eyes, nose, smile, and ears). Now, demonstrate how to use stir sticks to measure the lengths of various body parts. Then, distribute Activity Sheet C (3.1.3), and have each student use stir sticks to measure the length of one of his/her arms, one leg, one foot, his/her smile, one hand, and the length of his/her entire body. Have students record these measurements on their activity sheets.

Activity Sheet C

Directions to students:

Using stir sticks, measure the length of each body part shown, and record it on your activity sheet (3.1.3).

Activity: Part Five

Together as a class, explore the fact that an object's orientation does not alter its

measurements. For example, build a seven-cube train of interlocking cubes. Ask:

- How long is the train? (seven cubes)
- What happens to the length of the train if I turn it?

Turn the train, and count the cubes again with students. Repeat the activity with trains of different lengths. Continue the activity with other classroom objects. For example, have students use chain links to measure the height of their classroom chairs. Then, tell students to turn their chairs onto their sides and measure the height again to determine that the measurement does not change.

Problem Solving

Have students snap together a set number of interlocking cubes (e.g., ten) to make interlocking cube trains. Ask students to find objects in the classroom that are shorter than, as long as, or longer than their interlocking cube trains.

Note: A reproducible master for this problem can be found on page 89.

Activity Centre

Provide a variety of non-standard measurement tools (e.g., plastic chain links, paper clips, and so on). Have students measure various objects using the different measurement tools provided.

Extensions

- Continue adding new terms to the Math Word Wall, such as *estimate*, *measure*, *length*, *width*, and *height*.
- Have students work with partners to compare their body prints and discuss the similarities and differences between the two.
- Measure and compare the heights of students in September, January, and June.

Date: _____

Name: _____

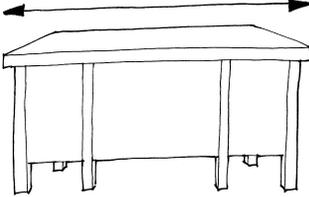
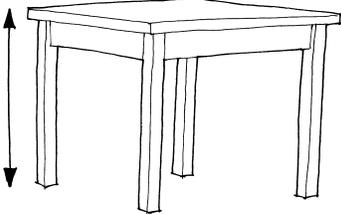
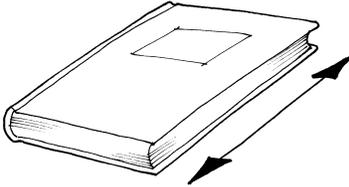
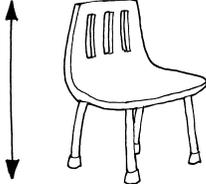
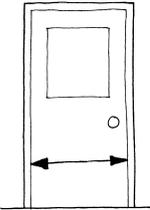
Measuring Length

Object	Estimate (in cubes)	Length (in cubes)

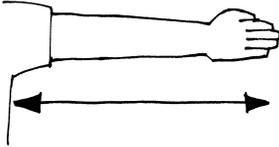
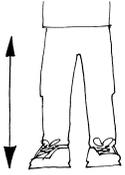
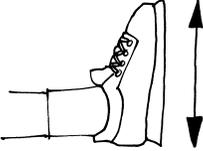
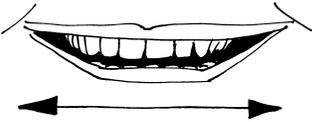
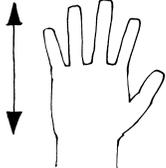
Which object is the shortest? _____

Which object is the longest? _____

Using My Hand Cutout to Measure Objects

Object to be Measured	Estimate (Number of Hands)	Actual (Number of Hands)
 <p data-bbox="212 800 542 842">Length of a Desk</p>		
 <p data-bbox="212 1083 542 1125">Height of a Table</p>		
 <p data-bbox="212 1360 542 1402">Length of a Book</p>		
 <p data-bbox="196 1629 558 1671">Height of My Chair</p>		
		

Measuring My Body Parts Using Stir Sticks

Body Part	Number of Stir Sticks
 <p data-bbox="337 762 415 800">Arm</p>	
 <p data-bbox="342 995 412 1033">Leg</p>	
 <p data-bbox="337 1234 415 1272">Foot</p>	
 <p data-bbox="326 1467 431 1505">Smile</p>	
 <p data-bbox="326 1703 431 1740">Hand</p>	
 <p data-bbox="180 1923 578 1961">Length of Entire Body</p>	