



Unconventional Measure

<p>THE BASICS</p>	<p>THE TOOLBOX</p>	<p>EDUCATION STANDARDS</p>	<p>Measurement Math Standard: Understanding measurable attributes of objects and how to estimate distance and determine perimeter.</p>
<p> Grade Level: K-4</p>	<ul style="list-style-type: none"> • 1 sheet of paper and a pencil • 30-40 small items of uniform size such as toothpicks, red beans, paper clips, crayons, dominoes, pasta, etc. 	<p>SAFETY CONCERNS</p>	<p>Make sure the younger students do not put small items in their mouths. Caution students about sharp ends on toothpicks.</p>
<p> Estimated Time: 20 min.</p>		<p>FOR KIDS WITH DISABILITIES</p>	<p>This is an ideal activity for visually-impaired students. Students with mobility impairments may be able to manipulate larger objects more easily.</p>



Educational Objective:
To learn how to use unconventional units of measure to estimate distance and to measure perimeter.

What to Do:

- Gather the materials and duplicate the activity sheet(s).

Questions to Ask Students As They Do This Activity:

Toothpick Measure:

- Why is it important to use units of the same length?
- What parts of your body could you use to measure the paper?
- What could you use to measure the length of the room if you didn't have a ruler or a measuring tape?

The Fence:

- What do you have to know about the sides of a rectangle in order to do this activity?
- If you used toothpicks to calculate and your friend used jelly beans, would your answers be the same or different? Explain.

Why It Happens:

Toothpick Measure:

Units of measure can be anything you want them to be as long as the units are the same. Before there were standard units like inches and meters, people used what was handy, such as the last joint on the thumb or the length of a person's foot, which is why we have a unit called "foot". Did you know that the height of a horse is still measured in "hands"? In order to provide some uniformity to this kind of measuring system, the body parts of someone important such as a king or queen would often be used as a standard.

The Fence:

The opposite sides of a rectangle are the same length. No matter what size item you are using to represent one foot, the answer will always be the same, because it is the number of items representing one foot, not the particular length, that counts.

WEB SITES

- **Estimation**
<http://www.iit.edu/~smile/ma9407.html> (Grades K-1)
- **Finding Area & Perimeter**
<http://www.iit.edu/~smile/ma9112.html> (Grades 3-5)

SOFTWARE

- **Jump Start 1st Grade Math**
Knowledge Adventure, Inc., 1997
(Grades 1-2)
- **Math for the Real World**
Knowledge Adventure, Inc., 1997
(Grades 3-9)

READING ROOM

- Hewitt, Sally. **Measuring**. Raintree Steck-Vaughn, 1996. (Grades K-4)
- Time-Life Books. **See You Later, Escalator! Mall Math**. Time-Life Books, 1994. (Grades 1-4)
- Stein, Sherman. **Strength in Numbers: Discovering the Joy and Power of Mathematics in Everyday Life**. Wiley, 1996. (Grades 7 and up.)

Career Connections

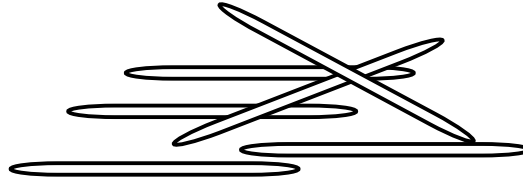
A cartographer is someone who makes maps. A cartographer needs to know many different ways to measure the earth.

UNCONVENTIONAL MEASURE ACTIVITY SHEET

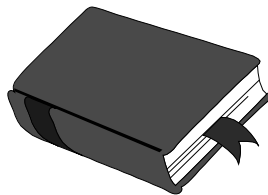
TOOTHPICK MEASURE

You Will Need:

- 1 sheet of paper
- A pencil
- Some toothpicks
- A book



1. How many toothpicks do you think it would take to make a line of toothpicks across the top of your paper? _____
2. Now, lay your toothpicks end-to-end to make a line completely across the top side of the paper from one end to the other. Count the number of toothpicks it takes to make the line across the top of the paper. How many toothpicks did it take? _____
3. How close was your estimate? _____
4. How many toothpicks do you think it would take to make one line of toothpicks from the top to the bottom of the paper? _____
5. Now, try it! How many toothpicks did it take? _____
6. How close was your estimate? _____
7. How many toothpicks would it take to measure the width of a book from the spine to the side where the book opens, and the length from the top to bottom? Write down your estimate and then try it. Try estimating then measuring other objects using toothpicks. Are your estimates getting better? Why?



Challenge:

Try the same activity placing your toothpicks side-to-side. How many more toothpicks do you think it will take to cover the paper end-to-end (the width)? Top to bottom (the length)? Write down your answers and then try it.

UNCONVENTIONAL MEASURE ACTIVITY SHEET

THE FENCE

Your school is planning to build a new sandbox for the playground. A low fence needs to be built around the sandbox to keep the sand in. The builders need to know how much fence material to buy. The principal knows you like math and has asked you to help with the project. The sandbox will be a rectangle. It will be six feet long and 4 feet wide.



1. How many feet of material will be needed to build the fence around the sandbox?
 - To find out, pretend that each toothpick is one foot long.
 - Make a rectangle with your toothpicks that is 6 feet long and 4 feet wide.
 - Count the number of "feet" there are around the outside of the rectangle.
2. How many feet of material did you use to build your fence?

Challenge:

- How many sides of the rectangle are six feet long? _____
- How many sides are four feet long? _____
- Can you solve the problem without counting all the toothpicks?

