Math by the Month

Are You Measuring Up?

Muffet Reeves

The "Math by the Month" activities are designed to appeal directly to students. Students may work on the activities individually or in small groups. No solutions are suggested so that students will look to themselves as the mathematical authority, thereby developing the confidence to validate their work.

"Measurement activities can and should require a dynamic interaction between students and their environment" (NCTM 1989, 116). Measurement concepts should be presented in a natural context and focus on problem solving. This month's activities will help students understand attributes of objects, units, and systems of measurement as they apply a variety of techniques, tools, and formulas for determining measurements. The activities also involve students in using other mathematics skills, such as number operations, geometric ideas, statistical concepts, and notions of functions.

References

Clement, Rod. *Counting on Frank.* Milwaukee, Wisc.: Gareth Stevens Children's Books, 1991.

National Council of Teachers of Mathematics (NCTM). *Curriculum and Evaluation Standards for School Mathematics.* Reston, Va.: NCTM, 1989.

Pluckrose, Henry. *Length: Math Counts.* Chicago, Ill.: Children's Press, 1995.

Slobodkina, Esphyr. *Caps for Sale.* New York: Harper & Row, 1987. ▲

Muffet Reeves, muffet.reeves@sharon.alpine.k12.ut.us, is the principal of Sharon Elementary School, Orem, UT 84097. She is a past president of the Utah Council of Teachers of Mathematics and is her school district's K–12 mathematics and science specialist.

Edited by **Deanna Rigdon** *and* **Jolyn Raleigh,** *Hunter Elementary School, 4351 South 5400 West, West Valley City, UT 84120. Readers are encouraged to send manuscripts appropriate for "Math by the Month" to the editors.*

WEEKLY ACTIVITIES

MEASURING: K–2 **OCTOBER 1999**

4 **How long?** In Henry Pluckrose's book *Length: Math Counts* (1995), we learn ways to measure something from one end to another. How many of your steps are needed to walk across your classroom or from your classroom to the cafeteria? If someone else walks that same distance, will he or she use the same number of steps? Will your teacher use the same number of steps? Why do you find a difference?

11 **Body dimensions.** Have a partner trace the outline of your body on a large sheet of paper. Measure the parts of your paper "body" using objects that you find around the classroom, such as paper clips, pencils, crayons, and so on. Record the data on small sticky notes, and place the notes on the body parts. Why are the measurements smaller when you use larger measuring tools, and why are they larger when you use smaller measuring tools?

18 **Weighing in.** Collect five different objects. By "feeling" their weights, place them in order from the lightest to the heaviest. Combine your objects with those of a partner, and reorder the combined collection. Discuss with your classmates the ways that you could actually measure these objects to test your weight predictions.

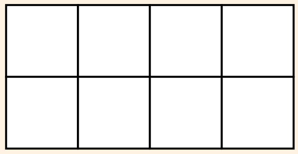
25 **Estimation.** Estimate how long a piece of string you will need to fit around a playground ball. Without actually measuring, cut a piece of string that you think will go once around the ball at its widest part. Test your prediction. Was your string too long, too short, or just right? Create a class graph of the guesses. Try this estimating activity with other objects—and not just round ones!

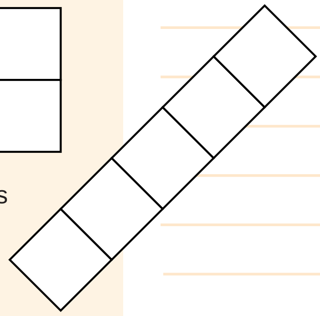
WEEKLY ACTIVITIES

MEASURING: 3–4 **OCTOBER 1999**

4 **Ancient measures.** In ancient times, people used objects found in their environments to measure things that they were building. Sometimes the units were parts of the body or such objects as sticks or bones. On the playground, draw in chalk the outline of a "home" that you would construct with a perimeter of, say, 24 units. Use an object found in your environment as the standard unit. Explore various shapes, such as squares, rectangles, and others. How many students can fit in each shape? What shape results in the greatest area?

11 **Patterns.** Use square blocks to create rectangles. Does one block create a rectangle? Try different numbers of blocks to create rectangles. Make a chart to record their dimensions, perimeters, and areas. When you double the dimensions of a rectangle, what happens to the area?





18 **Cap sale**. In *Caps for Sale* (Slobodkina 1987), a peddler travels from town to town selling his sixteen caps. If the peddler charges $4 for each cap, how much money would he earn? If the peddler sold one-fourth of his caps at the regular price and the remaining caps at half price, how much money would he make?

25 **Staying afloat.** With your classmates, construct "boats" using equal-sized sheets of aluminum foil, and float them in a sink or tub of water. Gradually add one penny at a time to your boat until it sinks. How many pennies did you need to sink your boat? How does the shape of the boat affect the number of pennies that it can hold without sinking?

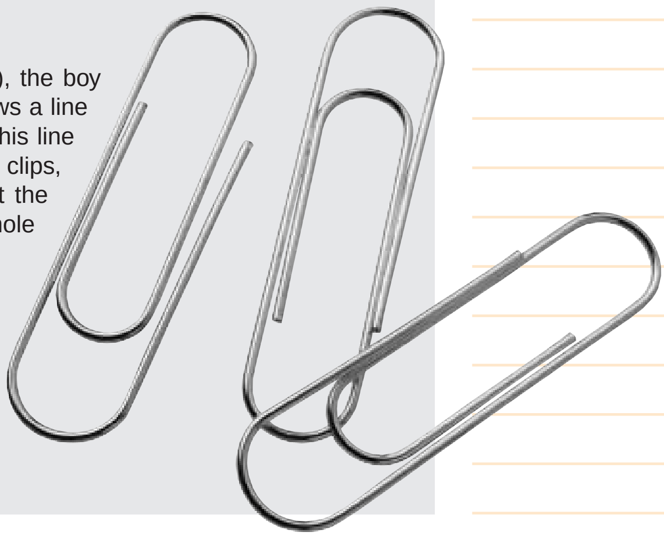
WEEKLY ACTIVITIES

MEASURING: 5–6 **OCTOBER 1999**

4 **Pi.** Collect a variety of circular items, such as lids, cans, bottles, and mugs. Use a length of string to measure the diameter of each item. How many times will the measured diameter go around the circumference of an item? Graph your findings for each object. You should have determined that slightly more than three diameters will fit around each circumference. The exact number is a special number called *pi,* which equals approximately 3.14.

11 **Hot dog or hamburger?** Roll two identical pieces of paper into cylinders—one the "hot dog way" (long and skinny) and one the "hamburger way" (short and fat). Secure the edges with tape. Which do you think will hold more counters? Fill the tall cylinder with beans or some other small counters. Do you wish to change your estimate? Next place the short cylinder around the tall one and pull the tall one out, allowing the counters to fill the other cylinder. Describe and explain what you discover.

18 **Clip measurement.** In *Counting on Frank* (Clement 1991), the boy measures a lot of items. He states that a ballpoint pen draws a line 7000 feet long before running out of ink. How long would this line be in centimeters? If you were to measure that line in paper clips, how many clips would you need? How can you figure out the number of clips needed without actually measuring the whole 7000 feet?



25 **Calculating area.** Place a can on a piece of centimeter graph paper, and trace its circumference. Carefully count the squares within the circle. Combine partial squares to equal whole squares. After you get an answer, use the formula $A = \pi r^2$. How close were your answers? Why are the answers different?