RAFT IDEAS

Topics: Geometry, Pi, Diameter, Circumference

Materials List

- ✓ Sticker strip ~2.5 cm x 100 cm (~1" x 36")
- ✓ Permanent marker (or ball point pen, depending on sticker type)
- ✓ Cardstock or matte board scrap
- ✓ Ruler (with inches, centimeters, or both)

This activity can be used to teach:

- Measurement & Geometry, Circles, and Pi (CA Math Standards: Grade 6, 1.2; Grade 7, 2.0; HS Geometry)

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Forest Ranger Measuring Tape

For Measuring the Diameter of Trees and Other Round Things

Measuring the diameter of a tree without cutting it down can be a bit tough. Rangers apply Pi (π) to make these useful measuring devices.

To Do and Notice

1. Create a "diameter tape" to use when measuring the diameter of round objects, like tree trunks. Working a few inches at a time, remove backing from the sticker strip and fold the sticker over onto itself horizontally, creating a long tape, ½ of the original sticker width.
2. Use a ruler and cardstock scrap to create a template to use when calibrating the measuring tape (use inches, centimeters, or both). The template should have 1 unit carefully measured and marked. While a Metric (decimal) tape is much easier to create, tapes with fractions (used with inches) are widely used by rangers in the United States. Provide the chart below if appropriate:

Decimal (cm)	Tape unit	Fractions (inches)	Tape unit
.25	.78	¼	¾
.5	1.6	½	1 9/16
.75	2.4	¾	2 5/16
whole	3.14	whole	3 1/7

Note: Since rulers are not marked in 7ths, students can measure 1/7th as slightly larger than 1/8th. Other measurements are approximate.

3. Calibrate the tape using the template and marker by numbering whole units and marking off ½ and ¼ units with shorter lines.
4. Use the tape to measure the diameter of a variety of trees and/or round objects. Take care to insure tape is straight (not twisted) around the circumference of the object.

The Content Behind the Activity

Forest rangers, environmental scientists, and foresters use tree diameter to measure tree health (performance) and to estimate tree volume. Diameter tapes apply the geometric formula for circumference: diameter x π = circumference. By calibrating the tape in units of Pi (π), the tape automatically computes the diameter of the object measured. Diameter tapes can be used to measure the diameter of trees at any point of the trunk or any other round object. By convention, however, tree diameter is measured at "breast height" (DBH = Diameter at Breast Height) of 1.37 meters (4.5 ft).

Taking it Further

For other ideas around the topic of Pi, see the RAFT Idea Sheets ***Finding Pi*** and ***Wearable Pi***.

Web Resources (Visit www.raft.net/more for how-to videos and more ideas!)
For images of professional diameter tapes in use, see:
www.uwsp.edu/cnr/cwes/forestree/Toolbox/dbhtape.htm

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