A Tapestry of Geometry Lessons

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Mathematics in general and geometry in particular model a wide variety of types of human thought and activity. The purpose of this article is to outline a chain of varied lessons in geometry that enlivens some potentially dry topics, introduces younger students to topics and developmental processes often regarded as advanced, and more.

The chain of activities can be stratified by sections on distance, area, and volume. In another respect, the student experiences three learning tools: hands-on activity, definition, and analysis, the latter including use of the concept of a limit.

Building a chart such as the one illustrated as the year goes along may help students remember, sequence, classify, and connect the links, and see the spectrum of approaches in developing these ideas.

This body of activities is intended for odd-time use during the year, not as a unit or chapter. Pieces should be done and then reviewed as time allows through the year. It may be repeated in subsequent years.

To emphasize: each activity should be reviewed briefly and connected to the previous parts of the chain each day for several days before the next activity is undertaken. And again: each activity should be brief, with the entire chain relegated to spare-time activity over a semester or year.

One Dimension

The **first link** in the chain is the activity of drawing a circle with a compass, allowing students to experience radius meaningfully.

(Introducing use of the compass requires more help than many teachers appreciate. Students should be advised, if discovery doesn't occur, that (1) the compass should lean in the direction that the pencil is moving, (2) a little pressure on both point and pencil is needed, with more on the point, and (3) starts and stops are common when drawing a complete circle.)

The **second** link consists of defining diameter from radius, defined and quantified as a chord of length 2r. The definition of diameter leads to the **third link**, the popular small-group activity of discovering π, described here with one or two modifications.

A teacher may help students discover π by distributing round lids of widely varying sizes, one lid to each group of not more than three students. Each group also gets a strip of masking tape longer than the circumference of the lid.

Following a teacher's example, the students attach the tape around the outside rim of the lid, tearing tape when said tape is around the rim