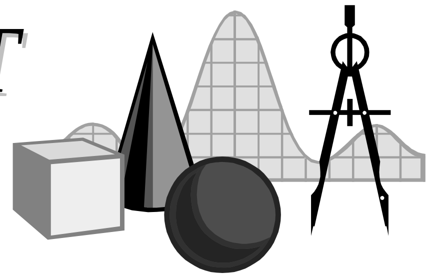
TAKE IT TO THE MAT

A NEWSLETTER ADDRESSING THE FINER POINTS OF MATHEMATICS INSTRUCTION



Math Audit Team
Regional Professional Development Program
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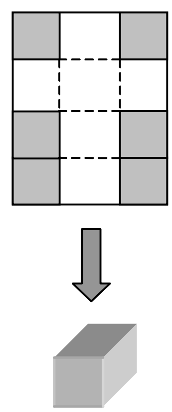
Greetings! An enthusiastic welcome and welcome back to new and returning teachers from the Math Audit Team. With this issue, we embark on our second year of producing *Take It to the MAT*, a newsletter provided as a resource for teachers of all levels.

Within the geometry strand is the topic of solids. Sometimes we have misconceptions of what a solid really is. The difference between common use of the term and its mathematical use is at the heart of the matter. Consider the following definitions of solid:

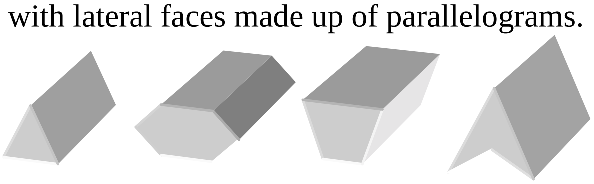
1. Of definite shape and volume; not liquid or gaseous.
2. Not hollowed out; *a solid block of wood*.
3. Of or pertaining to three-dimensional geometric figures or bodies.
4. A closed surface in space; the set of all points of 3-D space that lie inside a complete closed part of the space.

The first definition pertains to physical properties, e.g. water in its solid state is ice. The second refers to how material is concentrated—this is our everyday meaning. The last two citations are relevant to our cause, number four being the more formal. For elementary students, the third definition is usually sufficient.



Take a sheet of paper (and some tape) and make it into a "box" using the diagram at right, cutting on solid lines and folding on dotted lines. Throw away the shaded portion. Our "box" is more appropriately called a *rectangular prism*.

A *prism* is a solid with two parallel, congruent bases which are polygons with lateral faces made up of parallelograms. A few prisms are shown at left.



From left to right: Triangular prism, hexagonal prism, trapezoidal prism, quadrangular prism.

Other solids include spheres, cones, pyramids, and cylinders. A cylinder is effectively a prism with circular bases; a cone is basically a pyramid with a circular base.

Back to our box. Is it a solid? After all, it's hollow inside—it's only six small paper rectangles taped together. But, by our mathematical definitions it is a solid—a closed surface. It does not have to be "solid" in the conventional sense, like a piece of lumber. It need only be a 3-D object with no openings in the surface.

Consider a tennis ball and a billiard ball, both spheres. The tennis ball is hollow and the billiard ball is not. Both are solids; they are closed surfaces.

Here's something to ponder: what if we cut the one side of the box off, much like taking the lid off of a shoe box? Is it still a solid?