Spatial Reasoning Between 2-Dimensions and 3-Dimensions

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Spatial Reasoning between 2-Dimensions and 3-Dimensions

Objective: Students will build a three-dimensional figure given a drawing of its perspectives (front, one side, and top), as well as create drawings of the perspectives from a given 3-dimensional figure.

SOL: This supports SOL 8.9, advanced students in 6th and 7th grades, and encourages spatial thinking as a review in the high school.

Materials: Classroom set of cubes 10 in a ziplock per table, isometric grid paper, handout of sketches, colored pencils, overheads of perspectives

Vocabulary: perspective, three dimensional model, point of view

Procedures:
Demonstrate how to draw on isometric paper. Distribute isometric dot paper to the students. On an overhead, demonstrate how to draw a single unit cube. Position a set of three cubes in an L-shape and show students how to draw the figure on isometric dot paper. Use colored pencils to shade the different sides of the cubes to enhance visualization.

Display a representation of a solid from the front, side, and top perspective with an overhead or in the handouts. Model the expectations of creating the 3-D figure for the students with the unifix cubes. Then, present another set of perspectives for pairs or groups of students to create the figure using unifix cubes.
Using at least 5 and no more than 10 cubes student pairs will create their own figure then copy this figure’s front, side, and top perspectives on isometric grid paper. One will build and one will draw. Teacher will collect and shuffle the perspectives, redistribute (ensure students do not receive their own), and instruct the pairs of students to construct the model from the given perspective. Once completed, the students will check their model against the original model. Repeat and switch jobs. Each student will have an opportunity to build, draw, and rebuild.

Next, have the students draw the perspectives from two-dimensional pictures of solids (worksheet adapted from McDougal Littell, 12.2 Spatial Thinking). This will allow students to move from the kinesthetic learning to creating a representation. The students will have access to the cubes if needed. Class discussion regarding answers will occur.

Assessment:
Hand out or display an SOL related question from the released 8th grade SOL test. Have students answer the question and describe why the non-selected choices from the questions are NOT the right answer.
Differentiation:
Various sized cubes and larger grid paper will be available.

Closure:
Debrief students and initiate discussion about what made it difficult to make the perspectives. When would you have to build or use perspectives? Why did we build them and make it flat? Why would you need to build from a 2-dimensional drawing? Possible answers: architecture, interior design, construction, graphic art, math teacher, landscape designer.