# Cube on Base

## Purpose:

In this curriculum, 3D objects are typically represented in orthographic projection which shows only “flat” views of the front, top, and right sides. However, students should have some exposure to perspective views since they are very commonly used to illustrate the depth of 3D objects. To this end, students will draw a cube in isometric projection following step-by-step instructions that walk them through each line and angle. While completing these drawings, students will reference a physical cube to develop an understanding of how the 2D lines on their perspective drawing correspond to the 3D shape.

## Functionality:

This manipulative is a suspended cube that is presented to the student at an angle. Having the cube raised allows the student to feel all around the sides of the cube, including the bottom faces, and the orientation is such that the perspective of the student looking straight on matches a standard isometric view of a cube.

## Construction:

This manipulative is made from a 3” cubic wooden block, a 6” long dowel, and a 6” square piece of thick plywood, MDF, or similar. The exact diameter of the dowel and the thickness of the plywood aren’t important, as long as the plywood base is thick enough to support the dowel vertically, and the holes drilled match the diameter of the dowel.

Holes are drilled into the cube and into the base. A dowel is glued into these holes so that the cube is supported above the base. The hole in the cube must be carefully drilled at a 30-degree angle so that the cube sits at the correct angle relative to the student. Also, when gluing the cube must be rotated so that one vertical edge of the cube faces the front side of the base, and the top face is tilted down.

## Graphics:

Page 1: Cube on Base Components. Scale 1:2. Shows the cube, dowel, and base separately. Each one has a label and dimensions written above a front view of the component.

Page 2: Cube on Base. Orthographic projection–shows a front view (bottom left), top view (top left), and side view (bottom right) of the completed assembly. Each view is labeled near the top left of the object.

Page 3: Cube on Base Cross-Section. Additional views–a cross-section of the completed assembly, showing how the dowel protrudes into both the cube and the base. Labels of each component are to the left of the object. Dowel height dimension is noted, as well as angle of the cube.