

Visualization Exercise 1

Design Exercise for Engineers

1. Consider each of the 2D shapes shown in (a)-(d). Each shape is a set of squares on a single plane that is being viewed isometrically. The number on each box represents the out-of-plane height each square should be extruded to create a solid. Create the solid for each shape and complete steps 2-4. Refer to the example as needed.

2. Uniquely shade or crosshatch each of the three surfaces (surfaces seen from front, right, top directions). Refer to the example.

3. Project a shadow -- and crosshatch it -- onto a plane one unit behind the solid to the left. Refer to the example.

4. Use a Sharpie to draw a bold outline around the outer edges of the solid to make it pop out of the page. Refer to the example.

5. For shape A1 (A1 means assembly 1), assemble (a), (b), and (c) together into a 3 by 2 by 4 cuboid. Uniquely color each part, and crosshatch each surface of each part differently, as shown in the example. There are 4 correct answers; you only need one.

6. For shape (e), determine the extrusion heights that would produce a solid 3 by 3 by 4 cuboid (box) if turned upside down and placed onto shape (d). Do steps 2-4 above for shape (e) in the right side up position.

7. For shape A2, assemble (d) and (e) together into a 3 by 3 by 4 cuboid. Also color/hatch the surfaces as in step 5 above.

8. Critically evaluate your work against the solution, and make corrections as needed.

TIPS: Do your best work. The goal is not to *do* the exercise, but instead the goal is to *become* better at 3D visualization and sketching while you are doing the exercise.

