

ISOMETRIC DRAWING: Opening up the activity to reveal student learning



MEREDITH BEGG and
ANTHONY CAVAGNA,
describe how students
used isometric
drawings to examine
3D shapes and scaling.



Open-ended activities can be a powerful and engaging tool, promoting authentic learning and opportunities for formative as well as summative assessment. This activity shows how an open-ended task—with a variety of solution strategies and multiple correct answers—can be an effective educational activity which also offers insights into student thinking and learning.

Introducing isometric drawing

This initial activity asks students to use isometric paper to draw shapes made from four cubes, as in Figure 1, thus minimising consideration of proportion. We found that success relied less on advanced artistic skills than on the ability to think visually.

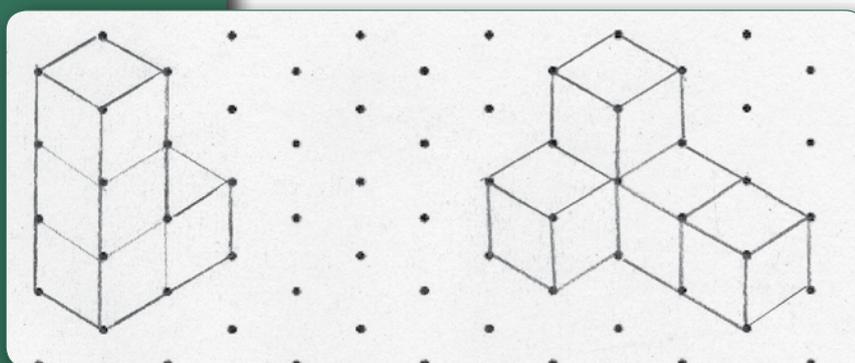


Figure 1. Stacked cubes can be used as an initial activity.

Opening up the task

Students can then be asked to draw their own choice of objects from their home or classroom environment. The benefits of this approach are that:

- students are more motivated by having input into what they draw;
- they may learn more through the opportunity to attempt more complex isometric drawings than the teacher may have selected. Figure 2 shows the extent to which this student was able to maintain perspective

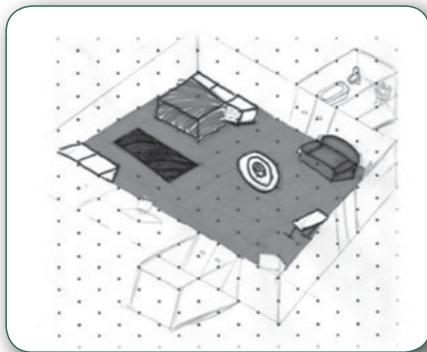
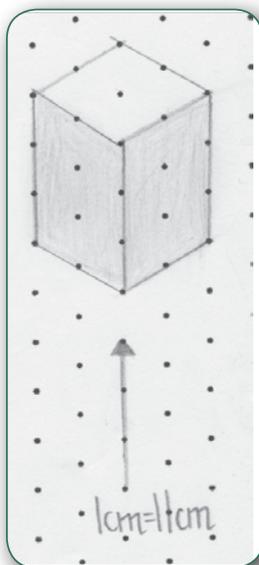


Figure 2. Isometric drawing of shapes in the home.

Extending the task

For students who are able to draw their objects in isometric view, the task might be extended by asking students to:

- give their pictures the illusion of depth;
- draw some items to scale.



This is quite challenging for many students in Grades 5 and 6 and in this instance, the only students who successfully achieved this chose to draw regular rectangular prism shapes such as a paper-recycling carton drawn to scale.

Figure 3. A rectangular-shaped paper-recycling carton drawn to scale.

Assessing student learning

Open-ended tasks that require higher-order mathematical thinking (such as how to represent objects in proportion and perspective) can provide teachers with a window into student thinking. For example, the openness of this isometric drawing task allows the teacher to identify the variance in skills within the classroom and to assess them. Figure 4 shows an example of a student's ability to draw objects in isometric view, including shading to give the impression of depth, but the proportions are incorrect; so although it shows advanced work for this age group, it and suggests that a relevant progression for this student would be to work on scaling. The teacher's awareness of the full breadth of a student's skills in isometric drawing, combined with planned extension activities, allows for meaningful immediate extension work, rather than the more common repetition of similar activities, which offers limited new learning.

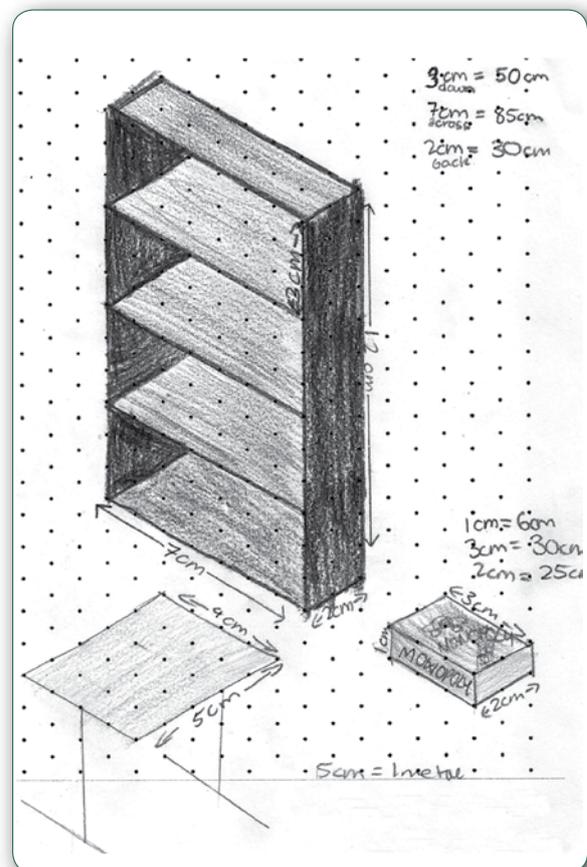


Figure 4. Isometric drawings of objects.