Concept: Projective Geometry

Name:

COMPUTER COMPONENT

Instructions: In UMATH X follow the **Content Menu** path:

Measurement and Geometry > Projective Geometry

Work through all Sub Lessons of the following Lessons **in order**:

- *An Introduction*
- *Toothpicks on Isometric Dot Paper*
- *Orthographic Projection: Introduction*
- *The Cube Tool*
- *Given Solid – Build It*
- *Given Views – Build It*
- *Given Volume – Build It*
- *Given Area – Build It*

As you work through the computer exercises, you will be prompted to make notes in your notebook/math journal.

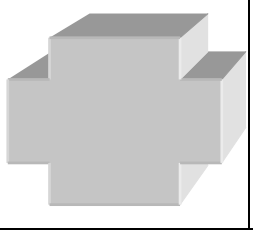
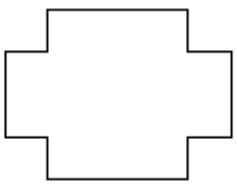
SUMMARY

1. When we draw in 2D space ***square*** units are used to measure the size of the enclosed area (polygon). However, when we draw in 3D space, ***cubic*** units are used to measure the enclosed volume (polyhedron).
2. To represent a 3D object on paper (2D), the technical artist would need to make a series of orthographic drawings.

What are the names of these views?

TOP ***FRONT*** ***SIDE***

3. Draw the views that would represent the following model.

Shape	*Front*	*Side*	*Top*
			

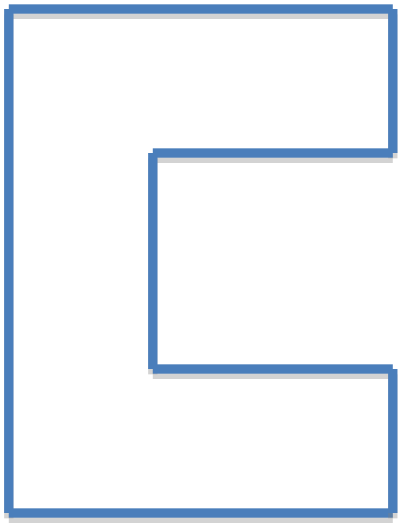
4. When working with the software, you were actually starting into an area of technical drawing called CAD – Computer-Assisted Drawing. This has developed into a very powerful set of tools used in design and manufacturing. As you complete the sections (examples) using the Cube Tools, have your teacher (or person designated by your teacher) initial your chart to indicate mastery of the task. (Computer displays *Correct!*) See if you can collect all 24 initials.

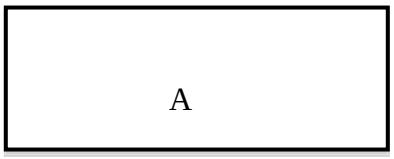
Given Solid – Draw It					
1.	2.	3.	4.	5.	6.
Given Views – Draw It					
1.	2.	3.	4.	5.	6.
Given Volume – Draw It					
1.	2.	3.	4.	5.	6.
Given Area – Draw It					
1.	2.	3.	4.	5.	6.

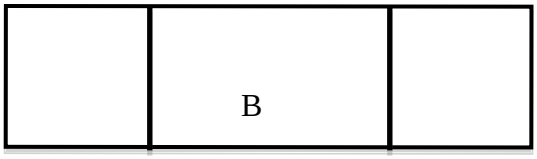
OFF COMPUTER EXERCISES

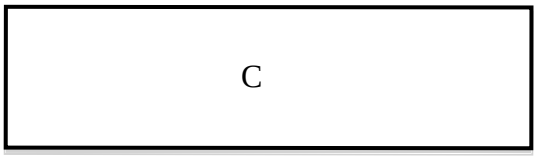
NOTE: *You will need interlocking cubes and isometric paper for this section.*

1. From the top, a stack of blocks looks this:





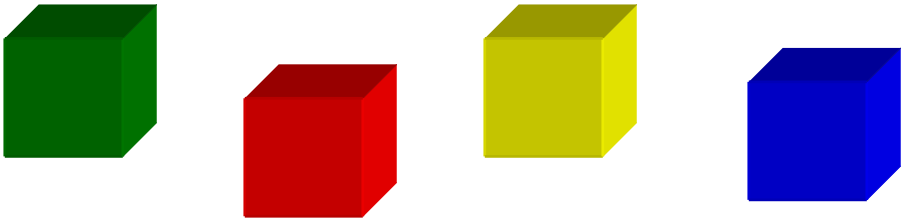


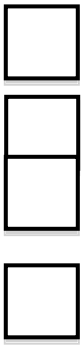


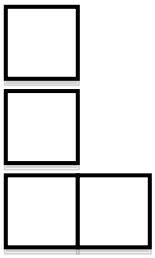
What might it look like from the front?

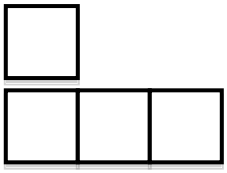
As the front is not clearly defined, there could be a number of options.

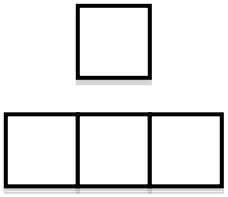
2. How many possible structures can be constructed with four interlocking cubes? Model then draw your results.



1. 

2. 

3. 

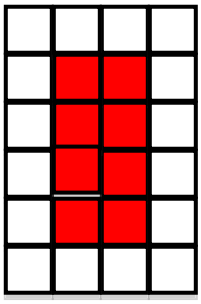
4. 

3. Build a replica of your favorite chair with 10 to 20 interlocking cubes.

- Draw the top view of your chair.
- Draw the front view of your chair.
- Draw the side view of your chair.

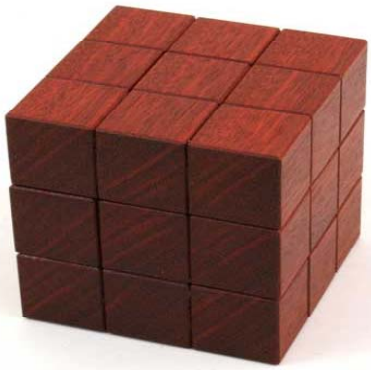
Answers will vary.

4. A model of interlocking cubes was made, glued together, and then painted on the outside. Eight of the cubes were painted on exactly two sides. What might this model look like?



This is one option. The 'RED' indicates the cubes that were painted on exactly two sides. The corner cubes would have been painted on four sides. The remaining cubes would have been painted on three sides.

5. Rudy made this 3D model.



(a)What is the least number of cubes that could be in this structure?

The least number of cubes that could be in this structure is 19.

(b) Is there a greatest number of cubes? Explain.

The greatest number of cubes that could be in this structure is 27. I know this because the maximum number of cubes on the base layer is 9. There are 3 layers. $\therefore 9 \times 3 = 27$