Choose a room that you will draw a part of in perspective, using the perspective theorem.

- Choose an exact point somewhere in the room that you will have be the viewing position – the viewer's eye.
- Choose where the picture plane is going to be. While it would be fun to have that plane *not* be parallel to any of the walls, it will be harder as well so take that into account when making your choices. Remember, the picture plane should be between the viewer's eye and the portion of the room you're going to draw.

  Also remember: if your picture plane is parallel to all the features you are drawing, your drawing will not exhibit any features of perspective. So be sure to include some points that will connect to form lines that are *not* parallel to the picture plane – for instance, floor or ceiling tiles, or the lines where the back wall meets the side walls.
- Figure out where your origin – the point $(0, 0, 0)$ is going to be and somehow clearly mark it. Somewhere on a table, a wall, or the floor is probably best. Remember that the origin and the viewing position have to be on the same level (have the same y-coordinate), and that the line that connects the viewer's eye to the origin will be the z-axis. It will be easiest (although less interesting, perhaps) if this is parallel to one of the lines determined by where floor meets wall.
- Figure out what d, the distance to the viewer's eye, is. If you have a measuring tape that measures in centimeters rather than inches, I'd suggest using metric units. Remember the coordinates of the viewer's eye are $(0, 0, -d)$.
- Once you have clear in your mind what directions x, y, and z are and what units you're measuring in, start figuring out the real-life 3D coordinates of key features of the room by measuring how far from the origin they are in the x, y, and z direction. *Note: You are* **not** *measuring the distance from the origin to the point – you are measuring how far over, how far up, and how far out from the origin it is – 3 measurements for each point.*

  Key features to pay attention to: each corner of the room that lies on the positive side of the picture plane, as well as corners of windows or pieces of furniture – especially windows or furniture that is **not** parallel to the picture plane. *Be sure to clearly note what each coordinate is, in as much detail as possible! Otherwise, connecting the dots later is going to be impossible.*
- Use the perspective theorem to find the perspective image of each of these points on the picture plane, as it would appear to a person whose eye is located at the viewing position you chose. As you calculate each image point, carefully label what it represents. (I would suggest using a spreadsheet to do this, but you're welcome to do it by hand if you'd rather.)
- Very very carefully plot each of these image points on a set of 2D axes on graph paper, and then connect those dots that should be connected, to obtain (if all went well) a pretty good perspective image of the features of the room you recorded.
- Feel free to then color in the result as you see fit!

- Please write a description of what you did and an analysis of how it turned out.

Possible points: Your group score for this project will depend on how many points in the room you find the 3D coordinates of, how accurate your measurements appear to be (based on your final result), how accurate your calculations are, and how careful your final graph/perspective drawing is. 10 points in the room could earn a score of up to 20 (if done well, and there's some perspective on display), while 15 points could earn a score of up to 30 points, and 25 points could earn a score up to 50 points. If done in a group, that score will then be divided among the members of the group.