Instructions for Measuring Proportion: Drawing a Cube

1. Set a cube on the table in front of you. Place the cube at a distance that is farther than you can reach. Turn the cube so that one corner is pointing toward you (two point perspective).

2. Draw a vertical line on your paper. This will represent the closest corner of the cube. The size of this line will determine the size of the cube. The longer you draw the line, the larger the cube.

3. At the bottom of the line, draw a horizontal line. This will help you to measure the angles in the next step.
4. Find the angles for the lines that will represent the bottom of the cube. Do this by holding your pencil out at arm’s length. Keep your pencil horizontal and perpendicular to your line of sight. Hold the pencil up so that it appears to touch the bottom of the cube.

5. Look at the triangular space on the left side of the cube, between your pencil and the bottom of the cube.

6. On your paper, draw an angled line as close to the observed angle on the bottom of the cube.

7. Compare your drawing to the cube by holding your pencil up to the cube. Then look back and forth from the cube to your drawing. If there is a difference, redraw the angle. Do not erase your first mark. Just redraw the line until you get it right, then erase the marks that were drawn incorrectly.
8. Complete this same process for the right side of the cube.

Note that it is necessary to compare what you draw to the reference (cube) after every step in this list of procedures. Failure to compare after each step will cause you to draw inaccurate proportions.

9. Now we will determine the width of each side of the cube. You will do this by sight measuring with your pencil.

Hold your pencil out at arms length. Make sure that your arm is straight, and your elbow locked. Keep your pencil perpendicular to your line of sight.

Hold the pencil up to the cube. Measure the distance between the front corner and the right corner. Place your thumb on the pencil to mark the distance.
10. Keeping your thumb on the pencil where you measured width of the right side of the cube, turn your pencil vertical. Holding your pencil out again at arms length, place your thumb (which should still be marking on the pencil the width of the right side of the cube) at the bottom of the front corner of the cube. Then look to see how much shorter the end of your pencil appears in relationship to the front corner of the cube.

11. In this example, the width of the cube is about 3/4 the size of the height of the front corner of the cube.

On the line representing the front corner of the cube, draw a mark at 3/4 the distance from the bottom to the top of the line.

Note: The proportion of 3/4 to 1 is the case for this example. You may observe a different proportion depending on how you set up your cube, so 3/4 may not be accurate in your drawing. It is necessary to observe and compare.)

12. With your pencil, measure the distance from the bottom of the front corner of the cube to the mark that is at 3/4 the height of the cube.
13. Hold your thumb on the pencil, marking the measurement of 3/4 the height of the front of the cube. Then turn your pencil 90 degrees, place the part of the pencil you are marking with your thumb on the line representing the front corner of the cube. The end of your pencil will be the measurement for the width of the right side of the cube. Make a mark at the end of your pencil.

Figure 13

14. Draw a vertical line at the mark that you just made in the previous step.

Figure 14

15. Repeat this same process for the left side of the cube.

Figure 15
16. Draw a horizontal line at the top of the front corner of the cube. You will use this line to measure the angles of the top of the cube.

17. Measure the angles of the top of the cube using your pencil, just as you did for the bottom of the cube in steps 4-7.

18. Draw the observed angle on the right side, and compare with the reference cube.
19. Draw the observed angle on the left side.

20. Draw horizontal lines at the top left and top right corners.

21. Measure the angle on the right with your pencil.
22. Draw the observed angle.

Figure 22

23. Measure the angle on the left.

Figure 23

24. Draw the observed angle. Make sure to compare what you draw to the actual cube (see step ). You must compare each time you draw a line.

Figure 24
25. You now have the proportions drawn for the entire cube.

26. Refine the line quality of the cube by darkening lines and erasing unnecessary lines. You can use your eraser to clean up the edges of the lines so they appear smooth, and not sketchy.

Make lines that appear closer slightly darker and thicker than lines that appear farther away.
Other Helpful Techniques

Linear Perspective:

Linear perspective will be covered with more detail in a later assignment, but be aware of the following principles. They will help you check to see if your angles are correct.

A. When drawing the cube In two point linear perspective, you have three possible directions that you may draw lines.

1. Vertical: Make sure that the three lines going up and down, representing the sides and front corner, are vertical. You may check this by measuring the distance from the edge of your paper to the bottom of the line, and comparing that distance to the measurement from the edge of your paper to the top of the line. If the measurements are the same, then the line is vertical. These three vertical lines will be parallel to each other.

2. To vanishing point #1: All angles lines, if extended, will converge at one point on an eye level or horizon line. (See figure ##.) There will be three lines that will do this.

3. To vanishing point #2: The remaining three lines of the cube will converge at a point on the opposite side of the drawing on the eye level or horizon line. (See figure ##.)

B. Make sure that all diagonal lines are converging toward a vanishing point. Make sure that both vanishing points are on the same horizon line. Make sure that the eye level or horizon is horizontal.

Figure 27
Alignment:

Another way to check proportion is by looking at vertical and horizontal alignment.

A. Begin by holding your pencil up to the cube. Hold the pencil vertical and observe how the front corner and back corner line up in relation to the pencil. In this example the front and back corners align vertically.

B. Check your drawing to see if the front and back corners of the cube are aligned.

C. Follow the same step for the left and right corners, holding your pencil horizontal.
D. Note that the corners will not always line up as they have in the previous example. The following example is a drawing where the cube was rotated differently. Notice that the front and back corners do not align. Just compare your drawing to your reference, and make sure that they are the same.

Figure 32