**Activity 6.7.2 Three Dimensional Modeling: Working with Scale**

Now we will follow Eleanor along a path to her solution. Here is Eleanor's first sketch:

Notice that she builds the couch of rectangular prisms, cylinders that are cut in half for the top of the back and the arm rests, and hemispheres for feet. You will need to consider not only the dimensions of the rectangular solids but the radii of the cylinders and hemispheres.

She wants to estimate how high and deep to make the seat. Since the “father” doll is likely to be the largest “person” to sit in the chair. She decides to make some measurements. She was able to find an ad for a doll house family (3 to 5 inches tall). She isolated the picture of the “father” doll to take some measurements. She figures that she needs to know the height of the picture, the lengths from his feet to his knees, from his hips to his knees and the width of his seated figure.

1. First she needs to think about measuring. What kinds of units should she use? What are the advantages and disadvantages of using metric measurement vs. conventional American measurement units?

Here is the picture she uses.

2. Remembering that the actual doll is 5 inches tall, make measurements using whatever units you choose to use to find:

a. The height of the figure’s picture on the paper:

b. Best estimate of distance from feet to knees on the paper:

c. Best estimate of distance from knees to hip on paper:

d. Estimate the seating width of this doll:

3. Now consider the issue of scale. Use proportions to determine the distances in appropriate scale. We will assume the doll is actually 5 inches tall. For each part below show the proportion you set up to determine the lengths and the calculations you do to find the lengths. Be certain to include the units.

1. The foot-to-knee distance:
2. The knee-to -hip distance:
3. The width distance:

4. Use the lengths from the previous page to determine appropriate measures for Eleanor's *b*, *d* and *e* in her sketch on the first page. Remember that you want to plan for a little space around a person sitting on a couch.

Length *b* = \_\_\_\_\_\_\_\_\_\_\_\_\_\_

Length *d* = \_\_\_\_\_\_\_\_\_\_\_\_\_\_

Length *e* =\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

5. Use these lengths to determine appropriate lengths for the remaining measurements on Eleanor's sketch:

*a* =\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

*c* =\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

*f* = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

*g* =\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

6. Find the radii for each of the following:

1. The top of the back
2. The top of the armrests
3. The hemispherical feet