(Partial) Homework Solutions

2. The floor to be carpeted is an area and hence has a dimension of 2. Increasing the linear dimensions of the room by a factor of 5 will increase the area by a factor of $5^2 = 25$. Thus, the total cost of the carpet for the bigger room will be $25 \times \$130 = \$3250$.

3. There are 100 centimeters in a meter. A cubic meter is a measure of volume, so the dimension is 3. As a result, there are $100^3 = 1,000,000$ cubic centimeters in a cubic meter.

4. The beaker is holding a volume of water, so the dimension here is 3. Scaling up the beaker by a factor of 3 will scale up the volume by a factor of $3^3 = 27$. Thus, the big beaker can hold $27 \times .75$ liters $= 20.25$ liters.

5. Don't feel bad if you had trouble with this problem. I think that this example is a good bit harder than the snowflake example we did in class.

Notice that the big triangle appears to be made up of 3 smaller, identical triangles. Thus, three small copies of the triangle fit inside one big triangle. But what's the scale factor? Notice that 2 bases of the little triangles fit on the base of the large triangle. So the scale factor here is 2; all sides grow by a factor of 2. So,

$$\text{number of copies that fit inside scaled up version} = (\text{scale factor})^D$$

$$3 = 2^D\ .$$

Solving for D, we find:

$$D = \frac{\log 3}{\log 2} \approx 1.59\ .$$