Exploring Area and Volume with Physical Manipulatives NAMES:

We will use physical manipulatives to explore area and volume. Staple your lovely creations along the left side of the paper next to the appropriate questions. Use the in-class cubic inch manipulatives for the volume problems. This worksheet includes grid paper with 1-inch squares.

1.) What is the difference among one inch, one square inch, and one cubic inch? Perhaps you can draw them to help your explanation.

2a.) Cut a 2x3 rectangle out of your grid paper. What is the area of the rectangle you have made? Give two different ways (one calculation, one physical) that you could find the area of this rectangle. Include units.

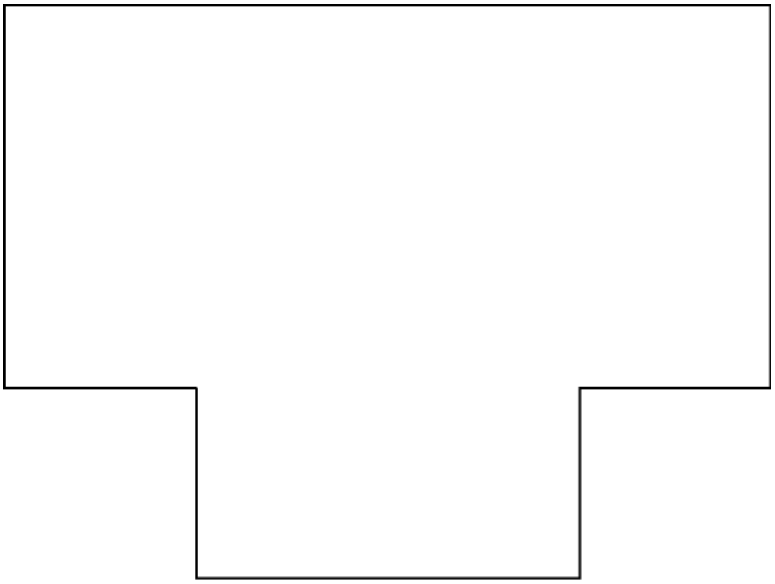
2b.) Now multiply each dimension by 2 and cut that rectangle out of the grid paper. What is the area of the rectangle you have made? Include units.

2c.) What happened to the area when each dimension was multiplied by 2?

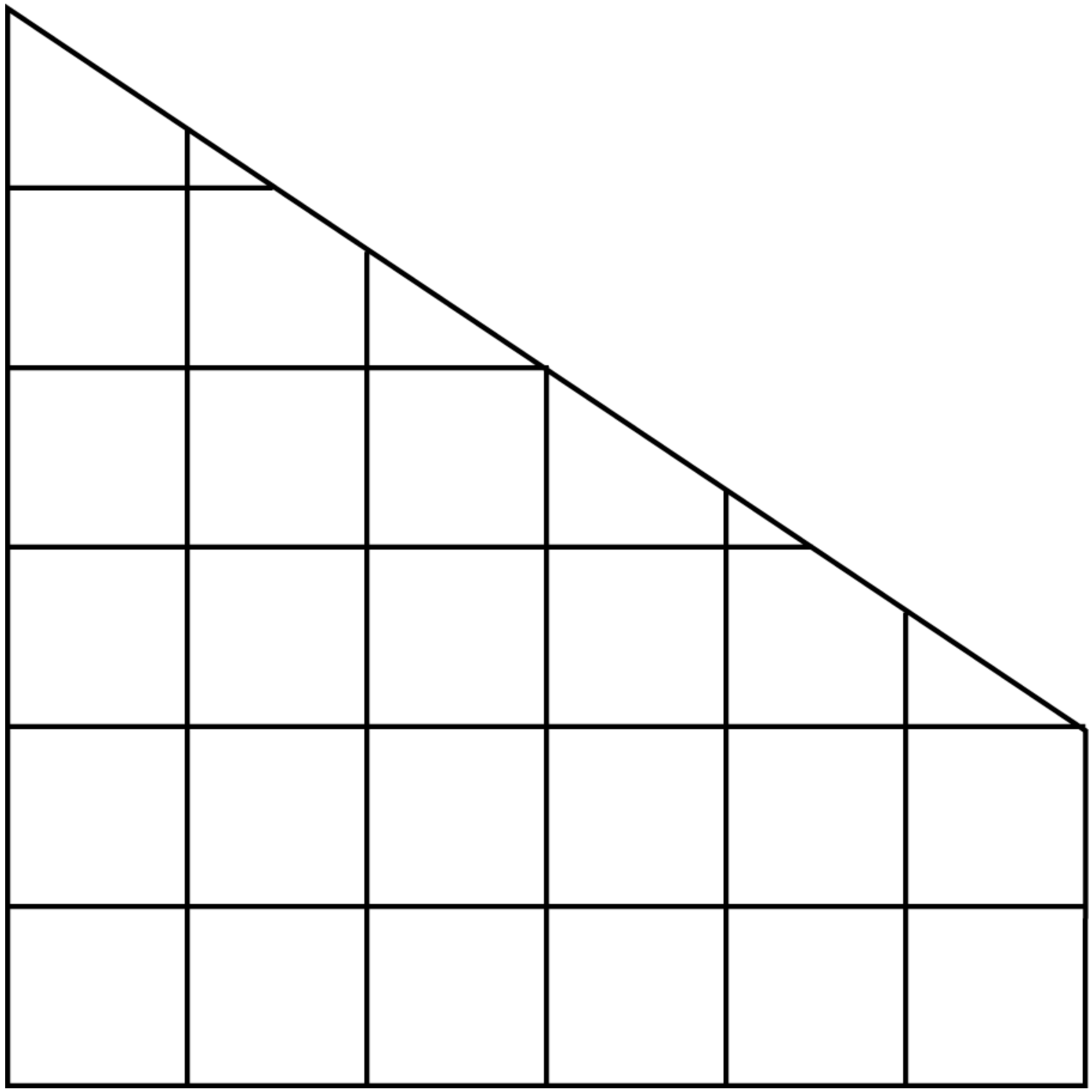
2d.) Let's say you do this with other rectangles of varying dimensions and you see the effect repeats. If you generalize that this relationship would work for every rectangle whose dimensions you double, would you be using inductive or deductive reasoning? Explain.

2e.) Take a whack at deductively proving that this result is true. Let your original rectangle have length l and width w. Find its area and then find the area of the rectangle whose dimensions are doubled. Does this work support your claim?

3a.) Find the area of this shape. Use your grid paper of one-inch squares that you have been given. Do not forget to record its area including units.



3b.) Find the area of this shape. (The lines are drawn at every inch.) Your answer will have to be an estimate. Do not forget units. Explain your method.



4a.) Use the one-inch cube manipulatives to form a cube shape that is 2 inches on each side. What is the volume of this cube? Give two different ways (one calculation, one physical) that you could find this volume. Include appropriate units.

4b.) If we multiplied each side by 2, what do you think would happen to the volume?

4c.) Get extra cube manipulatives (and possibly work with another group) so you have enough to actually double each side, forming this new cube. Were you right about the new volume? What is the true volume of this new cube? Include appropriate units.

4d.) What if we were to multiply each side of the original cube by 3? How would that affect its volume?

4e.) What if we were to multiply each side of the original cube by the whole number *n*? How would that affect its volume? To answer this, complete the table below and generalize the pattern.

If each side is multiplied by…	… the cube’s volume gets multiplied by what factor?
2	
3	
4	
5	
10	
