4/20/10

Similar Figures

In geometry the word *similar* refers to figures that have the same shape, but not necessarily the same size. For example a 3 cm x 5 cm rectangle will be similar to a 6 cm by 10 cm rectangle.

1) Draw a 1 cm x 3 cm rectangle. Now draw three rectangles of different sizes that are all similar to the 1 x 3 rectangle.

2) Draw a right triangle with legs 3 cm and 4 cm. Now draw two more right triangles of different sizes so all three will be similar.

3) All squares are similar. Is that also true for: rectangles, circles, ellipses, right triangles, cubes?

4) Gary had a potato garden that was 4 yards by 4 yards. The potatoes from his garden lasted only half a year. So next year he planted a potato garden that was 8 yards by 8 yards. Did Gary make a mistake? Explain?

5) King Cuadro had a square window that was one yard by one yard. He told his royal carpenter to alter the window. He wanted the new window to still be a square, have half the area of the original window, and be just as high and just as wide. Is there any way the carpenter can do that?

6) In the summer I go to a beautiful camp and live in a tiny cabin that's about 10 ft. x 10 ft. It's wonderful, with windows on all four sides, almost like sleeping outdoors. Let's say you wanted to "scale up" this design and build a cabin for 100 people to live in. Could you build a bigger cabin the same shape as the small one? Would that work? Explain!

7) Area ratios of similar figures are **not** the same as the length ratios! For example, draw a 4 cm x 4 cm square. Now draw a 12 cm x 12 cm square. The bigger square is three times as long. Is its area three times the area of the smaller square? Discover the rule! Then find the rule for volume ratios in similar figures!

8) Bob had a metal cube filled with sand. It weighed two pounds. Rob had a metal cube five times taller than Bob's. How many pounds of sand would it take to fill Rob's cube?

9) The math laws about area and volume ratios in similar figures can help explain many things in science and engineering. For example, could a car be made as big as a truck? If so, why do trucks have eighteen wheels instead of four? Most clouds are made of little water droplets. (Hmmm... why is something heavier than air floating in the sky?) But the droplets get bigger. Then they fall. Why do bigger droplets fall, but smaller ones don't? Could a one cell organism be as big as you? Why can flies walk on the ceiling, but you can't?

- 10) Identify each statement as true or false:
- a) If two polygons are similar, their corresponding angles are equal.
- b) If two polygons have corresponding angles that are equal, then they are similar.

11) Have fun!