Math 191 Fundamentals of Mathematics II
14.6: Area, Volume, and Scaling and 8.1: Factors and Multiples
April 7, 2014

Area, Volume, and Scaling We would like to answer the question: How are volumes and areas of similar objects related?

Remember that we say two objects are similar if

What does this mean for surface areas and volumes? Can we predict the factor that they scale by?

Example: Suppose we have a box (rectangular prism) with side lengths h units, l units and w units and a box with side lengths $2h$ units, $2l$ units and $2w$ units. The scale factor is

The surface area of the two boxes are:

The volumes of the two boxes are:

More generally, if we scale by a factor of k,

- _____ measurements (such as _____) scale by a factor of _____.
- _____ measurements (such as _____) scale by a factor of _____.

Example: Suppose you make a scale model boat out of the same materials you plan on using for the real boat. The real boat is going to be 20 times the length of the scale model. If it took half of the paint in a 1-quart paint can to paint the model, how much paint will you need for the actual boat?

If your scale model weighs 4 ounces, how much will the actual boat weigh?

Factors and Multiples

If A, B, C are _____ such that $A \times B = C$, we say

- C is a _____ of A and C is a _____ of B.
- A and B are _____ of C.
- A and B _____ C.
- C is _____ A and B.

Note: Finding a _____ number B satisfying $5 \times B = 30$ is a _____ problem. But when we talk about factors of 30, we are thinking about finding _____ counting numbers that satisfy

Also, finding a _____ number C satisfying $4 \times 5 = C$ is a _____ problem. But when we talk about multiples of 5, we are looking for _____ counting numbers that satisfy

For example, the factors of 12 are:

The multiples of 12 are:

How can we find all factors of a number? A first method is to _____ every number less than our number and see which _____. For each _____, we will also keep track of its corresponding _____.

For example, we can find the factors of 30 by dividing it by 1, 2, 3, 4, etc.

Notice that when we look for factors of a number, we only need to check up to its _____ _____ because factors always _____, and if there is a _____, its corresponding quotient must be _____.

Example: Find all the factors of 198.