



## Math 1030 #17E

**Scaling:  
Starting with Area and Volume**

If there are two proportionately identical objects, the **scale factor** is the number you multiply the lengths of the original object to get the lengths of the new object

**Scaling Laws:**

- *Lengths* scale with the scaling factor
- *Areas* scale with the *square* of the scaling factor
- *Volumes* scale with the *cube* of the scaling Factor

| Variation on Terminology |       | When length doubles | When length is scaled by $\frac{1}{3}$      |
|--------------------------|-------|---------------------|---|
| Length Scale Factor      | $a$   | $2^1 = 2$           | $\left(\frac{1}{3}\right)^1 = \frac{1}{3}$  |
| Area Scale Factor        | $a^2$ | $2^2 = 4$           | $\left(\frac{1}{3}\right)^2 = \frac{1}{9}$  |
| Volume Scale Factor      | $a^3$ | $2^3 = 8$           | $\left(\frac{1}{3}\right)^3 = \frac{1}{27}$ |

EX 1: A squeezable stress toy has a smaller and larger version, which are proportional to each other. There is The small toy has surface area 0.8 square feet and the large toy has surface area 1.5 square feet.

a) Find the length, area, and volume scale factors.

a) If the length of the small toy is 5 inches, find the length of the larger toy in inches.

b) The larger toy is filled with 400 cubic inches of foam. How much foam is in the smaller version?

EX 2: A candy maker makes chocolates in the shape of lady bugs. A small ladybug is solid chocolate, has a length of 4 cm, a width of 3 cm, and a height of 1.5 cm. It has a weight of 18 grams.

a) They want make a larger version that weighs 10 times as much and is still solid. What will the dimensions of the larger version be?

a) A new version of the small lady bug is covered with 5 grams of red sprinkles. How many grams of sprinkles would be needed to cover the large lady bug?