Math Lab: Surface Area and Volume Analysis

Purpose

To determine the effect of changing a dimension on the surface area and volume of a 3-D object.

Predictions

Predict the outcome of this investigation by completing the following sentences.

1. When the dimensions of a 3-D object are doubled, the surface area increases by a factor of _____.

2. When the dimensions of a 3-D object are doubled, the volume increases by a factor of _____.

3. When the dimensions of a 3-D object are tripled, the surface area increases by a factor of _____.

4. When the dimensions of a 3-D object are tripled, the volume increases by a factor of _____.

Materials

- applet titled “Exploring Surface Area, Volume, and Nets—Use It” (optional)

Procedure

Step 1: Choose two of the 3-D objects in question 2 of the Are You Ready? handout that you saved to your course folder.

Step 2: Record the surface area and volume of the two objects you selected.

Step 3: Recalculate the surface area and volume of each object after doubling each dimension. For example, if you were using the cone, you would use the following values:

- radius = 2 × 5 cm = 10 cm
- height = 2 × 12 cm = 24 cm
- slant height = 2 × 13 cm = 26 cm

Step 4: Record the new surface area and volume for both objects.

Step 5: Recalculate the surface area and volume of each object after tripling each original dimension. Again, in the case of the cone, you would use the following values:

- radius = 3 × 5 cm = 15 cm
- height = 3 × 12 cm = 36 cm
- slant height = 3 × 13 cm = 39 cm

Step 6: Record the new surface area and volume for both objects.

Analysis

5. For each object, determine the ratio of the new surface area to the original surface area. How do the ratios compare to your predictions?

6. For each object, determine the ratio of the new volume to the original volume. How do the ratios compare to your predictions?

7. Were the surface area and volume ratios the same for each object, or were there differences?