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*Activity Sheet for the March, 2011, MATHCOUNTS Mini*

## Warm-Up!

Try these problems before watching the lesson.

1. Three edges of a rectangular box have lengths 5 centimeters, 7 centimeters, and 8 centimeters.

   (a) What is the surface area of the box?

   (b) What is the volume of the box?

2. How many edges does a rectangular box have?

3. We can expand the product $x(y+1)$ as $xy+x$. Use the diagram below to explain what the expansion of the product $(x + 1)(y + 1)$ is.
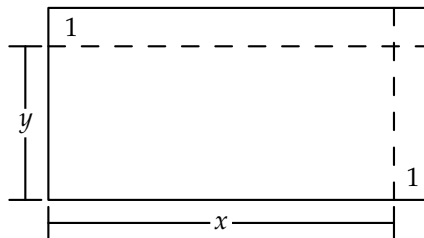


4. A rectangle has area 108 square inches and perimeter 42 inches. If the length and the width are both increased by 1 inch, then what is the area of the resulting rectangle?

## The Problem

A rectangular box has a volume of 4320 cubic inches and a surface area of 1704 square inches. The sum of the lengths of its 12 edges is 208 inches. What would be the volume of the box, in cubic inches, if its length, width and height were each increased by one inch?

## Follow-up Problems

5. A rectangle has area 97 square inches and perimeter 44 inches. If the length and the width are both increased by 1 inch, then what is the area of the resulting rectangle?

6. A rectangular painting has area 60 square inches and perimeter 48 inches. I place a rectangular frame around the painting. The frame produces a one-inch margin all the way around the painting.

   (a) What is the outer perimeter of the frame?
   (b) What is the area of the frame?

7. The areas of three faces of a rectangular box are 18 ft$^2$, 75 ft$^2$, and 24 ft$^2$, respectively. What is the volume of the box?

8. Suppose the length, width, and height of the original box in the video were increased by 2 inches. What is the volume of the resulting box?

9. The sum of the lengths of the 12 edges of a rectangular box is 92 centimeters. The surface area of the box is 240 square centimeters. What is the length of an interior diagonal of the box?

## Share Your Thoughts

Have some thoughts about the video? Want to discuss the problems on the Activity Sheet? Visit the MATHCOUNTS Facebook page or the Art of Problem Solving Online Community (www.artofproblemsolving.com).