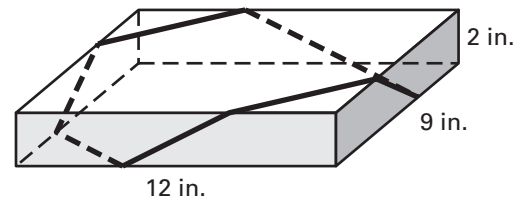


LESSON
7.1

Challenge Practice

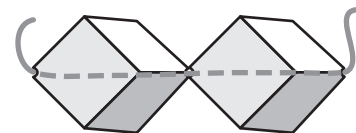
For use with pages 432–439

- 1. Gift Box** You are wrapping a gift box that has the dimensions shown in the figure. You want to tie a ribbon around the box as shown, so that whenever the ribbon intersects an edge of the box, its distance to the nearest corner is $\frac{1}{3}$ the length of the edge of the box. Not counting the extra length needed for tying the ribbon, how long must the ribbon be?



- 2. Formula for Pythagorean Triples** A right triangle has a hypotenuse of length 13.
- Find two integers m and n such that the length of the hypotenuse can be expressed as $m^2 + n^2$.
 - Assuming that all three sides of this right triangle form a common Pythagorean triple, write expressions for the lengths of the legs in terms of m and n . (*Hint: Only one of these expressions will involve the squares of m and n .*)
 - Verify your expressions for the three side lengths by using the Pythagorean Theorem.
 - Use your expressions to generate three more sets of Pythagorean triples.

- 3. Beads** A cube-shaped bead has a length, width, and height of 2 centimeters. A hole is drilled through the bead diagonally from one corner to the opposite corner that is farthest away from it. How many of these beads must be strung together to form a length of 5 feet? (*Hint: 1 inch = 2.54 centimeters*)



- 4. Perimeter** A regular polygon has edges of length $3x$, where x is an integer. A star shape is formed by joining congruent right triangles by their short legs to the edges of the polygon. The short leg of each right triangle is congruent to the edge of the polygon. All three side lengths of each triangle are integers.
- Write an expression in terms of n and x for the perimeter of the star shape whose center is a regular n -gon.
 - Make a table of values for an equilateral triangle, a square, a regular pentagon, and a regular hexagon, showing the star's perimeter P as x increases from 1 to 10.
 - Write an equation for each polygon that models the perimeter P of its star as a function of x .
 - The perimeter of which polygon's star grows most quickly? Use your answer from part (c) to explain algebraically why this makes sense.
- 5. Proof** Trace the figure at the right that represents the area of two squares. Cut along the dashed lines to remove two triangles from the figure. How can the two triangles be rearranged next to the remaining figure to prove the Pythagorean Theorem? *Explain* your reasoning.

