



Lessons 12.1–12.3

- 1. SHORT RESPONSE** Using Euler's Theorem, *explain* why it is not possible for a polyhedron to have 6 vertices and 7 edges.
- 2. SHORT RESPONSE** *Describe* two methods of finding the surface area of a rectangular solid.
- 3. EXTENDED RESPONSE** Some pencils are made from slats of wood that are machined into right regular hexagonal prisms.



- The formula for the surface area of a new unsharpened pencil without an eraser is

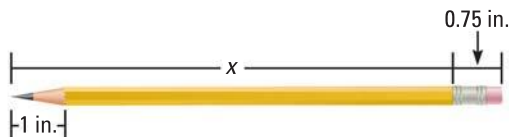
$$S = 3\sqrt{3}r^2 + 6rh.$$

Tell what each variable in this formula represents.

- After a pencil is painted, a metal band that holds an eraser is wrapped around one end. Write a formula for the surface area of the visible portion of the pencil, shown below.

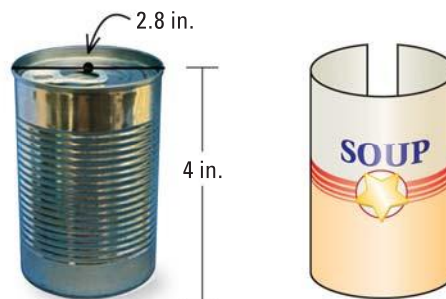


- After a pencil is sharpened, the end is shaped like a cone. Write a formula to find the surface area of the visible portion of the pencil, shown below.

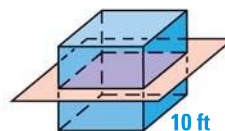


- Use your formulas from parts (b) and (c) to write a formula for the difference of the surface areas of the two pencils. Define any variables in your formula.

- 4. GRIDDED ANSWER** The amount of paper needed for a soup can label is approximately equal to the lateral area of the can. Find the lateral area of the soup can in square inches. Round your answer to two decimal places.



- 5. SHORT RESPONSE** If you know the diameter d and slant height ℓ of a right cone, how can you find the surface area of the cone?
- 6. OPEN-ENDED** Identify an object in your school or home that is a rectangular prism. Measure its length, width, and height to the nearest quarter inch. Then approximate the surface area of the object.
- 7. MULTI-STEP PROBLEM** The figure shows a plane intersecting a cube parallel to its base. The cube has a side length of 10 feet.



- Describe the shape formed by the cross section.
 - Find the perimeter and area of the cross section.
 - When the cross section is cut along its diagonal, what kind of triangles are formed?
 - Find the area of one of the triangles formed in part (c).
- 8. SHORT RESPONSE** A cone has a base radius of $3x$ units and a height of $4x$ units. The surface area of the cone is 1944π square units. Find the value of x . *Explain* your steps.