Surface Area of Prisms and Pyramids

Learning Goals

- I know the surface area of an object is the total area of the surface of the object
- I know that surface area is measured in square units
- I know that to find the surface area of a prism or pyramid I need to find the area of each face and add them together

Vocabulary

**Surface Area:**
- the total area of the surface of an object
- measured in square units
Activity

How Much Wrapping Paper Is Needed?
Suppose you are wrapping a gift. The gift is packaged in a square-based pyramid. Each face is an equilateral triangle. Estimate the amount of wrapping paper needed to wrap the gift.

1. On grid paper, draw a net of the pyramid. Label each face with its dimensions.
2. Find the area of each of the faces. Do you need to calculate the area of each triangular face? Why or why not?
3. The **surface area** is the total area of the surface of an object. Find the surface area of the gift.
4. Is the amount of wrapping paper needed equal to the surface area of the gift? Why or why not?
5. Explain why it is also necessary to consider the dimensions of the wrapping paper.

Surface Area of a Rectangular Prism
What is the least amount of wrapping paper needed to wrap this box?
Surface Area of a Square-Based Pyramid

The smallest of the three Pyramids of Giza in Egypt is the tomb of Pharaoh Menkaure, believed to be Pharaoh Khufu's grandson. The square base of this pyramid has length 344 ft and a slant height of 266 ft. What area of Menkaure's pyramid is exposed to the weather?

Surface Area of a Rectangular Pyramid

The base of a rectangular prism has dimensions 8 cm by 6 cm. Its height is 5 cm. Find the surface area of this pyramid.
Questions

1. For each prism, draw and label a net, then find the surface area.

   a)  
   ![Diagram of a prism with dimensions 11 in, 14 in, 26 in.]

   b)  
   ![Diagram of a prism with dimensions 4 yd, 2 yd, 8 yd.]

2. For each square-based pyramid, draw and label a net, then find the surface area.

   a)  
   ![Diagram of a square-based pyramid with dimensions 22 m, 18 m, 18 m.]

   b)  
   ![Diagram of a square-based pyramid with dimensions 36 ft, 12 ft, 12 ft.]

4. Find the surface area of each rectangular-based pyramid.

   a)  
   ![Diagram of a rectangular-based pyramid with dimensions 25 yd, 14 yd, 48 yd.]

   b)  
   ![Diagram of a rectangular-based pyramid with dimensions 13 cm, 10 cm, 24 cm.]

10. The cost to make the top of a rectangular container is \$5/\text{in.}^2\) and for all other sides is \$4/\text{in.}^2\). How much will it cost to make the rectangular box below?

   ![Diagram of a rectangular box with dimensions 5 in, 22 in, 10 in.]

12. A storage shed in the shape of an isosceles triangular prism is to be painted. The paint is sold in cans that each cover 40 m$^2$ and cost \$16.50. How much will it cost to give the shed two coats of the paint? You will not need to paint the bottom side of the prism.

   ![Diagram of an isosceles triangular prism with dimensions 5 m, 6 m, 15 m.]