11.2 and 11.3 Surface Area

**Learning Targets:** The students will learn about
- surface area of prisms and cylinders
- surface area of pyramids and cones

**A. Surface Area of Prisms and Cylinders**

*Prism* - A polyhedron with exactly two congruent, parallel bases. The other faces are called the lateral faces.

- Rectangular Prism
- Pentagonal Prism

*Cylinder* - a 3-D figure with circular bases.

- Right Cylinder
- Oblique Cylinder
Surface Area is the sum of the areas of all of the surfaces (faces).

**Surface Area for Prisms and Cylinders**

\[ SA = 2B + ph \]

(B = area of the base; p = perimeter of base; h = height of prism/cylinder)
Problems

1. Find the total surface area.

   \[
   2B + \pi h
   \]
   \[
   [\frac{1}{3}(3 \cdot 4)] + (12 \cdot 4) \\
   12 + 48 = 60 \text{ cm}^2
   \]

2. Find only the lateral surface area.

   \[
   \pi pl \\
   \frac{(10\pi)}{2} = 20\pi \text{ cm}^2
   \]

3. Find the surface area.

   \[
   2(25\pi) + (10\pi)(74)
   \]
   \[
   50\pi + 240\pi
   \]
   \[
   = 290\pi \text{ ft}^2
   \]

B. Surface Area for Pyramids and Cones.

Pyramid - a polyhedron in which one face (the base) can be any polygon and the other faces (lateral faces) are triangles that meet at a common vertex.

Rectangular Pyramid

Pentagonal Pyramid

Cone - like a pyramid, but with a circular base
Surface Area of Pyramids and Cones

\[ SA = B + \frac{1}{2} pl \]

(B = Area of the base; \( p \) = perimeter of the base; \( l \) = slant height)

Slant height (\( l \))

Lateral faces

Altitude (height)

Base
Problems

1. Find the lateral surface area.

\[ \frac{1}{2} \times 9 \times 9 \times 9 \times 20 \approx 21.93 \text{ cm} \]

\[ \text{LSA} = \frac{1}{2} \times 9 \times 20 \approx 21.93 \text{ cm} \]

\[ \frac{1}{2} \times 9 \times 20 \times 21.93 \approx 680.06 \text{ cm}^2 \]

2. Find the total surface area.

\[ \frac{13}{4} \times 24 + \frac{1}{2} \times 2 \times 24 \times 15 \]

\[ \text{ TSA } = \frac{13}{4} \times 24 + \frac{1}{2} \times 2 \times 24 \times 15 \approx 3000 \text{ cm}^2 \]

3. Find the lateral surface area.

\[ \frac{1}{2} \times 2 \times 12 \times 12 \]

\[ \text{LSA} = \frac{1}{2} \times 2 \times 12 \times 12 \approx 122.4 \text{ m}^2 \]

4. Find the total surface area.

\[ \frac{1}{2} \times 2 \times 2 \times 9 \times 9 \]

\[ \text{ TSA } = \frac{1}{2} \times 2 \times 2 \times 9 \times 9 \approx 118.4 \text{ cm}^2 \]

Homework

Pg. 611 #5, 6, 8, 9, 11, 12, 15

Pg. 620 #1, 2, 4, 5, 7, 8, 9