Surface Area of Pyramids

Lesson 8.7
**Vocabulary:**

**Lateral Surface Area** - The sum of the areas of all the pyramid’s lateral faces.

**Slant Height** - The height of each lateral face.
**Vocabulary:**

**Regular Pyramid** -
A pyramid with a base that is a regular polygon.

The lateral area is the sum of the areas of the triangles.

\[ L.A. = 4 \left( \frac{1}{2} s \ell \right) \]
\[ L.A. = \frac{1}{2} (4s) \ell \]
\[ L.A. = \frac{1}{2} P \ell \]
The total surface area of a regular pyramid is the lateral surface area \(L.A.\) plus the area of the base \(B\).

\[
S.A. = B + \frac{1}{2} P\ell
\]
Square Pyramid:

\[
S.A. = (lw) + \frac{1}{2}P\ell
\]

Triangular Pyramid:

\[
S.A. = \left( \frac{1}{2}bh \right) + \frac{1}{2}P\ell
\]
1. Find the total surface area of the pyramid. Round to the nearest tenth.

\[ S.A. = (\ell \times w) + P\ell \]

\[ S.A. = (4 \cdot 4) + \frac{1}{2}(4 \cdot 4)(9) \]

\[ S.A. = (16) + \frac{1}{2}(16)(9) \]

\[ S.A. = (16) + \frac{1}{2}(144) \]

\[ S.A. = 16 + 72 \]

\[ S.A. = 88 \]

The surface area is 88 square inches.
2. Find the total surface area of the pyramid with a base area of 111 square meters.

\[ S.A. = \left( \frac{1}{2}bh \right) + \frac{1}{2}P\ell \]

\[ S.A. = 111 + \frac{1}{2}(16.3)(20) \]

\[ S.A. = 111 + \frac{1}{2}(48)(20) \]

\[ S.A. = 111 + 480 \]

\[ S.A. = 591 \]

The surface area of the pyramid is 591 square meters.
Examples

3. Find the total surface area of the pyramid.

\[
S.A. = \left( \frac{1}{2} bh \right) + \frac{1}{2} P\ell \\
S.A. = \left( \frac{1}{2} \cdot 10 \cdot 8.7 \right) + \frac{1}{2} (10 \cdot 3)(12) \\
S.A. = \left( \frac{1}{2} \cdot 87 \right) + \frac{1}{2} (30)(12) \\
S.A. = (43.5) + \frac{1}{2} (360) \\
S.A. = 43.5 + 180 \\
S.A. = 223.5
\]

The surface area is 223.5 square feet.
4. Sal is wrapping gift boxes that are square pyramids for party favors. They have a slant height of 3 inches and base edges 2.5 inches long. How many square inches of card stock are used to make one gift box?

\[ S.A. = (lw) + \frac{1}{2} P\ell \]

\[ S.A. = (2.5 \cdot 2.5) + \frac{1}{2} (2.5 \cdot 4)(3) \]

\[ S.A. = (6.25) + \frac{1}{2} (10)(3) \]

\[ S.A. = (6.25) + \frac{1}{2} (30) \]

\[ S.A. = 6.25 + 15 \]

21.25 square inches
Got It? Do this problem to find out.

Find the total surface area of each pyramid. Round to the nearest tenth.

\[
S.A. = (\ell w) + \frac{l}{2} Pe
\]

\[
S.A. = (6.4 \cdot 6.4) + \frac{1}{2}(6.4 \cdot 4)(6.1)
\]

\[
S.A. = (40.96) + \frac{1}{2}(25.6)(6.1)
\]

\[
S.A. = 40.96 + 78.08
\]

\[
S.A. = 119 \text{ cm}^2
\]
Find the total surface area of each pyramid. Round to the nearest tenth.

\[ S.A. = \left( \frac{1}{2} bh \right) + \frac{1}{2} P\ell \]

\[ S.A. = \left( \frac{1}{2} \cdot 9 \cdot 7.8 \right) + \frac{1}{2} (9.3)(7.8) \]

\[ S.A. = (35.1) + \frac{1}{2} (27)(7.8) \]

\[ S.A. = 35.1 + 105.3 \]

\[ S.A. = 140.4 \text{ mm}^2 \]
Amado purchased a bottle of perfume that is in the shape of a square pyramid. The slant height of the bottle is 4.5 inches and the base is 2 inches. Find the surface area.

\[
S.A. = (\ell w) + \frac{1}{2} P\ell
\]

\[
S.A. = (2 \cdot 2) + \frac{1}{2} (2 \cdot 4)(4.5)
\]

\[
S.A. = (4) + \frac{1}{2} (8)(4.5)
\]

\[
S.A. = 4 + 18
\]

\[
S.A. = 22 \text{ in}^2
\]
Find the total surface area of each pyramid. Round to the nearest tenth.

\[
S.A. = \left( \frac{1}{2} \cdot bh \right) + \frac{1}{2} P\ell
\]

\[
S.A. = \left( \frac{1}{2} \cdot 12 \cdot 10.4 \right) + \frac{1}{2} (12 \cdot 3)(15)
\]

\[
S.A. = (62.4) + \frac{1}{2} (36)(15)
\]

\[
S.A. = 62.4 + 270
\]

\[
S.A. = 332.4 \ m^2
\]
Find the total surface area of each pyramid. Round to the nearest tenth.

\[ S.A. = (\ell w) + \frac{1}{2} P\ell \]
\[ S.A. = (2 \cdot 2) + \frac{1}{2} (2 \cdot 4)(3.5) \]
\[ S.A. = (4) + \frac{1}{2} (8)(3.5) \]
\[ S.A. = 4 + 14 \]
\[ S.A. = 18 \text{ in}^2 \]
Find the total surface area of each pyramid. Round to the nearest tenth.

\[ S.A. = \left( \frac{1}{2} \cdot bh \right) + \frac{1}{2} \cdot P\ell \]

\[ S.A. = \left( \frac{1}{2} \cdot 2 \cdot 1.7 \right) + \frac{1}{2} \cdot (2 \cdot 3) \cdot (4) \]

\[ S.A. = (1.7) + \frac{1}{2} \cdot (6) \cdot (4) \]

\[ S.A. = 1.7 + 12 \]

\[ S.A. = 13.7 \ m^2 \]
Find the surface area of a square pyramid that has a slant height of 8 centimeters and a base length of 5 centimeters.

\[
S.A. = (\ell w) + \frac{1}{2} P\ell
\]

\[
S.A. = (5\cdot5) + \frac{1}{2}(5\cdot4)(8)
\]

\[
S.A. = (25) + \frac{1}{2}(20)(8)
\]

\[
S.A. = 25 + 80
\]

\[
S.A. = 105 \text{ cm}^2
\]
HOMEWORK:

Pg. 681 - 684

# 1-12 (all)

# 19 - 22 (all)