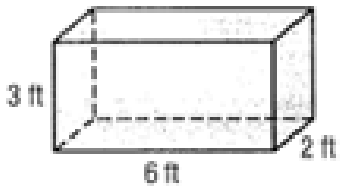
Get out your homework and have it ready to check.

Classwork - Surface Area of Pyramids

Find the surface area of each prism. Round to the nearest tenth if necessary. SHOW WORK AND LABEL.

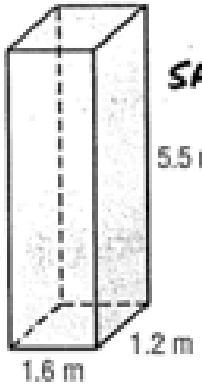
1.



S.A. = 2(3)(6)+2(6)(2)+2(3)(2)
36 + 24 + 12

S.A. = 72 ft²

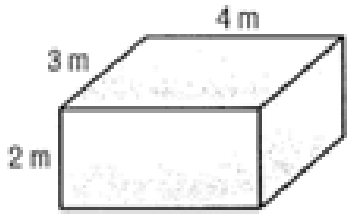
2.



SA = 2(1.6)(1.2)+2(1.6)(5.5)+2(1.2)(5.5)
3.84 + 17.6 + 13.2

S.A. = 34.6 m²

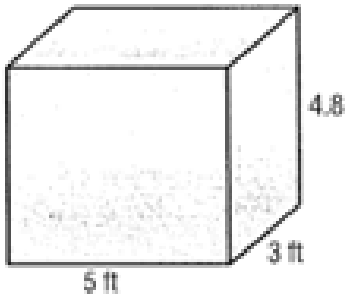
3.



SA = 2(2)(3)+2(3)(4)+2(3)(4)
12 + 16 + 24

S.A. = 52 m²

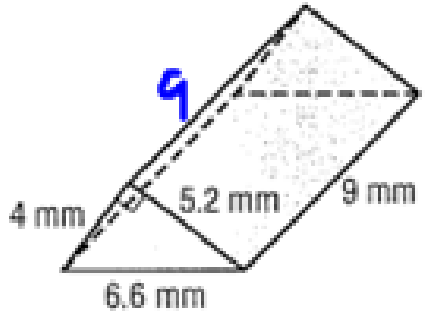
4.



SA = 2(5)(3)+2(5)(4.8)+2(3)(4.8)
30 + 48 + 28.8

S.A. = 106.8 ft²

5.



A of Δ Bases $A = \frac{1}{2}(4)(5.2) = 10.4(2) = 20.8\ mm^2$

A of L□ $= 4(9) = 36\ mm^2$

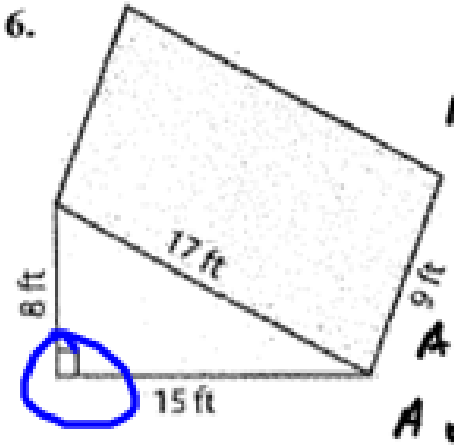
A of B□ $= 6.6(9) = 59.4\ mm^2$

A of R□ $= 5.2(9) = 46.8\ mm^2$

S.A. $= 163\ mm^2$

$20.8 + 36 + 59.4 + 46.8$

6.



A of Δ Bases

$A = \frac{1}{2}(8)(15) = 60\ ft^2$

$60(2) = 120\ ft^2$

A of L□ $= 8(9) = 72\ ft^2$

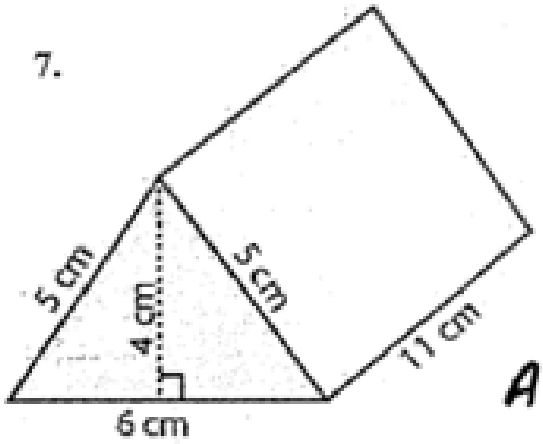
A of B□ $= 15(9) = 135\ ft^2$

A of R□ $= 9(17) = 153\ ft^2$

$SA = 120 + 72 + 135 + 153$

S.A. $= 480\ ft^2$

7.



A of Δ Bases

$A = \frac{1}{2}(4)(6) = 12\text{cm}^2(2) = 24\text{cm}^2$

A of R+L □ = $5(11) = 55\text{cm}^2$

$55(2) = 110\text{cm}^2$

A of B□ = $6(11) = 66\text{cm}^2$

S.A. = 200cm^2 SA: 24+110+66

8. **BIRTHDAY GIFT** When wrapping a birthday gift in the shape of a rectangular prism for his mother, Kenji adds an additional 2.5 square feet of gift wrap to allow for overlap. How many square feet of gift wrap will Kenji use to wrap a gift 3.5 feet long, 18 inches wide, and 2 feet high?

18in = 1.5 ft SA = 2(3.5)(1.5)+2(3.5)(2)+2(1.5)(2)

SA = 30.5 + 2.5 = 33ft^2

S.A. = 33ft^2

9. **CONTAINERS** A company needs to package hazardous chemicals in special plastic rectangular prism containers that hold 80 cubic feet. Find the whole number dimensions of the container that would use the least amount of plastic. ~~*There are multiple dimensions that could be correct.*~~

4ft by 4ft by 5ft SA = 2(4)(4)+2(5)(4)+2(4)(5)

32 + 40 + 40

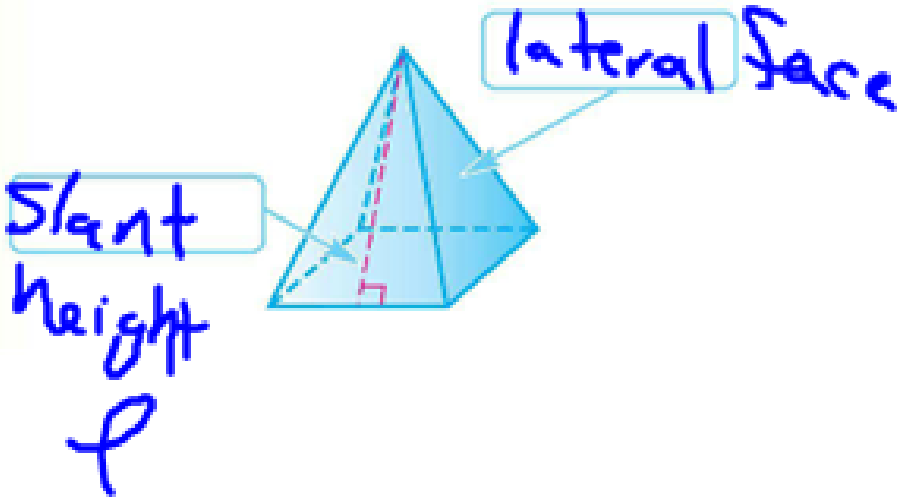
SA = 112ft²

Vocabulary Start-Up

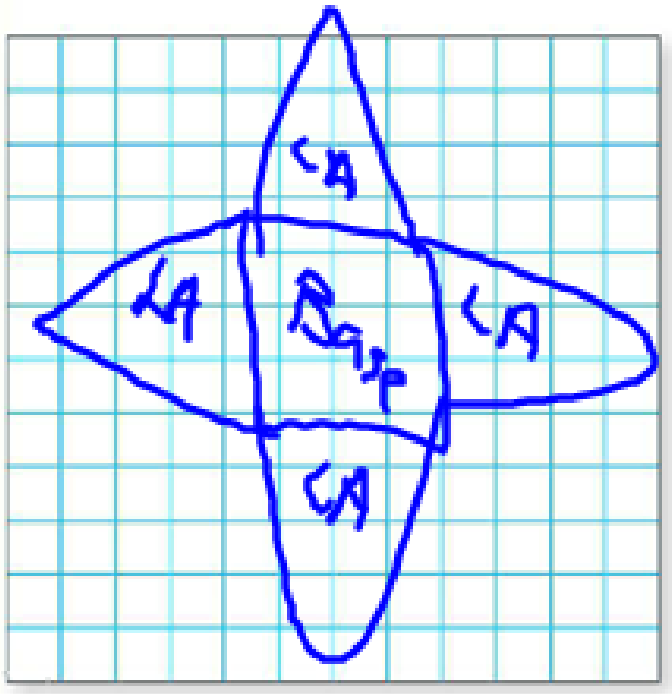
p677

Pyramids Ancient Egyptians built pyramids, such as the one shown in the photo below. A right square pyramid has a square base and four isosceles triangles that make up the lateral faces. The **lateral surface area** is the sum of the areas of all its lateral faces. The height of each lateral face is called **slant height**.

1. Fill in the blanks on the diagram below with the terms *slant height* and *lateral face*.



2. Draw a net of a square pyramid.

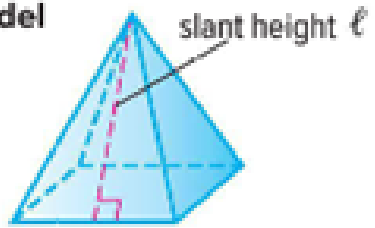


Surface Area of a Pyramid

Lateral Area

Words The lateral surface area $L.A.$ of a regular pyramid is half the perimeter P of the base times the slant height ℓ.

Model



Symbols $L.A. = \frac{1}{2}P\ell$

Total Surface Area

Words The total surface area $S.A.$ of a regular pyramid is the lateral area $L.A.$ plus the area of the base B.

Symbols $S.A. = B + L.A.$ or $S.A. = B + \frac{1}{2}P\ell$

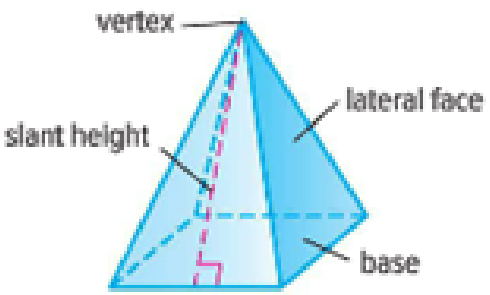
P = perimeter

ℓ = slant height

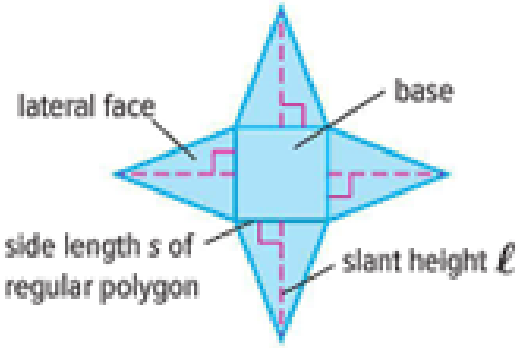
B = Area of base

A **regular pyramid** is a pyramid with a base that is a regular polygon.

Model of Regular Square Pyramid



Net of Regular Square Pyramid



To find the lateral area *L.A.* of a regular pyramid, refer to the net. The lateral area is the sum of the areas of the triangles.

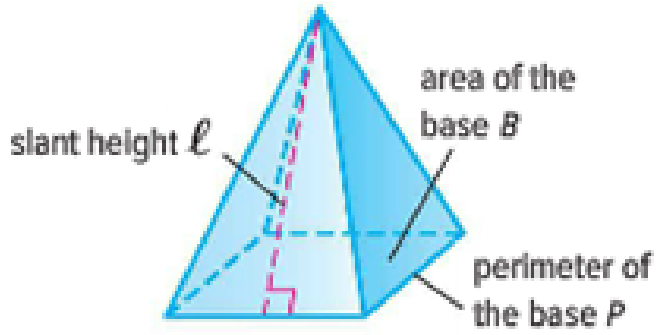
$$L.A. = 4\left(\frac{1}{2}s\ell\right)$$ Area of the lateral faces

$$L.A. = \frac{1}{2}(4s)\ell$$ Commutative Property of Multiplication

$$L.A. = \frac{1}{2}P\ell$$ The perimeter of the base P is $4s$.

The total surface area of a regular pyramid is the lateral surface area *L.A.* plus the area of the base *B*.

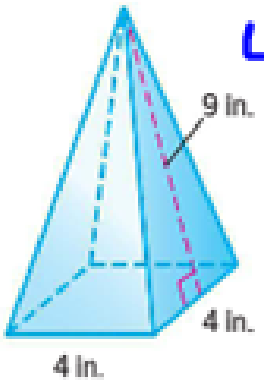
$$S.A. = B + \frac{1}{2}P\ell$$



Examples

Tutor

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



$S.A. = B + \frac{1}{2}P\ell$ Surface area of a pyramid

$S.A. = 16 + \frac{1}{2}(16 \cdot 9)$ $B = 4 \cdot 4$, $P = 4 \cdot 4$ or 16, $\ell = 9$

$S.A. = 88$ Simplify.

The surface area is 88 square inches.

$P = 4+4+4+4 = 16$ in

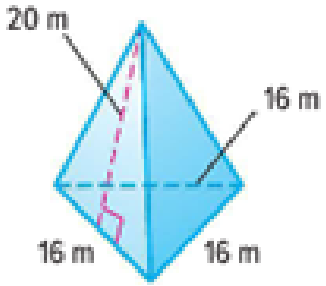
$LA = \frac{1}{2}(16)(9)$

$LA = 72$ in^2

$B = 4 \cdot 4 = 16$ in^2

$SA = 72+16 = 88$ in^2

2. **Find the total surface area of the pyramid with a base area of 111 square meters.**



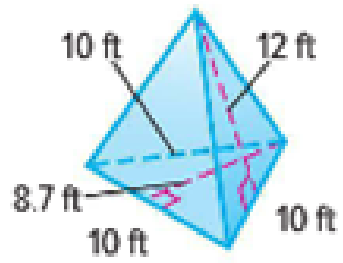
$S.A. = B + \frac{1}{2}P\ell$ Surface area of a pyramid

$S.A. = 111 + \frac{1}{2}(48 \cdot 20)$ $B = 111$, $P = 16 + 16 + 16$ or 48, $\ell = 20$

$S.A. = 591$ Simplify.

The surface area of the pyramid is 591 square meters.

3. **Find the total surface area of the pyramid.**



$SA. = B + \frac{1}{2}P\ell$ Surface area of a pyramid

$SA. = 43.5 + \frac{1}{2}P\ell$ $B = \frac{1}{2} \cdot 10 \cdot 8.7$ or 43.5

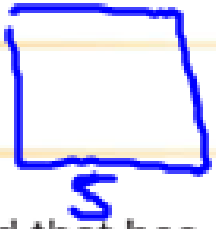
$SA. = 43.5 + \frac{1}{2}(30 \cdot 12)$ $P = 10 + 10 + 10$ or 30, $\ell = 12$

LA = 180 ft²

$SA. = 223.5$ Simplify.

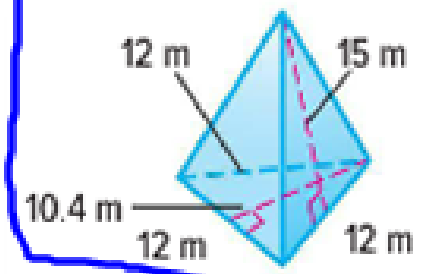
The surface area is 223.5 square feet.

Got it? Do these problems to find out.



a. Find the surface area of a square pyramid that has a slant height of 8 centimeters and a base length of 5 centimeters.

b. Find the total surface area of the pyramid shown.



A) $P = 5(4) = 20\ cm$

$LA = \frac{1}{2}(20)(8) = 80\ cm^2$

$B = 5 \cdot 5 = 25\ cm^2$

$SA = 80 + 25 = 105\ cm^2$

B) $P = 12+12+12 = 36\ m$

$LA = \frac{1}{2}(36)(15) = 270\ m^2$

$B = \frac{1}{2}(12)(10.4) = 62.4\ cm^2$

$SA = 270 + 62.4 = 332.4\ m^2$

Example

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?**

$S.A. = B + \frac{1}{2}P\ell$ Surface area of a pyramid

$S.A. = 6.25 + \frac{1}{2}(10 \cdot 3)$ $B = 2.5^2$ or 6.25, $P = 4(2.5)$ or 10, $\ell = 3$

$S.A. = 21.25$ Simplify.

So, 21.25 square inches of card stock are used to make one gift box.

Got it? **Do this problem to find out.**

c. 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.

$P = 2+2+2+2 = 8 \text{ in}$

$LA = \frac{1}{2}(8)(4.5) = 18 \text{ in}^2$

$B = 2 \cdot 2 = 4 \text{ in}^2$

$SA = B + 4 = 22 \text{ in}^2$