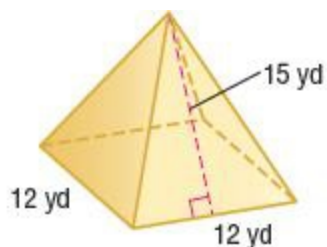


10-5 Surface Area of Pyramids

Find the surface area of the pyramid.

2.



SOLUTION:

area of base: $12(12) = 144$

area of each triangular side: $\frac{1}{2}(12)(15) = 90$

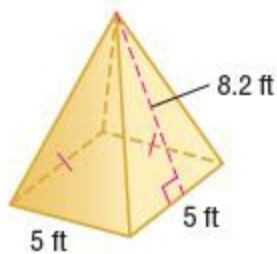
Add to find the surface area.

$144 + 90 + 90 + 90 + 90 = 504$ square yards

ANSWER:

504 yd^2

4.



SOLUTION:

area of base: $5(5) = 25$

area of each triangular side: $\frac{1}{2}(5)(8.2) = 20.5$

Add to find the surface area.

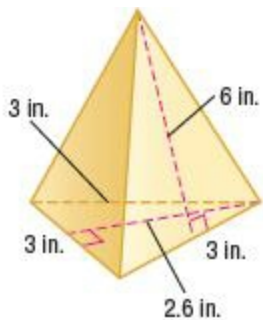
$25 + 20.5 + 20.5 + 20.5 + 20.5 = 107$ square feet

ANSWER:

107 ft^2

10-5 Surface Area of Pyramids

6.



SOLUTION:

$$\text{area of base: } \frac{1}{2}(3)(2.6) = 3.9$$

$$\text{area of each lateral face: } \frac{1}{2}(3)(6) = 9$$

Add to find the surface area.

$$3.9 + 9 + 9 + 9 = 30.9 \text{ square inches}$$

ANSWER:

$$30.9 \text{ in}^2$$

8. An earring design is shaped like a triangular pyramid. All sides are equilateral triangles with side lengths of 14 millimeters. The slant height is 12.1 millimeters. What is the surface area of the earring?

SOLUTION:

Each face has an area of $\frac{1}{2}(14)(12.1)$ or 84.7 square millimeters. So, the surface area of the triangular pyramid is $4 \cdot 84.7$ or 338.8 square millimeters.

ANSWER:

$$338.8 \text{ mm}^2$$

10-5 Surface Area of Pyramids

10. **Identify Structure** Refer to the figures listed in the table. Determine the number of faces the figure has of each two-dimensional shape. Explain.

Figure	Rectangular Faces	Triangular Faces
Rectangular Prism		
Triangular Prism		
Square Pyramid		
Triangular Pyramid		

SOLUTION:

A rectangular prism is a three-dimensional figure with two parallel bases that are congruent rectangles. Therefore there are 6 rectangular faces.

A triangular prism is a prism that has triangular bases. Therefore there are 2 triangular faces and 3 rectangular faces.

A pyramid is a three-dimensional figure with at least three lateral faces that are triangles and only one base.

Therefore a square pyramid has rectangular face and 4 triangular faces. A triangular pyramid has 4 triangular faces.

Figure	Rectangular Faces	Triangular Faces
Rectangular Prism	6	0
Triangular Prism	3	2
Square Pyramid	1	4
Triangular Pyramid	0	4

Sample answer: Rectangular prisms have no triangular faces and triangular pyramids have no rectangular faces. Triangular prisms and square pyramids have a combination of both. The figures are named by their bases.

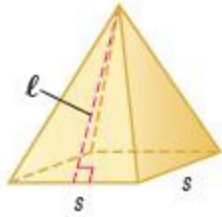
ANSWER:

Figure	Rectangular Faces	Triangular Faces
Rectangular Prism	6	0
Triangular Prism	3	2
Square Pyramid	1	4
Triangular Pyramid	0	4

Sample answer: Rectangular prisms have no triangular faces and triangular pyramids have no rectangular faces. Triangular prisms and square pyramids have a combination of both. The figures are named by their bases.

10-5 Surface Area of Pyramids

12. **Persevere with Problems** The *lateral surface area* L.A. of a pyramid is the area of its lateral faces. Use the square pyramid at the right to complete each step to find the lateral surface area of any pyramid.



$$\begin{aligned} \text{L.A.} &= \frac{1}{2} sl + \underline{\hspace{2cm}} \\ &= \frac{1}{2} (\underline{\hspace{2cm}})l \\ &= \underline{\hspace{2cm}} \end{aligned}$$

Lateral surface area

Distributive Property

Perimeter of base: $P = s + s + s + s$

SOLUTION:

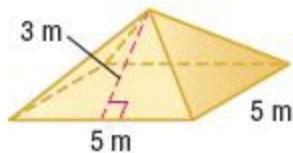
$$\begin{aligned} \text{L.A.} &= \frac{1}{2} sl + \frac{1}{2} sl + \frac{1}{2} sl + \frac{1}{2} sl \\ &= \frac{1}{2} (s + s + s + s)l \\ &= \frac{1}{2} Pl \end{aligned}$$

ANSWER:

$$\begin{aligned} &\frac{1}{2} sl + \frac{1}{2} sl + \frac{1}{2} sl \\ &s + s + s + s \\ &\frac{1}{2} Pl \end{aligned}$$

Find the surface area of the pyramid.

14.



SOLUTION:

$$\text{area of base: } 5(5) = 25$$

$$\text{area of each triangular side: } \frac{1}{2}(5)(3) = 7.5$$

Add to find the surface area.

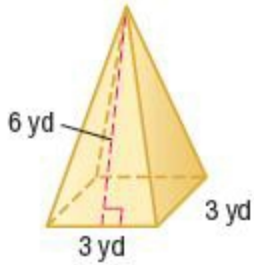
$$25 + 7.5 + 7.5 + 7.5 + 7.5 = 55 \text{ square meters}$$

ANSWER:

$$55 \text{ m}^2$$

10-5 Surface Area of Pyramids

16.



SOLUTION:

area of base: $3(3) = 9$

area of each triangular side: $\frac{1}{2}(3)(6) = 9$

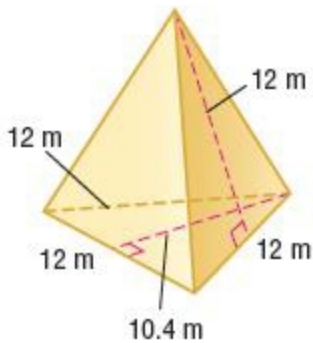
Add to find the surface area.

$9 + 9 + 9 + 9 + 9 = 45$ square yards

ANSWER:

45 yd^2

18.



SOLUTION:

area of base: $\frac{1}{2}(12)(10.4) = 62.4$

area of each lateral face: $\frac{1}{2}(12)(12) = 72$

Add to find the surface area.

$62.4 + 72 + 72 + 72 = 278.4$ square meters

ANSWER:

278.4 m^2

10-5 Surface Area of Pyramids

20. A paper model of the Khafre pyramid in Egypt has a square base 7.2 centimeters on each side. The slant height is 6 centimeters. How much paper was used to make the model?

SOLUTION:

$$\text{area of base: } (7.2)(7.2) = 51.84$$

$$\text{area of each triangular side: } \frac{1}{2}(7.2)(6) = 21.6$$

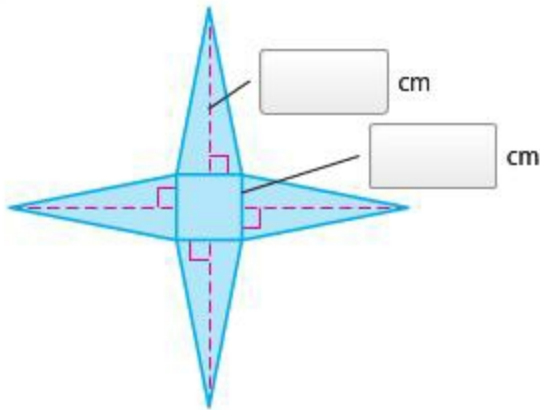
Add to find the surface area.

$$51.84 + 21.6 + 21.6 + 21.6 + 21.6 = 138.24 \text{ square centimeters}$$

ANSWER:

$$138.24 \text{ cm}^2$$

22. A salt shaker is in the shape of a square pyramid. The perimeter of the base is 16 cm, the height of the salt shaker is 10 cm, and the slant height is about 10.2 cm. Select values to label the net below with the correct dimensions. What is the surface area of the salt shaker.



2	10
4	10.2
8	16

SOLUTION:

The length of the slant height is given in the problem, it is 10.2 cm.

To find the length of the base, use the perimeter and work backwards. The perimeter of a square is $P = 4s$, where s is the length of the side.

$$p = 4s$$

$$\frac{16}{4} = \frac{4s}{4}$$

$$4 = s$$

So the length of the base is 4 cm.

Next, find the surface area.

$$\text{area of base: } 4(4) = 16$$

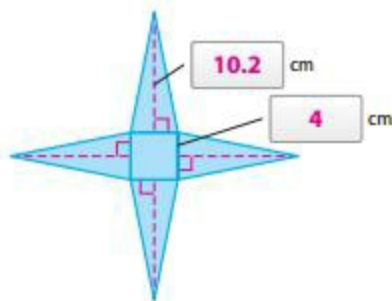
$$\text{area of each triangular side: } \frac{1}{2}(4)(10.2) = 20.4$$

Add to find the surface area.

$$16 + 20.4 + 20.4 + 20.4 + 20.4 = 97.6 \text{ square centimeters}$$

10-5 Surface Area of Pyramids

ANSWER:



$$97.6 \text{ cm}^2$$

Divide.

24. $240 \div 10 =$

SOLUTION:

Cross out the same number of zeros in the dividend and the divisor.

$$\begin{aligned} 24\cancel{0} \div 1\cancel{0} \\ 24 \div 1 = 24 \end{aligned}$$

So, $240 \div 10$ is 24.

ANSWER:

24

26. $4,800 \div 80 =$

SOLUTION:

Use the fact family 6, 8, and 48.

$$\begin{array}{ll} 6 \times 8 = 48 & 48 \div 8 = 6 \\ 60 \times 8 = 480 & 480 \div 8 = 60 \\ 600 \times 8 = 4,800 & 4,800 \div 80 = 60 \end{array}$$

So, $4,800 \div 80 = 60$.

ANSWER:

60

10-5 Surface Area of Pyramids

28. How many centimeters are equal to 0.05 meters?

SOLUTION:

Since 1 meter = 100 centimeters, multiply 0.05 by 100.

$$\begin{array}{r} 0.05 \\ \times 100 \\ \hline 5 \end{array}$$

So, 0.05 meters = 5 centimeters

ANSWER:

5 cm