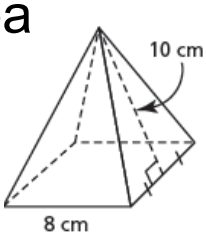
Find the Surface Area

This right square pyramid has a slant height of 10 cm and a base side length of 8 cm.

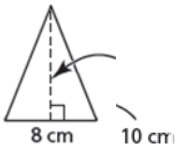


This net shows the faces and base of the pyramid.

The area, A, of each triangular face is:

$A = \frac{1}{2}(8)(10)$

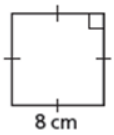
$A = 40$



The area, B, of the base is:

$B = (8)(8)$

$B = 64$



So, the surface area, SA, of the pyramid is:

$SA = 4A + B$

$SA = 4(40) + 64$

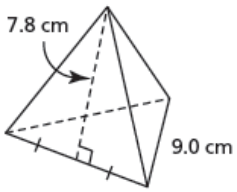
$SA = 224$

The surface area of the pyramid is 224 cm^2.

1.4 Surface Areas of Right Pyramids and Right Cones

Example 1 Determining the Surface Area of a Regular Tetrahedron Given Its Slant Height

Jeanne-Marie measured then recorded the lengths of the edges and slant height of this regular tetrahedron. What is its surface area to the nearest square centimetre?



SOLUTION

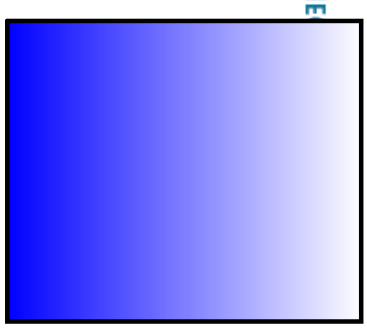
(Erase to reveal)

$A = A(4 \text{ triangles})$

$= 4(\frac{1}{2}bh)$

$= 4(\frac{1}{2}(9)(7.8))$

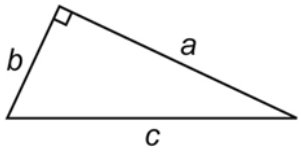
$= 140.4 \text{ cm}^2$



1.4 Surface Areas of Right Pyramids and Right Cones

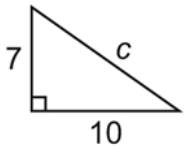
Activate Prior Learning:
The Pythagorean Theorem

In any right triangle, the sum of the squares of the two shorter sides is equal to the square of the longer side.



$a^2 + b^2 = c^2$

What is the unknown length in this right triangle?



$c^2 = a^2 + b^2$
$= 7^2 + 10^2$
$= 49 + 100$
$= 149$
$c = \sqrt{149}$
$= 12.2$ units

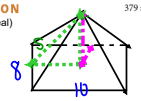
1.4 Surface Areas of Right Pyramids and Right Cones

Example 2 Determining the Surface Area of a Right Rectangular Pyramid

A right rectangular pyramid has base dimensions 8 ft by 10 ft., and a height of 16 ft. Calculate the surface area of the pyramid to the nearest square foot.

The surface area of the pyramid is approximately 379 square feet.

SOLUTION
(Erase to reveal)



side triangles

$S^2 = 16^2 + 5^2$
$= 256 + 25$
$= 281$
$S = \sqrt{281}$
$= 16.8$

$A = 2\left[\frac{1}{2}(8)(16.8)\right]$
$= 134.4$ units^2

$S_2^2 = 16^2 + 4^2$
$= 256 + 16$
$= 272$
$S_2 = \sqrt{272}$
$= 16.5$

$A = 2\left[\frac{1}{2}(10)(16.5)\right]$
$= 165$ units

$A_{total} = 134.4 + 165 + 80$
$= 299.4$ units^2 $+80$

Front/Back Triangles $= 379.4$ units

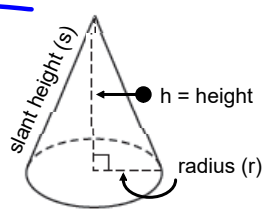
Base

A (total) = 165 + 134.4 + 80
= 379.4 ft^2

CHECK YOUR UNDERSTANDING

A *right circular cone* is a 3-dimensional object that has a circular base and a curved surface. ?
The *height* of the cone is the perpendicular distance from the apex to the base. ?
The *slant height* of the cone is the shortest distance on the curved surface between the apex and a point on the circumference of the base. ?

Cone



$$A = \pi r^2 + \pi rs$$

1.4 Surface Areas of Right Pyramids and Right Cones

Homework...

Worksheet - Surface Area of Pyramids and Cones.pdf

Solutions...

1) 113.1 in^2 2) 40 m^2 3) 188.5 mm^2 4) 63.3 yd^2
5) 84 ft^2 6) 343.1 cm^2 7) 208 m^2 8) 301.6 in^2
9) 123.7 ft^2 10) 263.2 mm^2 11) 95.7 cm^2 12) 210 yd^2
13) 74.4 cm^2 14) 152 yd^2 15) 857.7 in^2

1. $SA = \pi r^2 + \pi r s$

$= \pi (4)^2 + \pi (4)(5)$

$= 16\pi + 20\pi$

$= 36\pi \text{ in}^2$

$= 113.1 \text{ in}^2$

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2. $SA = 4(\text{triangles}) + \text{square}$

$= 4\left(\frac{1}{2}(4)(3)\right) + (4)(4)$

Attachments

Worksheet - Surface Area of Prisms and Cylinders.pdf

Worksheet - Surface Area of Pyramids and Cones.pdf