Name: _____ Date: _____

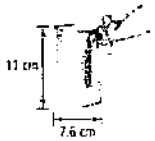
5.4 Surface Area of a Cylinder

FOLDABLES / cylinder
- a 3-D object with 2 parallel and congruent circular bases

Congruent means the exact same size.

Working Example 1: Determine the Surface Area of a Right Cylinder

a) Estimate the surface area of the can.



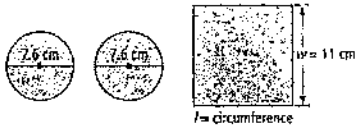
Solution

Surface area of can = area of 2 circles + area of 1 rectangle

To estimate, use approximate values:

$d \approx 8$, so $r = d \div 2$

$\approx$ _____



length of rectangle = circumference
$l = \pi \times d$

$\pi \approx 3$

Area of circle $= \pi \times r^2$

$\approx 3 \times$ _____^{2}

$\approx 3 \times$ _____ $\times$ _____

$\approx$ _____

$w \approx 10$

Area of rectangle $= l \times w$

$C = \pi \times d$

= circumference $\times w$

$\approx (\pi \times d) \times w$

$\approx 3 \times 8 \times 10$

$\approx$ _____ cm^2

There are 2 circles: $2 \times 48 =$ _____

Estimated surface area = area of 2 circles + area of 1 rectangle

$\approx$ _____ + _____

$\approx$ _____

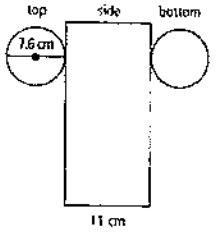
The estimated surface area is _____ cm^2.

b) What is the actual surface area of the can?
Round your answer to the nearest hundredth of a square centimetre (2 decimal places).

Solution

Method 1: Use a Net

Step 1: Draw the net and label the measurements.



Step 2: Find the radius.

diameter = 7.6 cm

radius = 7.6 ÷ 2

= _____

Step 3: Find the area of 1 circle.

$A = \pi \times r^2$

$= 3.14 \times 3.8^2$ 3.14 3.8 3.8

= _____

Step 4: Find the area of 2 circles.

$2 \times 45.3416 =$ _____

Step 5: Find the area of the rectangle using the circumference.

$A = l \times w$

length of rectangle = circumference

$A = (\pi \times d) \times w$

$A \approx 3.14 \times 7.6 \times 11$

$A \approx$ _____

Step 6: Total surface area = area of 2 circles + area of 1 rectangle

$\approx$ _____ + _____

$\approx$ _____

The total surface area is approximately _____ cm^2.

Round your answer to the nearest hundredth (2 decimal places).

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Method 2: Use a Formula

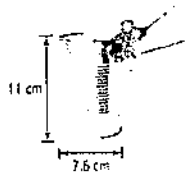
The formula for the surface area of a cylinder is

$$S.A. = \underset{\text{2 circles}}{2} \times \underset{\text{circle area}}{(\pi \times r^2)} + \underset{\text{rectangle area}}{(\pi \times d \times h)}$$

- length is the circumference of a circle ($\pi \times d$)
- width is the height of the cylinder (h)

Literacy Link

S.A.
- a short form for *surface area*



$d = 7.6$ cm $\quad r = 7.6 \div 2 = 3.8$ cm $\quad h = 11$ cm

$S.A. = 2 \times (\pi \times r^2) + (\pi \times d \times h)$

$S.A. = 2 \times (3.14 \times 3.8^2) + (3.14 \times 7.6 \times 11)$

$S.A. = 2 \times (3.14 \times 3.8 \times 3.8) + (3.14 \times 7.6 \times 11)$

$S.A. = 2 \times$ _____ + _____

$S.A. =$ _____ + _____

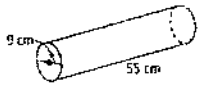
$S.A. =$ _____

The surface area of the can is _____ cm^2, to the nearest hundredth (2 decimal places).

Name: _____ Date: _____

Show You Know

Find the surface area of the cylinder to the nearest tenth of a square centimetre (1 decimal place).



$d =$ _____ $\quad r =$ _____ $\quad h =$ _____

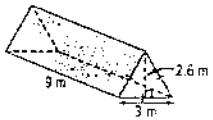
Use a net or the formula to find the answer.

Sentence: _____

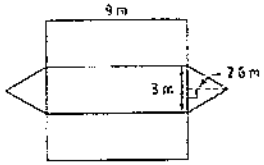
Name: _____ Date: _____

Working Example 2: Calculate the Surface Area of a Right Triangular Prism

a) Draw the net of this right triangular prism.



Solution

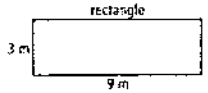


b) What is the surface area?

Solution

3 sides with the same length

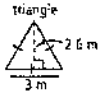
The bases of the prism are equilateral triangles. The sides of the prism are rectangles.



$A = l \times w$

$= 9 \times$ _____

$=$ _____ m^2



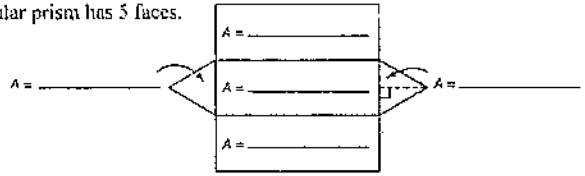
$A = (b \times h) \div 2$

$= (3 \times 2.6) \div 2$

$=$ _____ $\div 2$

$=$ _____ m^2

The right triangular prism has 5 faces.



Surface Area = (3 × area of rectangle) + (2 × area of triangle)

= (3 × 27) + (2 × 3.9)

= _____ + _____

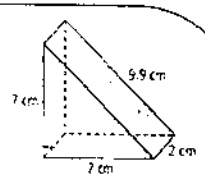
= _____

The surface area of the right triangular prism is _____ m^2.

Name: _____ Date: _____

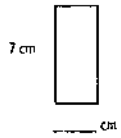
Show You Know

Find the surface area of the right triangular prism.



How many different-sized rectangles are there? _____

small rectangle

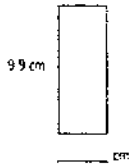


$A = l \times w$

$=$ _____

$=$ _____ cm^2

large rectangle

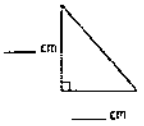


$A = l \times w$

$=$ _____

$=$ _____ cm^2

How many triangles of the same size are there? _____



$A = (b \times h) \div 2$

$= (\_\_\_\_\_ \times \_\_\_\_\_) \div 2$

$=$ _____ $\div 2$

$=$ _____ cm^2

Surface Area = (2 × area of small rectangles) + (area of large rectangle) + (2 × area of triangle)

= (2 × _____) + _____ + (2 × _____)

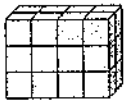
= _____ + _____ + (_____)

= _____

The surface area of the right triangular prism is _____ cm^2.

Name: _____ Date: _____

5.3 Surface Area of a Prism

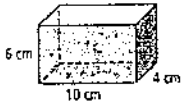


VOCABULARY

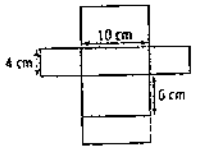
surface area
- the number of square units needed to cover all the faces of a 3-D object
- the sum of the areas of all the faces of an object
- measured in square units (cm^2, m^2)

Working Example 1: Calculate the Surface Area of a Right Rectangular Prism

a) Draw the net of this right rectangular prism.



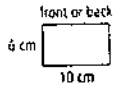
Solution



b) What is the surface area of the prism?

Solution

The right rectangular prism has 6 faces. There are 3 different sizes of faces.

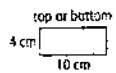


$A = l \times w$
$= 10 \times 6$

$=$ _____ cm^2

Area of front and back
$= 60 \times 2$

$=$ _____ cm^2



$A = l \times w$
$= 10 \times$ _____

$=$ _____ cm^2

Area of top and bottom
$= 40 \times 2$

$=$ _____ cm^2

$A = l \times w$
$= 6 \times$ _____

$=$ _____ cm^2

Area of both sides
$= 24 \times 2$

$=$ _____ cm^2

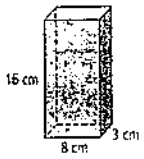
Surface Area = (area of front and back) + (area of top and bottom) + (area of ends)
$=$ 120 + 80 + 48

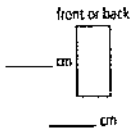
$=$ _____ cm^2

Name: _____ Date: _____

Show You Know

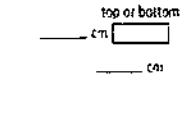
What is the surface area of the right rectangular prism?





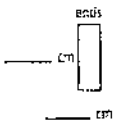
$A = l \times w$
$=$ _____ $\times$ _____
$=$ _____

Area of front and back:
$A =$ _____ $\times 2$
$=$ _____



$A = l \times w$
$=$ _____ $\times$ _____
$=$ _____

Area of top and bottom:
$A =$ _____ $\times 2$
$=$ _____



$A = l \times w$
$=$ _____ $\times$ _____
$=$ _____

Area of 2 ends:
$A =$ _____ $\times$ _____
$=$ _____

Surface Area = (area of front and back) + (area of top and bottom) + (area of ends)
$=$ _____ + _____ + _____

$=$ _____ cm^2

The surface area of the right rectangular prism is _____ cm^2.