Warm Up

Sept 13

The surface area of a prism is equal to the sum of the areas of its faces. For a rectangular prism with length ℓ, width w, and height h, the surface area is $S = 2\ell w + 2\ell h + 2wh$.
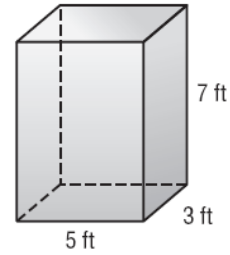
EXAMPLE 1 Find the surface area of the rectangular prism.

$S = 2\ell w + 2\ell h + 2wh$ 　　Surface area of a prism
$S = 2(3)(5) + 2(3)(7) + 2(5)$ 　　$\ell = 3, w = 5, h = 7$
$S = 142$ 　　Simplify.

The surface area is 142 squar

The surface area S of a cylinder

✓ **SOLUTION**
(Erase to reveal)

7 ft
5 ft
3 ft

$SA = 2\,A\,base + A\,faces$

$= 2\ell w + 2\ell h + 2wh$

$= 2(5)(3) + 2(5)(7) + 2(3)(7)$

$= 30 + 70 + 42$

$= 142\ ft^2$

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Problems with the homework?

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7. 22 ft × 16 ft

$22\,ft \times \dfrac{1\ yd}{3\ ft} = 7.\overline{3}\,yd$ 　　 $22\,ft \times \dfrac{1\ yd}{3\,ft} \times \dfrac{1\ m}{1.0936\,yd} = 6.7m$

$16\,ft \times \dfrac{1\ yd}{3\ ft} = 5.\overline{3}\,yd$ 　　 $16\,ft \times \dfrac{1\ yd}{3\ ft} \times \dfrac{1\ m}{1.0936\,yd} = 4.9m$

$A = \ell \times w$ 　Carpet
$= (7.3)(5.3)$
$= 38.69\,yd^2$

$A = \ell w$ 　Hardwood
$= (6.7m)(4.9m)$
$= 32.83m^2$

$Cost = \dfrac{\$21.95}{yd^2} \times 38.69\,yd^2$
$\$1350$
$= \$2199.25$

$Cost = \dfrac{\$18.99}{m^2} \times 32.83m^2 + \$1500$
$= \$2123.44$

Hardwood is cheaper

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$$A = 22ft \times 16ft$$
$$= 352ft^2$$

$$352ft^2 \times \left(\frac{1 \ yd}{3 \ ft}\right)^2 = 39.\overline{1}yd^2$$

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4.3 - Surface Area

Make Connections

The ancient pyramids at Giza, Egypt, were built about 4500 years ago.

This pyramid has a square base with a side length of 755 feet. The original height of the pyramid was 481 feet. Archeologists believe that the pyramid was once covered with a white limestone casing. How could you calculate the area that was once covered with limestone?

481'

$481' \angle \quad \ell$

$\frac{755}{2}$
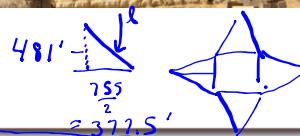
$= 377.5'$

Slant height $= \sqrt{481^2 + 377.5^2}$
$= 611.45 ft$

611.45

$A = 4 \ triangles$
$= 4 \left(\frac{bh}{2}\right)$

$\overset{2}{\cancel{4}} \left(\frac{(755)(611.45)}{\cancel{2}}\right)$
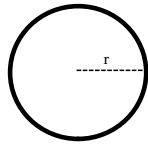
$= 923289.5 ft^2$

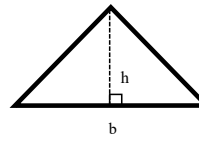Introduction

2

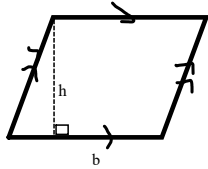# AREA Formulas...

Rectangle or Square
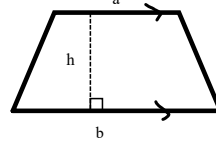
$A = bh$

Circle

$A = \pi\, r^2$

Triangle

$A = \frac{1}{2}\, bh$

Parallelogram or Rhombus

$A = bh$

Trapezoid

$A = \frac{1}{2}\, h(a + b)$

$$\frac{(a+b)\ h}{2}$$
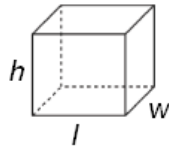
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Surface Area

Surface area is the total area of all of the faces of the object.

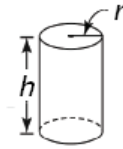## Steps need to find Surface area are:

1. Draw all of the faces with dimensions displayed on them.

2. Find the area of each face.

3. Then add up the areas of all of the faces.

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Activate Prior Learning:
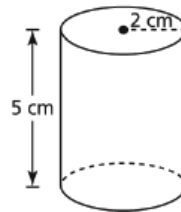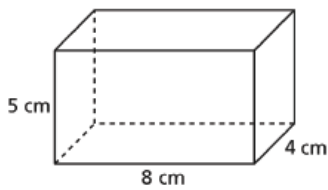## Surface Areas of Right Prisms and Cylinders

$SA = 2wl + 2hl + 2hw$ $SA = 2\pi r^2 + 2\pi rh$

Which object below has the greater surface area?

5 cm
4 cm
8 cm

2 cm
5 cm

1.4 Surface Areas of Right Pyramids and Right Cones
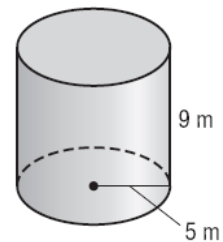
Activating Prior Learning 1

The surface area S of a cylinder with height h and radius r is the area of the two bases plus the area of the curved surface, or $S = 2\pi r^2 + 2\pi rh$.

EXAMPLE 2 **Find the surface area of the cylinder. Round to the nearest tenth.**

$S = 2\pi r^2 + 2\pi rh$ Surface area of a cylinder
$S = 2\pi(5)^2 + 2\pi(5)(9)$ $r = 5, h = 9$
$S \approx 439.8$ Simplify.

The surface area is about 439.8 squ

✓ **SOLUTION**
(Erase to reveal)

9 m
5 m

$$SA = 2\pi r^2 + 2\pi rh$$
$$= 2\pi(5)^2 + 2\pi(5)(9)$$
$$= 50\pi + 90\pi$$
$$= 140\pi$$
$$\doteq 439.8m^2$$

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Class/Homework

Worksheet on Prisms & Pyramids

necessary.

1. 6 ft, 4 ft, 2 ft

2. 3 in., 6 in.

3. 5 mm, 3 mm, 4 mm, 7 mm

4. 7 yd, 8 yd

5. 5 cm, 6.1 cm, 6.1 cm, 7 cm, 17 cm, 6.1 cm

6. 10 m, 8 m, 4 m

7. 12 mi, 5 mi, 5 mi, 13 mi

8. 11 km, 6 km, 5.7 km

9. 10.4 ft, 9 ft

10. 13 m, 7 m, 9.4 m

11. 15 cm, 9 cm, 12 cm, $7\frac{1}{2}$ cm

12. 18 in., $11\frac{3}{5}$ in.

13. cube: edge length, 11 m

14. rectangular prism: length, 9 cm; width, 13 cm; height, 18.4 cm

15. cylinder: radius, 9.4 mm; height, 15 mm

16. cylinder: diameter, 28 in.; height, 12.6 in.

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Attachments

Worksheet - Surface Area of Prisms and Cylinders.pdf

Worksheet - Surface Area of Pyramids and Cones.pdf

SA Prisms and Pyramids.pdf