12.2/12.3 Surface Areas of Prisms, Cylinders, Pyramids and Cones

Target: Use properties of 3-D figures to find lateral area and surface area

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Lateral Area of a Prism

$L.A. = Ph$
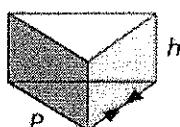
Find the lateral area of the prism. Round to the nearest tenth.

$6^2 + 5^2 = x^2$
$36 + 25 = x^2$
$x = 7.8$

5 cm
7 cm
6 cm
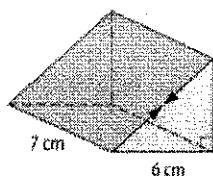
$P = 7.8 + 6 + 5$
$P = 18.8 \text{ cm}$

$LA = 18.8 (7)$
$LA = 131.6 \text{ cm}^2$

Surface Area of a Prism

$S.A. = L.A. + 2B$
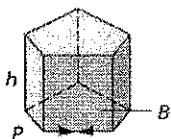
Find the surface area of the rectangular prism.

6 ft
4 ft
9 ft
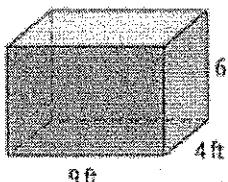
$P = 4 + 9 + 4 + 9$
$P = 26$

$LA = 26(6)$
$LA = 156 \text{ ft}^2$

$SA = 156 + 2(9 \cdot 4)$
$SA = 156 + 2(36)$
$SA = 228 \text{ ft}^2$

Lateral Area of a Cylinder

$L.A. = 2\pi rh$

$r = \dfrac{15}{2}$

$r = 7.5$
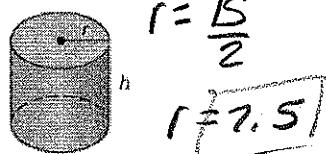
Find the lateral area of the cylinder. Round to the nearest tenth.

15 mm
18 mm
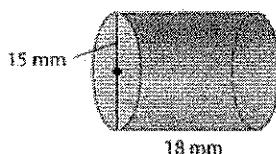
$LA = 2\pi (7.5)(18)$
$LA = 847.8 \text{ mm}^2$

Surface Area of a Cylinder

$S.A. = L.A. + 2\pi r^2$

$LA = 2\pi (7.5)(18)$
$LA = 847.8 \text{ mm}^2$

$r = \dfrac{15}{2} = 7.5$

15 mm
18 mm
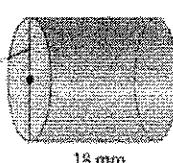
$SA = 2\pi (7.5)18$
$SA = 847.8 + 2\pi (7.5)^2$
$SA = 1201.2 \text{ mm}^2$

Lateral Area of a Regular Pyramid

$$L.A. = \frac{Pl}{2}$$
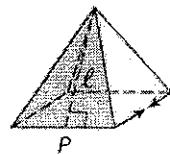
Find the lateral area of the square pyramid.

$$L.A = \frac{16(6)}{2}$$

$$L.A = 48\,in^2$$

6 in.

4 in.
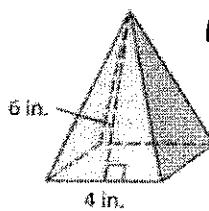
Surface Area of a Regular Pyramid

$$S.A. = L.A. + B$$

Find the surface area of the square pyramid to the nearest tenth.

16 cm

ℓ cm

12 cm
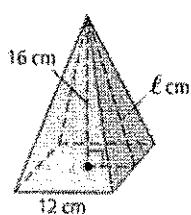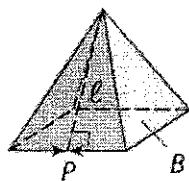
$$16^2 + 6^2 = \ell^2$$
$$256 + 36 = \ell^2$$
$$\sqrt{292} = \sqrt{\ell^2}$$
$$\ell = 17.08$$

$$SA = \frac{48(17.08)}{2} + 144$$

$$SA = 553.92\,cm^2$$

Lateral Area of a Cone

$$L.A. = \pi r l$$
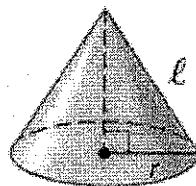
Find the lateral area.

16 ft ℓ

12 ft
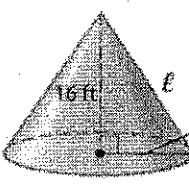
$$16^2 + 12^2 = \ell^2$$
$$256 + 144 = \ell^2$$
$$400 = \ell^2$$
$$\ell^2 = 20$$

$$L.A. = \pi(12)(20)$$

$$L.A. = 753.98\,ft^2$$

Surface Area of a Cone

$$S.A. = L.A. + \pi r^2$$

Find the surface area of a cone with a diameter of 14.8 centimeters and a slant height of 15 centimeters.

14.8 cm

15 cm
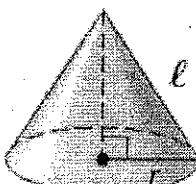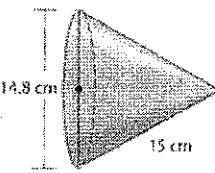
$$S.A = \pi(7.4)15 + \pi(7.4^2)$$
$$= 348.71 + 172.03$$
$$SA = 520.7\,cm^2$$

$$r = \frac{14.8}{2}$$
$$r = 7.4$$