SOL G.13

- **Cylinders**
- **and Cones**

Formulas: **S.A. = 2πr (r + h)**

Cylinders

$V = \pi r^2 h$

Cylinders are right prisms with circular bases.

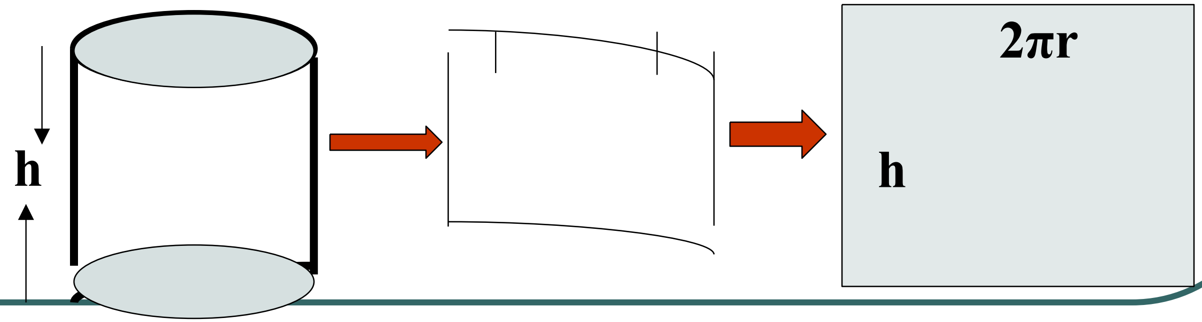
Therefore, the formulas for prisms can be used for cylinders.

Surface Area (SA) = 2B + LA = 2πr (r + h)

The base area is the area of the circle: πr^2

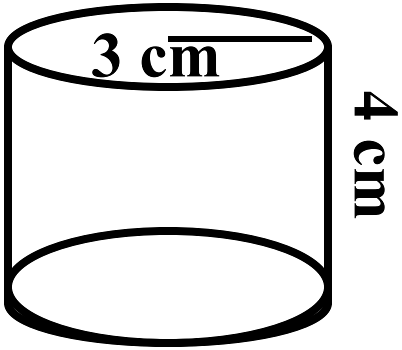
The lateral area is the area of the rectangle: **2πrh**

Volume (V) = Bh = $\pi r^2 h$



Example

For the cylinder shown, find the lateral area, surface area and volume.



$$L.A.= 2\pi r \bullet h$$

$$L.A.= 2\pi(3)\bullet(4)$$

$$L.A.= 24\pi \text{ sq. cm.}$$

$$S.A.= 2\bullet\pi r^2 + 2\pi r\bullet h$$

$$S.A.= 2\bullet\pi(3)^2 + 2\pi(3)\bullet(4)$$

$$S.A.= 18\pi + 24\pi$$

$$S.A.= 42\pi \text{ sq. cm.}$$

$$V = \pi r^2\bullet h$$

$$V = \pi(3)^2\bullet(4)$$

$$V = 36\pi$$

Cones

Formulas: $S.A. = \pi r(r + l)$

$V = \frac{1}{3}\pi r^2 h$

Cones are right pyramids with a circular base.

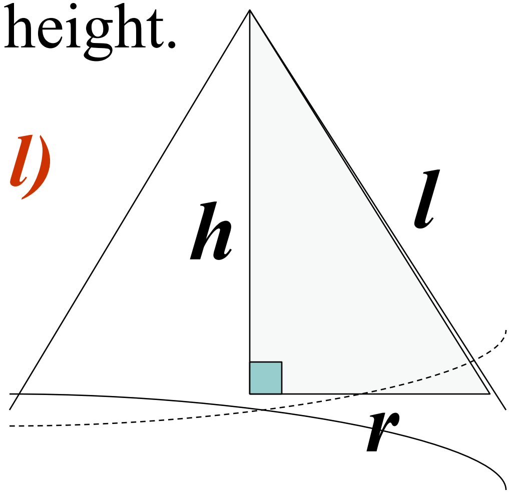
Therefore, the formulas for pyramids can be used for cones.

Lateral Area (**LA**) = ***π r l*,** where l is the slant height.

Surface Area (**SA**) = B + LA = $\pi r(r + l)$

The base area is the area of the circle: πr^2

Volume (**V**) = $\frac{1}{3}Bh = \frac{1}{3}\pi r^2 h$



Notice that the height (h) (altitude), the radius and the slant height create a right triangle.

Example:

For the cone shown, find the lateral area surface area and volume.

L.A.= πrl

$6^2 + 8^2 = l^2$

L.A.= $\pi(6)(10)$

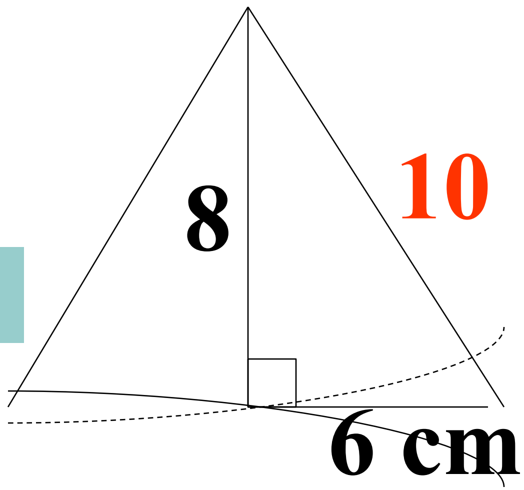
L.A.= 60π sq. cm.

S.A.= $\pi r\,(r + l\,)$

S.A.= $\pi \bullet 6\,(6 + 10)$

S.A.= $6\pi\,(16)$

S.A.= 96π sq. cm.



$$V = \frac{1}{3}\pi r^2 h$$

$$V = \frac{1}{3}\pi \bullet 6^2 \bullet 8$$

V= 96π cubic cm.

Note: We must use the Pythagorean theorem to find *l*.