Total Area & Volume

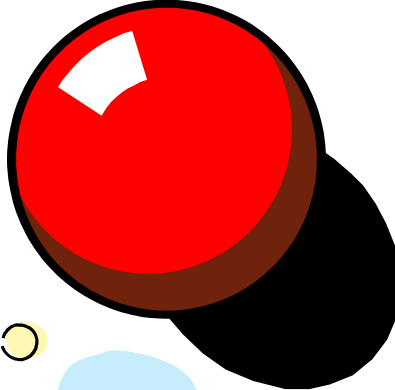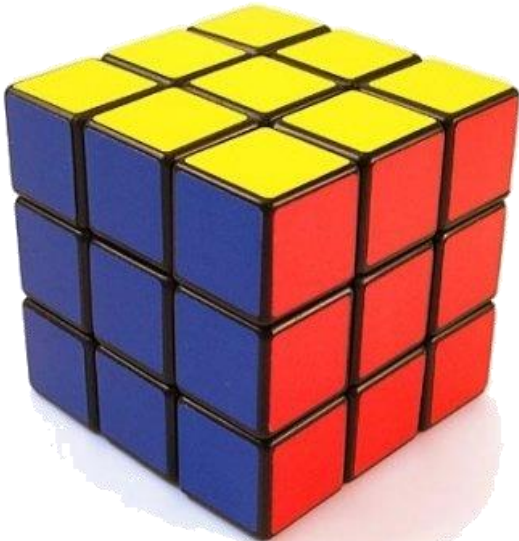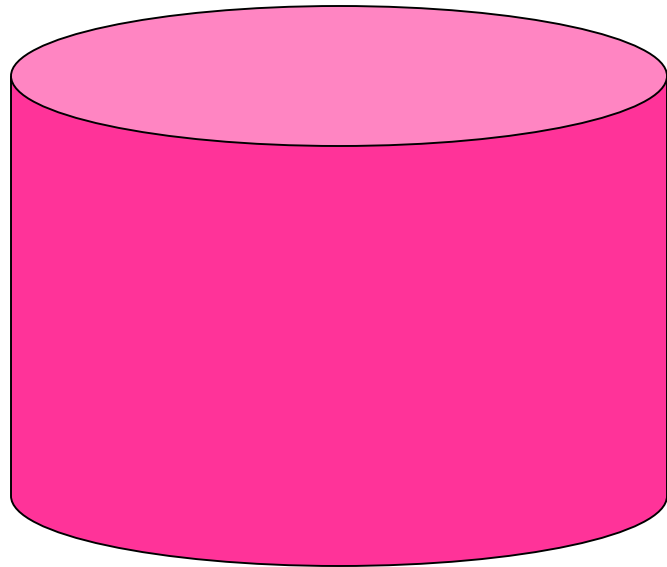SATURN

Cylinders – A **cylinder** is like the right prisms except that the bases of a cylinder are **circles**.

The formulas to calculate lateral area, total area, and volume will be nearly the same as prisms.

In a cylinder, the formula for Volume is exactly the same. (V=Bh)

Multiply the Area of the Base (B) by the height (h). In this case the base is a circle.

$$A = \pi r^2$$

The Lateral Area and Total Area are calculated in a similar manner. However we must replace "perimeter of base" with circumference of base.
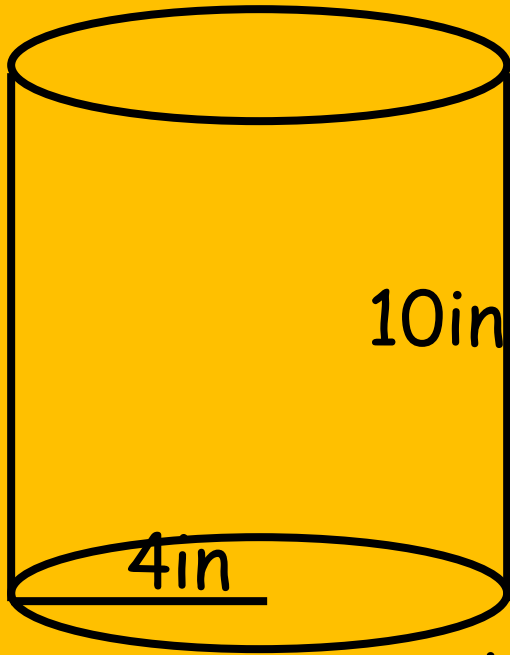
$$C = 2\pi r$$

Formulas:

$$LA = 2\pi rh$$

$$TA = LA + 2B$$

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

Example 1 – Find the Lateral Area, Total Area, and Volume of the Cylinder.

10in

4in

Radius – 4in

Area of Base = $16\pi in^2$

Height = 10in

Volume = $\pi(4^2)(10) = 160\pi in^3$

L.A. = $2\pi(4)(10) = 80\pi in^2$

T.A. = $80\pi + 2(16\pi) = 112\pi in^2$

Example 2

Radius – 7m
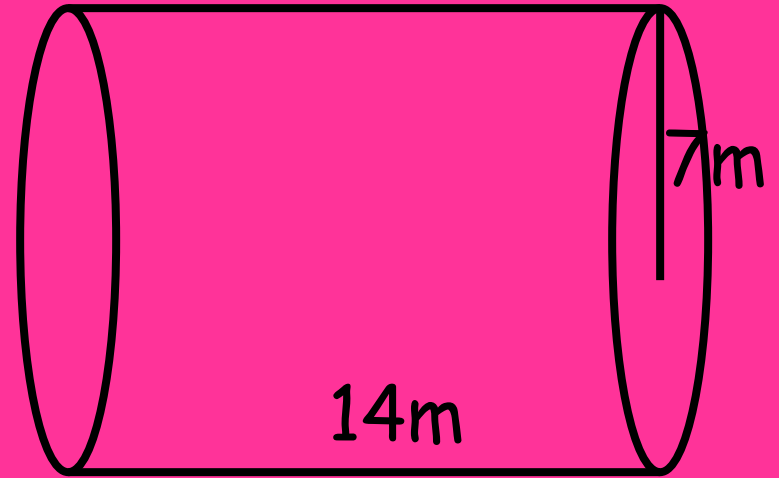
Area of Base = $49\pi m^2$

Height = 14m

Volume = $\pi(7^2)(14)$ = $686\pi m^3$

L.A. = $2\pi(7)(14)$ = $196\pi m^2$
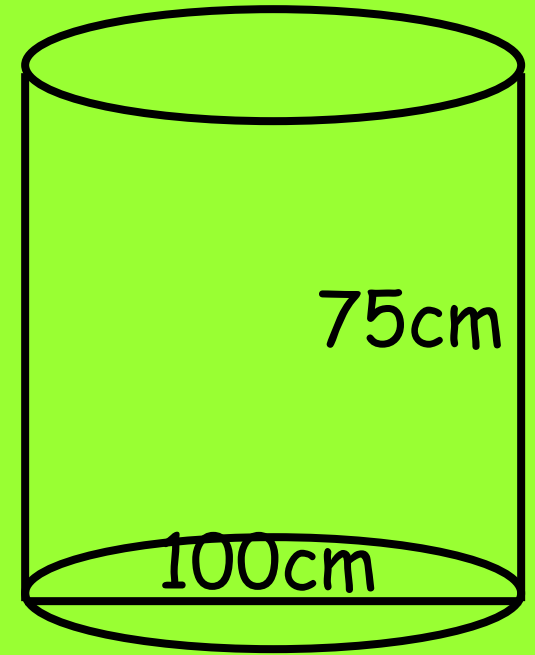
T.A. = $196\pi + 2(49\pi)$ = $294\pi m^2$

Example 3
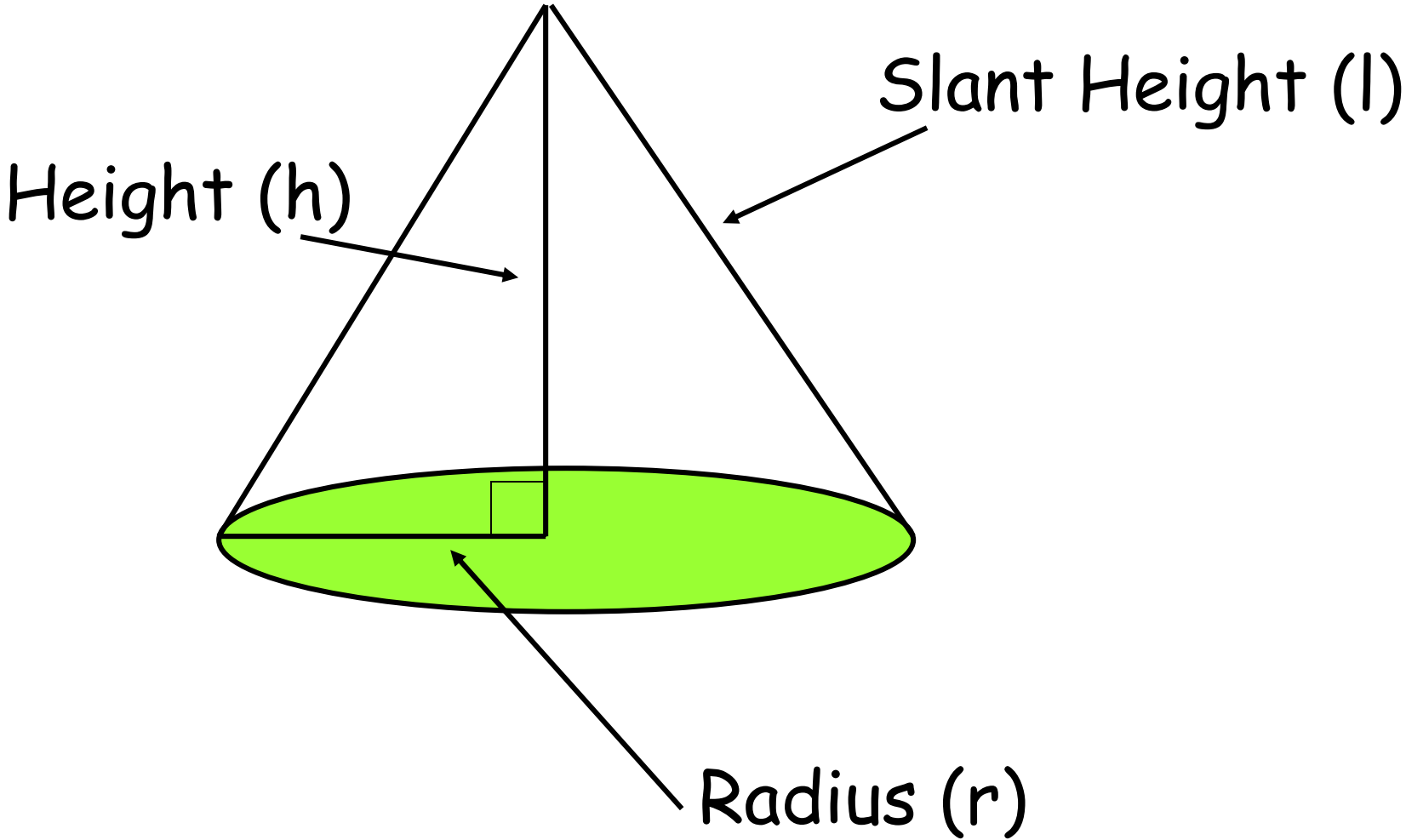

Radius – 50cm

Area of Base = $2500\pi cm^2$

Height = 75cm

Volume = $\pi(50^2)(75)$ = $187500\pi cm^3$

L.A. = $2\pi(50)(75)$ = $7500\pi cm^2$

T.A. = $7500\pi + 2(2500\pi) = 12500\pi cm^2$

A cone has one circular base.

Height (h)

Slant Height (l)

Radius (r)

Formula for Volume

Volume = $\frac{1}{3}$ Area of the Base x Height

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

Formula for Lateral Area

L.A. = ½ Circumference of Base x Slant Height

$$L.A. = \frac{1}{2}Cl \qquad C = 2\pi r \qquad L.A. = \pi r l$$

Formula for Total Area

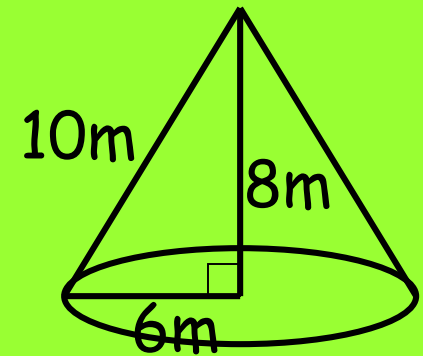Total Area = Lateral Area + Area of Base

$$T.A. = L.A. + B$$

c

o

n

e

Therefore, to calculate Total Area and Volume of a Cone you must find three key pieces of information:

1. Area of the Base – πr^2

2. Height of the object – h

3. Slant Height - l

Example 1

Radius (r) – 6m

Area of the Base (B) – $36\pi m^2$

Height (h) – 8m

Slant Height (l) – 10m

$L.A. = \pi r l$

Lateral Area (L.A.) – $\pi(6)(10)$
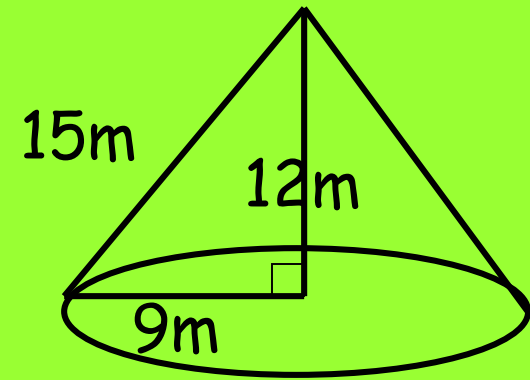
$60\pi m^2$

$T.A. = L.A. + B$

Total Area (T.A) –

$60\pi + 36\pi = $ $96\pi m^2$

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

Volume (V) – $\dfrac{1}{3}(36\pi)(8)$

$96\pi m^3$

Example 2

Radius (r) – 9m

Area of the Base (B) – $81\pi m^2$

Height (h) – 12m

Slant Height (l) – 15m

$$L.A. = \pi rl$$

Lateral Area (L.A.) – $\pi 9(15)$

L.A. = $135\pi m^2$

$$T.A. = L.A. + B$$

Total Area (T.A) –

$135\pi + 81\pi = 216\pi m^2$

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

Volume (V) – $\frac{1}{3}(81\pi)(12)$

$324\pi m^3$

Example 3 –

Lateral Area – $260\pi cm^2$

Total Area – $360\pi cm^2$

Volume – $800\pi cm^3$