Geometry

Mr. Bower

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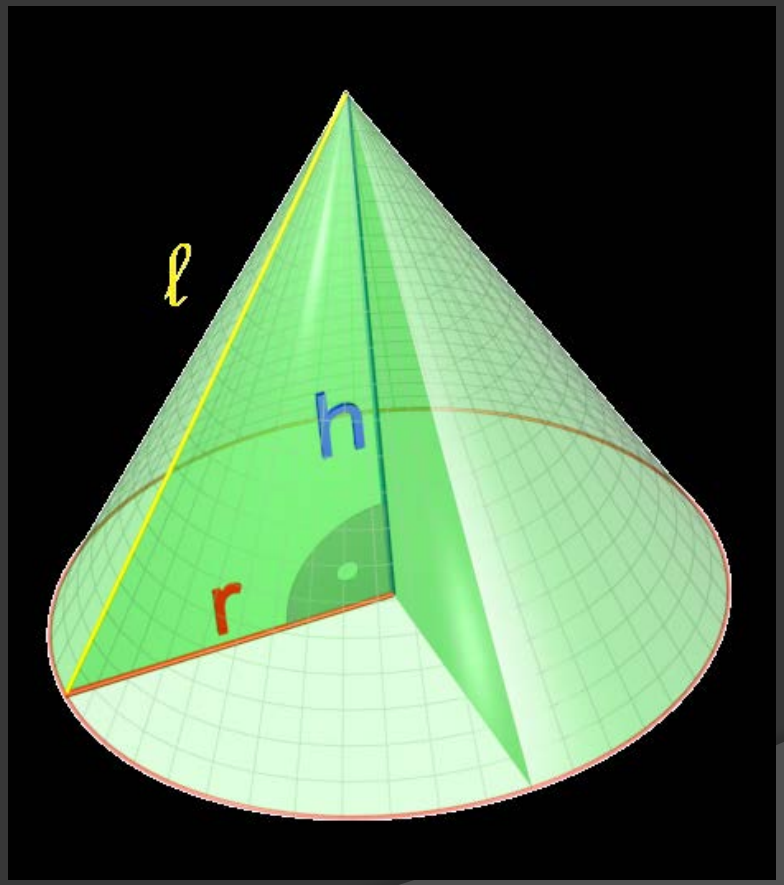
CONES

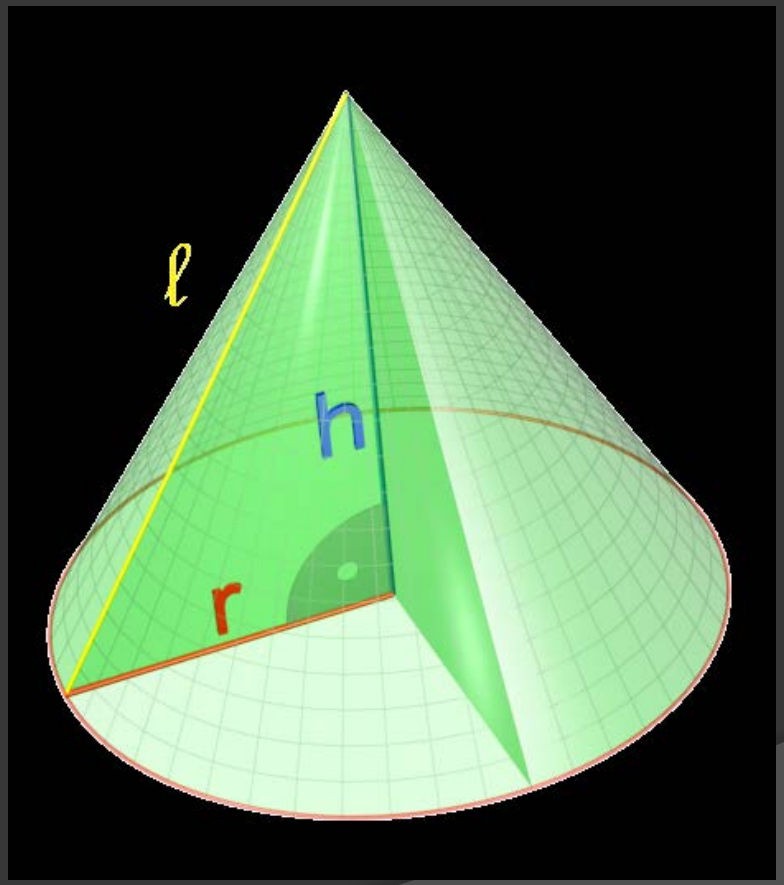
What is a cone?

- When you spin a right triangle (using one of the legs as an axis), you get a **cone**



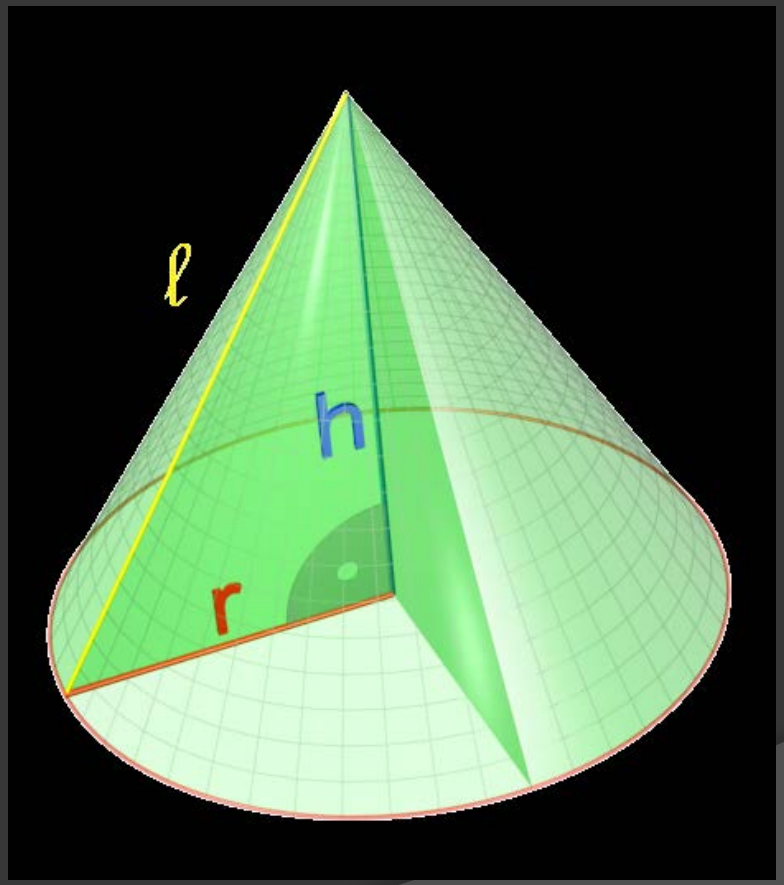
Cones vs. Pyramids

- How are cones and pyramids similar?



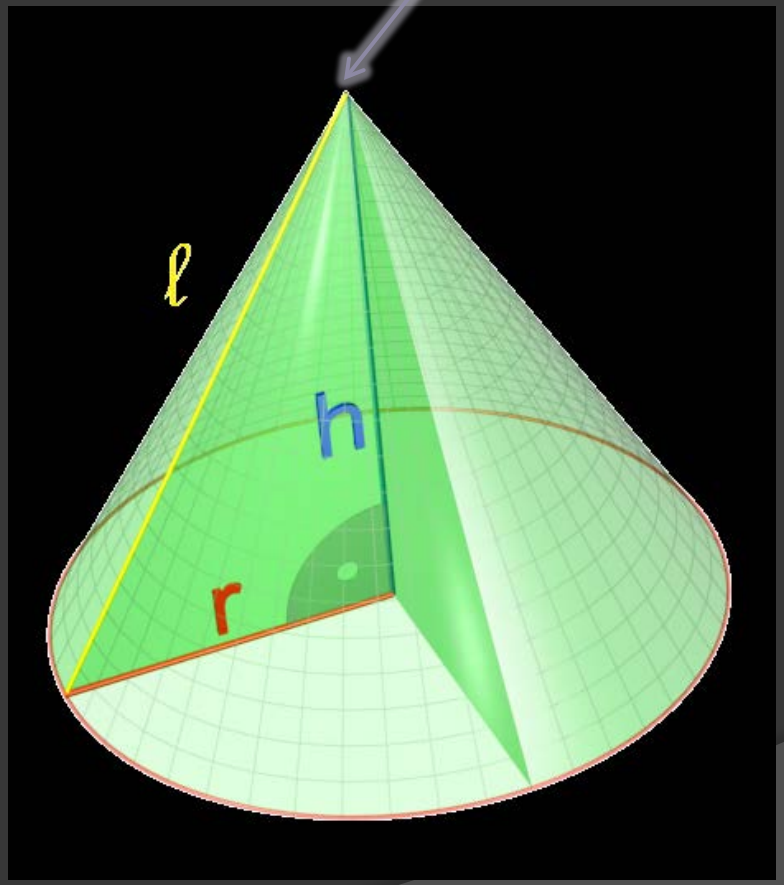
Cones vs. Pyramids

- How are cones and pyramids similar?
- How are cones and pyramids different?



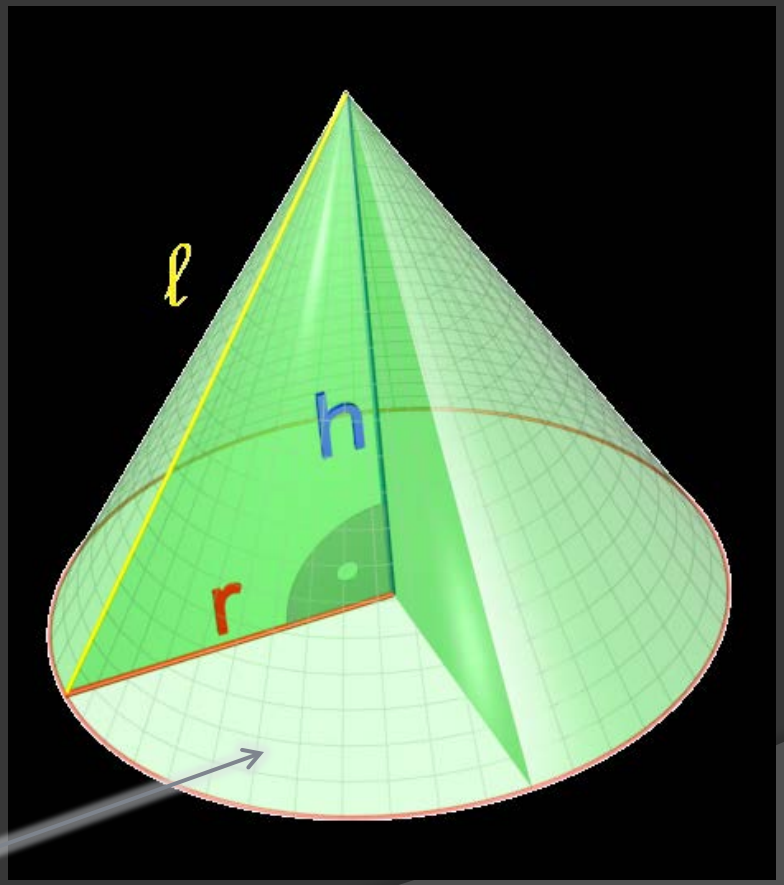
Parts of a cone

- The **apex** is the point at the top of the cone



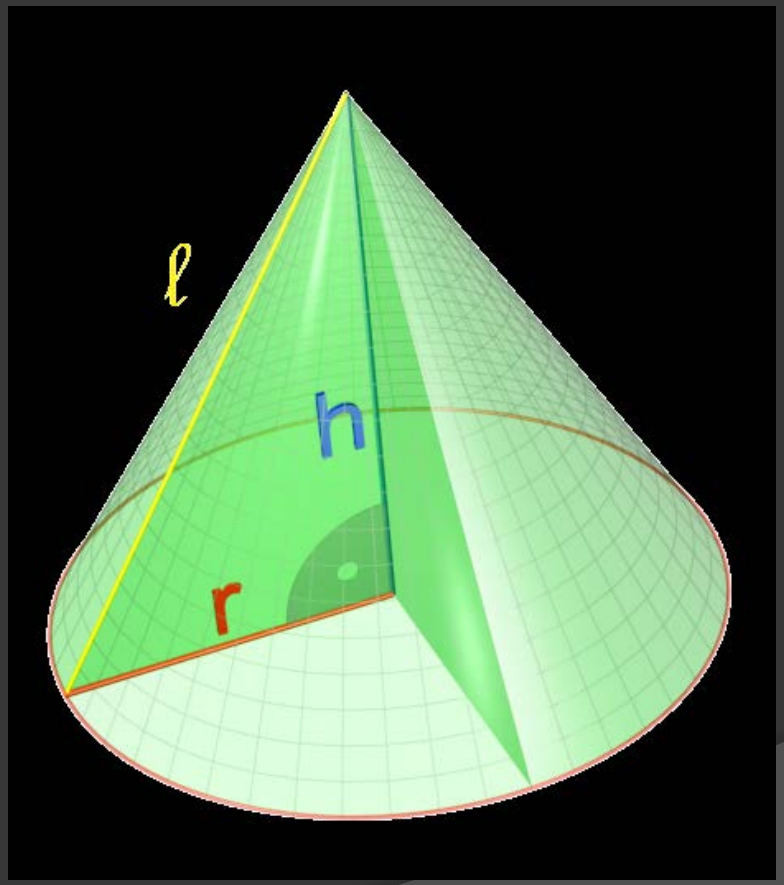
Parts of a cone

- The **base** is the circle at the bottom (or top, if you're eating ice cream!) of the cone
- The **radius** of that circle is called ***r***.



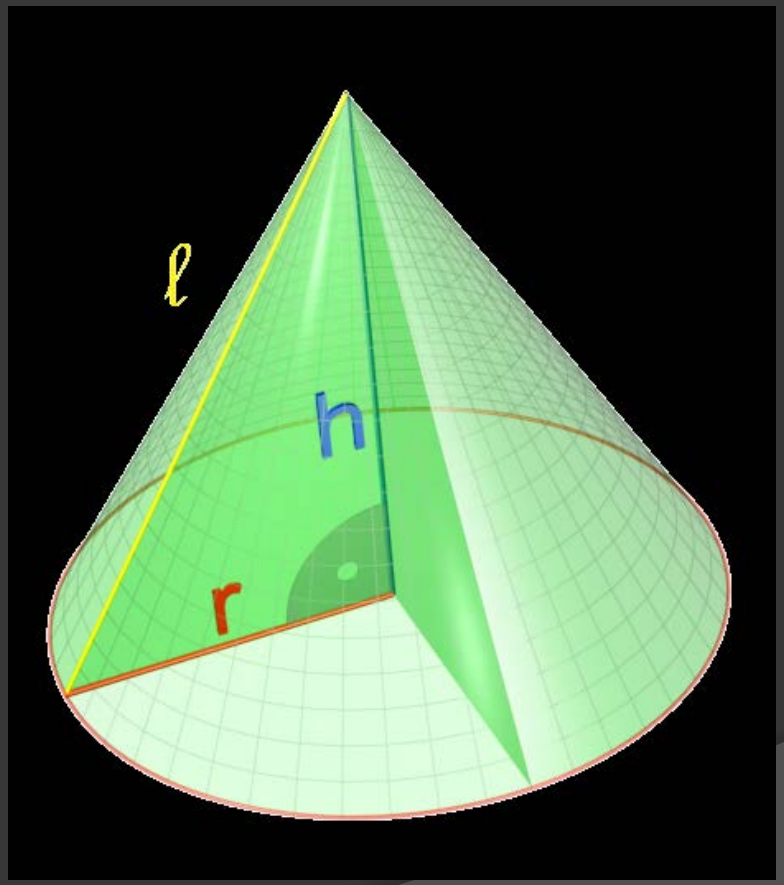
Parts of a cone

- The perpendicular distance from the circular base to the apex is the **height**, which we call ***h***.



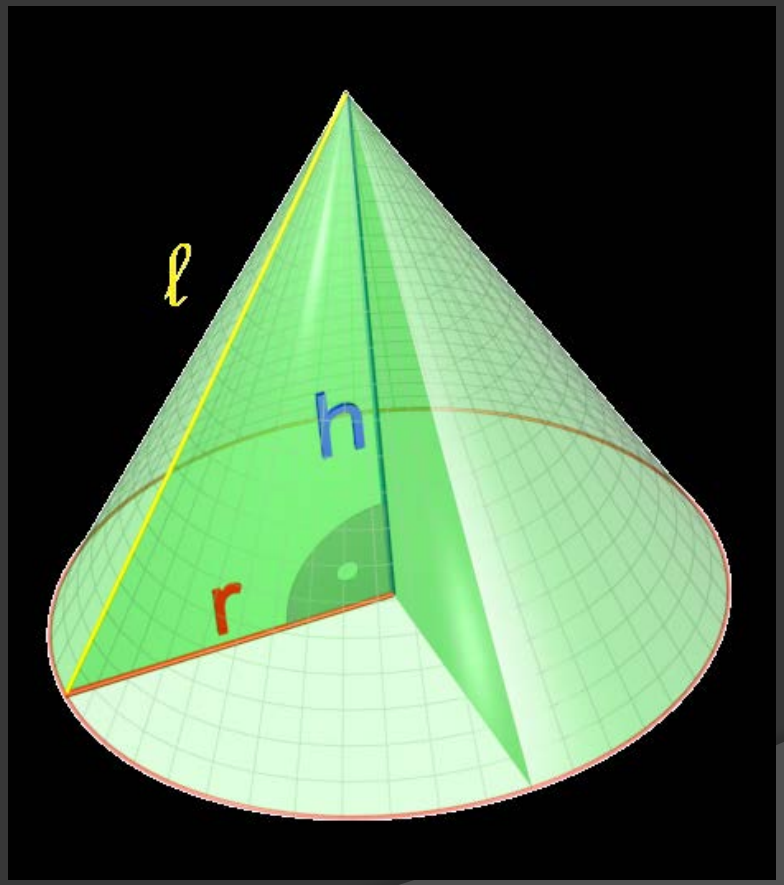
Parts of a cone

- The **slant height**, which we call ***l***, is the distance from the apex to a point on the circle.



Right triangle in a cone

- A cone has one right triangle
- $h^2 + r^2 = l^2$



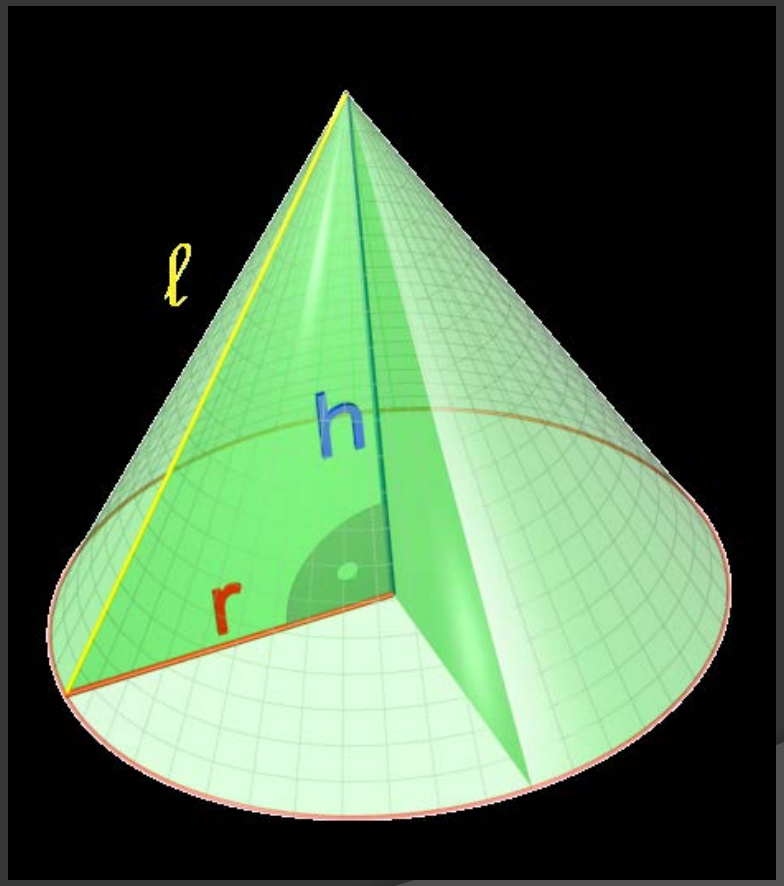
Cone – Lateral Area

- The LATERAL AREA of a cone includes the "side" of the cone (not the circular base)

- $L.A. = \frac{1}{2}(2\pi r) \bullet l$

or

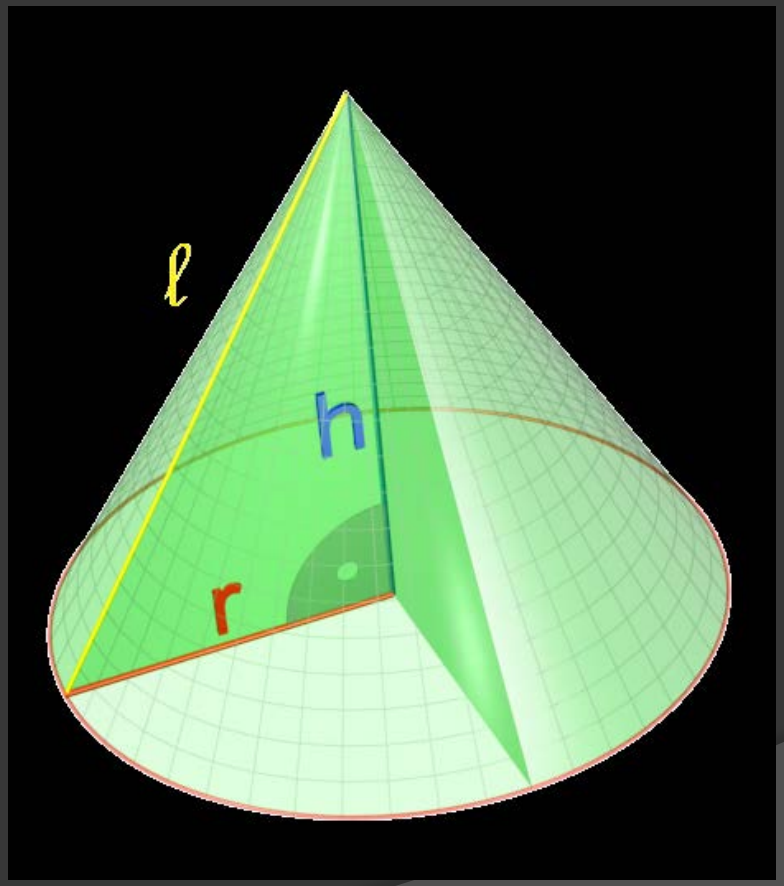
$L.A. = \pi r l$



Cone – Surface Area

- The SURFACE AREA of a cone is the sum of the lateral area and the circular base

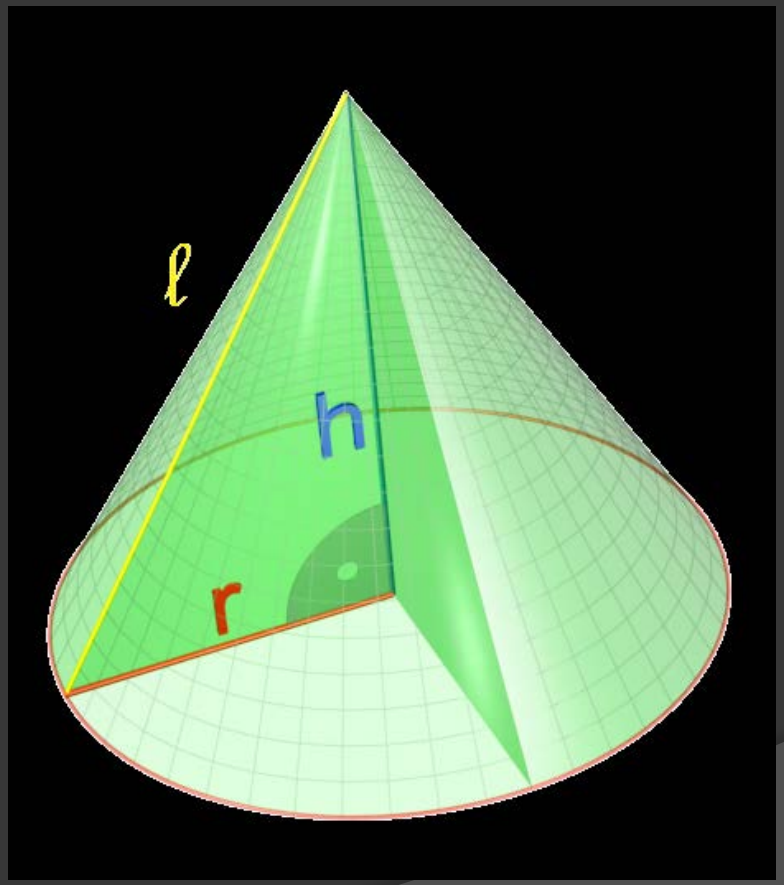
- $S.A. = L.A. + \pi r^2$



Cone – Volume

- The VOLUME of a cone is the amount of space inside the cone

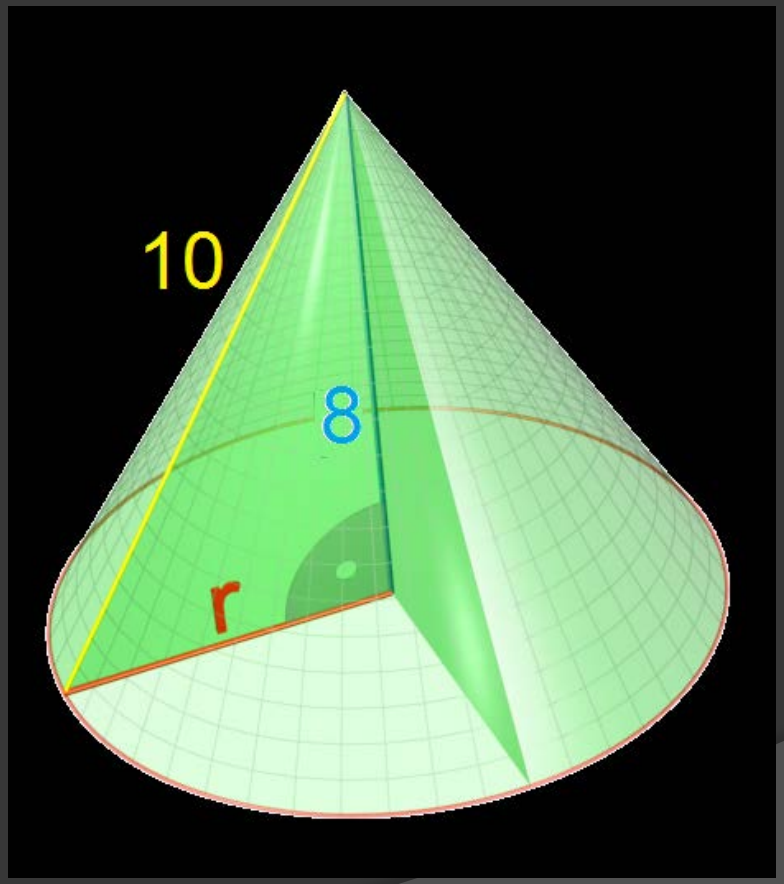
- $V = \frac{1}{3}(\pi r^2) \bullet h$



Cone – Example

- A cone has a height of 8 cm and a slant height of 10 cm.

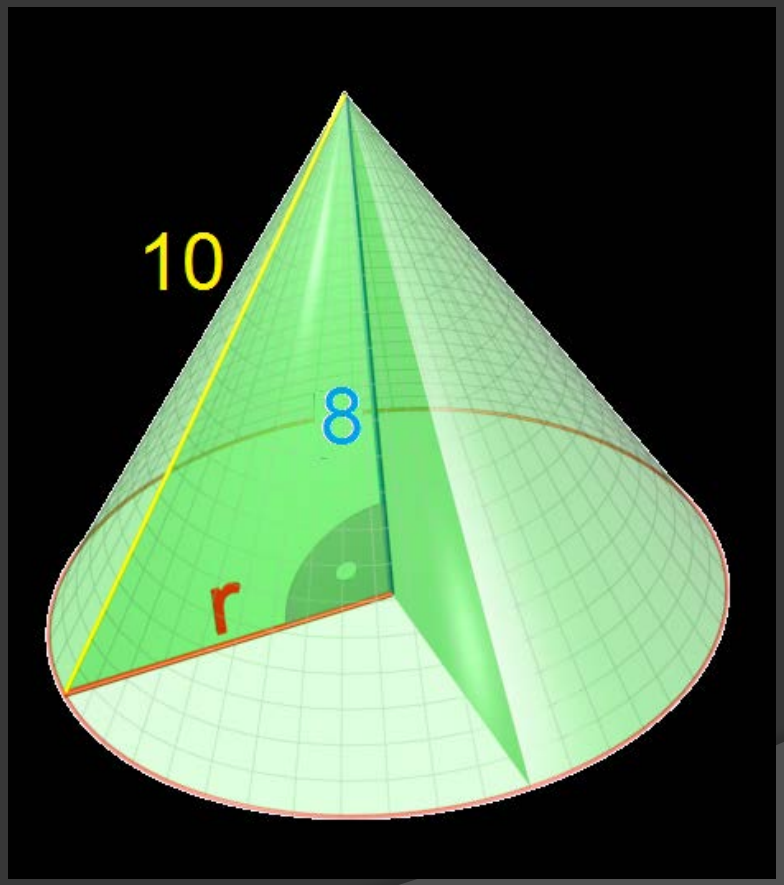
- Find the cone's…
  - Lateral Area
  - Surface Area
  - Volume



Cone – Example – How to start

- A cone has a height of 8 cm and a slant height of 10 cm.
- Let's start by making sure we know

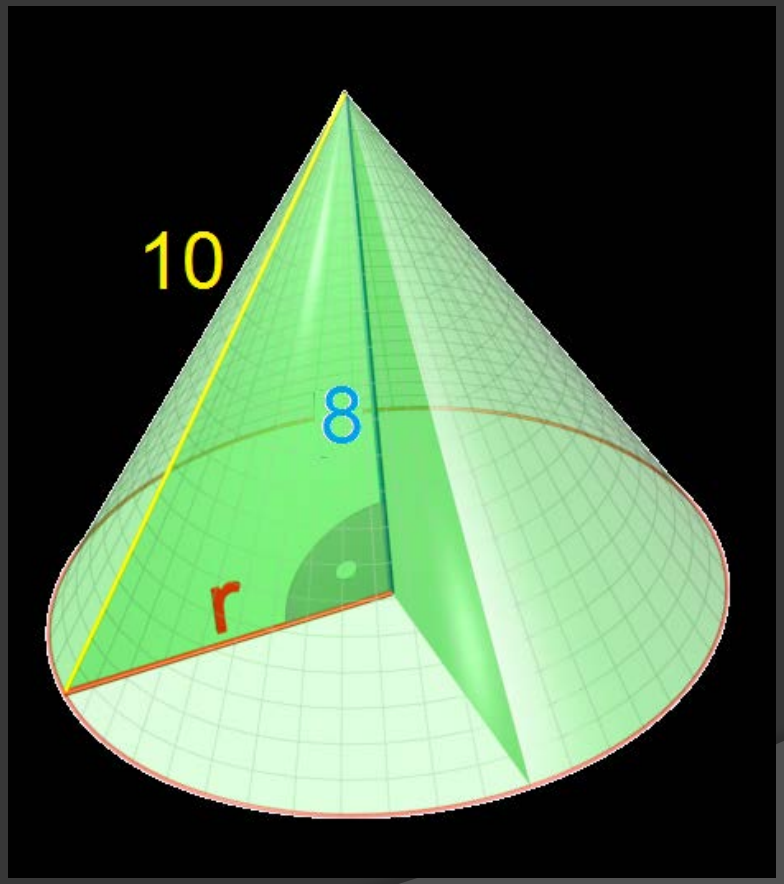
  h, r, and *l*.



Cone – Example – How to start

- A cone has a height of 8 cm and a slant height of 10 cm.

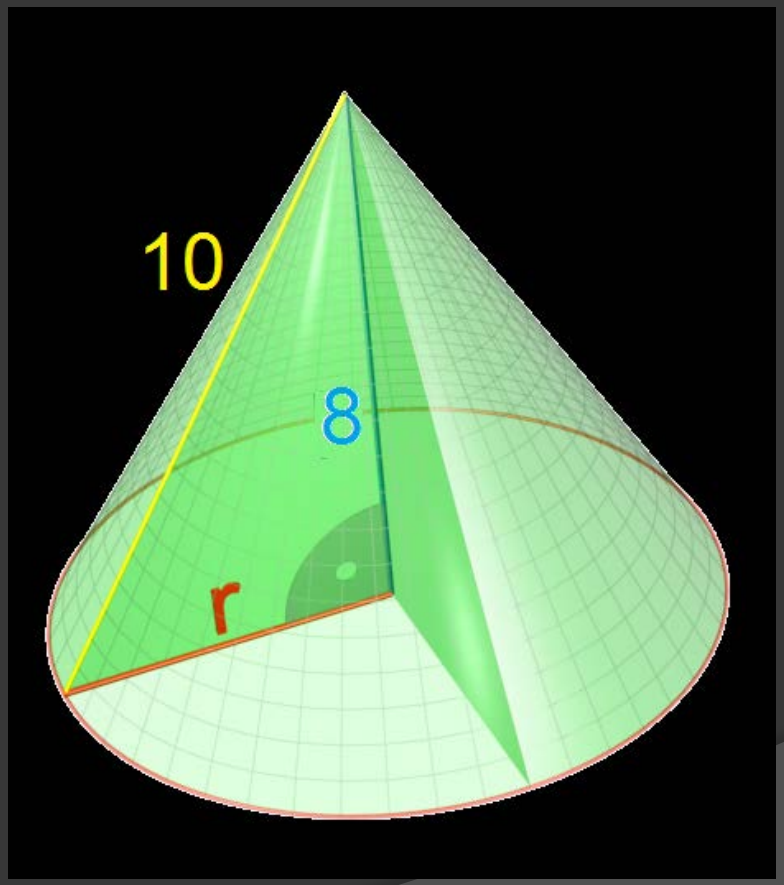
- $h = 8$ and $l = 10$
- We need to calculate r.



Cone – Example – How to start

- A cone has a height of 8 cm and a slant height of 10 cm.

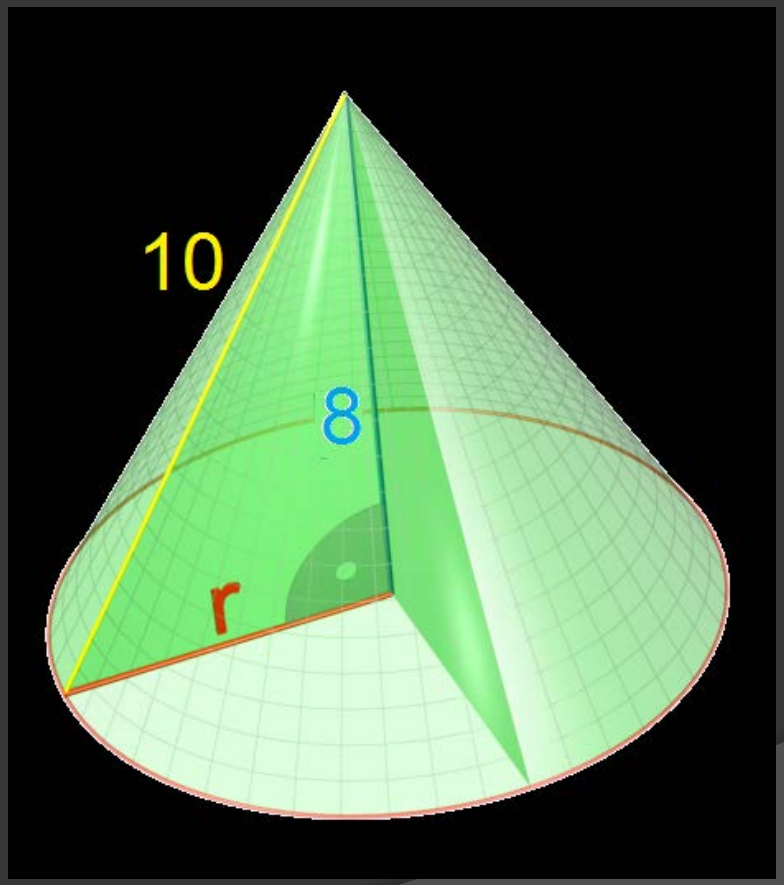
- $h = 8$ and $l = 10$
- We can use $h^2 + r^2 = l^2$



Cone – Example – How to start

- A cone has a height of 8 cm and a slant height of 10 cm.
- $h = 8$ and $l = 10$

$$8^2 + r^2 = 10^2$$

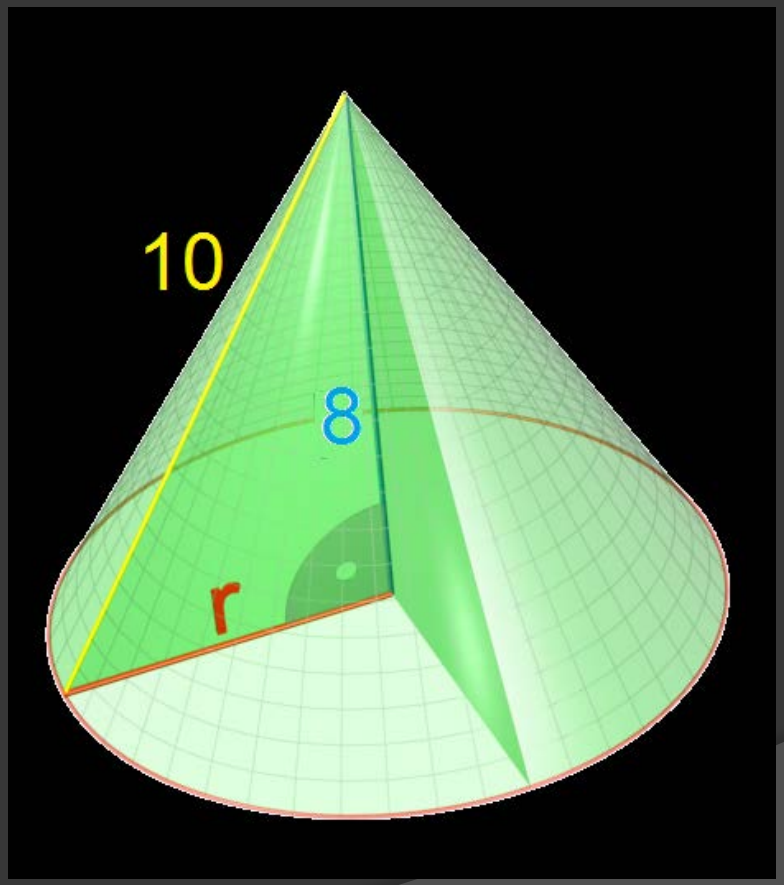


Cone – Example – How to start

- A cone has a height of 8 cm and a slant height of 10 cm.

- $h = 8$ and $l = 10$

$$64 + r^2 = 100$$

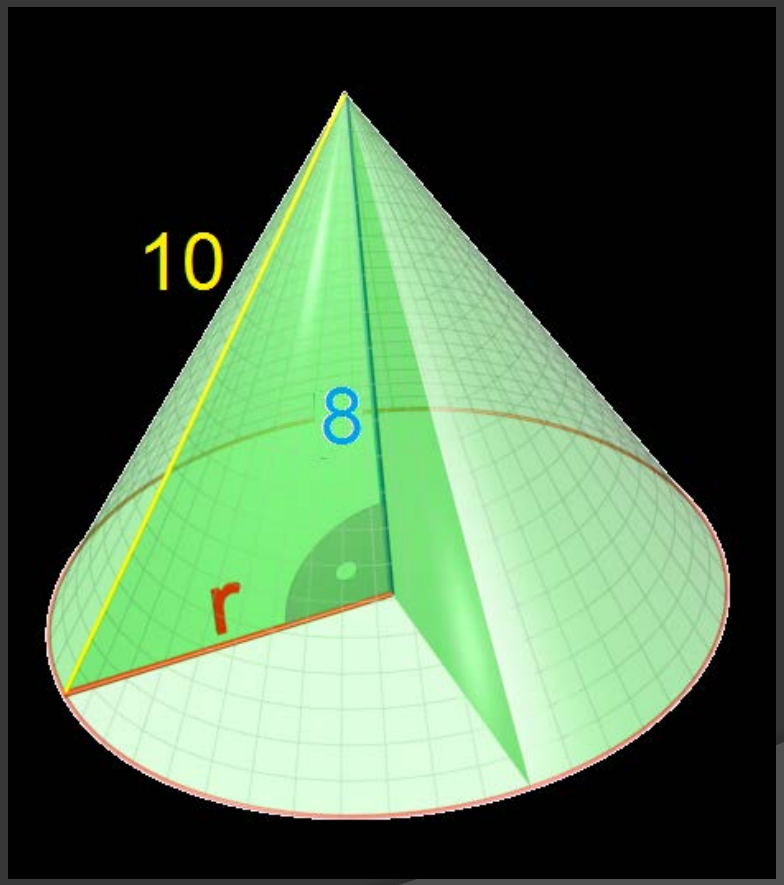


Cone – Example – How to start

- A cone has a height of 8 cm and a slant height of 10 cm.

- $h = 8$ and $l = 10$

$$r^2 = 36$$

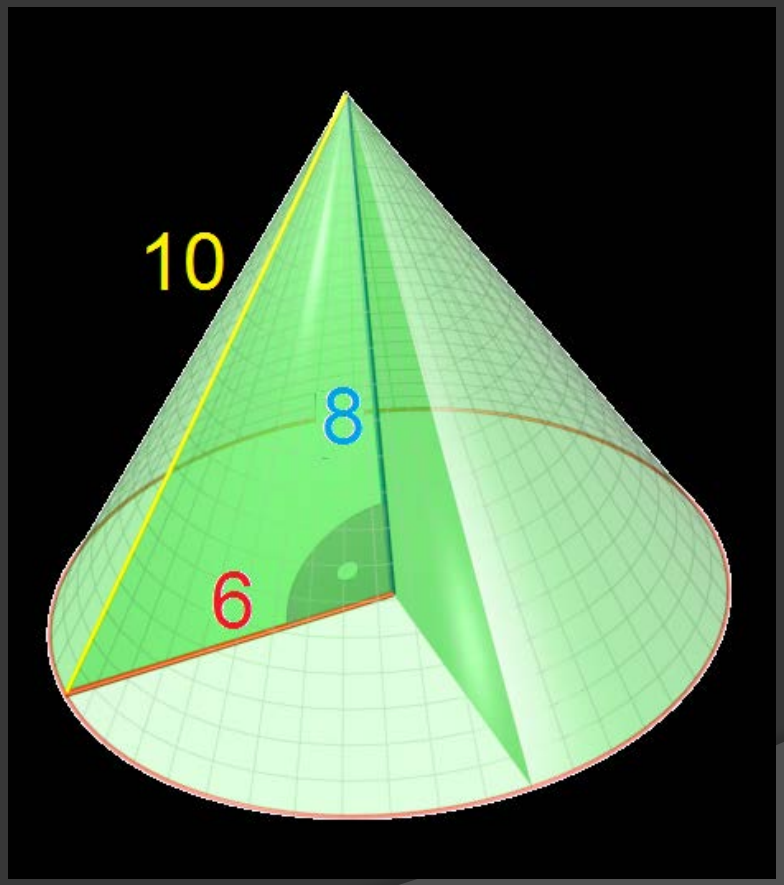


Cone – Example – How to start

- A cone has a height of 8 cm and a slant height of 10 cm.
- $h = 8$ and $l = 10$

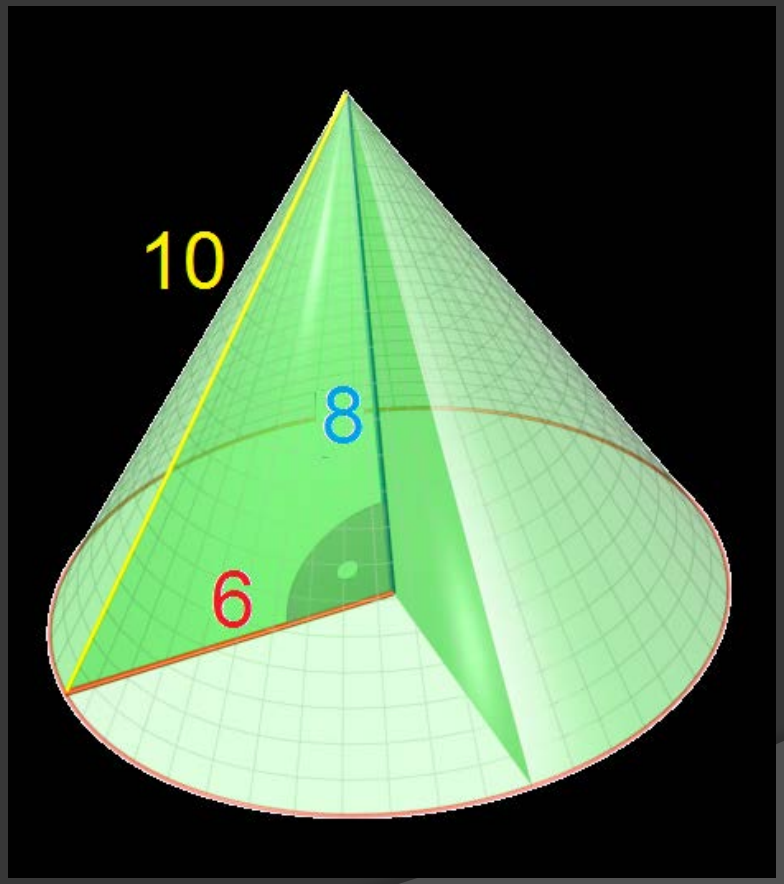
$$r = 6$$

Now we know all three segments!



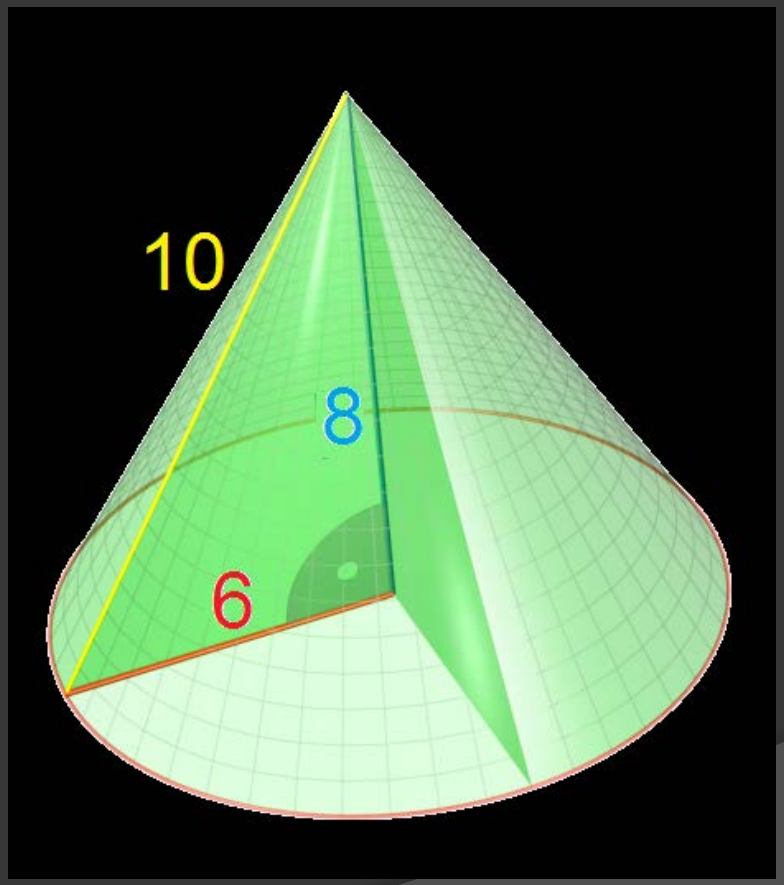
Cone – Example – Lateral Area

- A cone has a height of 8 cm and a slant height of 10 cm.
- Let's find the lateral area
- $L.A. = \frac{1}{2}(2\pi r) \bullet l$



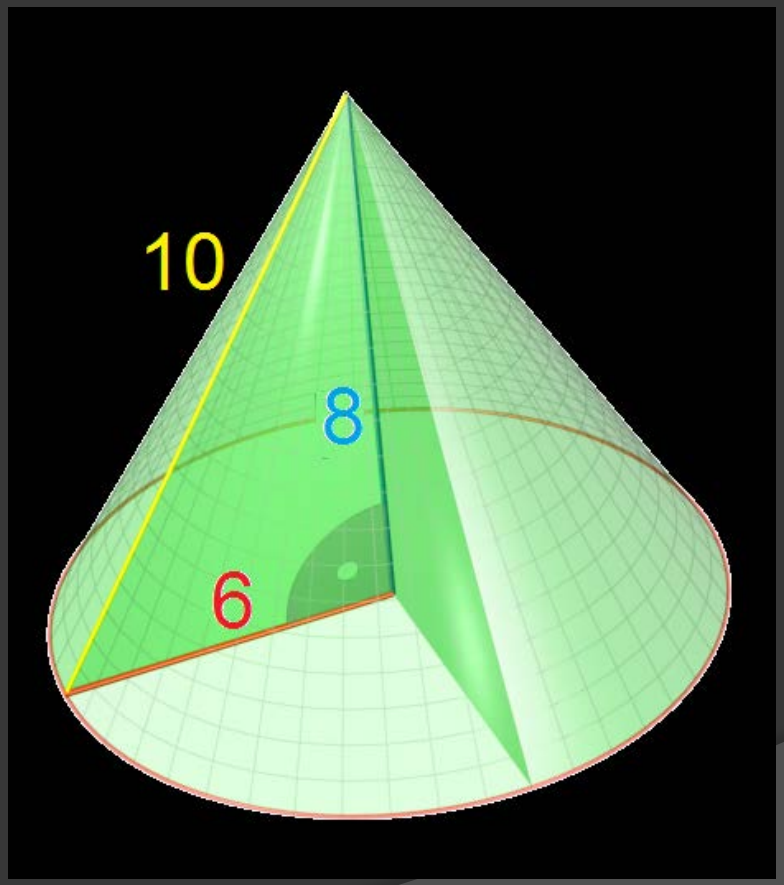
Cone – Example – Lateral Area

- A cone has a height of 8 cm and a slant height of 10 cm.
- Let's find the lateral area
- $L.A. = \frac{1}{2}(2\pi \bullet 6) \bullet 10$



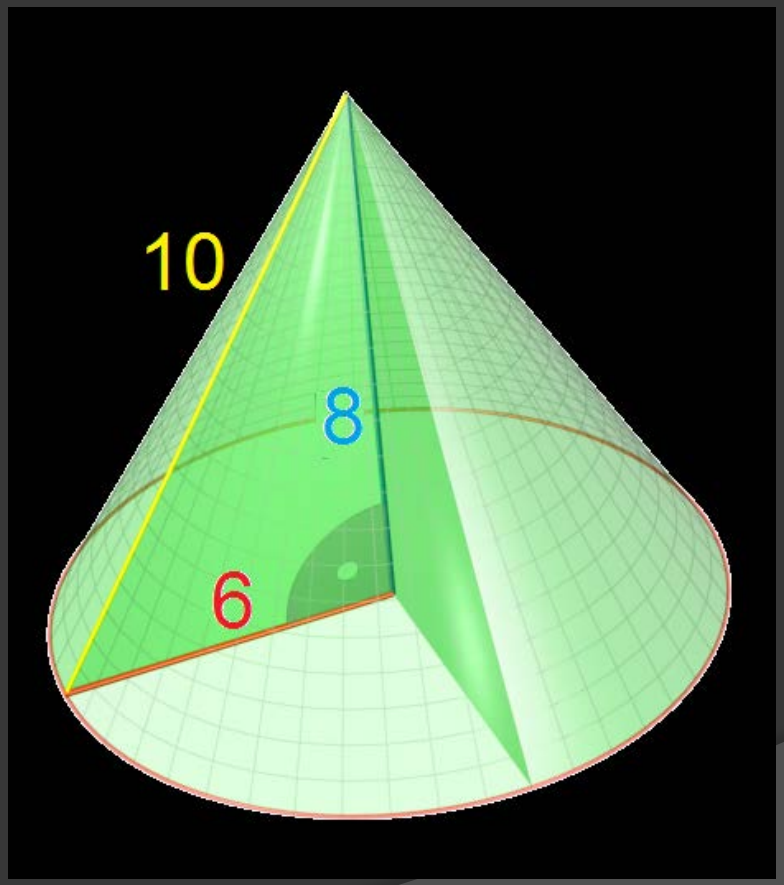
Cone – Example – Lateral Area

- A cone has a height of 8 cm and a slant height of 10 cm.
- Let's find the lateral area
- $L.A. = \mathbf{60\pi\ cm^2}$



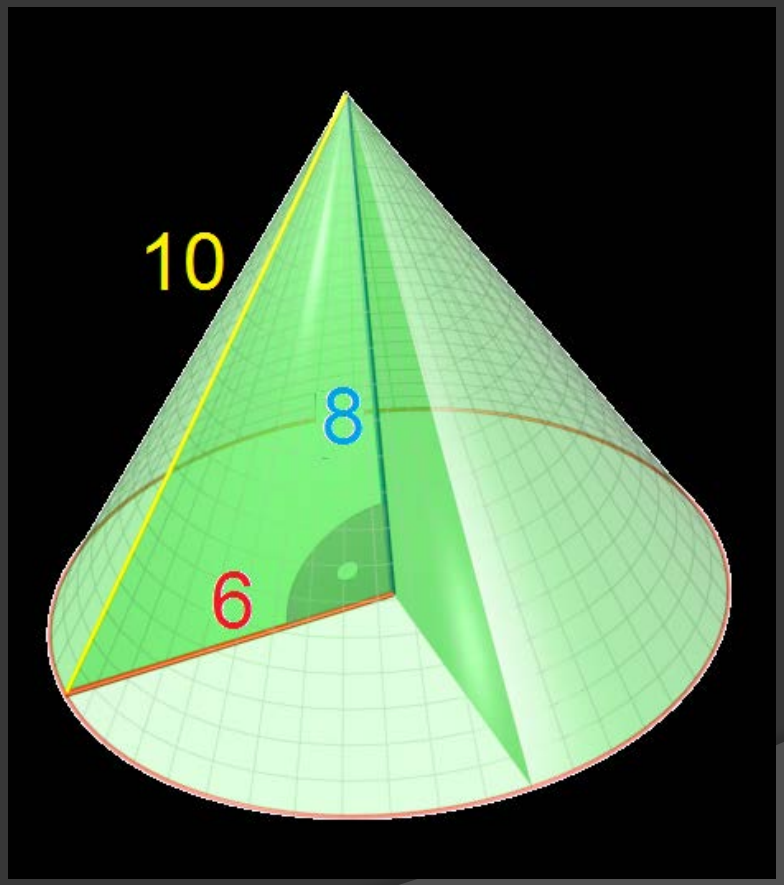
Cone – Example – Surface Area

- A cone has a height of 8 cm and a slant height of 10 cm.
- Let's find the surface area
- $S.A. = L.A. + \pi r^2$



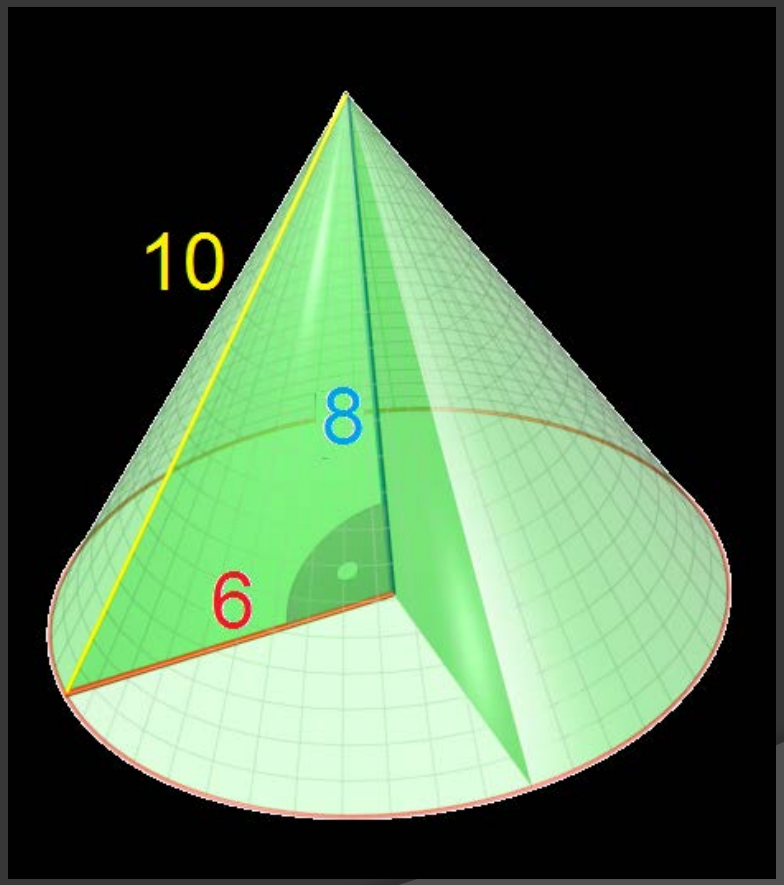
Cone – Example – Surface Area

- A cone has a height of 8 cm and a slant height of 10 cm.
- Let's find the surface area
- $S.A. = 60\pi + \pi(6)^2$



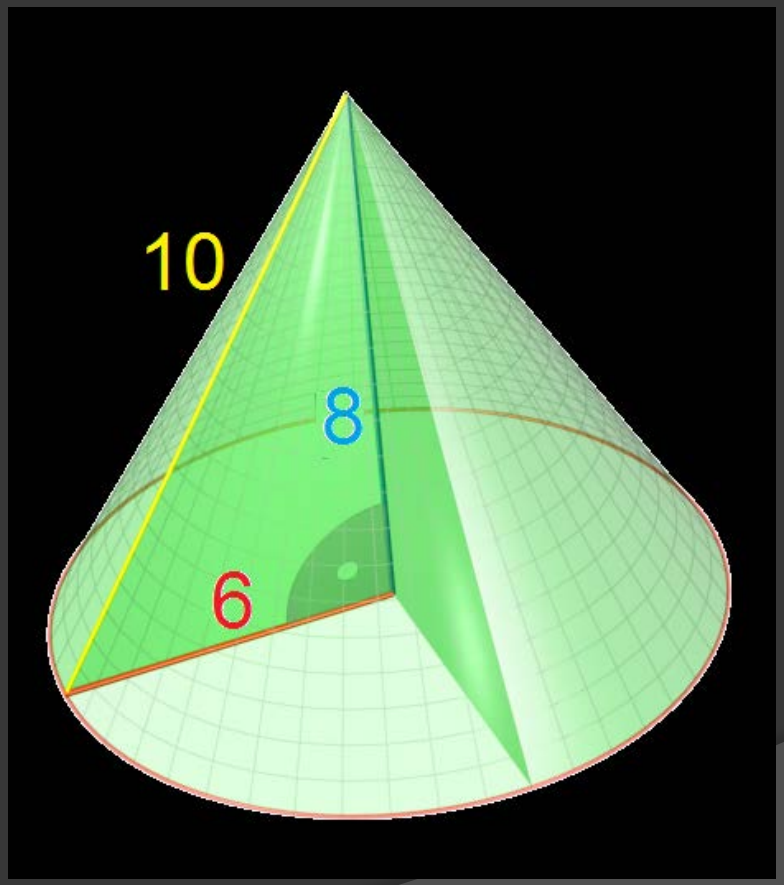
Cone – Example – Surface Area

- A cone has a height of 8 cm and a slant height of 10 cm.
- Let's find the surface area
- $S.A. = 60\pi + 36\pi$



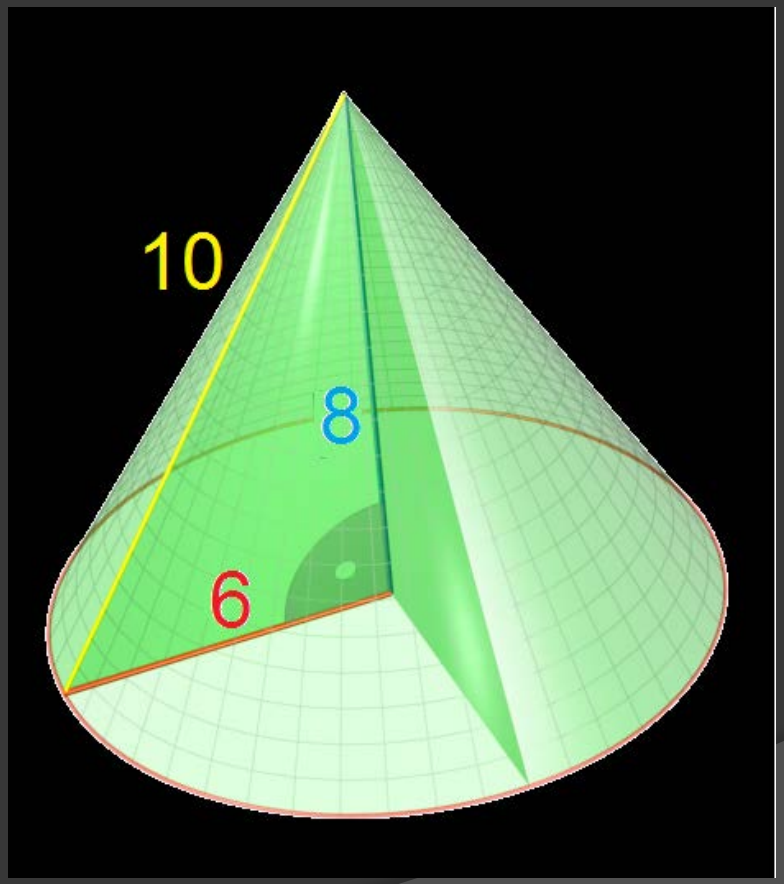
Cone – Example – Surface Area

- A cone has a height of 8 cm and a slant height of 10 cm.
- Let's find the surface area
- $S.A. = \mathbf{96\pi\ cm^2}$



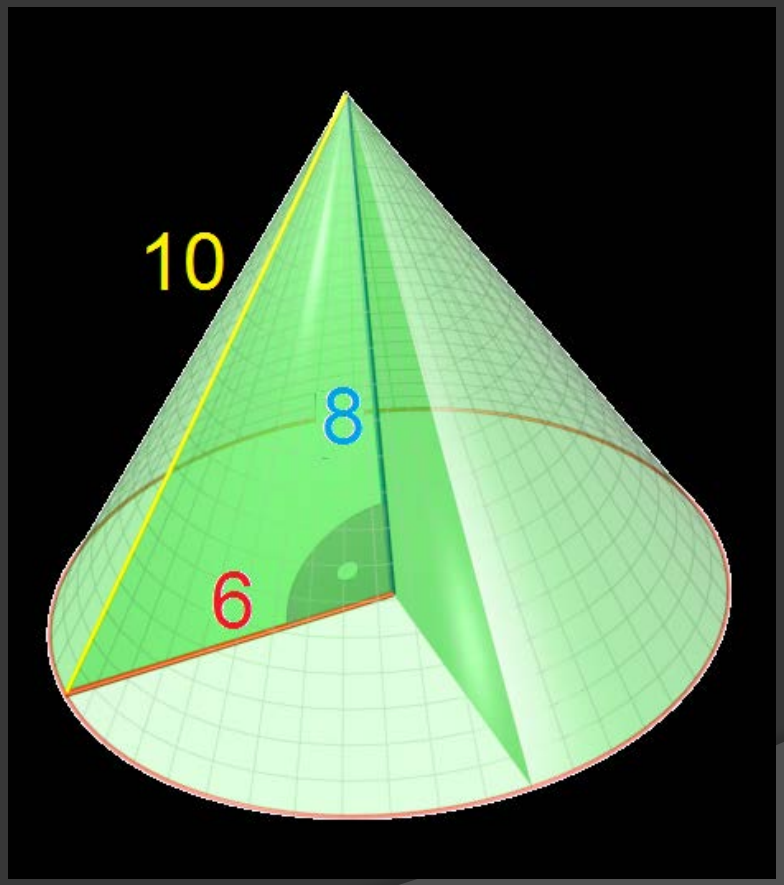
Cone – Example – Volume

- A cone has a height of 8 cm and a slant height of 10 cm.
- Let's find the volume
- $V = \frac{1}{3}(\pi r^2) \bullet h$



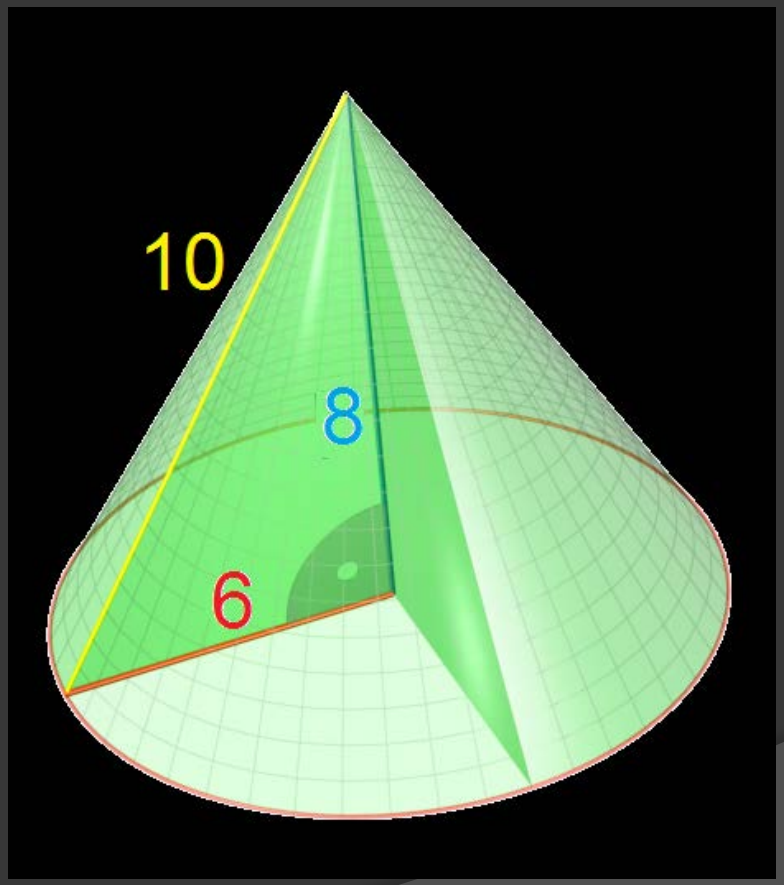
Cone – Example – Volume

- A cone has a height of 8 cm and a slant height of 10 cm.
- Let's find the volume
- $V = \frac{1}{3}\ (36\pi) \bullet 8$



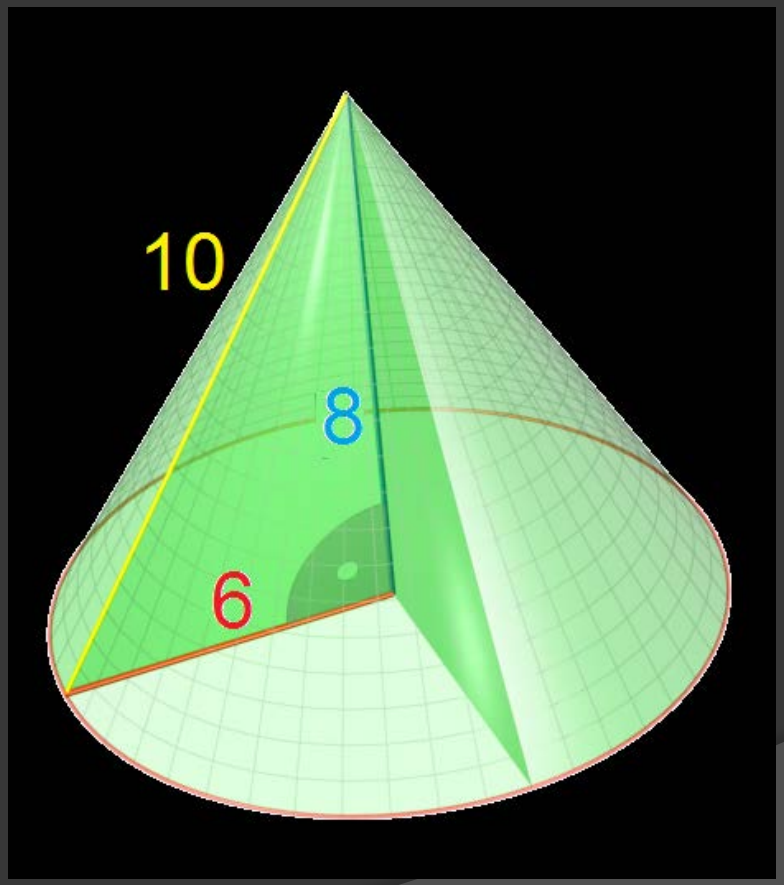
Cone – Example – Volume

- A cone has a height of 8 cm and a slant height of 10 cm.
- Let's find the volume
- $V = 12\pi \bullet 8$



Cone – Example – Volume

- A cone has a height of 8 cm and a slant height of 10 cm.
- Let's find the volume
- $V = \mathbf{96\pi\ cm^3}$



Cone – Summary

- Right Triangle

$$h^2 + r^2 = l^2$$

- Lateral Area

$$L.A. = \frac{1}{2}(2\pi r) \bullet l$$

or

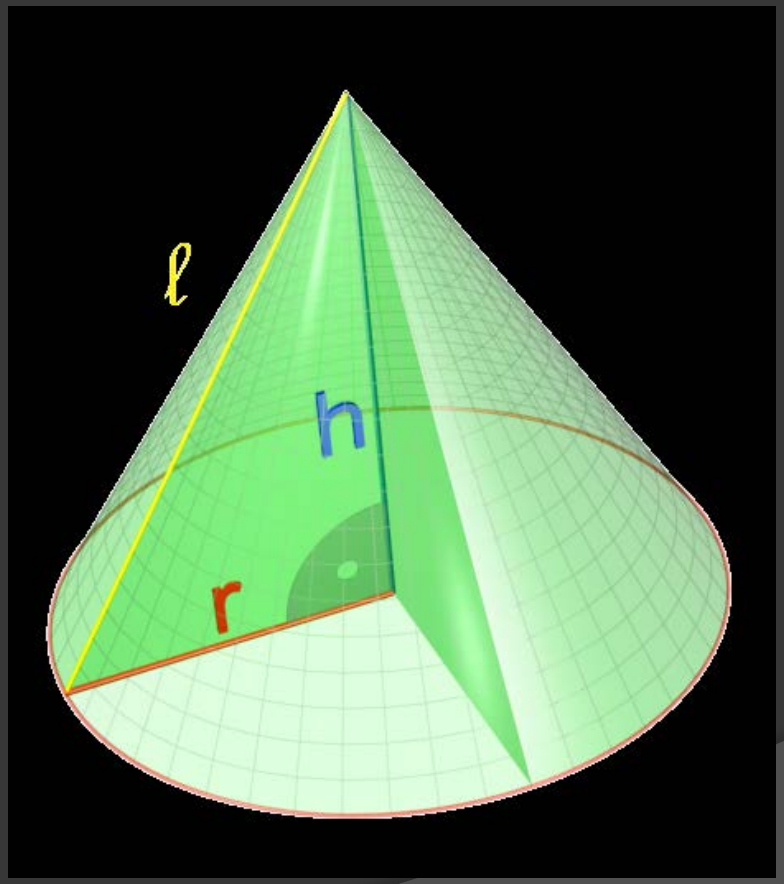
$$L.A. = \pi r l$$

- Surface Area

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

- Volume

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



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