Surface of a Cone (C)

A right circular cone is a cone whose base is a disk and whose vertex lies on the line perpendicular to the base and passing through the center of the base. Such a cone is characterized by the radius of the base and the **altitude** of the cone, that is, the distance from the vertex to the center of the base. The **slant height** of such a cone is the length of a straight line drawn from any point on the perimeter of the cone to the vertex. If the radius of the base is *R* and the altitude of the cone is *H*, then the slant height is

$$S \equiv \text{Slant height} = \sqrt{R^2 + H^2}$$

which can be seen from the Pythagorean Theorem. The surface area of the cone (neglecting the area of the base) is given by

$$SA \equiv \text{Surface Area} = \pi R\sqrt{R^2 + H^2}$$

as can be seen by slicing the cone up the side and unrolling into a sector of a circle whose radius is the slant height and whose perimeter is $2\pi R$.

Exercises

1. Find the slant height and surface area of a right circular cone whose altitude is 12 and whose base radius is 5
2. What is the effect on the surface area of the cone of doubling the altitude and the radius of the base?
3. What is the surface area of a cone if the altitude is the same as the radius of the base?