Cone: A three-dimensional figure that consists of a circular **base** and a curved **lateral surface** that connects the base to a single point not in the plane of the **base**. The **altitude** of a cone is the perpendicular segment from the vertex to the plane of the base. The **height** of the cone is the length of the altitude.

Right Cone: A cone with an altitude that intersects the base of the cone at its center.
**Oblique Cone**: A cone with an altitude that intersects the base of the cone at a point other than the center.

Right Cone   Oblique Cone
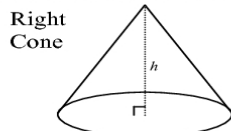
Surface Area of a Right Cone: The surface area, **S**, with lateral area **L**, base area **B**, radius **r**, and slant height **l** is
$$S = L + B \quad \text{or} \quad S = \pi r l + \pi r^2$$

Volume of a Cone (right or oblique): The volume, **V**, of a cone with radius **r**, height **h**, and base area **B** is
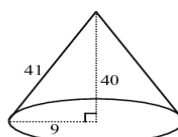$$V = \frac{1}{3} Bh \quad \text{or} \quad V = \frac{1}{3} \pi r^2 h$$

Practice: Find the exact (in terms of π) surface area and volume of each right cone.

1.

2.
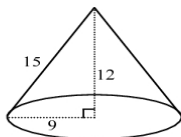
Find the exact (in terms of π) surface area of each right cone with a radius r, height h, and slant height l.

3. $r = 5.1$, $h = 2$, $l = 5.5$ 4. $r = 13$, $h = 17$, $l = 21.4$

5. $r = 4.2$, $h = 3.8$, $l = 5.7$ 6. $r = 1.1$, $h = 3$, $l = 3.2$

Find the exact (in terms of π) volume of each right cone with a radius r and height h.

7. $r = 0.5$, $h = 4$ 8. $r = 15$, $h = 20$

9. $r = 24$, $h = 30$ 10. $r = 8.2$, $h = 9$

11. The volume of a right cone is 1680π cm^3. The radius of its base is 12 cm. What is the height of the cone?

12. A sugar cone for ice cream is a cone with a radius of 3 cm and a height of 15 cm. A cake cone looks like a sugar cone with the tip removed. If the volume of a cake cone is 24π cm^3, how much larger is the sugar cone than the cake cone? Express your answer as a percent.