12.3 Surface Areas of Pyramids and Cones

- **Pyramid**:
  - Lateral Area: $L = \frac{1}{2} P\ell$
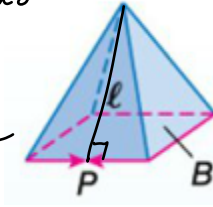
  perimeter of base

  slant height

  - Surface Area: $S = \frac{1}{2}P\ell + B$ ← area of base
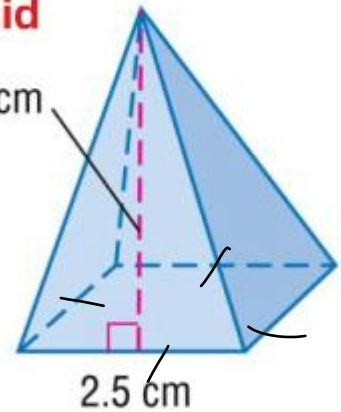
Ex. 1 Find the lateral area of the square pyramid.

mid

$$L = \frac{1}{2} P\ell$$
$$\frac{1}{2} \cdot 10 \cdot 5$$
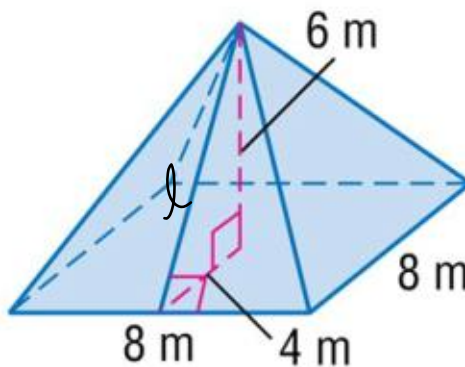$$\boxed{25 \ cm^2}$$

5 cm

2.5 cm

Find the surface area of the square pyramid to the nearest tenth.

$$S = \frac{1}{2}P\ell + B$$
$$\frac{1}{2} \cdot 32(7.2) + 64$$
$$\boxed{S = 179.2 \ m^2}$$
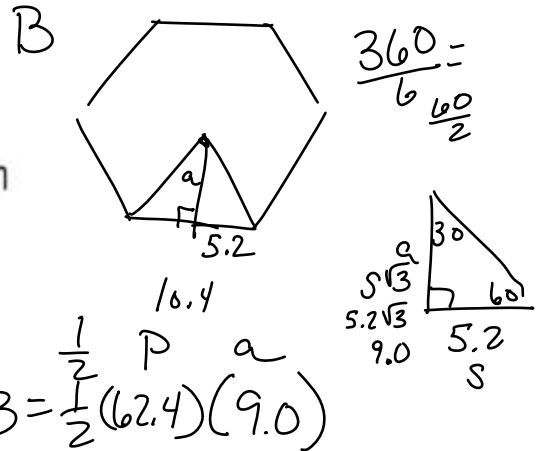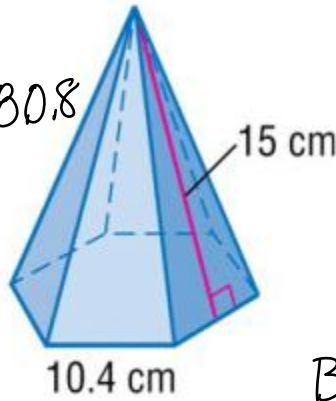
6 m

ℓ

8 m

8 m   4 m

$4^2 + 6^2 = \ell^2$
$7.2 = \ell$

Find the surface area of the regular pyramid. Round to the nearest tenth.

$S = \frac{1}{2}Pl + B$

$\frac{1}{2}(62.4)(15) + 280.8$

$\boxed{748.8\ cm^2}$

15 cm

10.4 cm

B

$\frac{360}{6} = 60$

$\frac{60}{2}$

5.2

10.4

$\frac{1}{2}\ P \quad a$

$B = \frac{1}{2}(62.4)(9.0)$

$5\sqrt{3}$

$5.2\sqrt{3}$

9.0

30

60

5.2

S

- **Cones**:
  - Lateral Area: $L = \pi r l$
  - Surface Area: $S = \pi r l + \pi r^2$

ℓ

r

ICE CREAM A sugar cone has an altitude of 8 inches and a diameter of $2\frac{1}{2}$ inches. Find the lateral area of the sugar cone.
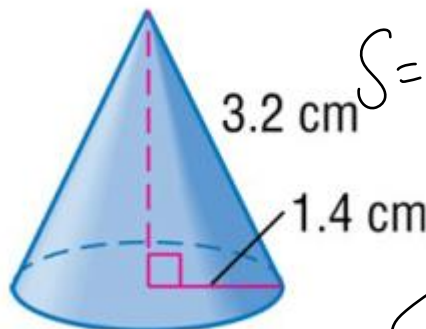
$r = 1.25$

$L = \pi r l$

$\pi \cdot 1.25(8.1) = \boxed{31.8\ in^2}$

$8^2 + 1.25 = l^2$

$8.1 = l$

8

ℓ

1.25

Find the surface area of the cone. Round to the nearest tenth.

3.2 cm

1.4 cm

$S = \pi r l + \pi r^2$

$\pi \cdot 1.4(3.2) + \pi(1.4)^2$

$\boxed{20.2\ cm^2}$