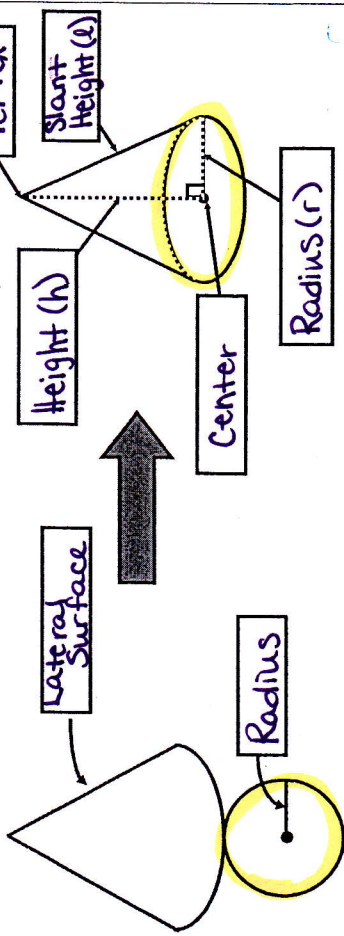


**NOTES 12.3/12.5**

**LATERAL AREA, SURFACE AREA, & VOLUME OF CONES**

The figure below is a net for a right cone:



**FORMULAS**

<b>LATERAL AREA:</b>	<b>SURFACE AREA:</b>	<b>VOLUME:</b>
$LA = \pi r l$	$SA = LA + \pi r^2$	$V = \frac{1}{3} \pi r^2 h$

**EXAMPLE 1:** For the cone below, find the EXACT Lateral Area, Surface Area, and Volume.

$LA = \pi r l$   
 $= \pi(3)(6)$   
 $SA = LA + \pi r^2$   
 $= 18\pi + \pi(3)^2$   
 $= 18\pi + 9\pi$   
 $V = \frac{1}{3} \pi r^2 h$   
 $= \frac{1}{3} \pi(3)^2(3\sqrt{3})$   
 $= \frac{1}{3} \pi(9)(3\sqrt{3})$

$leg^2 + leg^2 = hyp^2$   
 $h^2 + 3^2 = 6^2$   
 $h^2 + 9 = 36$   
 $h^2 = 27$   
 $h = \sqrt{27}$   
 $h = 3\sqrt{3}$

$r = 3$   
 $l = 6$   
 $h = 3\sqrt{3}$

$LA = 18\pi$   
 $SA = 27\pi$   
 $V = 9\sqrt{3}\pi$

**EXAMPLE 2:** For the cone below, find the EXACT Lateral Area, Surface Area, and Volume.

$LA = \pi r l$   
 $= \pi(3)(3\sqrt{2})$

$SA = LA + \pi r^2$   
 $= 9\sqrt{2}\pi + \pi(3)^2$   
 $= 9\sqrt{2}\pi + 9\pi$

$V = \frac{1}{3} \pi r^2 h$   
 $= \frac{1}{3} \pi(3)^2(3)$   
 $= \frac{1}{3} \pi(9)(3)$

$leg^2 + leg^2 = hyp^2$   
 $r^2 + 3^2 = (3\sqrt{2})^2$   
 $r^2 + 9 = 18$   
 $r^2 = 9$   
 $r = 3$

$h = 3$   
 $l = 3\sqrt{2}$   
 $r = 3$

$LA = 9\sqrt{2}\pi$   
 $SA = 9\sqrt{2}\pi + 9\pi$   
 $V = 9\pi$

**EXAMPLE 3:** If the volume of a cone is  $12\pi \text{ ft}^3$  and the radius is 3 ft, find the EXACT height, slant height, Lateral Area, and Surface Area.

$V = \frac{1}{3} \pi r^2 h$   
 $12\pi = \frac{1}{3} \pi(3)^2 h$   
 $12\pi = \frac{1}{3} \pi(9) h$   
 $\frac{12\pi}{3} = \frac{3\pi h}{3}$   
 $4 = h$

$LA = \pi r l$   
 $= \pi(3)(5)$

$SA = LA + \pi r^2$   
 $= 15\pi + \pi(3)^2$

$V = 12\pi \text{ ft}^3$   
 $r = 3 \text{ ft}$

$h = 4 \text{ ft}$   
 $l = 5 \text{ ft}$

$LA = 15\pi \text{ ft}^2$   
 $SA = 24\pi \text{ ft}^2$