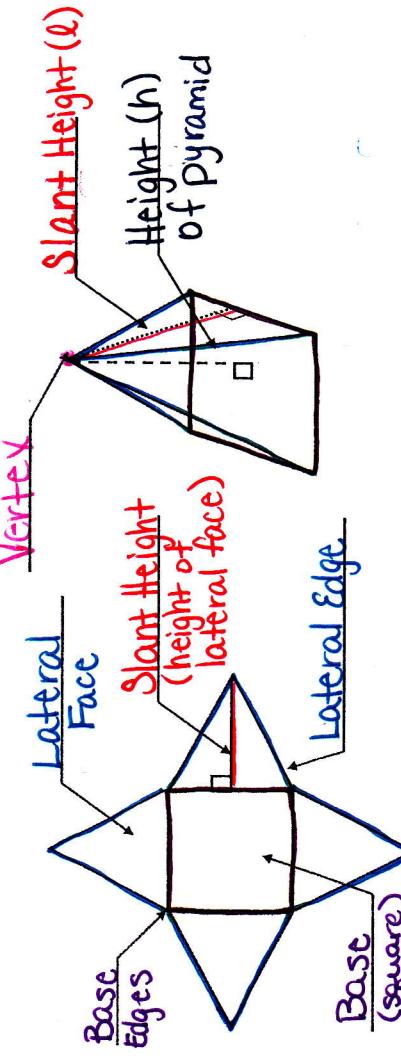
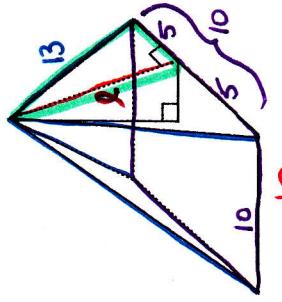


NOTES 12.3/12.5
LATERAL AREA, SURFACE AREA & VOLUME OF PYRAMIDS



EXAMPLE 3: A square pyramid has base edges of 10 and lateral edges of 13. Find its slant height.

$$\begin{aligned} \text{leg}^2 + \text{leg}^2 &= h\text{hyp}^2 \\ l^2 + l^2 &= 13^2 \\ l^2 + 25 &= 169 \\ l^2 &= 144 \\ l &= 12 \end{aligned}$$

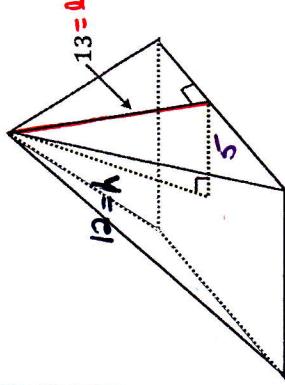


FORMULAS:

$$\begin{aligned} \text{LATERAL AREA} &= \frac{1}{2} Pl \\ \text{SURFACE AREA} &= LA + B \\ \text{VOLUME} &= \frac{1}{3} Bh \end{aligned}$$

$$\begin{aligned} P &= \text{perimeter of the base} \\ l &= \text{slant height} \\ B &= \text{area of the base} \\ h &= \text{height of the pyramid} \end{aligned}$$

EXAMPLE 4: Find the Lateral Area, Surface Area, and Volume of the square pyramid below.



$$\begin{aligned} LA &= \frac{1}{2} Pl = \frac{1}{2}(40)(13) = 260 \\ SA &= 260 + 100 = 360 \\ V &= \frac{1}{3} Bh = \frac{1}{3}(100)(12) = 400 \\ P &= 10(4) = 40 \\ B &= 5^2 = 10^2 = 100 \\ l &= 13 \\ h &= 12 \end{aligned}$$

EXAMPLE 1: Name each of the following.

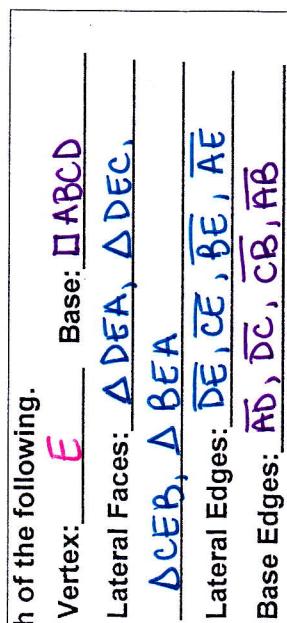
Vertex: E Base: $\square ABCD$

Lateral Faces: $\triangle DEA, \triangle DEC,$

$\triangle DCEB, \triangle BEA$

Lateral Edges: $\overline{DE}, \overline{CE}, \overline{BE}, \overline{AE}$

Base Edges: $\overline{AD}, \overline{DC}, \overline{CB}, \overline{AB}$



EXAMPLE 2: Find the indicated values.
 a) Find the slant height.

b) If the perimeter of the base is $16\sqrt{2}$ units, find the height.

$$\begin{aligned} P &= 16\sqrt{2} \\ S &= \frac{16\sqrt{2}}{4} = 4\sqrt{2} \\ \text{leg}^2 + \text{leg}^2 &= h\text{hyp}^2 \\ h^2 + (2\sqrt{2})^2 &= 9^2 \\ h^2 + 8 &= 81 \\ h^2 &= 73 \\ h &= \sqrt{73} \end{aligned}$$

Diagram of a square pyramid with base edges labeled 12 and slant height labeled 9. It shows the height of the pyramid and the other slant height of the lateral face.

$$\begin{aligned} \text{height of pyramid} &= 8 \\ \text{other slant height} &= 6 \\ \text{Triple - Use Pythagorean Theorem if you don't know.} \\ l &= 10 \\ h &= \sqrt{73} \end{aligned}$$

