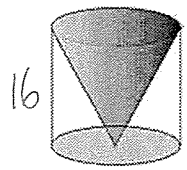
KEY

Geometry (H)
More Area & Volume problems

1. Find the volume and total area of the cylinder with the cone removed.
Diameter = 12, height = 16



$r = 6$

$V = \pi r^2 h - \frac{1}{3}\pi r^2 h$
$= \pi 36(16) - \frac{1}{3}\pi 36(16)$
$= 576\pi - 192\pi$
$V = 384\pi$

$TA = \text{Base} + LA_{\text{cylinder}} + \text{Cone}_{\pi r l}$
$= \pi 6^2 + 2\pi(6)16 + \pi(6)(2\sqrt{73})$
$= 36\pi + 192\pi + 12\sqrt{73}\pi$
$= 228\pi + 12\pi\sqrt{73}$

$l = ?$
$16^2 + 6^2 = l^2$
$292 = l^2$
$l = 2\sqrt{73}$

2. A 240° sector is cut out of a circular paper with radius 6 in. and bent to form the lateral surface of a cone. What is the volume of the cone?

$V = \frac{1}{3}\pi r^2 h$ ← need r of base, need h.

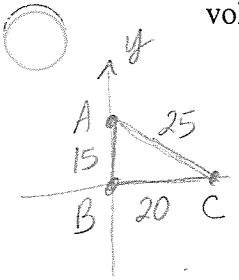
$\frac{240}{360}\pi 6^2 = L.A_{cone}$
$24\pi = LA_{cone}$

$LA = \pi r l$ = radius of circle
$24\pi = \pi r 6$
$4 = r$

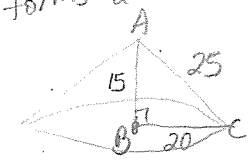
$h^2 + 4^2 = 6^2$
$h = 2\sqrt{5}$

$V = \frac{1}{3}\pi 4^2 (2\sqrt{5})$
$V = \frac{32\pi\sqrt{5}}{3}$

3. In ΔABC, AB = 15, AC = 25 and BC = 20. The triangle is rotated about leg $\overline{AB}$. Find the volume of the resulting solid.



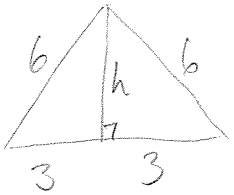
forms a cone



$V = \frac{1}{3}Bh$
$= \frac{1}{3}\pi r^2 h$
$= \frac{1}{3}\pi 20^2(15)$
$= \frac{6000\pi}{3}$

$V = 2000\pi$

4. An equilateral triangle with 6 cm side lengths is rotated about an altitude. Find the volume of the resulting solid.



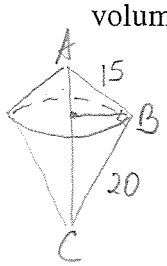
Cone → $V = \frac{1}{3}Bh$
$\frac{1}{3}\pi r^2 h$

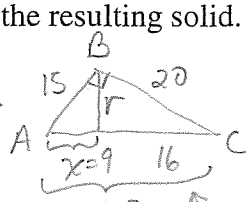
$h^2 + 3^2 = 6^2$
$h^2 = 36 - 9 = 27$
$h = 3\sqrt{3}$

$\frac{1}{3}\pi 9(3\sqrt{3}) = 9\sqrt{3}\pi$

$V = 9\pi\sqrt{3}$

5. In ΔABC, AB = 15, AC = 25 and BC = 20. The triangle is rotated about leg $\overline{AC}$. Find the volume of the resulting solid.





geometric mean:
$\frac{15}{x} = \frac{25}{15}$
$25x = 225$
$h = x = 9$

$\frac{r}{9} = \frac{16}{r}$
$r^2 = 144$
$r = 12$
radius = 12

$V_{TOP} = \frac{1}{3}\pi 12^2(9)$
$= 432\pi$

$V_{BOTTOM} = \frac{1}{3}\pi 12^2(16)$
$= 768\pi$

$V_{SOLID} = 1200\pi$

OR (ht.)
$V = \frac{1}{3}\pi 12^2(25$
$V = 1200\pi$