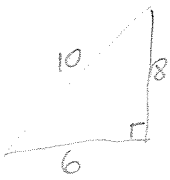
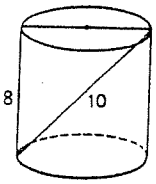
KEY

Geometry (Honors)
Lateral Area, Surface Area & Volume of Prisms and Cylinders

1. Find the surface area of the cylinder.





$d = 6$
$r = 3$

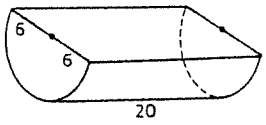
$TA = LA + 2B$
$= 6\pi(8) + 2\pi 3^2$
$= 48\pi + 18\pi$
$= 66\pi$

SA = 66π

2. Find the total (including the rectangular face) surface area and volume of a half cylinder with a radius of 6 and a height of 20.

$TA = \frac{1}{2}LA + B + rect.$
$= \frac{1}{2}(12\pi 20) + \pi 6^2 + 12(20)$
$= 120\pi + 36\pi + 240$
$= 156\pi + 240$

$V = \frac{1}{2}(Bh)$
$= \frac{1}{2}\,36\pi(20)$
$= 360\pi$



SA = $156\pi + 240$

V = 360π

3. A rectangular cake pan has a base of 10 cm by 12 cm and a height of 8 cm. If 810 cu cm of batter is poured into the pan, how far up the side will the batter come?

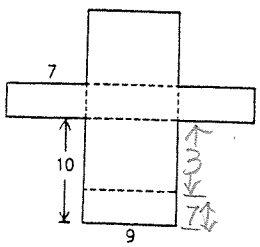
$V = Bh$
$= 12(10)8$
$= 960$
↑ not necessary

Solve for h:
$V = Bh$
$810 = 12(10)h$
$h = 6\frac{3}{4}"$

Ans: Batter will have a ht of $6\frac{3}{4}"$.

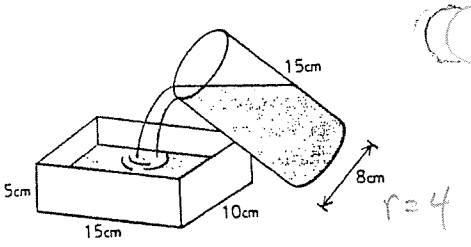
4. A rectangular container is to be formed by folding the cardboard along the dotted lines. Find the volume of this container.

$V = Bh$
$= 3(9)7$
$= 189$



V = 189

5. The cylindrical glass is full of water, which is poured into the rectangular pan. Will the pan overflow? If so, by how much?



V_{Glass} ← compare → V_{pan}

$V = Bh$ | $V = Bh$

$= \pi 4^2(15)$ | $= 15(10)(5)$

$= 240\pi$ | $= 750$

≈ 753.6

Yes, since $753.6 > 750$, the pan will not be able to hold all the water; will overflow by 3.6 cu. cm.

6. Jim's lunch box is in the shape of a half cylinder on a rectangular box. To the nearest whole unit, what is

a. The total volume it contains? $480 + 45\pi$

b. The total area of the sheet metal needed to manufacture it? $316 + 39\pi$

$V = V_{box} + V_{\frac{1}{2}cyl}$

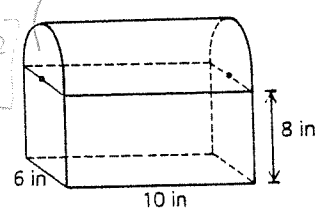
$= 6(10)(8) + \frac{1}{2}(\pi 3^2(10))$

$= 480 + \frac{90\pi}{2}$

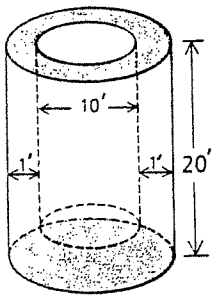
$TA = [LA + B] + [\frac{1}{2}LA + B]$

$= [32(8) + 6(10)] + [5(6\pi) + \pi 3^2]$

$= 316 + 39\pi$



7. A container is to be built of cement. The walls and bottom will be 1 ft thick. The outer height will be 20 feet. The inner diameter will be 10 ft. To the nearest cubic foot, how much cement will be needed for the job?



Inner Cylinder
ht: 19'
r = 5'

Outer
r = 6

$Cement = V_{outer} - V_{inner}$

$= \pi 6^2(20) - \pi 5^2(19)$

$= 720\pi - 475\pi$

$= 245\pi$

$= 245(3.14)$

≈ 769.3

Cement needed: 769 cu. ft.

8. A wedge of cheese is cut from a cylindrical block. Find the volume and the total surface area of this wedge.

$V = \frac{40}{360}(V_{whole})$

$= \frac{1}{9}\pi 20^2(15)$

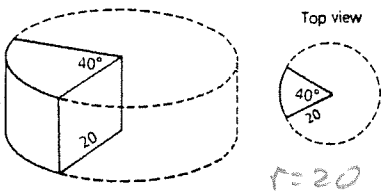
$= \frac{2000\pi}{3}$

$TA = 2\left(\frac{40}{360}\text{TOP}\right) + LA$

$= \frac{2}{9}\pi 20^2 + \frac{1}{9}C(15) + 2(20)(15)$ $\quad \frac{1}{9}40\pi(15)$

$= \frac{800\pi}{9} + \frac{200\pi}{3} + 600$

$= \frac{1400\pi}{9} + 600$



$V = \frac{2000\pi}{3}$

$SA = \frac{1400\pi}{9} + 600$

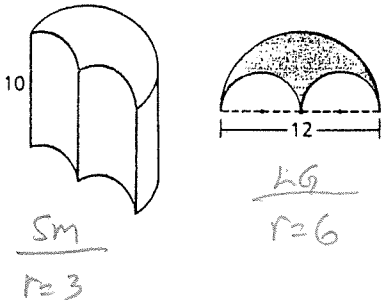
9. Find the volume of the ~~sold~~ solid at the right. (A representative cross section is shown.)

$V = \frac{1}{2}V_{cylinder(LG)} - V_{SM\ cyl}$

$= \frac{1}{2}\pi 6^2(10) - \pi 3^2(10)$

$= 180\pi - 90\pi$

$= 90\pi$



$V = 90\pi$

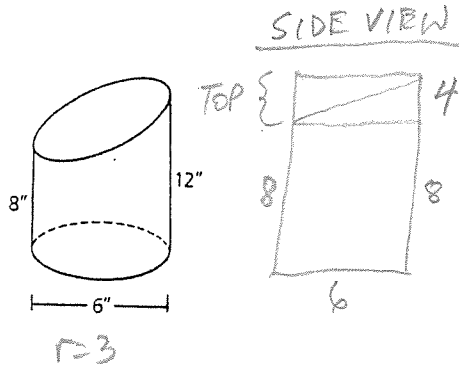
10. A cylinder is cut on a slant as shown. Find the solid's volume.

$V = V_{whole\ cyl} - \frac{1}{2}V_{TOP}$

$= \pi 3^2(12) - \frac{1}{2}\pi 3^2(4)$

$= 108\pi - 18\pi$

$= 90\pi$



$V = 90\pi$