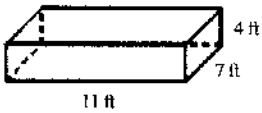
Agriculture
Volume Worksheet

Name Key

Find the volumes of the following figures to the nearest tenth unless stated otherwise.

1.



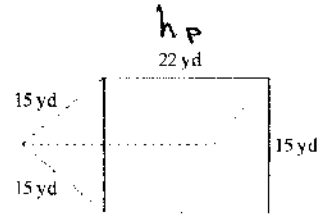
Not drawn to scale

$V = lwh$

$V = 11(7)(4)$

$V = 308\ ft^3$

2.

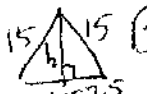


Not drawn to scale

$V = Bh_P$

$V = 97.5(22)$

$V = 2145\ yd^3$



$15^2 = 7.5^2 + h^2$

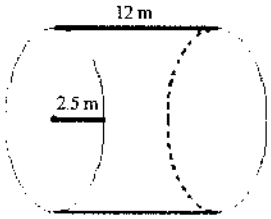
$h = 13$

$B = \frac{1}{2}bh$

$B = \frac{1}{2}(15)(13)$

$B = 97.5$

3.



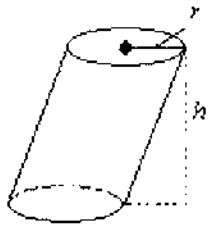
Not drawn to scale

$V = \pi r^2 h$

$V = \pi(2.5)^2 12$

$V = 235.6\ m^3$

4. h = 6 ft, r = 3 ft

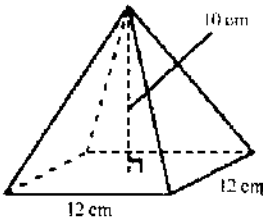


$V = \pi r^2 h$

$V = \pi(3)^2 6$

$V = 169.6\ ft^3$

5.



Not drawn to scale

$V = \frac{1}{3}Bh$

$V = \frac{1}{3}(12^2)10$

$V = 480\ cm^3$

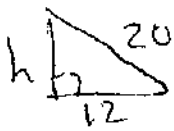
6.

Not drawn to scale

$V = \frac{1}{3}Bh$

$V = \frac{1}{3}(24^2)(16)$

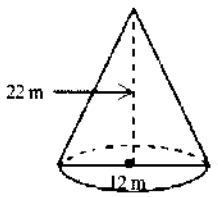
$V = 3072\ ft^3$



$20^2 = h^2 + 12^2$

$h = 16$

7.



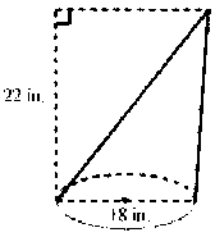
Not drawn to scale

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

$V = \frac{1}{3}\pi(6)^2 22$

$V = 829.4\ m^3$

8.



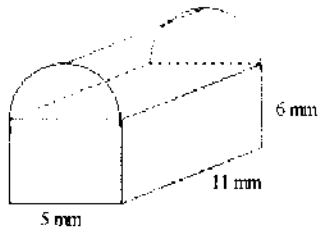
Not drawn to scale

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

$V = \frac{1}{3}\pi(9)^2(22)$

$V = 1866.1\ in^3$

9.



Not drawn to scale

$V_{prism} = lwh$

$V = 11(5)(6)$

$V = 330$

$V_{\frac{1}{2}\,cylinder} = \frac{1}{2}(\pi r^2 h)$

$V = \frac{1}{2}\pi(2.5)^2(11)$

107.99

$V = 108$

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

$V = 330 + 108$

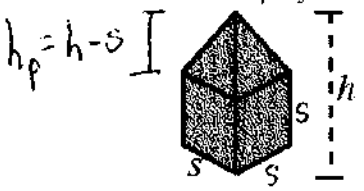
$V = 438\ mm^3$

10. The diagram shows a storage building that consists of a cubic base and a pyramid-shaped top.

a. Write an expression for the cube's volume.

b. Write an expression for the volume of the pyramid-shaped top.

c. Write a polynomial expression to represent the total volume.



$V_{cube} = s \cdot s \cdot s$

$V_{cube} = s^3$

$V_{pyramid} = \frac{1}{3}Bh_p$

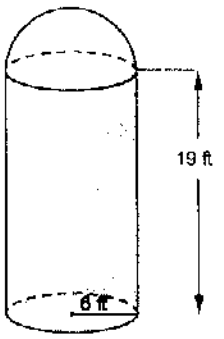
$V_{pyramid} = \frac{1}{3}s^2(h-s)$

$V_p = \frac{1}{3}s^2h - \frac{1}{3}s^3$

$V_{total} = s^3 + \frac{1}{3}s^2h - \frac{1}{3}s^3$

$V_{total} = \frac{2}{3}s^3 + \frac{1}{3}s^2h$

11. A farmer stores grain in the silo shown below. The shape of the silo is a cylinder with a radius of 6 feet and a height of 19 feet. On top of the cylinder is a hemisphere (half of a sphere) that also has a radius of 6 feet. How much grain can be stored in the silo when it is completely filled? Round your answer to the nearest tenth of a cubic foot. Show your work. Also convert the cubic feet to bushels.



$V_{cylinder} = \pi r^2 h$

$V = \pi (6)^2 (19)$

$V = 2148.8 ft^3$

$V_{\frac{1}{2} sphere} = \frac{1}{2}\left(\frac{4}{3}\pi r^3\right)$

$V = \frac{1}{2} \cdot \frac{4}{3} \cdot \pi 6^3$

$V = 452.4$

$V_{total} = 2148.8 + 452.4$

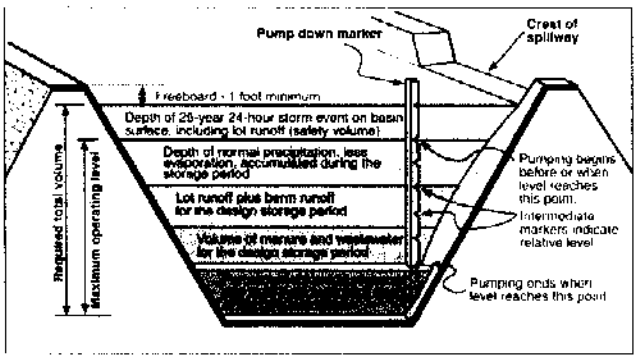
$V_{total} = 2601.2 ft^3$

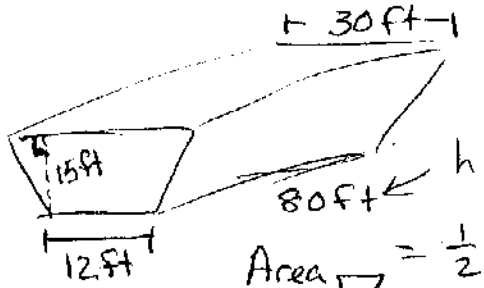
1 bushel = $1.24 ft^3$

$2601.2 ft^3 \cdot \frac{1 bu}{1.24 ft^3}$

2097.7 bushels

12. The side view of a manure pit is shown below.





$Area_{\square} = \frac{1}{2}(b_1 + b_2)h$

$\frac{1}{2}(12+30)15$

$B = A_{\square} = 315$

If you know the pit has a maximum depth of 15 feet, the bottom of the pit is 12 feet, the top of the pit is 30 feet, and the pit is 80 feet long, what is the approximate capacity of the pit in cubic feet? (Assume the shape is a trapezoidal prism).

$V = Bh$

$V = (315)(80)$

$V = 25200 ft^3$

Liquid manure is measured in gallons and solid manure is measured in bushels. What is the capacity of the pit in gallons? What is the capacity of the pit in bushels?

$1 ft^3 = 7.48$ gallons

$25200 ft^3 \cdot \frac{7.48 \text{ gallons}}{1 ft^3}$

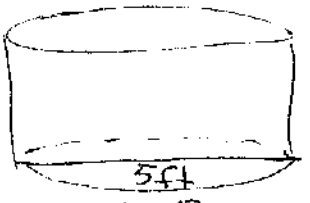
188,496 gallons

$1.24 ft^3 = 1$ bushel

$25200 ft^3 \cdot \frac{1 \text{ bushel}}{1.24 ft^3}$

20,322.6 bushels

13. A farmer has a cylindrical tank for storing fuel. The tank has a diameter of 5 feet and a height of 6 feet.
a. What is the volume of the tank? Explain how you find the volume.
b. One cubic foot is about 7.5 gallons. About how many gallons of fuel can be stored in the tank? Explain how you find the number of gallons.



$d = 5$
$r = 2.5$

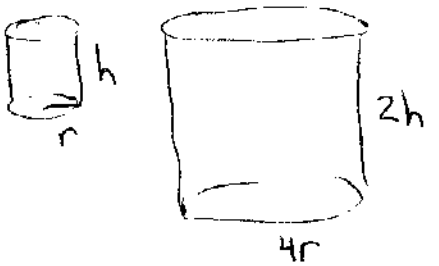
$V = \pi r^2 h$
$V = \pi (2.5)^2 6$
$V = 117.8 ft^3$

Find the radius. Find the area of ⊙ & multiply by height of cylinder

$117.8 ft^3 \cdot \frac{7.5 gal}{1 ft^3}$
883.5 gallons

Multiply Volume by 7.5 gallons

14. If the radius of a cylinder is multiplied by 4 and the height is multiplied by 2, by what amount will the volume be multiplied?

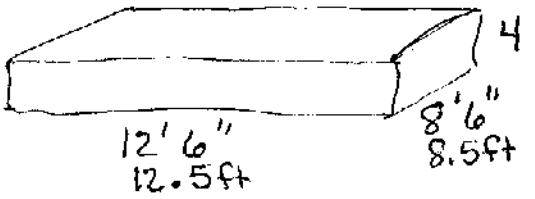


$V = \pi r^2 h$

$V = \pi (4r)^2 (2h)$
$\pi 16 r^2 \cdot 2h$
$V = 32 \pi r^2 h$

Volume will be multiplied by 32.

15. How many cubic feet is of material is needed to fill a rectangular box that has a length of 12' 6", a width of 8' 6", and a height of 4 feet? How many cubic yards of material will be needed?



$V = lwh$
$V = (12.5)(8.5)(4)$
$V = 425 ft^3$

$1 yd^3 = 27 ft^3$
$425 ft^3 \cdot \frac{1 yd^3}{27 ft^3}$
$15.7 yd^3$

16. Concrete can be purchased by the cubic yard. How much will it cost to pour a slab 17 feet by 17 feet by 4 inches if the concrete costs $40.00 per cubic yard?

$4 in \cdot \frac{1 yd}{36 in} = \frac{1}{9} yd$

$4 in \cdot \frac{1 ft}{12 in} = \frac{1}{3} ft$

$V = lwh$
$V = (17)(17)(\frac{1}{3})$
$V = 96.\overline{3} ft^3$

$96.3 ft^3 \cdot \frac{1 yd^3}{27 ft^3}$
$3.6 yd^3$
Will need $4 yd^3$

$4 (\$40)$
$\$160$