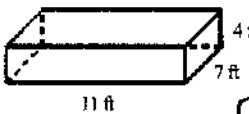
Welding
Volume Worksheet **Name** Key

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

1.



Not drawn to scale

$V = lwh$

$V = 11(7)(4)$

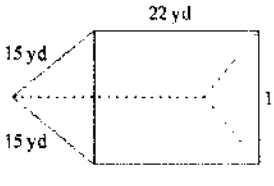
$V = 308\ ft^3$

2.

Several ways to find $A_\triangle$

$A_\triangle = \frac{1}{2}bh = \frac{1}{2}(15)(12.99)$

$A_\triangle = 97.4$



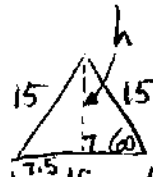
Not drawn to scale

$s = \frac{15+15+15}{2}$ $s = 22.5$

$A_\triangle = \sqrt{22.5(22.5-15)(22.5-15)(22.5-15)}$

$A_\triangle = \sqrt{22.5(7.5)(7.5)(7.5)}$

$A = 97.4$



$c^2 = a^2 + b^2$

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

$225 = 56.25 + h^2$

$h^2 = 168.75$

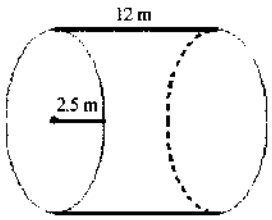
$h = 12.99$

$V = Bh$

$V = (97.4)(22)$

$V = 2142.8\ yd^3$

3.



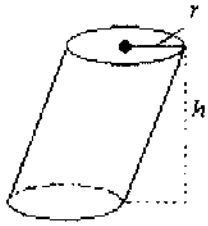
Not drawn to scale

$V = \pi r^2 h$

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

$V = 235.6\ m^3$

4. h = 6 ft, r = 3 ft



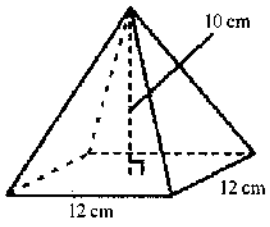
$V = \pi r^2 h$

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

$V = \pi(9)(6) = 54\pi$

$V = 169.6\ ft^3$

5.



Not drawn to scale

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

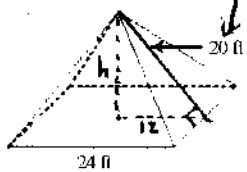
$V = \frac{1}{3}(12)^2(10)$

$V = \frac{1}{3}(144)(10)$

$V = 480\ cm^3$

6.

slant height

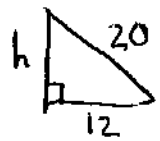


Not drawn to scale

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

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

$V = 3072\ ft^3$



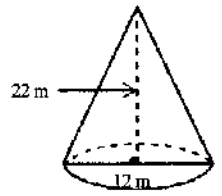
$20^2 = h^2 + 12^2$

$400 = h^2 + 144$

$h^2 = 256$

$h = 16\ ft$

7.



Not drawn to scale

$r = 6m$

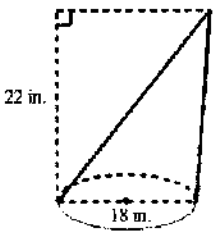
$V = \frac{1}{3}\pi r^2 h$

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

$V = \frac{1}{3}\pi(36)(22)$

$V = 829.4 m^3$

8.



Not drawn to scale

$r = 9in$

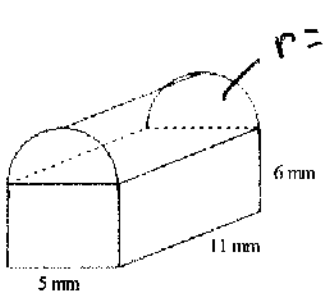
$V = \frac{1}{3}\pi r^2 h$

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

$V = \frac{1}{3}\pi(81)(22)$

$V = 1866.1 in^3$

9.



Not drawn to scale

$V_{box} = lwh$

$V = (11)(5)(6)$

$V = 330 mm^3$

$V_{\frac{1}{2}cyl} = \frac{1}{2}\pi r^2 h$

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

$V = 108 mm^3$

$V_{Total} = 330 + 108$

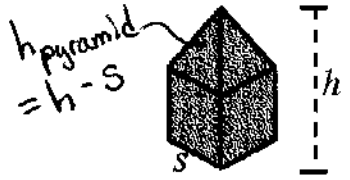
$V = 438 mm^3$

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.



A) $V_{cube} = s^3$

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

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

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

C) $V = s^3 + \frac{1}{3}s^2h - \frac{1}{3}s^3$

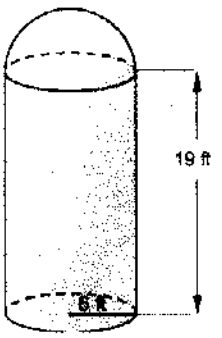
If $h_{pyramid} = x$

B) $V_{pyramid} = \frac{1}{3}s^2x$

C) $V_{total} = \frac{1}{3}s^2x + s^3$

(This is an easier alternative)

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.



Cylinder

$V = \pi r^2 h$

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

$V = \pi (36)(19)$

$V = 2148.8 ft^3$

$V_{1/2 sphere} = \frac{1}{2} \cdot \frac{4}{3} \pi r^3$

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

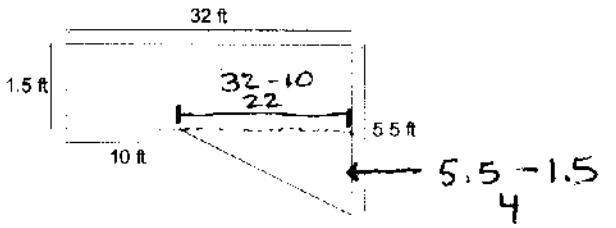
$V = \frac{1}{2} \cdot \frac{4}{3} \pi (216)$

$V = 144\pi = 452.2 ft^3$

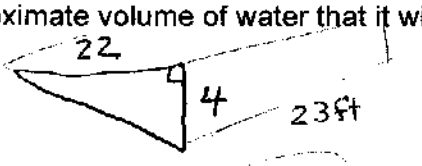
$V = 2148.8 + 452.2$

$V = 2601 ft^3$

12. The side view of a swimming pool is shown below.



If you also know that the pool is 23 feet wide, what is the approximate volume of water that it will take to fill the pool, expressed in whole cubic feet?



$V = lwh$

$V = (32)(23)(1.5)$

$V = 1104 ft^3$

$A_\Delta = \frac{1}{2}(22)(4)$

$A_\Delta = 44$

$B = 44$

$V = Bh$

$V = 44(23)$

$V = 1012 ft^3$

$V = 1104 + 1012$

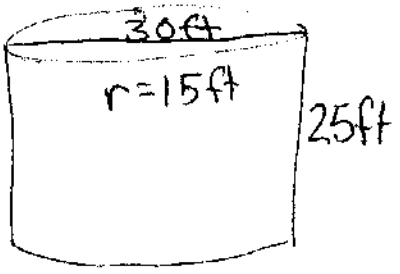
$V = 2116 ft^3$

13. Bridger City has a cylindrical tank for storing water used by the residents. The tank has a diameter of 30 feet and a height of 25 feet.

a. What is the volume of the tank? Explain how you find the volume.

b. One cubic foot of water is about 7.5 gallons of water. About how many gallons of water are in the tank? Explain how you find the number of gallons.

c. The city would like to build an additional tank with a volume of 150,000 gallons. Find a possible diameter and height for the new tank. Explain the method you use to find the dimensions.



A) $V = \pi r^2 h$

$V = \pi(15)^2(25)$

$V = 17671.5 ft^3$

B) $17671.5 ft^3 \cdot \frac{7.5 gal}{1 ft^3} = 132,536 gal$

C) $150000 gal \cdot \frac{1 ft^3}{7.5 gal} = 20000 ft^3 = V$

$V = \pi r^2 h$

$20000 = \pi r^2 h$

If $h = 25 ft$, $r \approx 16 ft$

ANSWERS CAN VARY

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

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

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

$V = \frac{1}{3}\pi 16r^2 \cdot 2h$

$V = 32\left(\frac{1}{3}\pi r^2 h\right)$

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?

$V = lwh$

$V = (12.5)(8.5)(4)$

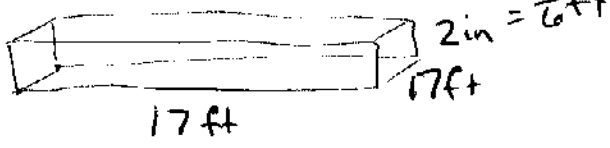
$V = 425 ft^3$

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

$15.7 yd^3$

$6 in \cdot \frac{1 ft}{12 in} = \frac{1}{2} ft$

16. Concrete can be purchased by the cubic yard. How much will it cost to pour a slab 17 feet by 17 feet by 2 inches for a patio if the concrete costs $40.00 per cubic yard?



$V = lwh$

$V = (17)(17)(\frac{1}{6})$

$V = 48.2 ft^3$

$(1.8)(\$40)$

$\$72$

$2 in \cdot \frac{1 ft}{12 in} = \frac{1}{6} ft$

$48.2 ft^3 \cdot \frac{1 yd^3}{27 ft^3} = 1.8 yd^3$