MFM2PI: **EXTRA PRACTICE - VOLUME** **Name:** Solutions

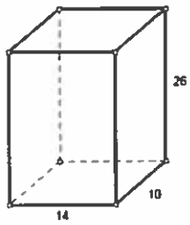
Formulas

$V_{Rectangular\ Prism} = Area\ of\ Base \times Height = L \times W \times H$ $V_{pyramid} = \frac{Area\ of\ Base \times Height}{3}$

$V_{Triangula\ Prism} = Area\ of\ Base \times Height = \left(\frac{b \times h}{2}\right) \times H$ $V_{Cone} = \frac{Area\ of\ Base \times Height}{3} = \frac{\pi r^2 \times H}{3}$

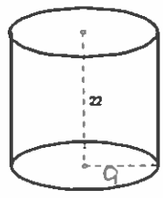
$V_{Cylinder} = Area\ of\ Base \times Height = \pi r^2 \times H$ $V_{sphere} = \frac{4\pi r^3}{3}$

1. Find the volume (in cubic centimetres) of the rectangular prism.



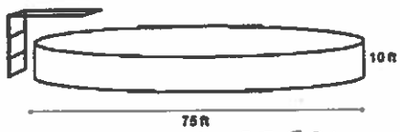
$V = lwh$
$= 14(10)(26)$
$= 3640\ cm^3$

2. Find the volume of a cylinder whose base is a circle with radius of 9 inches.



$V = \pi r^2 h$
$V = \pi(9)^2(22)$
$V = 5598\ in^3$

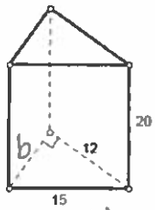
3. Find the amount of water in the pool to the nearest gallon (Hint: 1 cubic foot = 7.48052 gallons)



$r = 37.5\ ft$

$V = \pi r^2 h$
$= \pi(37.5)^2(10)$
$= 44178.6\ ft^3 \times 7.48052$
$= 330479\ gal$

4. Find the volume (in cubic centimetres) of the triangular prism. (Hint: Use Pythagorean Theorem to find *b* in the right triangular base.)

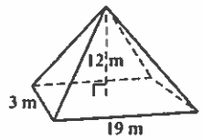


$a^2 + b^2 = c^2$
$12^2 + b^2 = 15^2$
$b^2 = 225 - 144$
$b = \sqrt{81}$
$b = 9\ cm$

$A_{triangle} = \frac{bh}{2}$
$= \frac{9(12)}{2}$
$= 54\ cm^2$

$V = A_{base} \times h$
$= 54 \times 20$
$= 1080\ cm^3$

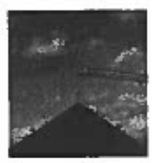
5. Find the volume (in cubic metres) of the rectangular pyramid.



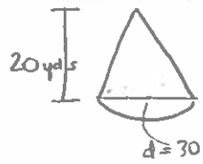
$V = \frac{A_{base} \times h}{3}$
$= \frac{57 \times 12}{3}$
$= 228\ m^3$

$A_{rectangle\ base} = lw$
$= 19 \times 3$
$= 57\ m^2$

6. Find the volume of a cone shaped pile of sand if the pile is 20 yards tall and the base is 30 yards wide.



$V = \frac{\pi r^2 h}{3}$
$= \frac{\pi(15)^2(20)}{3}$
$= 4712\ yds^3$



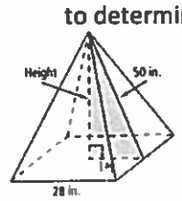
$r = 15\ yds$

7. Find the volume of water (in litres) that would be required to fill a spherical balloon with a diameter of 15 cm. Round your answer to the nearest hundredth of a litre. (Hint: 1 cubic cm = 0.001 L)

$r = 7.5\ cm$

$V = \frac{4\pi r^3}{3}$
$V = \frac{4\pi(7.5)^3}{3}$
$V = 1767\ cm^3$
$\times 0.001$
$V = 1.77\ L$

8. Find the volume of the square-based prism below. (Hint: Use Pythagorean Theorem to determine the vertical height first).



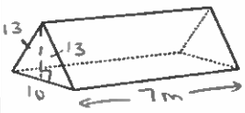
(The figure is not drawn to scale.)

$a^2 + b^2 = c^2$
$h^2 + 14^2 = 50^2$
$h^2 = 2500 - 196$
$h = \sqrt{2304}$
$h = 48\ in$

$A_{base} = lw$
$= 28(28)$
$= 784\ in^2$

$V = \frac{A_{base} \times h}{3}$
$= \frac{784 \times 48}{3}$
$= 12544\ in^3$

9. Find the volume of a prism whose height is 7 metres and whose base is an isosceles triangle with sides 13 m, 13 m and 10 m. (Hint: Use Pythagorean Theorem to find *h* in the triangular base.



$A_\Delta = \frac{bh}{2}$

$= \frac{10(12)}{2}$

$= 60\ m^2$

$h^2 + 5^2 = 13^2$

$h^2 = 169 - 25$

$h = \sqrt{144}$

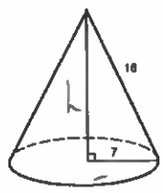
$h = 12$

$V = A_{base} \times h$

$= 60 \times 7$

$= 420\ m^3$

10. Find the volume (in cubic feet) of the cone. (Hint: Use Pythagorean Theorem to find the vertical height first).



$h^2 + 7^2 = 18^2$

$h^2 = 324 - 49$

$h = \sqrt{275}$

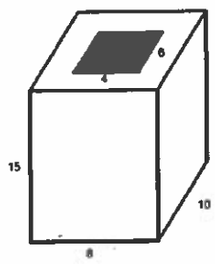
$h = 16.6\ ft$

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

$= \frac{\pi (7)^2 (16.6)}{3}$

$= 851.8\ ft^3$

11. Find the volume (in cubic feet) of the prism with a rectangular hole drilled all the way through it.



$V_{large} = lwh$

$= (8)(10)(15)$

$= 1200\ ft^3$

$V_{hole\ in\ middle} = lwh$

$= (4)(6)(15)$

$= 360\ ft^3$

Total Volume $= 1200 - 360$

$= 840\ ft^3$

12. A cylindrical can of soup that is 8 inches tall and 4 inches across the lid is emptied into a bowl that is hemispherical. The bowl has a diameter of 9 inches.

a) Determine the volume of space in the bowl that will NOT be filled with soup to the nearest tenth of a cubic inch.

$V_{soup\ can} = \pi r^2 h$

$= \pi (2)^2 (8)$

$= 100.5\ in^3$

$V_{bowl} = \frac{4\pi r^3}{3} \div 2$

$= \frac{4\pi (4.5)^3}{3} \div 2$

$= 190.9\ in^3$

Volume NOT filled $= 190.9 - 100.5$

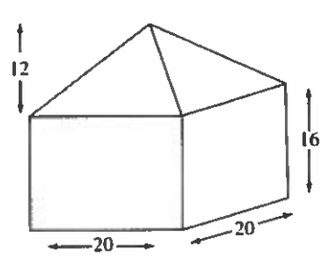
$= 90.4\ in^3$

b) How many more litres of soup could you add to the bowl before it would overflow? Round answer to the nearest hundredth of a litre.
(Hint: 1 cubic inch = 0.0163871 L)

$90.4\ in^3 \times 0.0163871\ L/in^3$

$= 1.48\ L$

13. Find the volume of air (in cubic feet) in the house below.



$V_{prism} = lwh$

$= 20(20)(16)$

$= 6400\ ft^3$

$V_{pyramid} = \frac{lwh}{3}$

$= \frac{20(20)(12)}{3}$

$= 1600\ ft^3$

Total Volume $= V_{prism} + V_{pyramid}$

$= 6400 + 1600$

$= 8000\ ft^3$

Answers:

1. 3640 cm^3	2. 5598 in^3	3. 330479 gal	4. 1080 cm^3	5. 228 m^3
6. 4712 yd^3	7. 1.77 L	8. 12544 in^3	9. 420 m^3	10. 851 ft^3
11. 840 ft^3	12. a) 90.3 in^3	12.b) 1.48 L	13. 8000 ft^3	