Solutions to Math Problems from September 2017 Newsletter

1. How many gallons of water are in an 8-inch diameter pipe that is 550 feet long?
   a. 26 gallons
   b. 27,632 gallons
   c. 1,435 gallons
   d. 192 gallons

8 inches

550 feet

Volume of Cylinder = .785 X (D)² X (Length)
$D = 8$ inches $X (1 ft/12in) = .667$ ft
$L = 550$ ft
$V = .785 X (.667ft)^2 X 550ft =$
$= .785 X .445ft^2 X 550 ft$
$= 191.89 ft^3 X (7.48gal/ft^3)$
$= \underline{1,435\ gal}$

2. How many gallons of water are in each 18-foot section of 16-inch diameter ductile iron pipe?
   a. 25 gallons
   b. 179 gallons
   c. 188 gallons
   d. 3,617 gallons

16 inches

18 feet
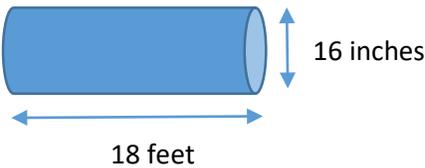
Volume of Cylinder = .785 X (D)² X (Length)
$D = 16$ inches $X (1 ft/12in) = 1.33$ ft
$L = 18$ ft
$V = .785 X (1.33ft)^2 X 18ft =$
$= .785 X 1.77ft^2 X 18 ft$
$= 25.12 ft^3 X (7.48gal/ft^3)$
$= \underline{188\ gal}$

3. How many cubic feet of water are in a 25-foot diameter storage tank that has 17.5 feet of water in it?
   a. 8,586 ft³
   b. 343 ft³
   c. 64,223 ft³
   d. 6010 ft³
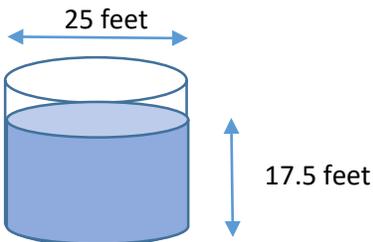
25 feet

17.5 feet

Volume of Cylinder = .785 X (D)² X (Height)*
$D = 25$ feet
$H = 17.5$ ft
$V = .785 X (25 ft)^2 X 17.5ft =$
$= .785 X 625ft^2 X 17.5 ft$
$= \underline{8,586 ft^3}$

*Note: When using the equation for the volume of a cylinder, the 'Height' is the same as 'Length'. A tank can be viewed as a cylinder that, instead of laying on its side like a piece of pipe, is standing upright.

4. How many million gallons (MG) of water are in the storage tank in the problem above?
   a. .0642 MG
   b. .0085 MG
   c. 64,223 MG
   d. 1,148 MG

The volume calculated in problem #3
= 8,586 ft³

8,586 ft³ X (7.48 gal/ft³)
= 64,223 gallons X (1 MG/1,000,000 gal)
= .0642 MG

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5. How many gallons per inch are there in a sodium hypochlorite solution tank that measures 30 inches in diameter and has 48 inches of liquid in it when full?
   a. 3 gallons/inch
   b. 37 gallons/inch
   c. 5 gallons/inch
   d. 147 gallons/inch
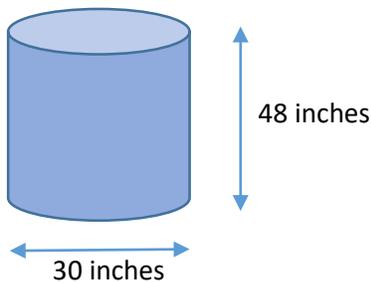
48 inches

30 inches

Solution – Method #1
Volume of Cylinder = .785 X (D)² X (Height)*
D = 30 inches X (1 ft/12in) = 2.5 ft
H = 48 inches X (1 ft/12in) = 4 ft
V = .785 X (2.5ft)² X 4ft =
= .785 X 6.25ft² X 4 ft
= 19.625 ft³ X (7.48gal/ft³)
= 146.8 gallons / 48 inches
= 3 gallons/inch

*Note: When using the equation for the volume of a cylinder, the 'Height' is the same as 'Length'. A tank can be viewed as a cylinder that, instead of laying on its side like a piece of pipe, is standing upright.

Solution – Method #2
Volume of Cylinder = .785 X (D)² X (Height)
D = 30 inches X (1 ft/12in) = 2.5 ft
H = 1 inch X (1 ft/12in) = .08333 ft
V = .785 X (2.5ft)² X .08333 ft =
= .785 X 6.25ft² X .08333 ft
= .4088 ft³ X (7.48gal/ft³)
= 3 gallons/inch