

## Math Problems

### Operator Certification Exam Review

November 30, 2016

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#### Problem 1

If the pressure gauge at the bottom of a storage tank reads 23 psi, how many feet of water are in the tank?

#### Problem 2

You have to order paint for the exterior of one of the storage tanks in your system. The tank has a capacity of 500,000 gallons and is 40 feet tall. How many  $\text{ft}^2$  are you going to have to paint (include top)? How many gallons will you need if 1 gallon covers  $150 \text{ ft}^2$ ?

#### Problem 3

The dimensions of an underground storage tank are 35 feet long, 20 feet wide, and 25 feet deep. How many gallons will it hold when it is 75% full?

#### Problem 4

How many gallons are in a 1 foot section of 18 inch pipe? How many gallons are in 45 feet of the same pipe?

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#### Problem 5

What is the volume (in  $\text{ft}^3$  and in gallons) of a tank that has a 20 foot radius and a height of 40 feet?

#### Problem 6

The pressure gauge at the bottom of a 60 foot tall storage tank is at 18 psi. How many gallons of water are in the tank if the diameter of the tank is 18 feet?

#### Problem 7

A well has a static water level of 128 feet and a pumping water level of 163 feet. What is the drawdown in the well?

#### Problem 8

A pump pumps 85 gpm, how many gallons are pumped in a day?

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#### Problem 9

How many days will it take to fill a 750,000 gallon storage tank at a pumping rate of 200 gpm?

#### Problem 10

Fire fighters used a hydrant for 1 hour 45 minutes. According the system records, the flow rate of the hydrant is 630 gpm. Determine how many gallons of unmetered water left the system.

#### Problem 11

What is the average usage in gallons per day? Use the information in the table.

Monday	89,235 gallons
Tuesday	95,651 gallons
Wednesday	79,357 gallons
Thursday	88,654 gallons
Friday	91,354 gallons

#### Problem 12

Find the pounds of HTH needed to chlorinate a 250,000 gallon storage tank to 2 mg/L when the HTH is 65 percent available chlorine.

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#### Problem 13

What is the chlorine dose (mg/L) when 16 pounds of 65 % HTH is added to 750,000 gallons of water?

#### Problem 14

The chlorine dosage of a water supply is 2.7 mg/L, and the chlorine residual is 2.1 mg/L. What is the chlorine demand?

#### Problem 15

What is the combined chlorine residual if the total residual is 0.85 mg/L and the free residual is 0.79 mg/L?

#### Problem 16

Calculate the chlorine demand of the system if you know the following:

Capacity = 0.75 MGD

Chlorine Dosage = 2.3 mg/L

Chlorine Residual = 1.2 mg/L

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#### Problem 17

How much power (kWh) is used by a 2600 Watt motor operating for 10 hours per day? How much will it cost, if the electric company charges 12 cents per kilowatt hour for the whole year?

#### Problem 18

A tank is fed 100 lbs of 70% HTH. The tank is 49 feet in diameter and is 20 feet high. What is the resulting concentration of HTH?

#### Problem 19

A 12 inch pipe has a velocity of 4 fps at 1400 gpm and then reduces to a 10 inch pipe. What will the velocity be in the 10 inch pipe in fps?

#### Problem 20

A pipe is placed in a trench that is 4 feet deep, 5 feet wide, and half a mile long. How many cubic yards of material are needed to refill the trench? How much will it cost to refill the trench if fill dirt costs \$2.90/ yd<sup>3</sup>?

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### **Problem 21**

A storage tank holds 500,000 gallons and the flow rate from the tank is 850 gpm. What is the detention time in hours? What is the detention time in days?

## Math Problems - Answers

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Problem 1  $h=53.1$  feet

Problem 2 Surface Area to Paint = 7421 ft<sup>2</sup>  
Paint needed = 50 gallons

Problem 3 75% volume = 13,125 ft<sup>3</sup> =  
98,175 gallons

Problem 4 Volume<sub>1ft</sub> = 13.2 gallons  
Volume<sub>45ft</sub> = 594.5 gallons

Problem 5  $V= 50,240$  ft<sup>3</sup> = 375,794 gallons

Problem 6  $V= 79, 104$  gallons

Problem 7 Drawdown = 35 feet

Problem 8 Volume = 122, 400 gallons

Problem 9 Time = 2.6 days

Problem 10 Volume = 66, 150 gallons

Problem 11 Volume = 88, 850 gallons

Problem 12 Feed Rate = 6.4 lbs/day

Problem 13 Dosage = 1.66 mg/L

Problem 14 Chlorine Demand = 0.6 mg/L

Problem 15 Combined Residual = 0.6 mg/L

Problem 16 Combined Residual = 1.1 mg/L

Problem 17 Power Used = 26 KW/hr  
Annual Cost = \$1138.80

Problem 18 Dosage = 29.8 mg/L

Problem 19 Velocity = 5.76 ft/sec

Problem 20 Volume = 1955.6 yd<sup>3</sup>  
Cost = \$5671.11

Problem 21 Detention Time<sub>hours</sub> = 9.8 hrs  
Detention Time<sub>days</sub> = 0.41 days