

MATH PROBLEMS
FOR THE PHCA RAIN WATER COLLECTION SYSTEM
 Steven Kramer – Spring 2013

These math problems refer to the rain water collection system located behind The Community Center. Some of you may be interested in trying to solve the problems, but it is not required. Prizes will be awarded based on your correct answers. The information listed here will be needed to solve these problems: Refer to the sketch below.

1. There are six rain water collection tanks. Each tank is shaped like a cube that measures 4 feet by 4 feet by 4 feet.
2. Each tank collects rain water from the roof, gutter and downspout. Each tank has a hose going to the garden.
3. At the garden, each hose is connected to a soaker hose which drips water onto the plants at a rate of 1.5 gallons per minute.
4. The roof is 150 feet in length by 80 feet across [front to back] with a normal roof slope as shown below.
5. The gutters are six-inches wide, seven inches high, and run the entire length of the roof.
6. One [1] gallon of water has a volume of 231 cubic inches, which is also 0.134 cubic feet.
7. Assume that each tank fills at the same rate...meaning they all fill the same amount when it rains.
8. The length of the gutter [height from ground to the gutter] is 18 feet.

FORMULA: Volume of water [in cubic feet] = Flow-rate of water [in cubic feet per minute] x time [in minutes]

Remember: 12 inches = 1 foot 60 minutes = 1 hour

Here are the problems – in increasing order of difficulty: This is open to students in third thru 12th grades.

1. How many cubic feet of water can fit in one rain water tank?
2. How many gallons could fit in one full rain water tank?
3. How many gallons of water would be in the tanks if two are half full and four are 2/3 full?
4. How many gallons of water would be in all six tanks if they are all full?
5. For each completely full tank, how long does it take to empty into the garden through its soaker hose?
6. If it rains one-half inch per hour, how long in minutes will it take to completely fill all of the tanks?
7. If the Center must purchase water from the city at a cost of \$1.00 for 32 cubic feet of water, how much money will the Center save by using one full water tank to water the garden?

Not a math problem, but....

8. Other than saving money [see number 7] what is another reason for collecting and using rain water for the garden?

- Give your answers showing all your work to Steve at The Center or email them to: skramer.phca@live.com
- Okay to use calculators. This must be your own work. Do not share your answers with others.
- Prizes will be awarded for correct answers based on what grade you are in, and the questions you answer correctly.
- Deadline: June 1st.

Back of the PHCA Gymnasium

