Exam Math Review
Collection Systems
Grades III & IV
Practice Problems

The Division of Water Quality
makes no claim as to the
accuracy of any answers
provided herein.
Certification Exam Review  
Collections Grade III & IV

Math Problems - Areas

1. How square feet is there in a 6 inch diameter pipe?, in a 8 inch diameter pipe?

2. How many square feet of asphalt must be removed, if a 25 foot diameter circle must be cut around a manhole?

3. After installing a main through a park, a strip that is 1,200 feet long and 6 feet wide that must be reseeded with grass. If one bag of grass seed covers 1,000 ft². How many bags of seed do you need to buy?

Math Problems - Volumes

4. How many gallons will a rectangular tank 50 feet long by 20 feet wide and 8 feet deep?
5. How deep is the wastewater in a manhole if there is 400 gallons in it? The manhole has a radius of 3 feet.

6. How many cubic feet of wastewater will a 4,500 foot section of 8 inch pipe hold?

7. A wet well is 10 feet by 15 feet, the water is at an elevation 78 feet. If the top of the wet well at elevation of 90 feet. How many additional gallons can the wet well hold before it overflows?

Math Problems - Velocity

8. Wastewater is pumped into a 6 inch pressure line by a 300 gpm pump. If the pump is 85% efficient, what is the velocity of the wastewater in the pressure line?
9. If it takes dye 3 minutes 42 seconds to go between two manholes, and the manholes are 400 feet apart. What is the velocity of the wastewater?

Math Problems - Head

10. How much pressure does 10 feet of head generate?

11. If a pump must lift wastewater 28 feet, and the pressure sewer line is 2,250 feet. Head loss in the sewer line is 4 feet per 1,000 feet of line. How many pound of pressure must the pump deliver for the wastewater to flow?

12. If a 125 gpm pump is driven by a 3 horsepower motor. The efficiency of the pump is 80% and the motor is 50%. What is the maximum head that the system deliver?
Math Problem - Times

13. If it takes 2 people 10 hours to do a job, how many hours will it take 5 people to do the same job?

14. A positive displacement pump has a bore of 8 inches and a stroke of 4.5 inches. The pump operates at 30 cycles/minutes. How long will it take to pump a wet well that is 5 foot by 6 foot and the wastewater is 5 feet deep?

15. If it is assumed that the average velocity of the wastewater in the collection system is 2.5 feet per second. How long does it take the wastewater to reach the treatment plant, if the maximum distance from the treatment plant to the farthest lateral is 12 miles?

Math Problems - Efficiency

16. What is the efficiency of the lift pump motor, if a 10 KW motor is required to run a 10 hp. pump?
17. If a wet well has two 100 gpm pumps in it. How many gallons of wastewater can be pumped a day if one of the pumps is 85% efficient and the other is 75% efficient?

Math Problems - Chlorine Equation

18. What is the chlorine feed rate per day for a flow of 1.5 MGD with a dose rate of 15 mg/L.

19. How many pounds of TSS are received in the collection system daily, if the system flow is 900,000 gpd and the TSS concentration is 195 mg/L?

20. Chlorine is used in the system for “freshening”. If the chlorine demand is 9 mg/L and the desired residual is 0 mg/L. The flow through the system is 1.5 ft³/s. How many pound of chlorine are used a day?
21. Industrial wastewater from a food processor has a BOD concentration of 3,000 mg/L and the industry produces 40 pounds of BOD per day. How many gallons of wastewater are produced a day?

22. A large wet well has an TSS influent concentration of 215 mg/L and an effluent concentration of 189 mg/L. If the flow through the clarifier is 0.80 MGD. How many pounds of TSS are captured per day by the wet well?

23. A jet rodder cleans 311,000 ft. of sewer line per month. If the operating costs of the rodder are $0.30/100 ft. What is the monthly cost to use the rodder?