



1. Convert  $1000 \text{ ft}^3$  to cu. yards (Ans:  $37 \text{ yds}^3$ )
2. Convert 10 gallons/min to  $\text{ft}^3/\text{hr}$  (Ans:  $\frac{27 \text{ ft}^3}{\text{hr}}$ )
3. Convert  $100,000 \text{ ft}^3$  to acre-ft. (Ans: 2.3 acre-ft)
4. Calculate the lbs/day of solids entering the plant given the influent flow is 5 MGD with an average solids concentration of 250 mg/l. (Ans:  $10,425 \frac{\text{lbs}}{\text{day}}$ )
5. Calculate the lbs of solids in the primary sludge if the sludge flow is 7500 gallons and the solids concentration is 4.5%. (Ans: 2,815 lbs solids)
6. If the influent wastewater flow is 5 MGD and the BOD concentration is 240 mg/l what is the daily BOD loading in lbs/day? (Ans:  $\frac{10,000 \text{ lbs}}{\text{day}}$ )
7. What is the % removal efficiency if the influent concentration is 10 mg/L and the effluent concentration is 2.5 mg/L? (Ans; 75%)
8. How many lbs of solids are removed daily by a primary clarifier treating a 6 MGD flow if the average influent TSS concentration is 300 mg/l and the clarifier TSS removal efficiency is 67%?  
(Ans:  $10,058 \frac{\text{lbs solids}}{\text{day}}$ )
9. Calculate the primary clarifier influent solids concentration if its outlet concentration is 60 mg/l and the known clarifier removal efficiency is 75%? (Ans: 240mg/l)
10. Calculate the outlet concentration if the inlet concentration is 80 mg/l and the process removal efficiency is 60%. (Ans: 32mg/l)
11. Calculate the inlet concentration if the outlet concentration is 80 mg/l and the process removal efficiency is 60%. (Ans: 200mg/l)
12. Calculate the flow, in gpd, that would pass through a grit chamber 2 feet wide, at a depth of 6 inches, with a velocity of 1 ft /sec. (Ans:  $646,272 \frac{\text{gal}}{\text{day}}$ )

13. A wastewater channel is 3.25 feet wide and is conveying a wastewater flow of 3.5 MGD. The wastewater flow is 8 inches deep. Calculate the velocity of this flow. (Ans:  $2.2 \frac{ft}{s}$ )
14. A wastewater flow of 3cu.ft/sec is flowing in a rectangular grit chamber. The chamber is 2 ft 8in wide. Wastewater is flowing 1 ft 3 in deep. Find the velocity of the flow in this grit chamber in ft/sec. (Ans:  $0.9 \frac{ft}{s}$ )
15. How many times would the velocity increase for the same flow rate if the diameter of the pipe is reduced by half (assuming pipes are flowing full)? (Ans: 4 times)
16. A sewer line to a wastewater treatment plant is 12 miles long. If the wastewater is flowing at 2.2 fps, approximately. How long will it take for wastewater to reach the plant? (Ans: 8 hrs)
17. A plastic float is dropped into a wastewater channel and is found to travel 10 feet in 4.2 seconds. The channel is 2.4 feet wide and is flowing 1.8 feet deep. Calculate the flow rate of this wastewater in cubic feet per second. (Ans:  $10.3 \frac{ft^3}{s}$ )
18. A 12 inch pipe conveys sewage at 2.6 feet per second. What is the flow expressed in MGD? (Ans:  $\frac{1.3ft}{s}$ )
19. A circular clarifier receives a flow of 11 MGD. If the clarifier is 90 ft. in diameter and is 12 ft. deep, what is: a) the hydraulic/surface loading rate, b) weir overflow rate, and c) clarifier detention time in hours? (Ans: a.  $1,730gpd/ft^2$  b.  $38,924gpd/ft$  c.  $2hrs$ )
20. A clarifier has a TSS removal efficiency of 50%. If the influent TSS concentration is 220 mg/L, how many lbs/day of TSS are removed if the flow is 10 MGD. Also, how many cu. ft of sludge is pumped if the sludge has a TS concentration of 5%. (Ans:  $2,941 \frac{ft^3 \text{ sludge}}{day}$ )