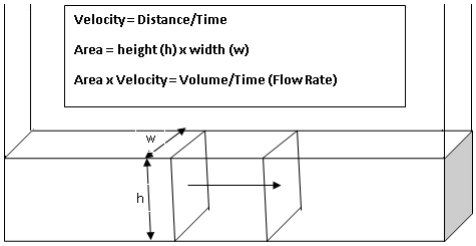
1 Math Problems

1. A sedimentation basin is 60 feet in diameter. What is the surface area of the tank?
   Solution: Surface Area$=\frac{\pi}{4} * \mathrm{D}^2 = 0.785 * 60^2 \mathrm{ft}^2 = \boxed{2,826 \mathrm{ft}^2}$

2. A rectangular cross section irrigation channel is 3.25 feet wide and is conveying a water flow of 3.5 MGD. The water flow is 8 inches deep. Calculate the velocity of this flow in ft/s.
   Solution:



$$Q = V * A \implies V = \frac{Q}{A}$$

$$\implies \mathrm{V}\frac{\mathrm{ft}}{\mathrm{s}} = \frac{3.5\frac{\cancel{\mathrm{MG}}}{\cancel{\mathrm{day}}} * \frac{1000000\cancel{gal}}{\cancel{\mathrm{MG}}} * \frac{\cancel{ft^3}}{7.48\cancel{\mathrm{gal}}} * \frac{\cancel{\mathrm{day}}}{(1440 * 60)\mathrm{s}}}{(3.25 * 0.75)\cancel{\mathrm{ft}^2}} = \boxed{2.2\frac{\mathrm{ft}}{\mathrm{s}}}$$

3. A circular tank has a diameter of 40 feet and is 10 feet deep. How many gallons will it hold?

   Solution

   Volume=Surface Area*Height $\implies (\frac{\pi}{4} * D^2 = 0.785 * 40^2 \ \mathrm{ft}^2 * 10 \ \mathrm{ft}) * 7.48 \ \mathrm{gallons} = \boxed{93,949 \mathrm{gallons}}$

4. A 50,000 gallon tank receives 250,000 gpd flow. What is the detention time in hours?

   Solution

   $$\mathrm{DT} = \frac{50,000 \ \mathrm{gallons}}{250,000 \ \frac{\mathrm{gallons}}{\mathrm{day}} * \frac{\mathrm{day}}{24 \ \mathrm{hrs}}} = \boxed{4.8 \ \mathrm{hours}}$$

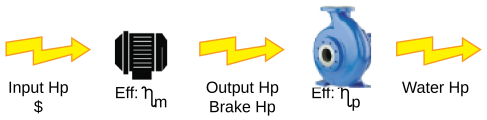
5. A tank is 44' in diameter and 22' high and is dosed with 50 ppm of chlorine. How many pound of 70% HTH is needed?

   $\mathrm{lbs} = \mathrm{Volume(MG)} * \mathrm{Concentration}\frac{\mathrm{mg}}{\mathrm{l}} * 8.34 \implies$

   $$\left(\left((0.785 * 44^2 * 22)\cancel{\mathrm{ft}^3} * \frac{7.48\cancel{\mathrm{gallon}}}{\cancel{\mathrm{ft}^3}} * \frac{\mathrm{MG}}{1,000,000\cancel{\mathrm{gallon}}} \right) * 50 * 8.34 \right) * \frac{1 \ \mathrm{lb \ of \ 70\% \ HTH}}{0.7 \ \mathrm{lb \ HTH}} = \boxed{149 \mathrm{lbs \ HTH}}$$

   $$\implies \mathrm{Concentration}\frac{\mathrm{mg}}{\mathrm{l}} = \frac{\mathrm{lbs}}{\mathrm{Volume(MG)} * 8.34} = \frac{40 \ \mathrm{lbs}}{80 \ \mathrm{gallons} * \frac{\mathrm{MG}}{1,000,000 \ \cancel{\mathrm{gallons}}} * 8.34}$$

6. A flow of 2,200 gpm is pumped against a total head of 14.0 feet. · The pump is 80% efficient and the motor' is 85% efficient. Calculate the brake Hp.



$$\text{pump efficiency} = \frac{\text{waterHp}}{\text{brake Hp}}$$

$$\implies \text{brake Hp} = \frac{\text{waterHp}}{\text{pump efficiency}} = \frac{2,200\text{GPM} * 14\text{ft} * \dfrac{\text{Hp}}{3,960\text{GPM} - \text{ft}}}{0.8} = \boxed{10Hp}$$