

1. Convert 45 psi to feet of head

$$45 \cancel{\text{psi}} * \frac{\text{ft head}}{0.433 \cancel{\text{psi}}} = \boxed{92.4 \text{ feet}}$$

2. How long (in minutes) will it take to pump down 25 feet of water in a 110 ft diameter cylindrical tank when using a 1420 gpm pump

$$\text{Time to pump down} = \frac{\text{Volume}}{\text{Flow}} = \frac{0.785 * 110^2 * 25 \cancel{\text{ft}^3}}{1420 \frac{\cancel{\text{gallon}}}{\text{min}} * \frac{\cancel{\text{ft}^3}}{7.48 \cancel{\text{gallon}}}} = \boxed{190 \text{ minutes}}$$

3. How long will it take (hrs) to

fill a 2 ac-ft pond if the pumping rate is 400 GPM?

$$\text{Time to fill (hours)} = \frac{\text{Volume}}{\text{Flow}} = \frac{2 \cancel{\text{Ac}} \cancel{\text{ft}} * \frac{325,851 \cancel{\text{gallons}}}{\cancel{\text{Ac}} \cancel{\text{ft}}}}{400 \frac{\cancel{\text{gallons}}}{\text{min}} * \frac{60 \cancel{\text{min}}}{\text{hr}}} = \boxed{27 \text{ hours}}$$

4. A pump is set to pump 5 minutes each hour. It pumps at the rate of 35 gpm. How many gallons of water are pumped each day?

Solution:

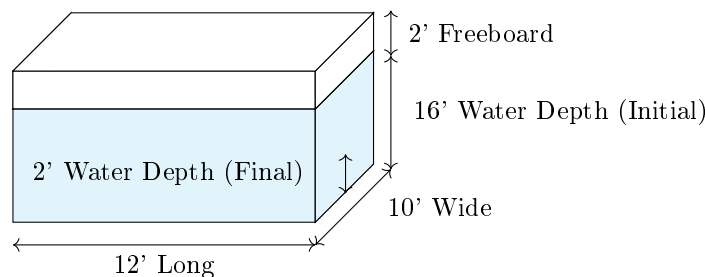
$$\frac{35 \cancel{\text{gal sludge}}}{\cancel{\text{min}}} * \frac{5 \cancel{\text{min}}}{\cancel{\text{hr}}} * \frac{24 \cancel{\text{hr}}}{\text{day}} = \boxed{\frac{4,200 \text{ gallons}}{\text{day}}}$$

5. A pump operates 5 minutes each 15 minute interval. If the pump capacity is 60 gpm, how many gallons are pumped daily?

$$\frac{60 \cancel{\text{gal sludge}}}{\cancel{\text{min}}} * \frac{5 \cancel{\text{min}}}{15 \cancel{\text{min}}} * 1440 \frac{\cancel{\text{min}}}{\text{day}} = \boxed{\frac{28,800 \text{ gal sludge}}{\text{day}}}$$

6. Given the tank is 10ft wide, 12 ft long and 18 ft deep tank including 2 ft of freeboard when filled to capacity. How much time (minutes) will be required to pump down this tank to a depth of 2 ft when the tank is at maximum capacity using a 600 GPM pump

Solution:



$$\text{Volume to be pumped} = 12 \text{ ft} * 10 \text{ ft} * (16 - 2) \text{ ft} = 1,680 \text{ ft}^3$$

$$\Rightarrow \frac{1,680 \cancel{\text{ft}^3} * 7.48 \frac{\cancel{\text{gal}}}{\cancel{\text{ft}^3}}}{600 \frac{\cancel{\text{gal}}}{\text{min}}} = \boxed{21 \text{ min}}$$

7. How long will it take to pump down 25 feet of water in a 110 ft diameter cylindrical tank when using a 1,420 gpm pump.
- 20 hours and 85 minutes
  - \*b. 20 hours and 51 minutes
  - 2 hours and 47 minutes
  - 12 hours and 36 minutes

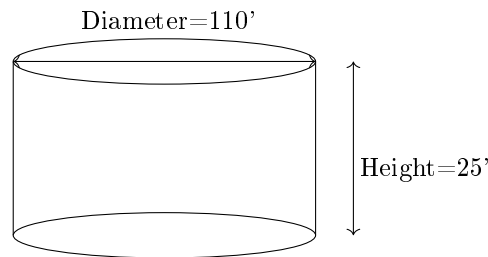
8. How long (in minutes) will it take to pump down 25 feet of water in a 110 ft diameter cylindrical tank when using a 1420 gpm pump

$$Time\ to\ pump\ down = \frac{Volume}{Flow} = \frac{0.785 * 110^2 * 25\ \cancel{ft^3}}{1420\ \frac{gallon}{min} * \frac{\cancel{ft^3}}{7.48gallon}} = \boxed{190\ minutes}$$

9. How long will it take (hrs) to fill a 2 ac-ft pond if the pumping rate is 400 GPM?

$$Time\ to\ fill\ (hours) = \frac{Volume}{Flow} = \frac{2\ \cancel{ac}\ \cancel{ft} * \frac{325,851\ gallons}{ac\ ft}}{400\ \frac{gallons}{min} * \frac{60\ min}{hr}} = \boxed{27\ hours}$$

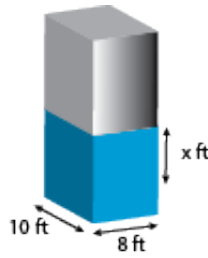
10. A tank is filling at the rate of 300gpm for a 20 minute period. How many of water will be contained in the tank at the end of 16 minutes?
11. How long (in minutes) will it take to pump down 25 feet of water in a 110 ft diameter cylindrical tank when using a 1420 gpm pump
12. How long will it take (hrs) to fill a 2 ac-ft pond if the pumping rate is 400 GPM?



$$Time = \frac{Total\ volume\ to\ be\ pumped}{Pump\ flow\ rate}$$

$$\Rightarrow \frac{(0.785 * 110^2 * 25)\ \cancel{ft^3} * \frac{7.48\ gal}{\cancel{ft^3}}}{\frac{1420\ gal}{min} * \frac{60\ min}{hr}} = 20.847hrs \Rightarrow 20\ hrs + 0.847 * 60\ minutes = \boxed{20hrs\ 51min}$$

13. Approximately how many inches will a 8 ft. wide and 10 ft. long wet well level be lowered in 15 min by a pump with a rated capacity of 100 gpm?.



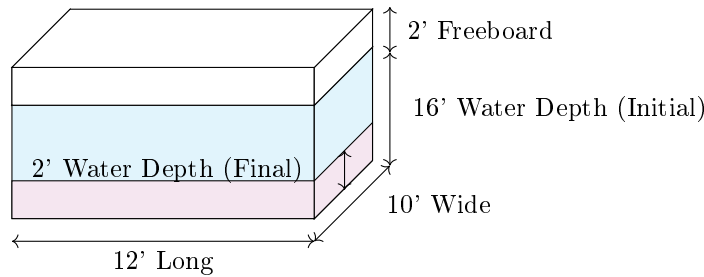
$$\text{Volume pumped} = 100 \frac{\text{gal}}{\text{min}} * 15 \text{min} = 1500 \text{gal} = 1500 \text{gal} * \frac{\text{ft}^3}{7.48 \text{gal}} = 200.5 \text{ft}^3$$

$$\text{Volume of wetwell for } x \text{ feet height of water} = 8 \text{ft} * 10 \text{ft} * x \text{ft} = 80x \text{ft}^3$$

$$80x \text{ft}^3 = 200.5 \text{ft}^3 \implies x = \frac{200.5}{80} = 2.5 \text{ft} = 2.5 \text{ft} * \frac{12 \text{in}}{\text{ft}} = \boxed{30 \text{in}}$$

14. Given the tank is 10ft wide, 12 ft long and 18 ft deep tank including 2 ft of freeboard when filled to capacity. How much time (minutes) will be required to pump down this tank to a depth of 2 ft when the tank is at maximum capacity using a 600 GPM pump

Solution:



$$\text{Volume to be pumped} = 12 \text{ ft} * 10 \text{ ft} * (16 - 2) \text{ ft} = 1,680 \text{ft}^3$$

$$\implies \frac{1,680 \text{ft}^3 * 7.48 \frac{\text{gal}}{\text{ft}^3}}{600 \frac{\text{gal}}{\text{min}}} = \boxed{21 \text{min}}$$

15. A pump is set to pump 5 minutes each hour. It pumps at the rate of 35 gpm. How many gallons of are pumped each day?

Solution:

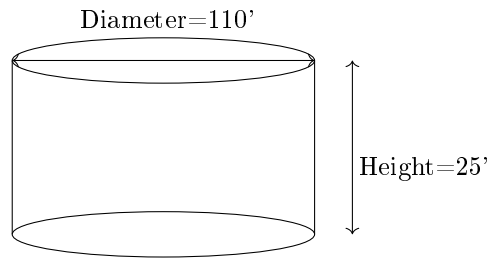
$$\frac{35 \text{ gal sludge}}{\text{min}} * \frac{5 \text{ min}}{\text{hr}} * \frac{24 \text{ hr}}{\text{day}} = \boxed{\frac{4,200 \text{ gallons}}{\text{day}}}$$

16. A pump operates 5 minutes each 15 minute interval. If the pump capacity is 60 gpm, how many gallons of are pumped daily?

$$\frac{60 \text{ gal sludge}}{\text{min}} * \frac{5 \text{ min}}{15 \text{ min}} * 1440 \frac{\text{min}}{\text{day}} = \boxed{\frac{28,800 \text{ gal sludge}}{\text{day}}}$$

17. How long will it take to pump down 25 feet of water in a 110 ft diameter cylindrical tank when using a 1420 gpm pump.

Ans: 20 hrs 51 minutes



$$Time = \frac{\text{Total volume to be pumped}}{\text{Pump flow rate}}$$

$$\Rightarrow \frac{(0.785 * 110^2 * 25) \cancel{ft^3} * \frac{7.48 \cancel{gal}}{\cancel{ft^3}}}{\frac{1420 \cancel{gal}}{\cancel{min}} * \frac{60 \cancel{min}}{\cancel{hr}}} = 20.847 \text{ hrs} \Rightarrow 20 \text{ hrs} + 0.847 * 60 \text{ minutes} = \boxed{20 \text{ hrs } 51 \text{ min}}$$

18. A single piston reciprocating pump has a 6 inch diameter piston with a 6 inch length of stroke. If it makes 16 discharge strokes per minute, the pumping rate is gallons per minute

a. 6  
 \*b. 12  
 c. 25  
 d. 47

19. Given the following information, calculate how many minutes a piston-type pump will have to run each day to pump 1 MGD of a solution if the pump will pump two (2) gallons per stroke and the pump is set at 50 strokes/minute

\*a. 25 minutes  
 b. 445 minutes  
 c. 95 minutes  
 d. 210 minutes

20. How long will it take (hrs) to fill a 2 ac-ft reservoir if the pumping rate is 400 GPM

Solution:

$$Time(\text{hrs}) \text{ to fill a } 2\text{ ac-ft pond} = \frac{2\cancel{ac} \cancel{ft} * \frac{43,560 \cancel{ft^2}}{\cancel{ac} \cancel{ft}} * \frac{7.48 \cancel{gal}}{\cancel{ft^3}}}{\frac{400 \cancel{gal}}{\cancel{min}} * \frac{60 \cancel{min}}{\cancel{hr}}} = \boxed{27 \text{ hrs}}$$