

# AALSO Operator Proficiency Examination Practice

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**Multiple Choice:** For each of the following questions, circle the letter of the answer that best answers the question.

1. Alkalinity is a measurement of:
  - A. The acidity of a solution.
  - B. The basicity of a solution.
  - C. The pH buffering capacity of the solution.
  - D. Both A and B.
  
2. Nitrifying bacteria require which of the following compounds to convert ammonia into nitrite and nitrate:
  - A. Oxygen
  - B. Sodium Hypochlorite
  - C. Ozonated Water
  - D. All of the Above
  
3. Coliform bacteria are measured using which unit?
  - A. Colony Forming Units
  - B. Coliform Factorial Units
  - C. Most Potential Number
  - D. Bacteriological Colony Units
  
4. Which federal organization regulates facilities that house marine mammals in captivity?
  - A. FCC
  - B. NOAA
  - C. FDA
  - D. USDA
  
5. Turbidity is a measurement of anything in the water column that:
  - A. Is dissolved and therefore changes the specific gravity of the water.
  - B. Causes the scattering or absorption of light.
  - C. Allows light to penetrate the water.
  - D. Changes the color of the water.
  
6. Centrifugal pump bearing temperatures in excess of 160°F could be caused by:
  - A. Under-Lubrication
  - B. Over-Lubrication
  - C. Lack of head pressure on the pump
  - D. Both A and B

7. Which of the following best describes a solution with a pH of 12?
- A. The solution is a base.
  - B. The solution is an acid.
  - C. The solution will rapidly dissolve most metals.
  - D. The solution will form hydronium ions when dissolved in water.
8. Which of the following types of pumps is not a positive displacement pump?
- A. Piston Pump
  - B. Diaphragm Pump
  - C. Centrifugal Pump
  - D. Peristaltic Pump
9. Which of the following types of valves, when fully open, would most affect static head loss?
- A. Ball Valve
  - B. Butterfly Valve
  - C. Globe Valve
  - D. Gate Valve
10. In a cathodic protection system, which of the following serves as the cathode?
- A. Structural and system components.
  - B. A sacrificial metal such as magnesium, aluminum, or zinc.
  - C. The salts that make up seawater.
  - D. All of the above.
11. In a cathodic protection system, which of the following serves as the anode?
- A. Structural and system components.
  - B. A sacrificial metal such as magnesium, aluminum, or zinc.
  - C. The salts that make up seawater.
  - D. All of the above.
12. Which of the following factors can affect the temperature at which water boils?
- A. Atmospheric pressure.
  - B. The amount of compounds that are dissolved in the water.
  - C. The volume of the water being boiled.
  - D. Both A and B.
13. Which of the following best describes the relationship between water and glass?
- A. Water is more cohesive with glass than mercury.
  - B. Water is more adhesive with glass than mercury.
  - C. Water makes a good solvent for glass.
  - D. Water and glass react exothermically.

14. OSHA requires that all Material Safety Data Sheets be stored in a central accessible location unless:
- A. They are stored where the chemicals are stored themselves.
  - B. They are kept in a locked office or file cabinet.
  - C. The chemicals are only to be stored and not to be used.
  - D. There are no exceptions.
15. How should you handle a hazardous chemical?
- A. With safety glasses, gloves, and a particulate respirator.
  - B. With the PPE provided to you by your manager or supervisor.
  - C. As indicated in the MSDS.
  - D. All of the above.

**True or False:** For each statement, indicate True or False.

1. Water has a freezing point of 0°F.
2. A protein skimmer employs the use of micro-bubbles to separate detritus, proteins, amino acids, and nitrogenous compounds from the water.
3. A ball valve has very little effect on static head loss when fully open.
4. A filter may be in need of a backwash if the filter inlet pressure is lower than normal.
5. A filter may be in need of a backwash if the filter inlet pressure is higher than normal.
6. A substance whose pH is lower than 7 can be considered an acid.
7. The USDA regulates that the salinity of a marine mammal pool be between 15 and 35 ppt.
8. Turbidity is measured in Nephelometric Turbidity Units.
9. When the temperature of water is increased, the water's ability to hold dissolved oxygen is increased.
10. Oil and water do not mix well at standard temperature and pressure because oil is a non-polar substance and water is a polar substance.

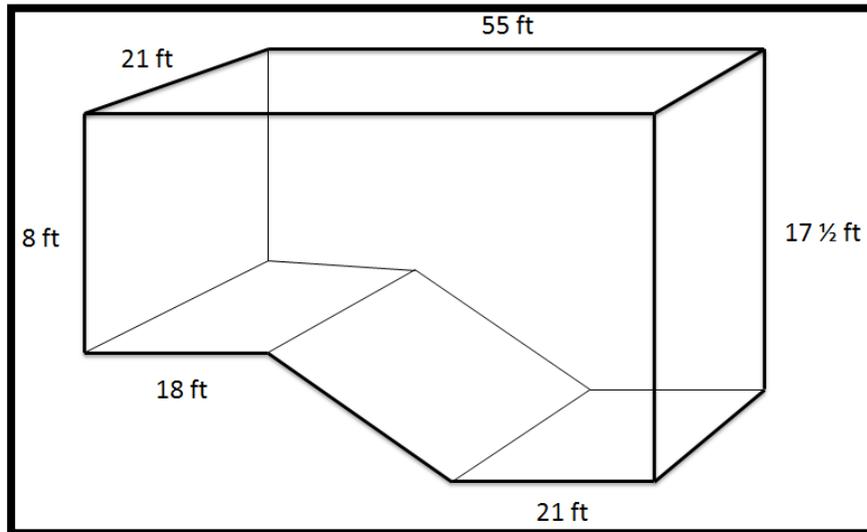
**Fill in the Blank:** Into each sentence below, copy a term from the word bank that correctly completes the sentence.

Acidic	Absorption	Activated Carbon	500CFU	Excessive Flow Rates
Dissolved Oxygen	Backwash	Excessive Backwash Rates	Neutral	Adsorption
1000CFU	Copper (II) Sulfate	Broken Lateral(s)	Basic	Alkalinity

1. A solution whose pH is 4 is considered to be a(n) \_\_\_\_\_ substance.
2. A solution whose pH is 9 is considered to be a(n) \_\_\_\_\_ substance.
3. A solution whose pH is 7 is considered to be a(n) \_\_\_\_\_ substance.
4. You open and inspect one of your vertical high pressure sand filters and find that you have lost 1/3 of the media you originally added. This problem could most likely be attributed to \_\_\_\_\_ and/or \_\_\_\_\_.
5. Activated carbon has a unique molecular structure that enhances its effectiveness in the \_\_\_\_\_ process.
6. Impaction and channeling of your filter media could be attributed to \_\_\_\_\_.
7. The USDA regulates that coliform bacteria in a marine mammal pool be tested weekly, and that the level of bacteria be maintained below \_\_\_\_\_ per 100mL.
8. \_\_\_\_\_ is both a quantitative and qualitative measure of carbonate and bicarbonate levels in your pool, which act as buffers to changes in pH.
9. \_\_\_\_\_ could be used in a river otter recirculation system to help reduce the amount chlorine in the municipal freshwater makeup.
10. A \_\_\_\_\_ is the process in which the flow direction through your filter is reversed, thus the media is free to be suspended and allowed to shed its waste.

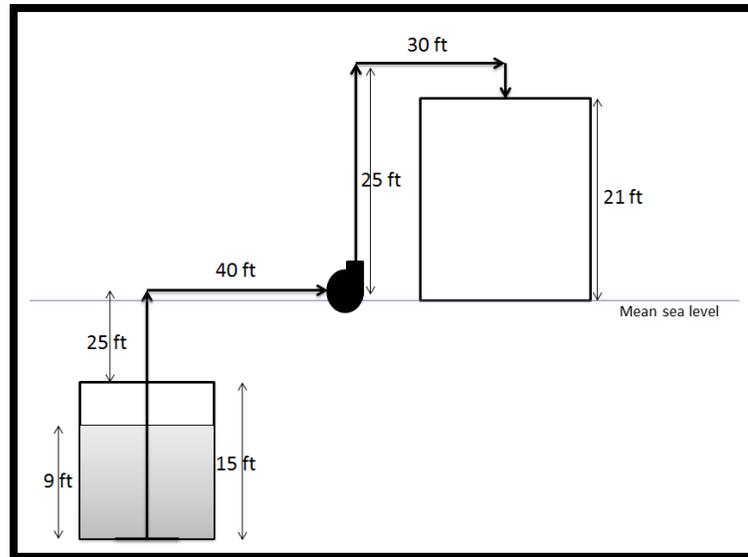
**Mathematical Calculations:** Solve for each of the following life support mathematical problems.

1. You are asked to build a perimeter fence around a cylindrical sea lion quarantine pool. The pool measures 32 feet across by 10 feet deep and the fence will sit  $3\frac{1}{2}$  feet from the edge of the pool. How many feet of fence will you need to order (rounded up to the nearest whole foot)?
2. Examine the diagram below of a sloping bottom pool. How many gallons of water will the pool contain when it is filled to  $\frac{7}{8}$  capacity?



3. A cylindrical pool measures 60 feet across with an average depth of 15 feet 5 inches. The pool is typically filled to  $\frac{9}{10}$  capacity. It is equipped with two pumps and filters whose normal rate of flow is typically 450 gpm each. How many turnovers will this pool experience in a typical 24 hour period?
4. A vertical high pressure sand filter measures 12 feet wide by 10 feet tall. A 15 horsepower centrifugal pump supplies the filter with a normal operating flow of 1000 gpm. What is the hydraulic loading rate on the filter?
5. An Atlantic Bottlenose Dolphin exhibit is equipped with 4 pumps and filters that all tie into a 16" ID (inside diameter) common discharge header that supplies the pool. Each of the pumps normally operates at 675 gpm through a 7.25" ID riser pipe that supplies the filters. What is the velocity of the water (ft/s) as it travels through the riser pipe (5a) and the discharge header (5b) respectively?

6. Examine the diagram below of a basic salt transfer system. What is the Total Dynamic Head at this instance assuming 15 psi of head lost to friction?



7. A 216,000 gallon dolphin exhibit has three (3) recirculation pumps and a turnover rate of 1 hour, 30 minutes. Each pump has a TDH of 55 feet. What are the brake horsepower (Bhp) requirements for each of the equivalent pumps? (Assuming each pump is 70% efficient)
8. You are asked to dose a 315,000 gallon sea lion exhibit with a new algaecide product. The algaecide solution that is available is a 60% solution with a specific gravity of 1.15. How much of the product will you need to add (in gallons) to reach a target concentration of 7 mg/L in the pool?
9. A 175,000 gallon cylindrical pool measures 40 feet across, but has an unknown depth. There are two recirculating pumps on this system with flow rates of 750 gpm and 950 gpm respectively. The temperature in the pool is to be maintained between 65°F and 68°F, however it's currently at 75°F. It is equipped with a 70% efficient 50 ton chiller. What is the turnover rate in hours and minutes (xx:yy)?
10. Convert the following (using figures for freshwater):
- 4212 gpm to CFS
  - 8 CFS to lbs/day
  - 22.35 CFS to gpm
  - 270,000 lbs/year to mL/min