

# Lesson # 14 Answers

## MA205 Integral Calculus and Introduction to Differential Equations

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### Mechanics Based Problems

1. An aquarium 2m long, 1m wide, and 1m deep is full of water. Find the work needed to pump half of the water out of the aquarium. Use the fact that water has a density of  $1000 \text{ kg/m}^3$ .

$$W = 2,450 \text{ J}$$

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ANS

2. A circular swimming pool has a diameter of 24 ft. the sides are 5 ft high and the depth of the water is 4 ft. How much work is required to pump all of the water out over the side? Use the fact that water weighs 62.5 pounds per cubic foot.

$$W = 339,292 \text{ ft}\cdot\text{lbs}$$

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ANS.

Problem Solving Problems

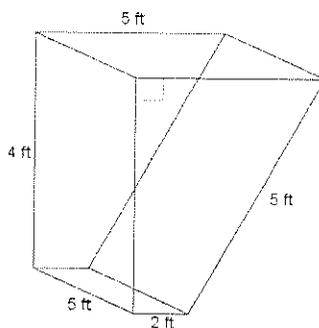
1. A spherical tank of radius 8 ft is half full of oil that weighs 50 pounds per cubic foot. Find the work to pump oil out through a hole in top of the tank.

$$W = 589,782 \text{ ft}\cdot\text{lbs}$$

ANS



2. A gas tank has a trapezoidal cross section as shown below and is 5 feet wide. How much work does the engine do in pumping the gas out of the top of the tank if fuel weighs approximately 55.6 pounds per cubic foot.



$$W = 6672 \text{ ft}\cdot\text{lbs}$$

ANS

The top of the tank

3. A cylindrical water tank 4 meters high with a radius of 2 meters is buried so that its top is 1 meter below the ground. How much work is done in pumping a full tank of water up to ground level? Water weighs 9800 Newtons per cubic meter.

$$W = 1.4778 \times 10^6 \text{ J or (N}\cdot\text{m)}$$

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ANS.