

Section 8.5

1. A worker on a roof 50 ft above the ground needs to lift a 300 lb bucket of cement from the ground to a point 20 ft above the ground by pulling on a rope weighing 4 lb/ft . How much work is required?
2. A water tank is in shape of right circular cylinder with the height 30 ft and radius 8 ft . If the tank is full of water, find the work required to pump all of it over the top of the rim. Note: 1 cubic foot water weighs 62.4 lb .
3. A water tank is in shape of right circular cone with the height 30 ft and radius of the base 8 ft . If the tank is full of water, find the work required to pump all of it over the top of the tank. Note: 1 cubic foot water weighs 62.4 lb .
4. A gas station stores its gasoline in a tank under the ground. The tank is a cylinder lying horizontally on its side. If the radius of the cylinder is 5 ft , its length is 15 ft , and the top is 12 ft under the ground, find the total work needed to pump the gasoline out the tank. Gasoline weighs 42 lb per cubic foot. The tank is full of gasoline.

5. A gas station stores its gasoline in a tank under the ground. The tank is a cylinder standing in upright position. If the radius of the cylinder is 4 ft , its height is 12 ft , and the top is 15 ft under the ground, find the total work needed to pump the gasoline out the tank. Gasoline weighs 42 lb per cubic foot. The tank is full of gasoline. Do the same problem when the tank is half full.

6. A water tank is in shape of right circular cone with the height 30 ft and radius 8 ft at the top. Find the work required to pump all of it over the top of the tank. Recall that 1 cubic foot of water weighs 62.4 lb .

A. If the tank is filled with water to a depth of 20 ft .

B. If the tank is full.

C. If the tank is full and the water is pumped to a height of 10 ft above the top of the tank.

7. A banner in the shape of an isosceles triangle is hung from the roof over the side of the building. The banner has a base of 25 ft and height of 20 ft . The banner is made from the material with a uniform density of 5 pounds per square foot. Set up an integral to compute the work required to lift the banner onto the roof of the building. Evaluate the integral to find the work.

8. A worker on a roof 30 ft above the ground needs to lift a rectangular banner from the ground. When the work is done the upper (shorter) edge of the banner is aligned with the edge of the roof and the banner hangs freely from the roof. The banner is 10 ft by 30 ft and has two ropes attached to the shorter side. Each of two ropes weighs 4 pounds per foot, the banner weighs 5 pounds per square foot. How much work is required?