

1. A circular swimming pool has a diameter of 24 ft, the sides are 5 ft high, the depth of the water is 4 ft. How much work is required to pump all the water out over the side? Water weighs  $62.5 \text{ lb/ft}^3$ .

2. Newton's Law of Gravitation states that two bodies with masses  $m_1$  and  $m_2$  attract each other with a force

$$F = G \frac{m_1 m_2}{r^2}$$

where  $r$  is the distance between the bodies and  $G$  is the gravitational constant.

- (a) If one of the bodies is fixed, find the work needed to move the other from  $r = a$  to  $r = b$ .

- (b) Compute the work required to launch a 1000kg satellite vertically to an orbit 1000 km high. Assume the earth's mass is  $5.98 \times 10^{24}$  kg and is concentrated at its center. Take the radius of the earth to be  $6.37 \times 10^6$  m and  $G = 6.67 \times 10^{-11}$  N·m<sup>2</sup>/kg<sup>2</sup>.

3. A cable that weighs 2 lb/ft is used to lift 800 lb of coal up a mineshaft 500 ft deep. Find the work done.