5. We can calculate the total force on the bottom of the pool in two equivalent ways. We may use the method of Problem 2 above employing the pressure we calculated in Problem 4.

$$F = P A$$

$$F = (29400 \text{ Pa}) (9.0 \text{ m} \times 24.0 \text{ m})$$

$$F = 6.35 \times 10^6 \text{ (Pa) m}^2$$

We know that 1 Pa = 1 N / m^2 so that we can write

$$F = 6.35 \times 10^6 \text{ (N / m}^2\text{) (m}^2\text{)}$$

$$F = 6.35 \times 10^6 \text{ N}$$

In the second method we may calculate the total weight of the fluid using the definition of density as mass per unit volume in order to calculate the mass. We start with the definition of density as

$$d = m / V$$

We multiply both sides of the equation by the volume to obtain the mass.

$$m = d V$$

$$m = (1000 \text{ kg / m}^3) (9.0 \text{ m} \times 24.0 \text{ m} \times 3.0 \text{ m})$$

$$m = 6.48 \times 10^5 \text{ kg}$$

The weight of the water in the pool is calculated as the mass times the acceleration of gravity or

$$wt = m g$$

$$wt = (6.48 \times 10^5 \text{ kg}) (9.8 \text{ m / s}^2)$$

$$wt = 6.35 \times 10^6 \text{ N}$$