

Under Pressure

$$1) F = \delta A d = (62.5 \frac{\text{lbs}}{\text{ft}^3}) (4\pi \text{ft}^3) (6 \text{ft}) = \boxed{1500\pi \text{ lbs}}$$

origin = center of ellipse

$$2) F = \delta \int_{-3}^3 d(y) \cdot l(y) dy = \delta \int_{-3}^3 (9-y) \left[\frac{4}{3} \sqrt{9-y^2} \right] dy$$

$$\frac{x^2}{4} + \frac{y^2}{9} = 1$$

↑

Eqn. of ellipse
(solve for x)

$$= \frac{4}{3} \delta \int_{-3}^3 (9-y) \sqrt{9-y^2} dy$$

$$= \frac{4}{3} \delta \left[9 \int_{-3}^3 \sqrt{9-y^2} dy - \int_{-3}^3 y \sqrt{9-y^2} dy \right]$$

$$= \frac{4}{3} \delta \left[9 \left(\frac{9\pi}{2} \right) - 0 \right]$$

$$= \boxed{3375\pi \text{ lbs}}$$