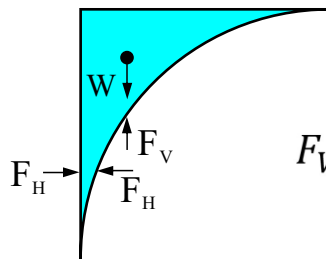
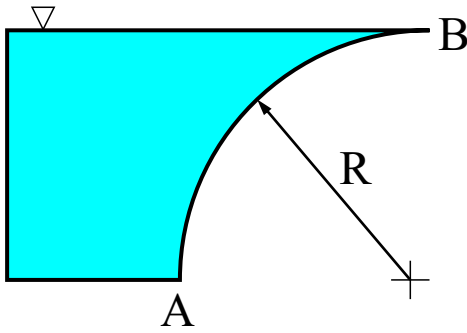


Free Body Diagram

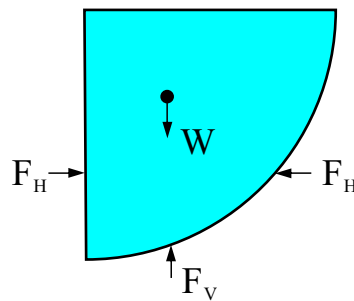
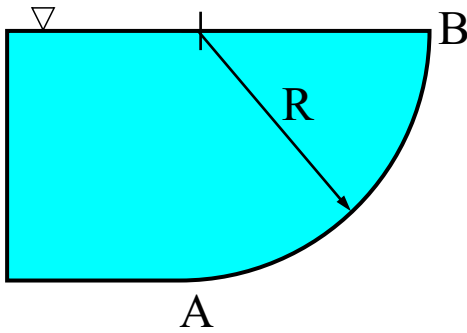
Force on Gate AB



$$V = R \square - \frac{\pi R^2}{4}$$

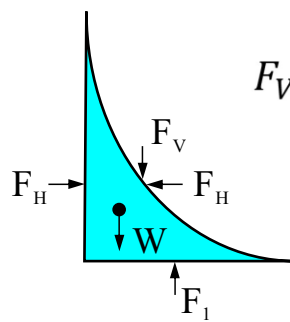
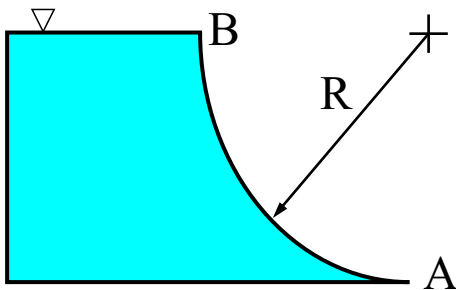
$$F_V = W = \gamma V = \gamma \left( R^2 - \frac{\pi R^2}{4} \right) \downarrow$$

$$F_H = \gamma \frac{R}{2} (R) = \gamma \frac{R^2}{2} \rightarrow$$



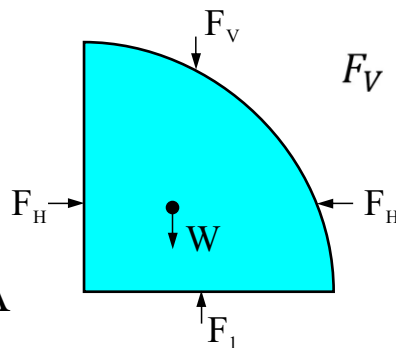
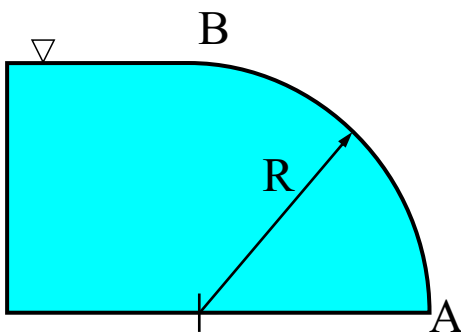
$$F_V = W = \gamma \left( \frac{\pi R^2}{4} \right) \downarrow$$

$$F_H = \gamma \frac{R}{2} (R) = \gamma \frac{R^2}{2} \rightarrow$$



$$F_V = F_1 - W = \gamma R^2 - \gamma \left( R^2 - \frac{\pi R^2}{4} \right) \uparrow$$

$$F_H = \gamma \frac{R^2}{2} \rightarrow$$



$$F_V = F_1 - W = \gamma R^2 - \gamma \left( \frac{\pi R^2}{4} \right) \uparrow$$

$$F_H = \gamma \frac{R^2}{2} \rightarrow$$

Note that the gate hinge forces are **NOT** applied to the free body diagram of the water!