

## **7.7 Fluid pressure and fluid force**

A fluid exerts pressure  $P=wh$  on a horizontally submerged object at depth  $h$  if the weight density of the fluid is  $w$ .

The force a fluid exerts on a horizontal plane region is  $F=PA$ , where  $P$  is the fluid pressure and  $A$  is the area of the region.

The force a fluid exerts on a vertical plane region is

$$F = w \int_c^d h(y)L(y)dy$$

where  $w$  is the weight density of the fluid,  $c$  is the depth at the region's bottom,  $d$  is the depth at the region's top,  $h(y)$  is the fluid's depth on the region at  $y$ , and  $L(y)$  is the horizontal length of the region at  $y$ .

ex. A tank at a city's aquarium features an isosceles triangular viewing window (vertex pointing upward) measuring 6 meters at the base, 4 meters high, and submerged so that the surface of the water is 5 meters above the vertex. How much force does the water exert on this window?