

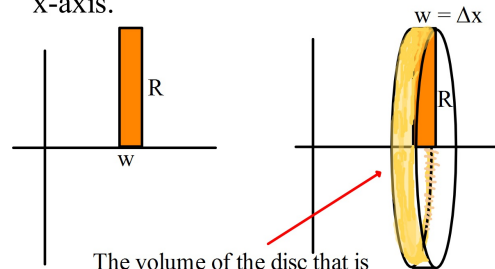
6.2

Find volume of solids of revolution using the DISC METHOD.

**ESSENTIAL QUESTION:**  
How does the volume formula for cylinders translate into the integral that represents volume of a solid of revolution?

A **solid of revolution** is formed when a region is rotated about a line (the **axis of revolution**).

Let's start by rotating a rectangle about the x-axis.



The volume of the disc that is formed is  $\pi R^2 w$ .



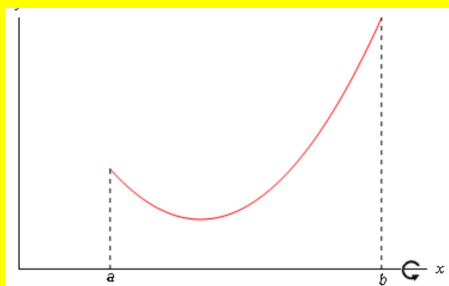
This website helps to visualize the disc method.

We know that the volume of a cylinder is  $V = \pi r^2 h$ , so the volume of one disc is  $V = \pi R^2 dx$ .

As a result, the **sum** of the volumes of all of the discs can be written as a definite integral:

$$V = \pi \int_a^b R^2 dx \quad \text{or} \quad V = \pi \int_a^b [f(x)]^2 dx$$

To get a solid of revolution, start with a function  $y = f(x)$  on the interval  $[a, b]$ . Draw a representative rectangle.



The solid that results from rotating this curve about the x-axis is shown below:

