

|         |         |         |
|---------|---------|---------|
|         | VOLUME  |         |
| DISK    | WASHER  | SHELL   |
| $dx/dy$ | $dx/dy$ | $dx/dy$ |

①

Graph showing a red curve  $y = x^2 - 1$  on a coordinate plane. The region between the curve and the y-axis is shaded yellow. The y-axis is labeled T F M L. The x-axis is labeled O C H R and T. A blue arrow indicates a rotation around the origin. The region is divided into TOP and BOTTOM sections by a horizontal line at  $y = -1$ . The y-axis is also labeled  $y = -1$  and the x-axis is labeled  $x = -2$ .

② **DISK** WASHER SHELL  
A.R. is a border of the region  
**dx**  $dy$   
A.R. is a horizontal line

③ Disk  $dx$ :  $V = \pi \int_L^R (T-B)^2 dx$   
 $V = \pi \int_{-2}^0 [(x^2-1) - (-1)]^2 dx = 6.4\pi \approx 20.1$