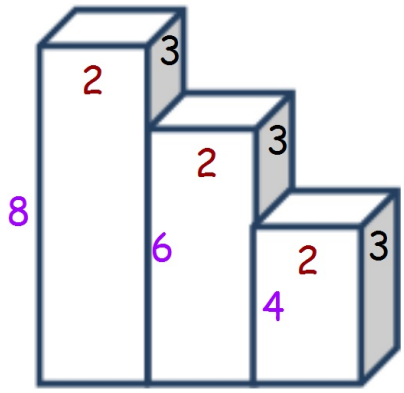
October 22

# Find the volume of the object below.



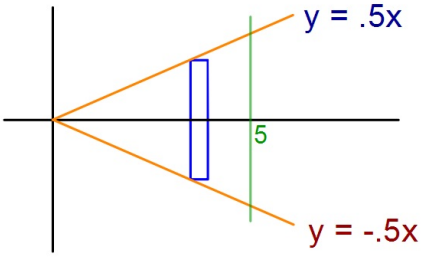

$b \cdot h \cdot w$

October 22

Students will verbally explain how to find the volume by slicing

(using the words:
cross-section, area, dimensions, slice...)

(1) Sketch the graph




Cross-sections perpendicular to the x-axis are rectangles, where the base is 2

(2) Draw and label a slice


(3) find the dimensions

$h = .5x - (-.5x) = x$ = upper y − lower y

$b = 2$

$w = dx$

(4) find the area of the slice

$A = x(2) = 2x$

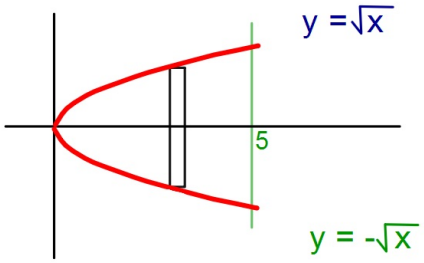
(5) find the volume of one slice

$V = 2x\,dx$

(6) find the total volume

$\int_0^5 2x\,dx = x^2\Big|_0^5 = 5^2 - 0^2 = 25$

(1) Sketch the graph




Cross-sections perpendicular to the x-axis are semi-circles

(2) Draw and label a slice


(3) find the dimensions

$d = \sqrt{x} - (-\sqrt{x}) = 2\sqrt{x}$

$r = \frac{d}{2} = \frac{2\sqrt{x}}{2} = \sqrt{x}$

$w = dx$

(4) find the area of the slice

$A = \frac{\pi r^2}{2} = \frac{\pi(\sqrt{x})^2}{2} = \frac{\pi x}{2}$

(5) find the volume of one slice

$V = (\text{Area})\,dx = \frac{\pi x}{2}\,dx$

(6) find the total volume

$\int_0^5 \frac{\pi}{2} x\,dx = \frac{\pi}{2}\int_0^5 x\,dx = \frac{\pi}{2}\left(\frac{x^2}{2}\Big|_0^5\right) = \frac{25}{4}\pi$

# Volume by Slicing

(volume with known cross-sections)

$$\int_a^b (\text{Area})\, dx$$