

## Volume of Known Cross Sections

**Use the given information to calculate the volume of the figures formed.**

1. The base of the figure is the region bounded by the x-axis and the functions  $y = \sqrt{x}$  and  $x = 9$ . Bases of cross sections are perpendicular to the x-axis. Find the volume if the cross sections are:
  - a. Squares
  - b. Semicircles
  - c. Isosceles Right Triangles
  - d. Equilateral Triangles
  
2. The base of the figure is the region bounded by the graphs of  $y = 4 - x^2$  and the x-axis. Bases of cross sections are perpendicular to the x-axis. Find the volume if the cross sections are:
  - a. Squares
  - b. Semicircles
  - c. Isosceles Right Triangles
  - d. Equilateral Triangles
  
3. The base of the figure is the region bounded by the graphs of  $y = \sqrt[3]{x}$  and  $y = 3$  in the first quadrant. Bases of cross sections are perpendicular to the y-axis. Find the volume if the cross sections are:
  - a. Squares
  - b. Semicircles
  - c. Isosceles Right Triangles
  - d. Equilateral Triangles
  
4. The base of the solid is the region enclosed by the curve  $f(x) = \sqrt{4 - x}$ , the x-axis, and the y axis. Cross sections are perpendicular to the y axis with the diameter in the base.
  - a. Squares
  - b. Semicircles
  - c. Isosceles Right Triangles
  - d. Equilateral Triangles

5. The base of a solid is the elliptical region with boundary curve  $9x^2 + 4y^2 = 36$ . Cross sections perpendicular to the x-axis are isosceles right triangles with hypotenuse in the base. Find the volume of the solid.
6. The base of a solid is a region bounded by the curves  $y = x^2$  and  $y = 1$ . Cross sections perpendicular to the x-axis are semicircles. Find the volume of the solid.
7. The base of a solid is the region bounded by the curves  $y = x^2 + 3$  and  $y = x$  on the interval  $[-2, 5]$ . Cross sections perpendicular to the x-axis are equilateral triangles. Find the volume of the solid.
8. The base of a solid is the region bounded by the graph of  $f(x) = x^2$  and  $g(x) = 8 - x^2$ .
- Find the volume of the solid if all cross sections perpendicular to the x-axis are rectangles, where the height is twice the base.
  - Find the volume of the solid if all cross sections perpendicular to the y-axis are squares.
9. The base of a solid is the region bounded by the graphs of  $y = 1/\sqrt{x}$  and  $y = -1/\sqrt{x}$  and the lines  $x = 1$  and  $x = 4$ . The cross sections perpendicular to the x axis are right isosceles triangles with a leg in the base. Find the volume of the solid.
10. Let  $R$  be the region in Quadrant I bounded by the graph of  $y = e^x$ , the y-axis, and the horizontal line  $y = 4$ . If  $R$  is the base of a solid with cross section perpendicular to the y-axis, find the volume of the solid with semicircle cross sections.