# LESSON 2: VOLUMES
# DISK AND WASHER METHODS

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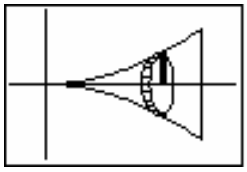
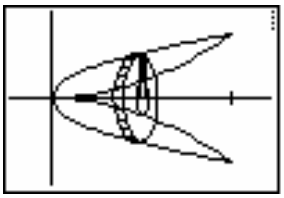
|---|---|
| Objectives: | 1. To use the disk and washer methods for finding the volume of solids of revolution |

## Disk Method



| *Known Formula* | *Sample Disk* | *Integration Formula* |
|---|---|---|
| $V = \pi r^2 w$ | $V = \pi \left[ r(x_i) \right]^2 \Delta x$ | $V = \pi \int_a^b \left[ r(x) \right]^2 dx$ |

## Washer Method



*Integration Formula*

$$V = \pi \int_a^b ([R(x)]^2 - [r(x)]^2) dx$$

Procedure

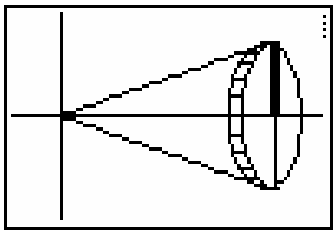
1. Make a sketch
2. Draw a representative slice
3. Write an expression for the volume in terms of one variable
4. Integrate

App. Int. Lesson 2, cont.

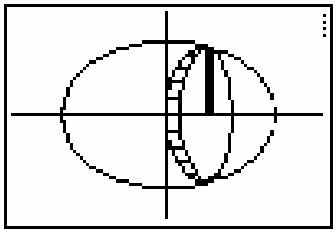
**Examples**

Worksheet 1 – 11 odd

1. Use the methods of this lesson to find the volume of a cone of height h and radius r.



2. Use the methods of this lesson to find the volume of a sphere of radius r.

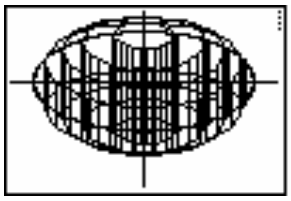


**Problems**

1. Find the volume of the solid of revolution obtained by revolving the region bounded by $y = x^2 + 1$ and $y = x + 3$ about the line $y = -2$.

2. Find the volume of the solid of revolution of the region bounded by $y^2 = 2x - 2$ and the line $y = x - 5$ revolved about the line $y = -2$.

App. Int. Lesson 2, cont.

3. Find the volume of the solid of revolution of the region bounded by $y = x^2$, $y = 0$, and the line $x = 2$ revolved about the line $x = -2$. (Doggie Bowl)

4. A hole of radius 2 inches is drilled through a spherical shaped solid of radius 8 inches. The axis of the hole is a diameter of the sphere. Find the volume of the part of the solid that remains.