

## **Video-Enhanced Lesson: Volumes of Rotation in AP Calculus**

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**Lesson Title:** Volumes of Rotation in AP Calculus

**Introduction:** This lesson introduces students to finding volumes by rotating a function about the x-axis or y-axis. Students should already be familiar with integration and should have studied finding area under a curve. The video link will provide students with visuals of the object as well as how to write the equation that will be calculated.

**Content Area and Grade Level:** Math, 11th/12th grade advanced students

### **Objectives:**

- Students will write an integral that represents volume of rotation
- Students will calculate the integral that represents volume of rotation

**Relative Advantage:** The video component will provide students with a clearer 3D visual of the rotation as well as the finished object. Students will also be able to more clearly see how the components of the integral come from the given function.

**Timeline:** This lesson can be completed in about an hour, or 1-2 class periods.

### **Materials:**

- Textbook: Calculus of a Single Variable (See reference)
- Video 1: [Volume of Revolution: The Disk Method](#)
- Video 2: [Solid of Revolution - Animated](#)

**Grouping Strategies:** Students do not need to be in groups for this activity. The video can be projected for the entire class, or previewed the night before class by individual students.

### **Learning Activities:**

1. Students will start by reviewing area under a curve during class. The instructor should ask students to solve a problem, and have several students demonstrate different methods to the class.
2. Next, students would watch the linked video 1 on Volumes of Rotation. Students can view at home, if class times are not adequate to also cover the practice.
3. After learning the method in the video, students will be asked to view the second video of a revolution, and to attempt to write an equation for the animation shown. Students can discuss the animation as a class, or can submit solutions individually for feedback.
4. Students will practice integration problems in the textbook #1-15odd and check answers at the website: <http://www.calcchat.com/>

**Assessment:** Students will be assessed through discussion questions, follow-up quiz scores and end of unit exam. Informal assessment through in-class questions will allow the instructor to determine if the video was effective in illustrating the concept, while quiz and test scores will show if the method can be applied to other problems successfully.

**Adaptations for Learners with Special Needs:** Because this is an advanced math topic, learners with special needs likely need extra time to digest the concept and apply it. These learners should be encouraged to preview the lesson before seeing it in class, and to use the benefits of video (replay, pause, etc) to have a more thorough understanding. Additional video links can also be provided. Learners with low-vision may need an alternate lesson plan.

**References:**

- Larson, R. and Edwards, B. (2013). *Calculus of a Single Variable* (10th ed). Boston, MA: Cengage Learning.