

Grades Remaining:

Project	100
C Topic Homeworks	30
Project Test	48

I hope that through these projects you will gain a sense of personal ownership of some piece of mathematics, improve your ability to read and write mathematical material, and cooperate with peers in the solution of problems.

The Project: **C TOPICS** This project requires your group to learn and then teach one of the following Calculus C topics to the class.

- **Parametric Equations and their Derivatives:** (page 26, 144) Teach what parametric equations are and why they are useful/important. Students should be able to graph a basic parametric equation on their calculators. Include the proof for the parametric derivative in your lesson. Students should know how to 'eliminate the parameter' AND how to use the parametric chain rule. (Have one problem where they find a parametric derivative both ways.)
- **Arc Length:** (page 395) Include a proof of the formula in your lesson. Include at least one application problem.
- **Integration by Parts:** (page 323) What kinds of integrals are candidates for 'parts'? Clearly explain strategies for choosing u and dv . Include $\int \ln x dx$ in your lesson and emphasize its importance! Students should also be asked to use parts to find $\int \ln x dx$ again in their homework.
- **Improper Integrals:** (page 433) Show both types ($\int_a^\infty f(x) dx$ and $\int_a^c f(x) dx$ has an infinite discontinuity). Clearly explain converge vs. diverge.
- **L'Hopital's Rule:** (page 417) Teach what L'Hopital's rule is and when to use it. Include indeterminate forms such as $1^\infty, 0^0, \infty^0$.
- **Volume By Shells:** (page 387) Demonstrate with a physical model, like we did with the oranges or the angel food cake.

C Topics Presentation Overview:

- You will have half of one class period to present the topic to the class. Your basic objective is to make it possible for every student to understand and apply the concept you're teaching.
- You must also create a homework assignment for after your presentation and develop questions for the C Topics test (see next page for details).
- The presentation should take about 35-40 minutes of the class period. Any remaining time should be used for students to work on the assignment.
- The presentation grade will not be hurt by attempts to be entertaining as well as informative. In other words, style points will be considered.
- In your presentation, feel free to give the class some hints, but not the exact questions, about what they might be asked on the test.

C Topics Resources:

It is expected that you will use resources other than your textbook! You should plan on using the Internet as well as other books. Studying different approaches to a concept helps deepen your understanding. Your teacher is NOT a primary resource during this process-- YOU are the teacher.

C Topics Test:

The project test will cover all C topics presented. There will be two multiple choice and one free response problem for each topic, written by the groups presenting the topic.

Attendance:

A group project cannot be completed without the participation of all group members. Consequently, your attendance every day is required. Students who are absent may be asked to complete a project individually on another topic. Perfect attendance (no tardies and no absences (except for school events)) for the remainder of the year will be rewarded. A student with perfect attendance will earn an additional 10 points to his or her project grade.

But wait, what are we turning in?

On the day of the presentation, hand in:

- Group:
 - A hard copy of your presentation (outline / lesson plan), organized in a folder. Include all definitions, activities, examples... Include an informal bibliography of all resources used.
 - A set of Homework Problems with complete solutions similar to those that might be asked on the test. You must thoughtfully select or write specific problems to assign. This should take your students no more than 25 minutes to complete. If you need this to be copied, give it to me at least one day before you are to present.
 - Two well-written multiple choice questions and One free response question, including answers with work shown, which will be the basis for the test to be given on the second to last day of classes. Also, email a copy of the questions in a Microsoft Word document to me at lveuve@leadershiphigh.org

- Individual: Each group member will submit a Project Summary (a minimum one page description of the mathematics involved in your project) and email me a confidential Peer Assessment (how would you divide 15 points among the 3 people in your group based on their performance on this project?). If I don't receive an email from you, I'll assume an even split.

Project Grading:

The project grade will have a group and individual component.

Points:	10 (Group)	Use of class time / Observable progress
	60 (Group)	Presentation and work handed in.
	10	Content of Presentation
	10	Design and flow of presentation / Style/Creativity
	20	Knowledge of content / Ability to answer questions/ Explanation of Topic
	10	Organization and completeness of work handed in.
	10	Test Questions
	30 (Individual)	
	15	Project Summary
	15	Peer Assessment

Students absent on the day of the project presentation may receive a zero.

Timeline:

	May 16: Work Day. Groups assigned, topics selected. Begin research on topics.	May 18: No Class – Senior Exhibitions
May 21: Work Day	May 23: Work Day	May 25: Work Day
No School: Memorial Day	May 30: PRESENTATIONS: Integration by Parts & Parametric Functions	June 1: PRESENTATIONS: Improper Integrals & Arc Length
June 5: C-Topic Test - Open notes and homework.	June 6: Last Day of Calculus ☺. Return projects, see test/semester grades, sign yearbooks, and say tender goodbyes.	

What should the Presentation look like?

Your goal is to give students a general overview of a new Calculus topic. By the end of the class period all students should be able to solve mid-level problems pertaining to your topic. Students are depending on you to teach them a lesson that they will be tested on!

First, all group members should spend time learning the topic individually. Then, discuss your impressions and start pulling together your lesson. Do NOT divide up the work in such a way that the right hand doesn't know what the left hand is doing. i.e. If one person is doing the lesson and another the homework, chances are that the homework won't really fit what was taught. This leads to general discontent (irritation and anger) among the masses. All group members should be involved with all aspects of the planning!!!

Your lesson should follow this basic outline:

I. Introduction

Introduce the topic-- give a 'big picture' and state your objectives for the lesson. What will you be teaching (what is your objective)? Why is it useful? What will we be able to do that we couldn't before? How does it connect to what we've already learned? Provide some historical context. Tease your audience about what is to come (motivation)

II. Review

Briefly state / review any previous skills that the students will need to utilize.

III. Instruction

Clearly provide examples, and justification of your topic. Any proofs should be audience appropriate. Examples should be straightforward. Emphasize STRATEGY. What decisions will the problem solver have to make? Is there an algorithm or step by step process to solving these types of problems? Is there a formula? Can you connect the calculus to a graph or picture?

Teach new material SLOWLY and carefully. Keep it simple and clear. Show examples. Give students time to practice and ask questions. Have an activity planned that will reinforce the learning. All members of the presenting group should actively assist students during this time.

IV. Practice

After each new skill taught, your students should be given an opportunity to practice what they've learned. Practice problems should range in difficulty level. Don't be afraid to challenge your students, but not so much that it distracts from the lesson. Remember they need to master the basics before they can think about a more difficult problem. Will you have students put their work on the board? Make sure you have time to discuss the problems and to answer questions.

V. Assessment

Have the students learned what you've taught? The only way you'll know this is by interacting with them. Observe their work. Ask them questions to see if they understand.

VI. Summary

Summarize the material learned. "What did we learn today?" Give students their handout for homework. If there is time, help students begin homework. Homework should take around (but no more than) 25 minutes for a student to complete.

Name: _____

AB Calc	Use of Class Time	Content and Prior Knowledge	Teaching	Presentation Style	Presentation Materials & Lesson Plan	Homework and Test Questions	Project Summary Paper
S u p e r i o r	Each preparation day class time was used wisely the entire period. (10)	The content is perfect for the class and is presented at a perfect level. Prior knowledge is integrated with new concepts. (10)	The presenters are very knowledgeable. The material is taught perfectly, with excellent examples. All students in the class understand and can do the homework. (20)	The presentation flows well. It captures the attention of all the class. All the presenters are enthusiastic. (10)	Detailed lesson plan includes all definitions, activities, examples and resources used. Neat and easy to read. (10)	The questions directly relate to the content of the presentation. They are perfectly written and of appropriate difficulty. No editing is required. (10)	The content is well organized. The paper provides copious amounts of evidence that you have great understanding of the topic. (15)
E x c e l l e n t	Each preparation day you used time wisely. (9)	The content is perfect for the class, but is presented at a level that is a little too high or too low. Prior knowledge is integrated with new concepts. (9)	The presenters are knowledgeable. The material is taught well, with excellent examples. All students in the class understand and can do the homework. (18)	The presentation flows well. It captures the attention of most of the class. All the presenters are very involved. (9)	Lesson plan includes all definitions, activities, examples and resources used. Neat and easy to read. (9)	The questions relate to the content of the presentation. They are well written and of appropriate difficulty. Little editing is required. (9)	The content is organized. The paper provides evidence that you have a good understanding of the topic. (13)
G o o d	On most preparation days the time was used wisely. (8)	The content is appropriate for the class and is presented at a level that is too high or too low. Some prior knowledge is integrated with new concepts. (8)	The presenters are somewhat knowledgeable. The material is taught well, with examples. Most students in the class understand and can do the homework. (16)	The presentation is somewhat disorganized. It captures the attention of most of the class. All the presenters are somewhat involved. (8)	Lesson plan includes most definitions, activities, examples and resources used. Neat and easy to read. (8)	The questions somewhat relate to the content of the presentation. They are of appropriate difficulty. Some editing is required. (8)	The content is organized. The paper provides evidence of understanding of the topic. (12)
F a i r	On some preparation days the time is used wisely. (6)	The content is appropriate for the class, but too little or too much is presented and at level that is too low. Little prior knowledge is integrated with new concepts. (6)	The presenters are somewhat knowledgeable. The material is taught okay, with a couple examples. Half of the students in the class understand and can do the homework. (12)	The presentation is disorganized. It captures the attention of some of the class. Some of the presenters are involved. (6)	Lesson plan includes some definitions, activities, examples and resources used. Messy or unclear. (6)	The questions are not well-related to the content of the presentation, or are not of appropriate difficulty. Considerable editing is required. (6)	The content is not well organized. The paper provides some evidence of understanding of the topic. (10)
P o o r	On most preparation days time was not used wisely. (5 – 0)	The content is not appropriate for the class. Too much or too little is presented. No prior knowledge is integrated with new concepts. (5 – 0)	The presenters are not knowledgeable. The material is not taught well. Few of the students in the class understand and can do the homework. (10 – 0)	The presentation is unpleasant to sit through. It does not capture anyone's attention. The presenters lack enthusiasm and involvement. (5 – 0)	Lesson plan incomplete. Messy or unclear. (5 – 0)	The questions are unrelated to the content of the presentation, and are not of appropriate difficulty. The questions must be rewritten. (5 – 0)	The content is poorly organized. The paper provides little evidence of understanding. (8 – 0)

Peer Assessment (out of 15): _____

Final Project Score (out of 100): _____