**Course: AP Calculus AB**

**Teacher:** Melissa Stewart

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**Remind:** Text @apcalcstew to 81010

**Room:** 320

**Tutorials:** Mrs. Stewart-Every day after school from 2-3:30 Mr. Kothe-Every day during lunch (except Wednesdays)

**Textbook:** *Single Variable Calculus Early Transcendentals*, AP edition, 6e by J. Stewart. (Replacement Cost is $155.97)

**Daily Supplies:** Pencil, paper, graph paper, 3-ring notebook, graphing calculator (TI-84plus)

**Grading and Homework**

There will be homework every day, almost without exception. Daily notes and assignments should be done in the notebook, in pencil and in the order assigned. Discipline yourself to keep current with your assignments. Parents, insist that your child does his/her homework on a daily basis, as this is the key to success in math. I encourage parents to look at the notebook on a weekly basis.

Your nine weeks grade will be calculated using a weighted average, which is shown below.

* Tests- 40 %
* Quizzes- 30%
* Homework- 15%
* Bell Ringer/Classwork- 8%
* Free Response Question- 7%

The letter grade is assigned using the district scale (pp.5 student agenda).

Please note that assignments and assessments will be given a ZERO if the work is not shown, unless specifically instructed otherwise. Also not all homework and classwork that is assigned will be collected for a grade. Unless otherwise stated, all homework is due the next time the class meets at the beginning of the period. **Late work is not accepted.** All students must take a written final first semester exams, **no exemptions**!!!

**Make-Up Work due to Absences**

Students will receive 3 days to complete and submit make-up work.

**Attendance**

The county attendance policy in your student agenda will be followed (pp.9-12 student agenda). When you are absent, **YOU!!!** are responsible for all work missed, including class notes, quizzes, tests, and homework. It is your responsibility to find out what was missed, turn in that assignment, if applicable, and to make arrangements with me to make up any tests. In order to make up work, an absence **MUST BE EXCUSED**. Teachers are not required to accept make-up work for unexcused absences. **Important:** You may turn assignments in/make-up quizzes or tests but the grade will not be entered until the absence is excused. For this reason, on the day you return to school you should provide the attendance office with a written documentation requesting that your absence be excused.

* In the event that you are absent, you can check the class web page for daily assignments.
* If you miss class because of a field trip, you are required to see me in advance in order to obtain the work you will be missing, so that you will not get behind.
* You have 3 days to complete and submit make- up work. Make up work will not be accepted after 3 days. If you are absent only on the day of a quiz or test, you will be required to make-up that quiz or test on the day that you return.
* If you are caught ***skipping*** my class on the day of a quiz or test; you will receive a zero and your citizenship grade will be lowered to a 2 for the grading period.

**Academic Integrity**

Academic integrity violations can include plagiarism, cheating, and unauthorized group work on any assignment, project, or test. If a student is caught the following will occur:

* The student will receive an “F” with zero credit.
* The citizenship grade will be lowered for the grading period.
* A notice will be recorded with the guidance office.

Any occurrence of *academic dishonesty* may be reported by the guidance office on college admissions applications.

**Guidelines for Success**

*PRIDE: be Positive, be Respectful & Responsible, be Involved, be Determined, be Ethical*

**Citizenship/Discipline Plan**

I make a commitment to assure that the rights of others are respected. One student will not be allowed to take away time and resources through inappropriate behavior. Students’ physical safety is a priority.

The county policy for behavior and discipline will be followed (pp.14-15 student agenda). Proper classroom behavior is a requirement. Respect and consideration for others is mandatory for a good learning environment. Each student must be responsible for themselves and their actions.

**Discipline Policy:** Inappropriate classroom behavior will **not** be tolerated.

* First offense of disruptive behavior: Student will get a warning.
* Second offense: Conference with the teacher.
* Third offense: Phone call to parent/guardian
* Fourth offense: Disciplinary Referral.

**Objective and Goals of the Class**

The objective of Calculus is to provide students an appreciation of mathematics beyond rote memorization. This course strives to accomplish the following goals to each student willing to put in the necessary time and effort.

1. To teach all topics associated with Functions, Graphs, and Limits; Derivatives; and Integrals as delineated in the Calculus AB Topic Outline in the AP Calculus Course Descriptions
2. To provide students with the opportunity to work with functions represented in a variety of ways (graphically, numerically, analytically, and verbally) emphasizing the connections among each of these representations.
3. To teach students how to communicate mathematics by explaining solutions both verbally and in writing.
4. To be thoroughly comfortable with using the graphing calculator when necessary to solve problems, experiment, interpret results and support conclusions.

5. To reinforce prior math knowledge by using skills taught in earlier math classes.

6. To be challenged to a higher thinking level by writing in complete sentences reasons for conclusions.

7. To establish calculus concepts that will be used in other subjects (engineering and business)

 8. To be adequately prepared for success (3 or above) on the AP test.

**Timeline**

**Pre-Calculus Review (~5 days)**

Most of the students that elect to enroll in Calculus generally do not need to have a systematic review period. A quick review of skills will take place during the first week of class. Any additional review of pre-calculus concepts will be handled at the time needed. However, graphing calculator skills will be discussed and reviewed.

**Limits and continuity (~10 days**)

Topics covered below are usually in this order. Tests and quizzes will be given periodically during this time. Several questions, multiple choice and free response, modeled after previous AP problems will be included.

**Topics**

 1. Finding limits by tables and graphs

 2. Properties and methods used to evaluate limits

 3. Definition of continuity and determining if a function is continuous

 4. Behavior and characteristics of vertical and horizontal asymptotes

 5. Finding infinite limits and limits approaching infinity

*Students will be tested and given assignments that determine if they will be able to solve problems by more than one method. During the discussion of limits students will be required to confirm their analytical solutions graphically and vice versa. Students will use the calculator table feature as they investigate limits as they approach a value from both directions. These techniques will then be used to support the conclusions drawn from analytical methods of finding the limits.*

**Derivatives (~24 days)**

Extra days are built into this time period to allow for ability level of each class. Practice AP problems, multiple choice and free response questions are given during this time period. Several major tests will be administered periodically.

**Topics**

 1. Defining the derivative using the difference quotient

 2. Using the difference quotient to find the equation of the tangent lines

 3. Explanation of when derivatives do not exist

 4. Simple differentiation rules

 5. Using derivatives in velocity and acceleration problems

 6. The product and quotient rules

 7. The chain rule

 8. Implicit differentiation

 9. Related rate problems

*Students will confirm the tangent line of a function using the graphing calculator, by graphing the tangent line equation that was derived as well as the function on the same graph.*

*Students will use their calculator to simulate motion parametrically and will confirm the conclusion found by analytical methods (i.e. time when particle changes directions, intervals the particle moves right, left etc.). During this unit, students should be prepared to explain and demonstrate their solution to different problems to the class.*

**Applications to derivatives (~20 days)**

Many of the application problems will model AP problems. Emphasis is on the concepts however to ensure that the students can solve a variety of problems

**Topics**

 1. Define extremas, critical points and maximum/minimum problems

 2. Rolles theorem and mean value theorem

 3. Using the 1st and 2nd derivative tests

 4. Discussion of the optimization problems

 5. Linearization and differentials including business application

 6. L’Hospital’s Rule

*Students will be required to use graphs as well as analytical methods to confirm conclusions. At this time students will also need to state verbally reasons to back their assessments when called upon. Using the calculator students will graph the first and second derivatives as well as the original function on the same graph to develop conjectures about the relationship of these three graphs. They will be given an activity, to be work in groups of two or three, matching graphs of functions, the first and second derivatives. They will be asked to explain the method used to group the graphs. The use of the calculator to solve problems will be required often during this unit.*

**Anti-derivatives (~10 days)**

Simple integration rules and solving simple differential equations will be taught. Also, during this period there will be a discussion of slopefields and Euler’s method with several examples of slopefields from past AP tests. A major test will be given at the end of this unit.

**Topics**

 1. General anti-derivatives using simple integration formulas

 2. Solving simple differentiation equations

*Each person will be given a different point from a given differential equation and will be required to calculate the slope and then sketch a small portion of the line on the graph displayed in the front of the room. This will allow us to graph the slopefield very quickly. These will be confirmed with calculator based applications that graph slopefield*s. *Students will be then be given the opportunity to graph individual slopefields using small 3x3 graphs.*

**Integration (~24 days)**

Connecting differential calculus to integral calculus will be a major goal of this unit. Students will be given examples using a variety of different techniques used in solving these problems. A major test will be included in this section

**Topics**

 1. Area and Riemann sums

 2. Accumulation of a rate of change

 3. Rectangular approximation methods

 4. Trapezoid and Simpson’s rule

 5. Fundamental theorems of calculus

 6. Evaluating integrals using substitutions

*Students will have the opportunity to use the different accumulating techniques to solve a variety of problems. They will show the graphs of a given function with the rectangles drawn representing either right RAM, left RAM or middle RAM. The area for each will be calculated with the calculations shown on their paper.*

**Natural Logs and exponential functions (~23 days)**

 After a brief review of logs, students will develop the derivatives and integrals of the exponential and natural log functions. A considerable amount of time will be given to application of the exponential functions such as growth and decay and other rate of growth functions. A couple of major tests will be included in this section.

**Topics**

 1. Review of logarithms and inverse functions

 1. Derivative and integral of natural logs

 2. Derivative and integral of exponential functions

 3. Finding derivative and integral of bases other than e

 4. Growth and decay applications including logistic curves

 5. Inverse trig functions

 6. Derivatives and integrals of inverse trig function

 7. Logistic Growth

8. Slope fields and Euler’s method

*The graphing calculator will be used to verify concepts discussed during this unit.*

**Area and volume (~19 days)**

Students will use the connection of integral to area and volume problems. A major test will be given as well as several quizzes. Sometimes this unit will need to be postponed until the third nine weeks if students needed more time on the other concepts.

**Topics**

 1. Area between curves

 2. Volume by the disc, washer, and shell method

 3. Finding volume by cross-sectional areas

 4. Arc length

*Technology will also be used to help visualize the concepts of volume by rotation and cross-sectional areas. The built in features of the calculator will be used to calculate volumes. However, students will be required to know how to solve volumes by analytical methods.*

**Review for AP test (22 days**)

 Time is built into the year to review for the AP test. During this time, we will do an additional intensive review. We will complete review assignments, practice multiple choice and free response problems, and take released AB exams. If time permits, after students complete their examination, a project will assigned and time given in class for students to complete and present.