ETP Title: Mathematical Modeling & Service Learning Project
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Abstract
A service learning mathematics project will be done by the analysis and trigonometry classes. All of the students will collect, model, and analyze some data on different aspects of a particular topic. Students will submit 2 written reports containing their 3 or 4 different math models, analysis of models, and conclusion involving their findings and its connection with or impact on a community. They will then create awarness in a community through a collaborative project involving various forms of media.

ETP alignment with State standards
Technology will be used in a context of helping to promote students' understanding and improve problem solving skills. Precise communication about quantities and logical relationships through the use of mathematics. Using math to analyze evidence and building arguments based on analysis of gathered information to support or refute a conjecture. Making connections with math and the World. Specifically in regard to state standards it address the following mathematics standards for grades 9 - 12 :
Algebra1: 5, 6, 15, 16, 23, 24.1, 24.2, 24.3
Algebra 2: 10, 12
Prob and Stat: 6, 8
Trigonometry: 2, 4, 19

Connection between ETP and Summer Fellowship
My fellowship this summer has been dealing with using the optimization program LS-OPT to create a mathematical model for a viscous-elastic-plastic solid propellant material subjected to 4 different controlled deformation rates. Students will be using similar processes to create their mathematical models.

Page(s)	Heading	Purpose
1	Mathematical Modeling and Service Learning Project	Contains learning objectives and materials required for project
2 & 3	Timeline for Entire Project	To be used by teacher. Contains general information and dates concerning all three portions of the project
4 – 6	Modeling Project Linear and Sinusoidal Teacher Notes	To be used by teacher. Contains specific lesson plans for the specific days the project will be covered in class
6 & 7	Modeling Project Quadratic and Exponential Teacher Notes	To be used by teacher. Contains specific lesson plans for the specific days the project will be covered in class
8 & 9	Mathematical Modeling Project	Handout to be given to students describing math projects, requirements, and grading
10	5 step mathematical modeling approach	Handout to be given to students to help with the process of modeling
11	Mathematical Modeling Rubric	Rubric to be used by teacher to grade both first and second semester modeling projects and serve as a handout to be given to students for guidance on requirements and grading
12 & 13	Service Learning Activity Teacher Notes	To be used by teacher. Contains specific lesson plans for the specific days the project will be covered in class
14	Service Learning Project	Handout to be given to students describing project, requirements, and grading
15	Service Learning Rubric	Rubric to be used by teacher to grade service learning project and serve as a handout to be given to students for guidance on requirements and grading

Mathematical Modeling and Service Learning Project

Learning objectives for Mathematical Modeling Portion

- Understand the differences between linear, sinusoidal, quadratic, and exponential functions when used as models for a particular phenomena and how each can be used to describe mathematical patterns.
- Create and compare various mathematical models.
- Learn how to analyze data and make predictions or base conclusions on data and mathematical reasoning.
- Understand the relationship and differences between expressing a concept graphically, numerically, or algebraically.
- Work with technology in a context of helping to promote understanding and improve problem solving skills.
- Precise communication about quantiities and logical relationships through the use of mathematics.
- Using math to analyize evidence and building arguments based on analysis of gathered information to support or refute a conjecture.

Learning objectives for Service Learning Portion

- Develop a sense of community which includes an understanding of and respect for the diversity of others.
- Exercising justice, compassion, and integrity as citizens of the global and local community.
- Sharing ones gifts and talents in a spirit of interdependence, dialogue, and collaboration.
- Interpreting and evaluating complex messages presented through various media.
- Analyzing, organizing, and applying information and ideas from a variety of sources.
- Using language precisely in speech and writing.

Materials for Mathematical Modeling Portion

- Pencils and paper to perform calculations necessary to generate and analyze linear, sinusoidal, quadratic, and exponential models.
- Graphing calculators to be used as a tool to help generate models and perform analysis of models.
- Data on a particular aspect of a topic (prices, production, consumption, cost, issues with labor, health issues, proliferation of companies, increase or decrease in consumption for various age groups, impact on the environment, etc) will be used to generate a mathematical model.
- Access to computers that have Microsoft Word for generation of reports, Microsoft Excel to create graphs and tables, and an Internet connection to collect data.
- Digital projector, interactive whiteboard, and computer to be used for demonstrations to students.

Materials for Service Learning Portion

- Poster boards and art supplies will used to generate poster boards.
- Video camera and video will be used to generate a short video piece for airing on MCTV.
- Access to computers and printers are required for students to generate letters, send e-mails, or write articles to be published in school paper or considered to be published by a media organization.
- Access to computers with an Internet connection to research issues discovered in class discussions.
- Paper, envelops, and stamps to be used to send letters.
- Digital projector, interactive whiteboard, and computer to be used for student presentations.

Timeline for Entire Project

Note: MCHS is on a block schedule so some classes meet on different days, Day 1 and Day 2.

1. On 08/16/05, the first day of class, students will receive a brief discussion of project, requirements, and weight of grade as referred to in the course description and syllabus.

2. On 08/31/05 and 09/01/05 students will work on a linear regression example in class similar to what they will be doing in November/December for their first of two mathematical modeling reports. They will be asked to begin their journals with this example and also include a corresponding reflection. The requirements for the journal will be discussed in class on the same day prior to the example done in class.

3. On 09/02/05 and 09/06/05 journal entries will be inspected and graded.

4. On 11/15/05 and 11/16/05 students will work on a sinusoid example on daylight in class similar to what they will be doing in their first mathematical modeling report. They will be asked to put this example and a corresponding reflection in their journals. Classes will meet in math computer lab.

5. On 11/17/05 and 11/18/05 journal entries will be inspected and graded. Introduction to the linear and sinusoidal models begins. Students will be introduced to the yearlong modeling project, details, requirements, handouts, etc. Mention to students that examples in journals are useful in working on project. The issue of data collection, web searches, and appropriate data will be addressed. A list of web sites containing data on the topic will be listed in class. Due date for data is given to students. Classes will meet in math computer lab.

6. During the time period of 11/17/05 through 11/30/05 proposals and data will be checked for each student and work begins on the linear and sinusoidal models.

7. During the time period of 11/28/05 through 12/05/05 students will be given opportunities in class to work on their projects when appropriate. Students will be given the option of working on their report or homework when time permits.

8. On 12/06/05 and 12/07/05 students reports on the linear and sinusoid models will be collected.

9. On 01/04/06 and 01/05/06 students reports will be handed back and gone over in class. Students will be asked to make notes on projects in order to be referenced for second modeling report to be done in March 2006. Students can use first report as a reference when doing their second report. Emulate the correct parts and improve on the incorrect parts.

10. On 02/15/06 and 02/16/06 students will work on a quadratic example in class similar to what they will be doing in their second mathematical modeling report. They will be asked to put this example and a corresponding reflection in their journals.

11. On 02/17/06 and 02/18/06 journal entries will be inspected and graded.

12. On 02/28/06 and 03/01/06 students will work on an exponential example in class similar to what they will be doing in their second mathematical modeling report. They will be asked to put this example and a corresponding reflection in their journals.

13. On 03/02/06 and 03/03/06 journal entries will be inspected and graded. Students will begin work on the quadratic and exponential models and be reintroduced to the modeling project, details, and requirements. Mention using first report and examples in journal as a tool. Students will be using same data set from first modeling project. Students will have the option of using a different data set.

14. On 03/06/06 and 03/07/06 proposals will be checked and graded.

15. During the time period of 03/06/06 through 03/27/06 students will be given opportunities in class to work on their projects when appropriate. Students will be given the option of working on their report or homework when time permits.

16. On 03/28/06 and 03/29/06 students reports on the quadratic and exponential models will be collected.

17. On 04/03/06 and 04/04/06 students reports will be handed back and gone over in class and they will begin the service-learning portion of the project.

18. On 04/03/06 and 04/04/06 students will be grouped together in terms of different and related data sets to compare and contrast models, topics, findings, and conclusions. The entire class will then have a discussion so that groups or individuals can express their findings, ask questions, or state opinions. The class will generate a list of all the issues along with the corresponding communities affected by a particular issue. Each student will be asked to record a journal entry on what opinions or conclusions he or she has on the outcome of the discussion. A reflection on the collaborating experience.

19. On 04/05/06 and 04/06/06 the role of the journal in the service-learning portion of the project will be discussed with the class. Journal entries will be inspected and graded.

20. On 04/05/06 and 04/06/06 the compellation of all four class lists will be displayed to each class. A class discussion will be held on the list presented to the class and any additional issues and corresponding communities added to the list. Students will be asked to research one of the issues and required to bring in a form of media that addresses that particular issue or perhaps another newly discovered issue found in the process of their original search.

21. On 04/05/06 and 04/06/06 students will be introduced to the media portion of the service-learning project, details, requirements, handouts, etc. A list of different possibilities for a media form will be given to the students. Students will be asked for any amendments to the list. Students involved in MCTV and the school paper will be encouraged to take part in the their repsective media forms. Students will also be encouraged to consider that they will be not just be working with people in their own class, but students from all 4 classes.

22. On 04/07/06 and 04/10/06 students submit their chioce and prefered form of contact and groups will be formed based on preference for a particular type of service learning project. Lists will be generated of the students within each group and circulated to all the students within a particular group.

23. On 04/11/06 and 04/12/06 several different lists will be circulated to all the students. Each list will contain a particular media form and the names and contact information for each student within the group.

24. Service learning projects must be completed and submitted by 05/11/06 and 05/12/06. Media projects will be turned in as a group project and students journals will also be submitted individually with service learning portion.

Modeling Project Linear and Sinusoidal Teacher Notes

08/31/05 and 09/01/05

- Pass out handouts containing data sets to students.
- Students need to place name, heading, and the date on the handout or in journal.
- Have students close notebooks and use a separate sheet of paper or use their journal notebook to record the work done on this example.
- Introduce the requirements for the journal to the class.
- Mention to class it will be inspected and graded.
- Work through your data set using linear regression while having students imitate exactly what you are doing with their respective data set.
- After completion have students do a reflection about doing the example. Provide topics to help get students started on journal.
    1. Describe process just performed in non-math terms or with math terms.
    2. Remember doing process before in Algebra?
    3. Entirely new process?
    4. Is the regression line a bad model or a good model?
    5. Justify in reflection why it is good or bad (error).
    6. Comments on topic. Interesting or Not?
    7. Think of another topic that is more personal that behaves linearly.

11/15/05 and 11/16/05

- Classes will meet in math computer lab.
- Have students go to computers at completion of lecture.
- Use the Smart Board to illustrate the process used for modeling daylight
    1. Go to the website http://aa.usno.navy.mil/
    2. Select a location. Students can select their own location.
    3. Find min (winter solstice, 12/21) and max (summer solstice, 6/21) for daylight.
    4. Take down times for sunset and sunrise (24 hour) for both days.
    5. Have students also take down sunrise and sunset times for another 2 different days of their choice (to be used to check accuracy of models).
- Have students go back to seats after they have information.
- Have students close notebooks and use a separate sheet of paper or use their journal notebook.
- Students need to place name, heading, and the date on the paper or in journal.
- Work through your example and have students work through theirs at the same time.
- After completion have students do a reflection about doing the example. Provide topics to help get students started.
    1. Did you now what the solstices are?
    2. Why did you choose this particular city?
    3. Describe process just performed in non-math terms or with math terms.
    4. Difficult or easy to learn new process?
    5. Sinusoid a bad model or a good model?
    6. Justify in reflection why it is good or bad (error).
    7. Comments on topic. Interesting or Not?
    8. Think of another topic that is more personal and that behaves in a repetitive pattern.

11/17/05 and 11/18/05

Introduction to the linear and sinusoidal models begins.

1. Classes will meet in math computer lab.
2. Students will be introduced to the yearlong modeling project. Project topic, requirements, and details are introduced and materials are passed out to students.
    - 5 step mathematical modeling approach handout
    - Mathematical modeling project handout
    - Mathematical Modeling Rubric handout
3. Mention to students that examples in journals are useful for working on project.
4. Issue of data collection, web searches, and appropriate data will be addressed. Students will be shown several websites on the interactive whiteboard to access data on coffee.
5. A list of web sites containing data on the topic will be listed in class.
6. Final due date for data and proposal is given to students (11/30/05).
7. Due date for project is given to students (12/06/05 and 12/07/05).
8. They will be asked to select a data set from some website or other media form and base their models on the choice.

    Websites:

    - ico.org
    - coffeeresearch.org
    - cosic.org
    - .mc.vanderbilt.edu/coffee/
    - indiacoffee.org
    - census.gov
    - coffeescience.org

    Note: Data on medical research will be given to students for research articles that data could be obtained.

11/17/05 – 11/30/05

Students are required to submit a proposal. Proposals should contain the following

- Topic they are going to do for the project
- Copy of data and source listed
- Brief description of the project
- List of variables and constants
- Units
- Type of equations
- Method of solution (briefly describe process used to get models). Two different methods should be written

11/28/05 – 12/05/05

- Students will be given opportunities to ask questions, work on project in class, encouraged to see their math teacher during collaboration periods, submit rough drafts, and seek assistance after school.
- Format of report is discussed. The rubric is reviewed together by class and teacher, and examples will be provided of previous projects.
- Students will be given the option of working on their report or homework when time permits.

12/06/05 and 12/07/05

Linear and sinusoid project is due.

01/04/06 and 01/05/06

- Students linear and sinusoid projects will be handed back and gone over in class.
- Students will be asked to make notes on projects in order to be referenced for second modeling report to be done in March 2006. Students can use first report as a reference when doing their second report. Emulate the correct parts and improve on the incorrect parts.

Modeling Project Quadratic and Exponential Teacher Notes

02/15/06 and 02/16/06

- Classes will meet in math computer lab. Lab for parabolic construction and not for project
- Pass out handouts containing data sets to students.
- Students need to place name, heading, and the date on the handout or in journal.
- Have students close notebooks and use a separate sheet of paper or use their journal notebook.
- Remind class it will be inspected and graded.
- Work through your data set using quadratic method while having students imitate exactly what you are doing with their respective data set.
- After completion have students do a reflection about doing the example. Provide topics to help get students started.
    1. Describe process just performed in non-math terms or with math terms.
    2. Remember doing before in algebra?
    3. Entirely new process?
    4. Quadratic curve a bad model or a good model?
    5. Justify in reflection why it is good or bad (error).
    6. Comments on topic. Interesting or Not?
    7. Think of another topic that is more personal that exhibits parabolic behavior?

02/28/06 and 03/01/06

- Pass out handouts containing data sets to students.
- Students need to place name, heading, and the date on the handout or in journal.
- Have students close notebooks and use a separate sheet of paper or use their journal notebook.
- Remind class it will be inspected and graded.
- Work through your data set using exponential method while having students imitate exactly what you are doing with their respective data set.
- After completion have students do a reflection about doing the example. Provide topics to help get students started.
    1. Describe process just performed in non-math terms or with math terms.
    2. Exponential curve a bad model or a good model? Justify in reflection why it is good or bad.
    3. Comments on topic. Interesting or Not?
    4. Think of another topic that is more personal that behaves exponentially (growth, decay).

03/02/06 and 03/03/06

Introduction to the exponential and quadratic models begins.

1. Reintroduce modeling project. Project topic, requirements, and details are mentioned and materials are passed out to students who have lost handouts.
    a. 5 step mathematical modeling approach handout
    b. Mathematical modeling project handout
    c. Rubric used for grading math modeling portion
2. Can have students look at first report when going over requirements for second modeling report.
3. Mention to students that examples in journals are useful for working on project.
4. Mention to students that first modeling report is useful for working on project.
5. Data is the same from first report. Allow students option of changing data set.
6. Due date for proposal is given to students (03/06/06 and 03/07/06).
7. Due date for project is given to students (03/28/06 and 03/29/06).

03/06/06 and 03/07/06

Proposals will be checked and graded. Proposals should contain the following

- Topic they are going to do for the project
- Copy of data and source listed
- Brief description of the project
- List of variables and constants
- Units
- Type of equations
- Method of solution (briefly describe process used to get models). Two different methods should be written.

03/06/06 - 3/27/06

- Students will be given opportunities to ask questions, work on project in class, encouraged to see their math teacher during collaboration periods, submit rough drafts, and seek assistance after school.
- Format of report is discussed. The rubric is reviewed together by class and teacher to cover how it applies to these two new models. Application will be same as it was for Linear.
- Students will be given the option of working on their report or homework when time permits.

03/28/06 and 03/29/06

Exponential and quadratic models report is collected.

Mathematical Modeling Project

1. **Choice of Topic:**

   You are expected to select your own topic based on data collected from some media source related to the topic of coffee. Below is a list of websites containing information and statistics on various aspects of coffee. You do not have to just use these websites. Any legitimate media source is allowable for the collection of data (books, newspapers, journals, magazines, other websites, etc).

   - ico.org
   - coffeeresearch.org
   - cosic.org
   - .mc.vanderbilt.edu/coffee/
   - indiacoffee.org
   - census.gov
   - coffeescience.org

2. **Planning of the Investigation:**

   A proposal containing the details of the intended investigation must be submitted beforehand for comment and approval. Your instructor will provide a due date. The proposal must contain the following:

   1. A brief description of the topic chosen.
   2. A clear, precise description of the variables and constants involved, including appropriate units.
   3. Copy of data and source.
   4. Brief description of the project. Make sure that you clearly state specifically what it is you are doing in regard to your topic.
   5. Type of equations.
   6. Method of solution (briefly describe process used to get models). Two different methods should be written.
   7. Meets reasonable composition standards.

   Note: Look at the first two steps of the 5-step modeling approach handout for help

3. **Execution of the Investigation:**

   - Collect data on a particular aspect of coffee from a media source.
   - Use the data on a particular aspect of coffee collected from a media source to generate two mathematical models similar to the examples done in class. The examples are the ones done in your journals.
   - Write the calculations performed to derive each model (equation).

     Note: Look at the third step of the 5-step modeling approach handout for help with the points mentioned above.
   - An analysis and interpretation of the data and models (equations) must be performed personally (NO PARTNERS).

     How accurate are the equations? Is the equation good or bad at predicting the data? Compare the two equations prediction ability. Which is better? Why is the one you chose better? Justify your choice!

     Note: Look at the fifth step of the 5-step modeling approach handout for help with the point mentioned above

Note: Remember to refer to the appropriate journal entries for help with execution

4. **Report**:

The report must be typed. The report on your findings must include the following.

1. A Title.
2. An introduction as to why the particular topic was chosen.
3. An explanation that discusses the aspect of coffee that you have chosen to examine. Clear explanations of what is varying with what, and the means by which you obtained the data concerning the investigation. List the source of the data.
4. The work done in the investigation, including the raw data. A Table of the data labeled correctly.
5. The model's vital statistics (coefficients, slope, intercepts, exponents, constants, variables, etc) and the methods used to determine the models values. In the case of the sinusoid model vital statistics are amplitude, period, frequency, phase shift, and vertical shift. The functions, methods, or laws used to calculate the model.
6. The equation of the model.
7. A graph, which includes both your data and the graph of your equation. The graph should be clearly labeled. Title, axes labeled, and units included.
8. A subjective analysis of how well your mathematical model fits the actual real world coffee data. Comparisons of models predictions to actual values. State inferences made from an analysis of the investigation and it's findings (interpretation).
9. Some discussion as to where mathematical error may have been introduced in your model and thoughts on how to improve on the methods used in modeling your particular aspect of coffee. Discuss weather the equation is a good fit. Could there be a better function to fit the data?
10. Any professional needs to be able to communicate their findings clearly. Your report should meet reasonable English composition standards and use correct mathematical language when appropriate.

5. Project grade:

The grading breakdown for this project is as follows:

Project proposal 15 points

- 2 points each: 7 requirements mentioned above in planning of the investigation.
- 1 point: submit proposal

Written Report 50 points

- 1 - 12 points: Introduction
- 1 - 24 points: Model
- 1 - 12 points: Analysis and Conclusion
- 2 points: Submit report

Refer to the grading rubric for more details on points

5 step mathematical modeling approach

Formulation

Step 1. Ask the question

a. Make a list of all the variables in the problem, including appropriate units.
b. Be careful not to confuse variables and constants.
c. State any assumptions you are making about these variables, including equations and inequalities.
d. Check units to make sure that your assumptions make sense.
e. State the objective of the problem in precise mathematical terms.

Step 2. Select the modeling approach.

a. Choose a general solution procedure to be followed in solving this problem.

Step 3. Formulate the model.

a. Restate the question posed in step 1 in terms of the modeling approach specified in step 2.
b. You may need to relabel some of the variables specified in step 1 in order to agree with the notation used in step 2.
c. Note any additional assumptions made in order to fit the problem described in step 1 into the mathematical structure specified in step 2.

Solution

Step 4. Solve the model

a. Apply the general solution procedure specified in step 2 to the specific problem formulated in step 3.
b. Be careful in your mathematics. Check your work for math errors. Does your answer make sense?
c. Use appropriate technology.

Application

Step 5. Answer the question.

a. Rephrase the results of step 4 in non-technical terms.
b. Avoid mathematical symbols and jargon.
c. Anyone who can understand the statement of the question as it was presented to you should be able to understand your answer.

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Mathematical Modeling Rubric

	1- 4	5 - 8	9 - 12
Introduction • Data • Explanation • Assumptions • Objective in non-math language	1. Parts of problem are not understood 2. Addresses some but not all necessary components 3. Some evidence of mathematical reasoning	1. Illustrates a broad understanding of problem and necessary concepts 2. Addresses all of the necessary components 3. Uses effective mathematical reasoning	1. Illustrates a deep understanding of problem and necessary concepts 2. Addresses all of the necessary components 3. Employs refined and complex mathematical reasoning. Uses a very efficient and sophisticated strategy.
Model • Variables • Constants • Units • Objective in math terms • Method • Work	4. Could not completely carry out necessary procedures 5. Some parts may be correct but a correct answer is not achieved.	4. Mathematical procedures correctly used. 5. All parts are correct and a correct answer is achieved.	4. Mathematical procedures correctly used to solve and verify the results. 5. All parts are correct and a correct answer is achieved. Verifies solution and/or evaluates the reasonableness of the solution.
Model • Vital Statistics • Equation • Calculations • Graphs • Tables • Technology	6. Some use of appropriate mathematical representation 7. Some correct use of math notation and terminology	6. There is appropriate use of accurate mathematical representation 7. There is effective use of math notation and terminology	6. Math representation is actively used as a means of communication 7. Precise and appropriate use of math notation and terminology
Analysis • Calculations • Errors • Validity of Model • Conclusions • Results in non-technical terms	8. Incomplete explanation, not clearly represented	8. There is a clear explanation	8. Clear and effective explanation of how problem solved and all steps included Makes relevant observations and/or connections

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Service Learning Activity Teacher Notes

04/03/06 and 04/04/06

- Students reports will be handed back and gone over in class.
- Students will be grouped together in terms of different and related data sets to compare and contrast models, topics, findings, and conclusions.
- Teacher should circulate around classroom and help guide students in the direction of discovering some issue.
- The entire class will then have a discussion so that groups or individuals can express their findings, ask questions, or state opinions.
- Findings about the topics discussed and their connection with or impact on a particular community. The community can be local (junior class, entire student body, city, county, or state) or global (country, continent, world).
- The class will generate a list of all the issues discovered along with the corresponding communities affected by a particular issue. Have a student write the issues on the board or work on computer to generate a table in excel or word that is displayed on the Smart board. A column for the issue and a column for the community. Generate title for list referring to class (A&T period 5)
- For homework students will be asked to record a journal entry on what opinions or conclusions he or she has on the outcome of the discussion. A reflection on the collaborating experience.

04/05/06 and 04/06/06

- The role of the journal in the service-learning portion of the project will be discussed with the class. A journal entry should be made each time the project is worked on individually or in a group.
- Journal entries will be inspected or collected and then graded from class discussions in previous class.
- Journals on service learning portion will be randomly collected.
- Students are required to bring journal entries to class everyday.
- The compellation of all four class lists will be displayed to each class. A class discussion will be held on the list presented to the class and any additional issues and corresponding communities added to the list.
- Students will be asked to research one of the issues and required to bring in a form of media that addresses that particular issue or perhaps another newly discovered issue found in the process of their original search. Students need to collect a hard copy to bring to class.

- Students will be introduced to the media portion of the service-learning project, details, requirements, handouts, etc.
    1. Service Learning Project handout
    2. Service Learning Rubric handout
- A list of different possibilities for a media form will be given to the students. Students will be asked for any amendments to the list. Students involved in MCTV and the school paper will be encouraged to take part in the their repsective media forms. Students will also be encouraged to consider that they will be not just be working with people in their own class, but students from all 4 classes.
  List of choices:
    1. Create poster boards to be placed around school.
    2. Write articles to be placed in school paper.
    3. Write letters or send e-mails to companies, organizations, newspapers, Moreau community members, or government officials.
    4. Create a video to be aired on MCTV.
    5. Hold an answer/question gathering during a collaboration to address questions after presentation of video.

6. Hold an answer/question gathering during a collaboration to address questions about articles written in school paper after the papers distribution.
7. Perform a presentation during a collaboration period.
8. Write a letter to NPR to be considered for placement on the program Perspective.
9. Student generated ideas for projects.

04/07/06 and 04/10/06

- Students submit their chioce and prefered form of contact and groups will be formed based on preference for a particular type of service learning project. Lists will be generated of the students within each group and circulated to all the students within a particular group.
- Students will decide on what type of service learning project they want to participate in. Groups will be formed based on choices. The students in the groups will be placed together also based on being in a different class, used a different model, some of the same topics and some different topics covered. Students are required to begin to write in journal/log begun during math portion. Materials on project will be handed out during this portion. Students should be very familiar with the process for they have done service-learning projects in other disciplines as a freshman and sophomore.

04/11/06 and 04/12/06

- Several different lists will be circulated to all the students. Each list will contain a particular media form and the names and contact information for each student within the group.
- Students are required to meet within a week with members in their service-learning group.
- Students will be encouraged to meet at a collaboration period in math classrooms. They are required to record the progress of the group each time they meet as a journal entry.
    1. Who was in meeting?
    2. What was discussed?
    3. Tasks assigned to particular people?
    4. What was accomplished as a result of meeting?
    5. How do you feel about meeting? Do you feel your input or opinion was valued? Did you feel respected by members in the group at your meeting?
    6. Were you active or not very active in meeting?
- Each student will be required to write a letter for the letters groups. Each student will have to come up with a design for a poster board for the poster board groups, etc. Not all posters have to be created nor all letters sent. Groups can chose best posters, articles, or letters to send or publish.

05/11/06 and 05/12/06

Service learning projects must be completed and submitted.

- Media projects will be turned in as a group project. Project should contain final version and a list of students involved in the media form.
- Students journals and individual work in group will also be submitted with service learning portion.

Note: This is the last day to turn in projects. Projects can be submitted earlier than this date.

Service Learning Project

You will be part of a group of students who will do a communication service learning project.The goal is to create an awareness in a particular community of your chosing. The particualr issue of your chosing will be related to some aspect of coffee. The issue and community should be one that was brought up in are class disscussions. You will inform the community of your chioce with some type of media form. Groups will not just be formed by students in your class but by students from all four analysis & trigonometry classes.

Types of communities:

1. Student body, faculty, and staff
2. Parents of MCHS students, alumni of MCHS
3. Government agencies, companies, non-profit organizations
4. City, county, state, country, world

Choices for media forms:

9. Create poster boards to be placed around school.
10. Write articles to be placed in school paper.
11. Write letters or send e-mails to companies, organizations, newspapers, Moreau community members, or government officials.
12. Write a letter to NPR to be considered for placement on the program Perspective.
13. Create a video to be aired on MCTV.
14. Hold an answer/question gathering during a collaboration to address questions after presentation of video.
15. Hold an answer/question gathering during a collaboration to address questions about articles written in school paper after the papers distribution.
16. Perform a presentation during a collaboration period.

Project Requirements

1. You will be required to continue to make entries in your journal throughout the whole process. Anytime you work on the project individually or with others in your group you should write in a reflection. Some questions that you should be considering are the following:
    - Who was in the meeting? Was the meeting productive?
    - What was discussed? What was accomplished as a result of meeting?
    - Tasks assigned to particular people? Were you active or not very active in meeting?
    - How do you feel about meeting? Do you feel your input or opinion was valued? Did you feel respected by members in the group at your meeting?

2. Your own contributions to the group must be done and submitted. Your design for a poster board, your letter written for paper, your idea for video, your ideas for presentation. Not all posters have to be created nor all letters sent. Groups can chose the best poster designs, articles, or letters to send or publish.
3. Final copy of media form used with a list of all participating students.

Project grade

Journal	20 points
Individual contribution and final media form	30 points

Note refer to service learning rubric for more details on the grade distribution for the project

Service Learning Rubric

Criteria	Below Average	Average	Above Average	Excellent
Purpose	Unclear purpose or main idea	Communicates an identifiable purpose and/or main idea for an audience	Achieves a clear and distinct purpose for a targeted audience and communicates main ideas with effective use of techniques for introducing and representing ideas and insights.	Achieves a clear and focused purpose for a targeted audience and communicates main ideas using a variety of techniques to introduce and represent ideas and insights
Organization	Organization is unclear, introduction, body, and/or conclusion are underdeveloped, missing, or confusing.	Organization is occasionally unclear, introduction, body, or conclusion may be underdeveloped.	Organization is clear and easy to follow. Introduction, body, and conclusion are defined and aligned with the purpose.	A clear organizational structure that enhances the audience's understanding. Introduction, body, and conclusion are well defined, effective, and aligned with the purpose.
Language Mechanics and Usage	Limited variety of sentence structures and lengths and significant errors in grammar, word usage, spelling, capitalization, punctuation, and/or pronunciation	Limited variety of sentence structures and lengths or significant errors in grammar, word usage, spelling, capitalization, punctuation, and/or pronunciation	Variety of sentence structures and lengths and no significant errors in word usage, grammar, spelling, capitalization, punctuation, and/or pronunciation.	Engaging variety of sentence structures and lengths. Word usage, grammar, spelling, capitalization, punctuation, and pronunciation are correct.
Detail	Supporting details and/or visuals are missing, irrelevant, inaccurate, or inappropriate.	Supporting details and/or visuals are relevant but limited, overly general, or inconsistently provided.	Relevant use of supporting details, e.g., analogies, comparisons, examples, descriptions, and/or visuals, e.g., symbols, diagrams, graphs, tables, maps, models.	Uses a variety of clear, pleasing, and relevant supporting details or visuals that contribute to the audience's understanding.
Voice	Some use of descriptive language and wording that may appear mundane, forced, or awkward	Use of descriptive language or wording to communicate a personal style.	Effective use of descriptive language and transitional devices to express a personal style with a discernable voice and to enhance and connect ideas.	Consistent and effective use of descriptive language and transitional devices that move, engage, or teach the audience.