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PLEASE NOTE

The NYS Mathematics Core Curriculum (revised 2005), in effect September 2005 for all NYS schools, describes what students should know and be able to do for PreK-Grade 8, Integrated Algebra, Geometry and Algebra 2 and Trigonometry

Please refer to http://www.emsc.nysed.gov/ciai/mst/mathstandards/mathcorepage.htm for further information.

ONLY the 1996 Learning Standards, Standard 3, Student Work, Commencement-level portion, pages 84-89, remains in effect until January 2009 for Math A, and June 2010 for Math B.

Posted June 22, 2007

Intermediate

Mathematics

Student Work Sample

Task

You have been asked to design a phone chain that will contact your classmates in case of emergency. (Assume a class of 30.)

You will be expected to:

(a) determine how long it would take to call everyone on the chain if you used a two, three, four, or five-person chain. (Explain the method you used in the summary.)

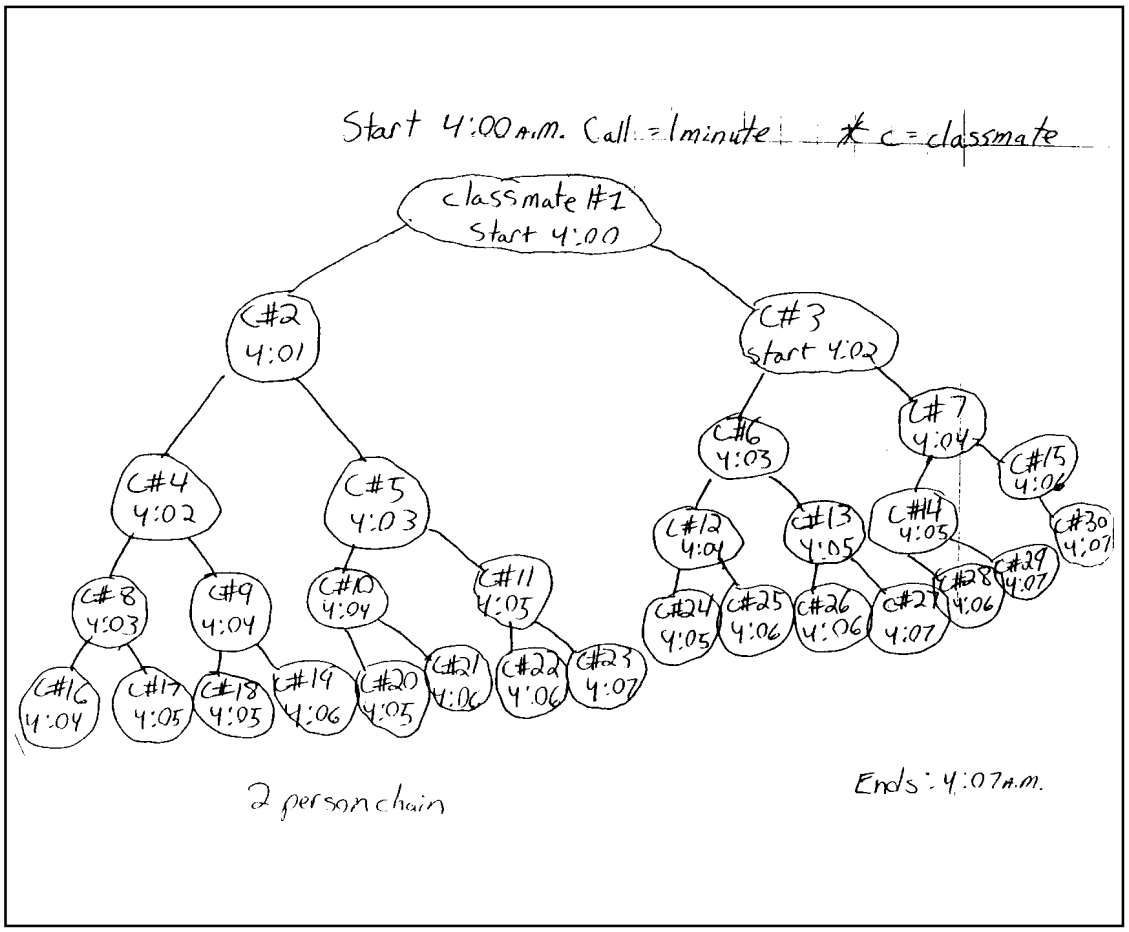
(b) consider advantages and/or disadvantages of using a certain numbered chain. (Explain your reasoning in the summary.)

(c) present your solution in an organized way that will convince classmates that your plan is the best choice.

Record your work as you attempt to solve the problem. Record any thoughts or questions you have as your proceed. Write a summary of your solution.

Student Response

In order to determine the time it would take to complete a two, three, four, or five person chain, I drew up a chart for each chain. In each chain I picked 4:00 a.m. to start the calls. I estimated that each call took one minute to complete. I assigned each person a number and wrote down when they had been contacted. According to my work a two person chain that is started at 4:00 a.m. will be completed at 4:07. My work also shows that a three person chain started also at 4:00 a.m. will end also at 4:07. A four person chain started at 4:00 a.m. will end at 4:08 and a five person chain started at 4:00 a.m. will end at 4:09. Overall, the two person chain is the best because each person has to call fewer people which saves, each person calling, money. It also is the fastest time you can get out of all the chains.



Performance Indicators

OPERATIONS

- Make and evaluate conjectures and arguments using appropriate language
- explore and produce graphic representations of data . . . .

MODELING

- use concrete materials and diagrams to describe the operation of real-world processes and systems.

MEASUREMENT

- estimate, make, and use measurements in real-world situations.
- select appropriate measurement units to measure to a desired accuracy.

UNCERTAINTY

- use estimation to solve problems for which exact answers are inappropriate.

Commentary

The Sample:

- Uses a tree diagram to illustrate the phone chain.
- Shows times are well sequenced.
- Explains the procedure for the completing the phone chain.
- Clearly expressed the conclusion regarding the relationship between the number of persons and time needed.

Standard 3—Mathematics

Intermediate

Mathematics

Student Work Sample

Task

Percents

Create an illustration to represent a real-life situation involving the mathematics you've studied in this unit. Use your imagination!!

Performance Indicators

Students can:

. . . understand and apply ratios, proportions, and percents through a wide variety of hands-on explorations.

Commentary

The Sample:

- Illustrates a real-life application of the use of percent.
- Correctly computes and rounds sales tax.
- Estimates total cost to nearest dollar.
- Shows dialogue that is realistic and imaginative.

Student Response

Write a caption describing your illustration:

Girl: The jeans are $18.95, so $18.95 x 8% tax equals $1.52.
Man at counter: Tax is $1.52.
Girl: $18.95 + $1.52 equals about $20.
Man: That will be $20.47 total.
Girl: I was pretty close! Thank you.

Commencement

Mathematics

Student Work Sample

Task

Directions for Creating a Concept Map for Parabolas

Working in pairs or individually you are to design a complete and clear mind map of everything we discussed and shared about parabolas. You will be given one 80-minute class period to research and create a draft of your concept map.

Along with the map, you are to create equations of a minimum of two examples of parabolas that display as much of the information in your map as possible. Clear and detailed graphs as well as explanations of your work must be included.

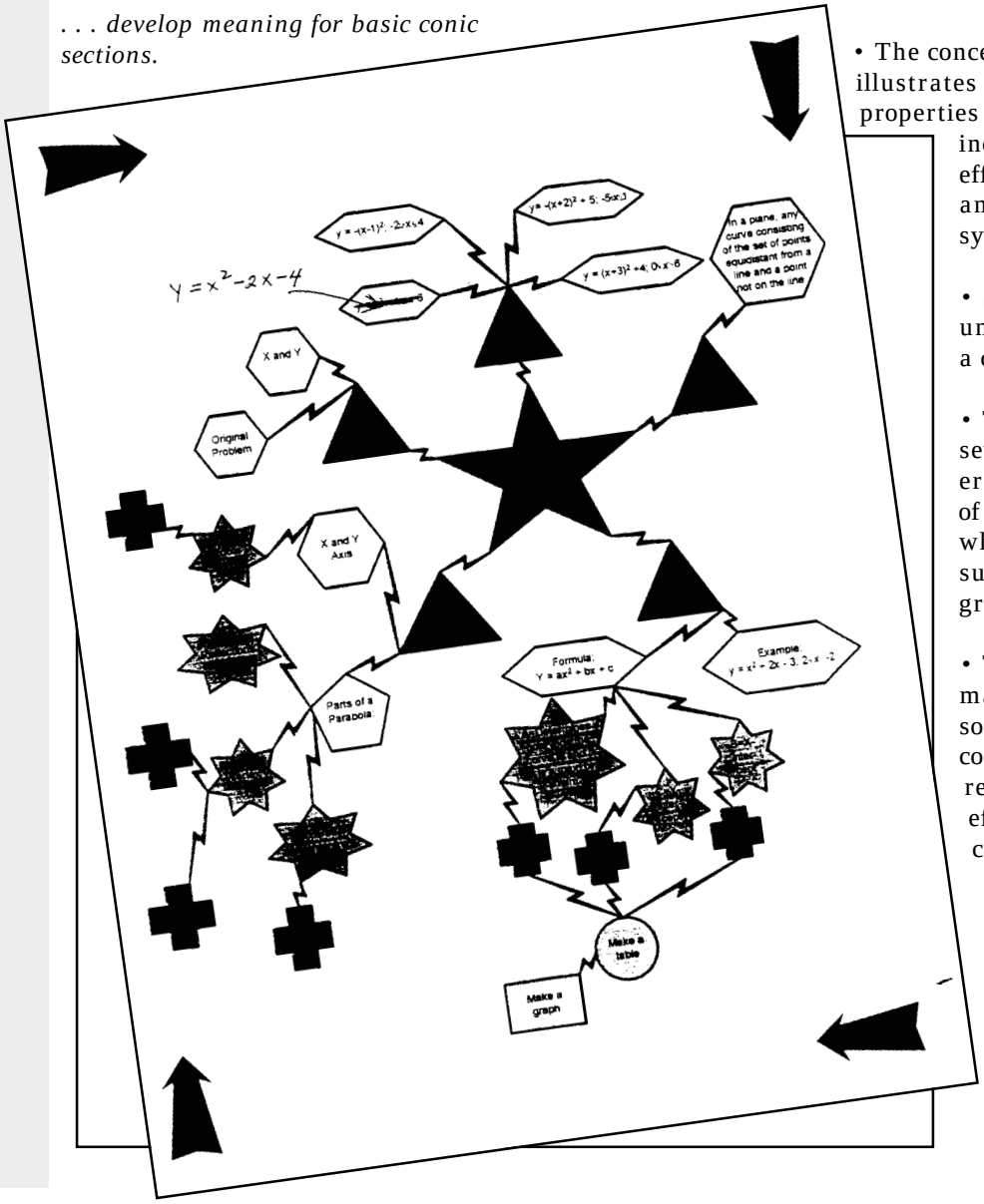
All concept maps and examples will be displayed in the classroom. As you know, I am expecting your best work. BE CREATIVE AND HAVE FUN!

Your grade will be based on the following rubric and equivalent to one test grade.

Performance Indicators

Students can:

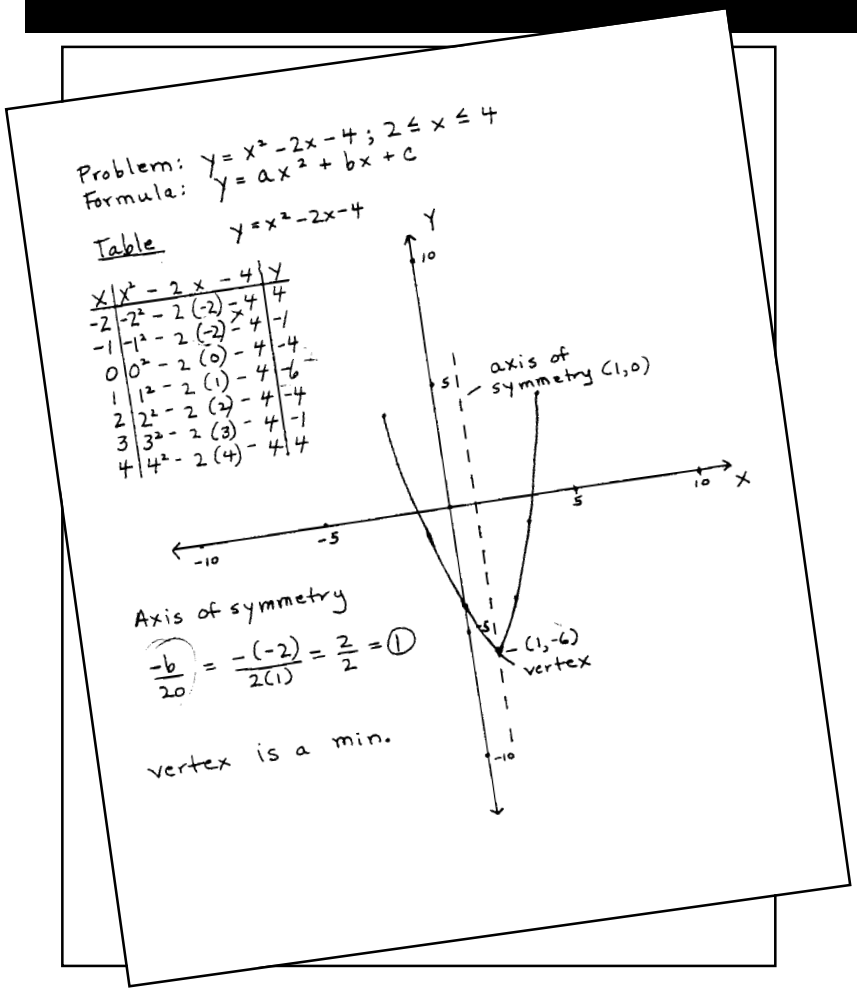
. . . develop meaning for basic conic sections.



Commentary

The Sample:

- The concept map illustrates many properties of the parabola, including the effect of "a," "c," and the axis of symmetry.
- Student shows understanding of a concept map.
- There are several arithmetic errors in the table of values, one of which affects the subsequent graph.
- The concept map contains some mis-conceptions regarding the effect of the coefficient "b."



SCORING GUIDE:
Creating Concept Maps
"Content" Rubric

Superior (5 pts.)	The written and visual presentation of the concept map is free of any math errors. The description of the math examples is logical and thorough. The complexity of the concept being described exceeds the level to which they have been taught in school. Student work is over and above the quality standards set by the class.
Proficient (4 pts.)	Mathematical errors are inconsequential. The descriptions are logical and thorough enough to be understandable to an expert. The complexity of the examples are no more than one year below grade level. The quality of work meets the standards set by the class.
Acceptable (3 pts.)	Some major mathematical errors may be present but are corrected upon questioning. The descriptions of the concept map and examples are incomplete or illogical enough to be confusing to experts, but are corrected upon questioning. The complexity of the examples is not challenging. One or two of the standards on quality are missing.
Not Yet	Major math flaws or errors exist. The descriptions are incomplete or illogical and not corrected upon questioning. Does not go beyond common knowledge. Student work does not meet several of the quality standards.

Standard 3—Mathematics

Commencement

Mathematics

Student Work Sample

Task

As a concerned friend you have decided to help a student in your class learn major math concepts that were taught to the class while he/she was absent. Since you love to write notes in class anyway, it will be a great way to "teach" your friend what was missed. Your note should include your own "creative" examples supporting your descriptions of how to apply the major concepts of Right Triangle Trigonometry identified in class. Clear and accurate diagrams, detailed steps leading to solutions of your examples, and descriptions of the work in complete sentences should be included in your note. After you describe each example, please include a follow up activity for your friend to check for his/her understanding.

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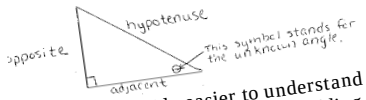
Student Response

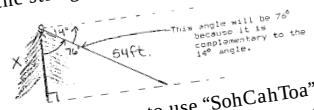
Dear friend,

I thought you might want to know about what we learned while you were gone so that our teacher doesn't have a fit. We learned about how to apply Trigonometry to things that could really happen. We used that "SohCahToa" formula for right triangles that we used before. That's where the Sine of an angle is equal to the measure of the Opposite side over the Hypotenuse, Cosine is the Adjacent side over the Hypotenuse and Tangent is equal to the Opposite side over the Adjacent side. Using this formula you can find missing sides or angles by putting numbers into it for either the sine, cosine or tangent parts, and solving by using a calculator or a Trigonometry Table.



This whole concept is probably easier to understand if you look at a problem:

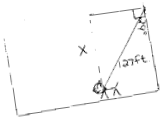
You are at the top of a tree and you are holding a string that is 54 ft. long stretching from the ground to the top of the tree. The angle of depression from your eye level to the string is 14º. How tall is the tree?



For this problem, you have to use "SohCahToa" to find the missing side (the height of the tree). You use the information that you have which is 54 ft. and 76º. "x" is the height of the tree because that is what we don't know. The 54 ft. is the hypotenuse of the triangle and "x" is adjacent to the angle that we already know. Referring back to "SohCahToa" we find that we need to use the cosine function (cos $= \frac{\text{Adj}}{\text{hyp}}$). Then using this you should have that the cosine of 76 is equal to x over 54 ft. or cos 76º $= \frac{x}{54 \text{ ft.}}$. Then using the calculator you find out that the cosine of 76º is .2419. Then you can solve for x by multiplying that number by 54. Then you will find that the tree is 13 ft. tall.

Now here is a problem that you can try on your own:

A dog that was wearing a 127 ft. leash fell down to the bottom of an empty pool. The angle from the wall of the pool to the leash is 29º. How deep is the pool?



I have the answer if you would like to know what it is.

Your friend,

Performance Indicators

Students can:

. . . use trigonometry as a method to measure indirectly.

Commentary

The Sample:

- Accuracy, thoroughness, and clarity are superb.
- The activity for the reader matched the examples presented in the letter.
- Explanation of the concepts was very clear.
- The illustrations were well done.

SCORING GUIDE:

Expert

Meets and exceeds the criteria and standards for proficient.

Proficient

Right angle trigonometry and its application(s) are accurately and clearly described in a logical order for both the skill and the reader. Clear and relevant examples are provided for clarification both before and during the description. Effective checks are provided for the reader to check for his/her ability to perform the skill and its application(s). More than one approach is used to provide for the reader's needs. The reader reports he/she had little or no difficulty working through your descriptions until he/she could do what was being described.

Competent

The reader is able to work through the descriptions and examples and within three attempts is able to do what is being described. The reader reports that the descriptions and examples tended to be unclear or confusing, but they ultimately worked. Checks are provided for the reader to check for his/her ability to perform the skill and its applications(s).

Novice

The reader is confused by the note. There are not adequate examples and/or the procedures described are not described clearly enough, or the procedures described will not generally work.

Expert:	A+
Proficient:	A
Competent:	B
Novice:	Work in Progress

Standard 3—Mathematics

Four-year sequence

Mathematics

Student Work Sample

Task

Students were asked to formulate a simple research question and then carry out an experiment to help answer their question. They could also devise a survey to answer their question. They were then asked to use one of three statistical tests to analyze their results—a Chi Square, a Pearson's r, or a matched t-test. Finally, the students were asked to write a research paper.

Performance Indicators

Students can ;

. . . obtain confidence intervals and test hypotheses using appropriate statistical methods.

Commentary

The sample:

- Student made a proper use of the t-test.
- Student chose an interesting experiment and followed standard statistical procedures.
- Although the student did find the difference between the results of the two tests, it was not statistically significant and does not warrant the conclusion drawn.
- References were appropriate, but should have been at the end of the paper.

Student Response

Introduction:

The purpose of this paper is to determine the effects of listening to various types of music on performing a task. If this experiment provides satisfactory results, then all the students in this world can listen to the music that will aid them to perform better on exams. The researchers believe that listening to Mozart's and Pachelbel's music will affect the teenagers in doing better on exams because we think Mozart's music is calm and serene for the brain to enable them to concentrate. We feel that other varieties are too nerve-wracking and distracting for the brain while studying for an exam.

Literature Review:

The fact that many universities have picked Mozart's music as a variable for testing the theory of his music as significantly improving student's performance on intelligence tests greatly implies that his music is considered complex and highly structured. Researchers from the University of California at Irvine have found that exposure to Mozart's Sonata for Two Pianos in D Major results in considerably improved student's aspect in intelligence tests taken immediately afterward (4). The students IQ scores rose by nine points after listening to ten minutes of Mozart's music. They have shown that listening to Mozart's music also assists in the solution of spatial puzzles involving folded cutout shapes, while undergraduates listening to Philip Glass's Music in Changing Parts' did not perform as well. (4) Studies have also found that surgeons who listen to classical music while performing an operation improved their performance. They had faster speed and better accuracy when listening to Pachelbel's Canon in D. (2)

Researchers have done studies as to why people who listen to music have improved short-term memory and they have found that as blood flow increases in the temporal lobe, it all produces changes in the temporal lobe and enables the brain to have improved short-term memory. (1)

References:
1. Bower, B. "Brain Images Reveal Cerebral Side of Music," *Science News*, 145:260.
2. Choo, Viven. "Music for Surgeons," Lancet, 344:947, 1994.
3. *The New York Times Company*, (Nature) "Mozart makes the brain hum, a study finds," October 14, 1993, p. 9, sec:B.
4. *The New York Times Company*, "Classical View; listening to Prozac . . . er, Mozart," August 28, 1994, p.23, sec:2.

Measures:

Test results were measured according to the matched T-test. The T-test showed that students listening to Mozart's music while administering the test received better results.

Findings:

We found that students did better on the second test while listening to Mozart's music. Nearly 70% of the students improved their test scores while listening to Mozart.

Total Scores:
No music 234
With music 250

(paper included list of data and formula for t-test [t = 1.146])

Method:

Our sample consisted of all the students taking the Invest Tech course...between the ages of 12 and 15 (N = 26; there were 9 boys and 17 girls). First, an arithmetic test was administered without music. Next the same group was given a similar test while listening to Mozart's Piano Concerto No. 19 in F Major (k.459) and Piano Concerto No. 20 in D Minor (k.466).

First, we handed out Test A and tested the students without music. Then we handed out Test B and tested the students with Mozart's music. Each test was conducted in 12 minutes. Raw scores on both tests were calculated.

Discussion:

The major finding of this study was that there was a difference in the students when taking the test while listening to Mozart's music. For example, they would tap their feet and move their heads in time to the music . . . But we do know that our study proved that Mozart's music does aid people to do better on tests.