Kentucky Council of Teachers of Mathematics

January 2004

Message from the President

Welcome to 2004! Although we don't know what the weather has in store for us this year, we know that mathematics education will continue to be improved and refined as we all strive for proficiency by 2014. Make sure to read the articles about being a math detective (probability at the primary level) and indirect proof (at the high school level). Perhaps you will find a gem of an idea that you can use in your classroom. As always, we are looking for your ideas and lessons that have worked in your classroom. Contact the vice-president for your grade level and submit the article to him or her. Don't know who that person is for your level? Check out the area of our website listed "KCTM Officers." There is a direct link to the email of the vice-president for each grade level.

We welcome our newest Board members, who took office in January 2004. Beth Noblitt (Northern Kentucky University) is serving as the vice-president college, Leslie Robertson (Anne Mason Elementary, Scott County) is the vice-president elementary, and Peg Darcy (retired) is the treasurer. These members will serve until December 2005, and we look forward to their activity on the Board. A big thank you goes to Wanda Weidemann (Western Kentucky University), Penny Roberts (Longest Elementary, Muhlenburg County), and Bob Garvey (Walden School, Jefferson County) for their contributions over the last two years.

Elections for additional board positions will be held in late September. Officers that are up for election this year are President-Elect, Secretary, Vice-President Middle, and Vice-President High. If you are interested in running for any of these positions, contact a current board member to express your interest. Want to know what the job entails? Feel free to ask the person who is currently in that position. He or she would be the best source of information. We are striving to have two candidates for each position this year, so please think carefully about serving. We meet four times a year, and the requirement is that you be a member of KCTM (President-Elect candidates must also be NCTM members, and vice-president candidates need to be teaching at the appropriate level). We want you! Also needed are representatives from the Cumberland Council of Teachers of Mathematics and the Eastern Kentucky Council of Teachers of Mathematics. We currently do not have anyone representing these affiliates attending our board meetings, and we certainly want to know what is happening in these areas of the state. Please contact your affiliate President if you are interested in serving in this capacity.

The fall conference date and place have been set. The date is October 30, 2004, at Second Street School, in Frankfort, KY. Mark your calendars now, and watch the website for more details, including a printable registration form when it becomes available.

Enjoy this edition of the KCTM Newsletter. Please contact me (ldurham@scott.k12.ky.us) or our editor, Amy Herman (aherman1@jefferson.k12.ky.us), with comments and questions about the newsletter.

Lori Durham
KCTM President

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Your Class Is Needed to Solve a Crime!

A series of crimes have been committed, and your class is needed to determine who is responsible! Your students will need view the "evidence" in their Top Secret files. There are five possible suspects. Police have had reports by witnesses that the two criminals have very similar physical features. It is speculated that the two criminals could be brothers. Traces of "DNA" evidence have been found at one of the crime scenes when blood was left on a shattered windshield. It will be necessary to take "samples" of the DNA evidence from five different suspects, in order to determine which of the two suspects could be relatives. This is where your class, the newly enlisted private detective team, begins their work.

Materials:
5 paper bags or tube socks per investigating team
Red, blue, and green color tiles (See key)
Evidence log
Cumulative evidence report
Bar graph page
Calculators (optional)
Crime music (optional)
Detective outfit (optional)
Various items to create a crime scene area in classroom (optional)
Judges outfit (optional)
Various items to create a courtroom in classroom (optional)
FBI Files (optional)
Syringes of fake blood (ketchup)

Procedures:

- Enter the room dressed as an FBI agent with brief case handcuffed to arm and crime music playing in the background. Have "FBI files" in brief case or under arm.
- Task Attraction: Have students view information in "FBI files" (photos with a story line created by you ahead of time) as a means for beginning their investigation.
- Introduce the five suspects to the class (e.g., Harry the Horrible, Mark the Maniac, Carrie the Criminal, etc.). Show them the blood samples (syringes of fake blood) that have been obtained from each suspect.
- Place students in investigating teams of five. Each student in an investigating team will investigate one of the five criminals. Hand out bags of color tiles that represent the DNA strands of each of the five criminals (two of the bags will have identical sets of color tiles inside which will represent the two criminals that are relatives). Remind students they are not to look into the bag at any time during the investigation.
- Once a bag with a criminal's name has been handed to each student, ask students to write down the name of his or her criminal on the top of a piece of paper entitled "Evidence Log". Remind them how to

make tallies, if necessary, before beginning the sampling process. Have students create a table that takes up the majority of the page with the following headings: red, blue, green.

- Each investigating team will then decide on their method for collecting data (e.g., Will one student draw out of their bag at a time and all do tallies for each criminal? Or will each person investigate their own assigned criminal and then report their finding to the group?)
- Once all students have designed a plan, ask them to begin gathering "DNA evidence" by drawing samples of color tiles from a paper bag/tube sock (one tile at a time and then returning it) twenty-five times. They are to make a tally mark under the correct heading in their table as each sample is drawn from the bag.
- Once "evidence" has been collected twenty-five times for each criminal, data from each of the five criminals is then compared/analyzed by investigating teams. Detectives look closely at the number of red, blue, AND green color tiles that have been drawn for each criminal, and try to determine which two criminals have similar evidence (if any at this point). Each investigating team then comes up with their first prediction of which two criminals they feel committed the crime and could be brothers.
- Students continue to gather "evidence", twenty-five samples at a time, stopping to compare/analyze data between sets, and making adjustments to predictions when necessary, until they have drawn a total of 100 samples.
- Detectives still do not look in their bags at this point. Gathered data is then represented in bar graph form for each criminal. Students study this visual representation of data and draw their final conclusion. Ask each investigating team to report which two suspects they would convict for the crimes committed.
- If all investigating teams do not agree on the final verdict, gather cumulative totals for each criminal and base final conclusion in a "Cumulative Evidence Report".
- Once the final verdict has been reached, you can turn your classroom into a mock courtroom by becoming the judge. Ask the investigating teams to rise from their seats, a team at a time, in order to announce their verdict. Record their final decision.
- Before they are given the actual verdict, tell students how many tiles are in each bag for each criminal. Ask student to predict how many of the total tiles in their bags were red, blue, and green according to the outcome of the data they collected in their data tables.
- Once students have made and written down their predictions, allow them to empty their color tiles on their desks so that they can see what was actually in their bags.
- Discuss or have students determine the probability of getting a red, blue and/or green tile out of each bag.

COLOR TILE KEY FOR CRIMINAL BAGS

	RED	BLUE	GREEN
Criminal 1	4	2	0
Criminal 2	1	3	3
Criminal 3	3	1	2
Criminal 4	3	1	2
Criminal 5	4	2	1

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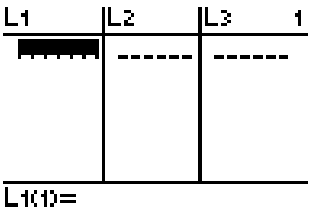
How to Use the TI-73 to find the Measures of Central Tendency

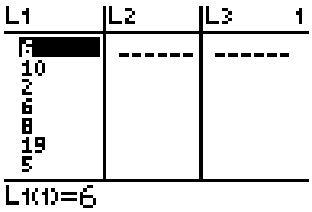
Sara surveyed her friends and asked them how many DVDs they owned. Here are the results: 6, 10, 2, 6, 8, 19, 5, 12

STEP ONE: ENTER THE DATA IN A TABLE (OR LIST).

1. Press the LIST key. L1 stands for List 1, L2 stands for List 2, etc.



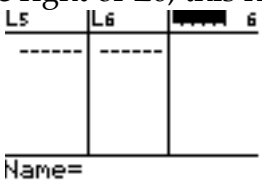
2. Enter the data one number at a time. The first piece of data should be entered into the first cell BELOW the heading L1. A common error is that students will try to enter data in the heading. If this happens, an error message will occur. If this happens, select QUIT and start over. Make sure you press the ENTER key after entering each number. L1(1) means List 1,element 1. Figure shows the first 6 data entries. You can scroll the list with the up and down arrows.



TIPS:

- If you enter the wrong number, simply re-type over the number. If too many numbers are entered, you can delete the number by moving to the cell location (the number selected should be darkened) and selecting the DELETE key (DEL).

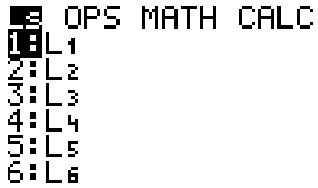
- To clear the entire list of data, move the cursor to the list heading (L1); the heading should be darkened. Select the CLEAR key and the ENTER key. CAUTION: Make sure you select the CLEAR key and not the DEL key. If the DEL key is selected, L1 will be "hidden". To retrieve L1, move cursor to the heading that is to the right of L6; this heading should be darkened.



Select INS key (2^{nd}, DEL). Select STAT (2^{nd} key and then the LIST key). Select L1 and ENTER. ENTER again. Your list should be retrieved.

STEP TWO: FIND THE MEASURES OF CENTRAL TENDENCY.

1. Go to the HOME screen by selecting QUIT (2^{nd} and then MODE).
2. Select the STAT key (2^{nd} and then LIST).



3. Right arrow key to MATH.

4. Arrow key to one of the following options and ENTER:
   3: Mean(, 4: median(, OR 5:mode.
5. Select the name of the list by selecting the STAT key (2nd and then LIST) and option 1:L1. ENTER. ENTER again.
6. The calculated measure will result.

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Indirect Instruction Empowers Geometry Students

A traditional geometric theorem presentation using a chalkboard or markerboard permits the geometry instructor to construct one good sketch, perhaps two or three, while conducting a lecture as students take notes. Customarily the teacher puts forth the vast majority of the effort while the students are passive participants.

Wouldn't it be exciting if the teacher could find a way to do less direct instruction while the students were actively engaged in developing not just the same sketch but a multitude of equivalent sketches! Math teachers utilizing the power of dynamic geometry software make this happen every day. One such dynamic geometry source is the new TI-83 Plus Silver Edition APP, Cabri Jr, which is a free download from http://education.ti.com. What follows is a view of a sample lesson employing indirect instruction.

The following theorem is taken from page 363 of *Glencoe Geometry* (1998) but a variation could be found in any standard high school geometry text.

Theorem 7-6:
A segment whose endpoints are the midpoints of two sides of a triangle is parallel to the third side of the triangle, and its length is one-half the length of the third side.

For our class activity, we will not provide the students with the complete theorem; only the "If" portion. The students will activate Cabri Jr and create an image that satisfies the conditions set forth in the "If" statement, manipulate the image, and form conclusions. (In the beginning, it may be desirable to list hints in the "Then" section to guide the students toward a specific outcome.)

Create a sketch with Cabri Jr that satisfies the conditions of the following "If" statement. Manipulate the image, while maintaining the accuracy of the sketch, and record your conclusions in the space provided.

If:
A segment whose endpoints are the midpoints of two sides of a triangle…

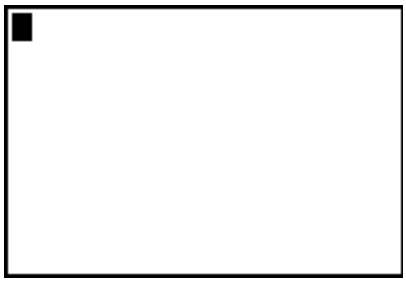
Then:

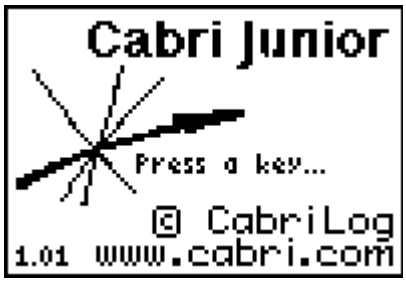
Write a theorem that combines the If and Then statements above. (You are permitted to ask questions of any other student as long s the questions evoke only a Yes or No response. You are not permitted

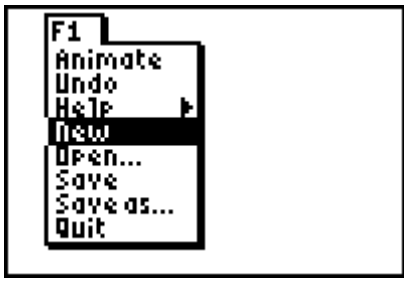
If students are given the "If" part of a theorem and are provided with a background in the use of Cabri Jr, they should be able to complete the sketch. One possible procedure would be to:

- ✓ Form a triangle
- ✓ Locate midpoints of two sides
- ✓ Connect these midpoints
- ✓ Explore
- ✓ Theorize

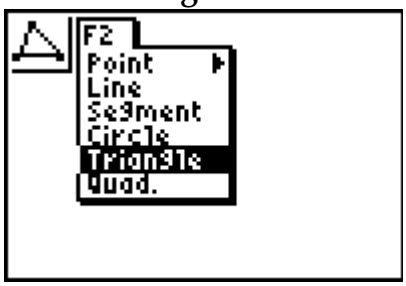
Calculator screens would look something like this:

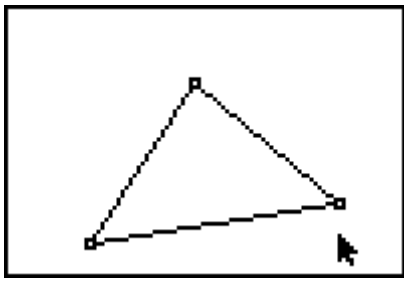




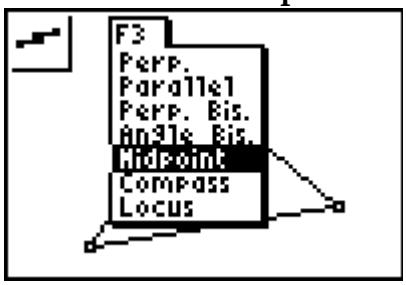


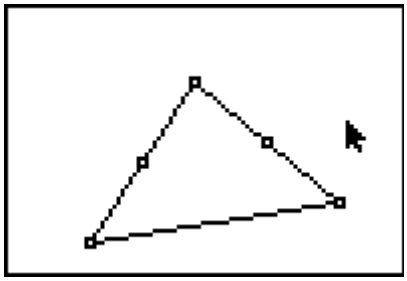
Form a triangle



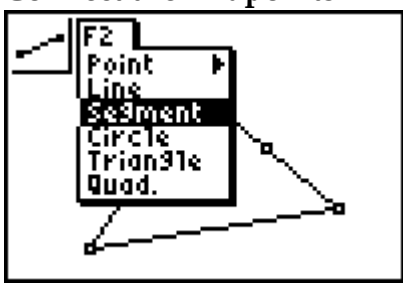


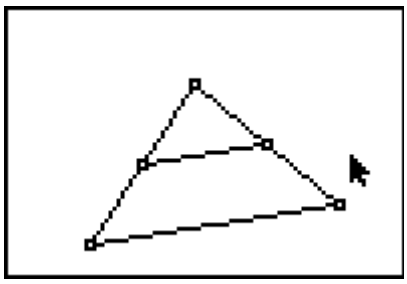
Determine the midpoint of two sides



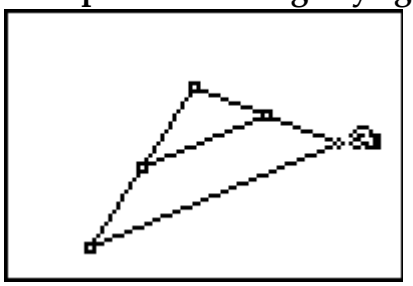


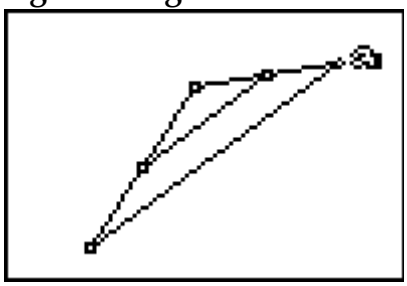
Connect the midpoints

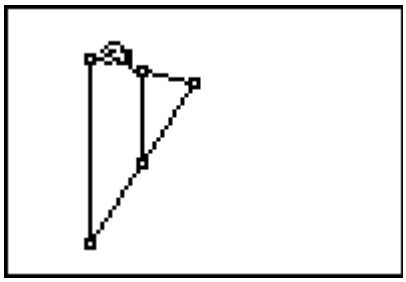


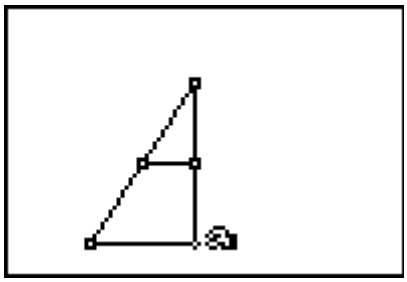


Manipulate the image by "grabbing" a triangle vertex and moving it.

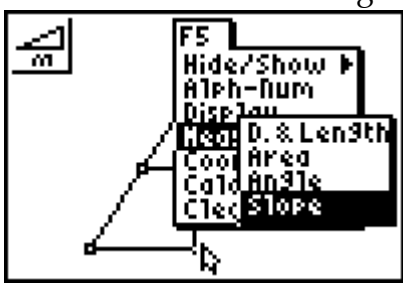


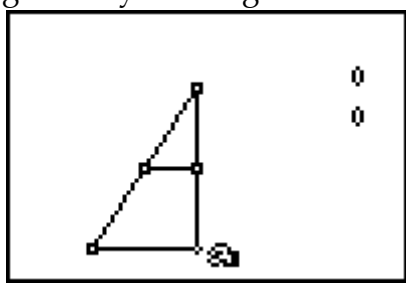


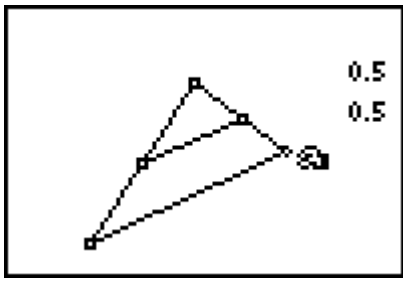


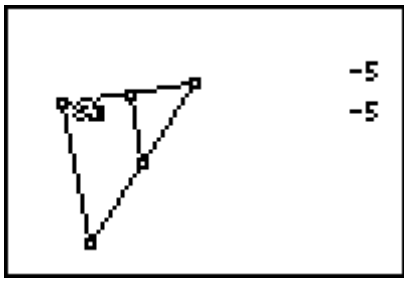


What conclusions have you made? Almost all students will be convinced that the segment connecting the midpoints is parallel to the third side of the triangle. (If we identified the slopes of these segments, we would have connected algebra to geometry with a good discussion of parallel lines having the same slope.)









Wow! Students have been actively engaged in thinking and in creatively sharing their conclusions. The teacher is doing nothing more than acting as a facilitator. A lively discussion will follow if the teacher asks probing questions that allow the students to defend their findings.

Don't forget there is more to this activity. Could the students not discover that the segment is one-half the length of the third side? Yes! In fact, students usually find much more than just the desired outcome of completing the given theorem. Students will also enjoy using the APP to sketch their homework activities.

Finally, have we proven this theorem? No! Our purpose here is to engage and to empower the student with a confidence in her or his own mathematical investigative skills. For those who include the formal proof, the students will be much more likely to be successful because they have their own intuitive sense of the steps required to make the proof.

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Using WebQuests in the Mathematics Classroom

WebQuests are becoming more popular in the mathematics classroom at all grades levels. Students love them! Check out some of these sites to see what is so exciting!!

http://webquest.org/ - Bernie Dodge's site – He is credited with creating the idea of WebQuests.

http://www.bestwebquests.com - Tom March's site – the Best WebQuests University. Lots of great stuff!

http://school.discovery.com/schrockguide/eval.html - Kathy Schrock's site. Contains a wealth of information on WebQuests and how to evaluate them.

http://studenthome.nku.edu/~webquest/ - Math and Science WebQuests created by P-12 teachers in the Northern Kentucky area.

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NCTM Annual Meeting in Anaheim

Dear Colleague:

The National Council of Teachers of Mathematics 2005 Annual Meeting and Exposition will be in Anaheim, California, Wednesday, April 6 – Saturday, April 9, at the Anaheim Convention Center, the Anaheim Marriott Hotel, and the Hilton Anaheim Hotel.

The conference theme is **"Embracing Mathematical Diversity".** The Program Committee seeks proposals that represent diverse perspectives, approaches, information, and ideas. Proposals are encouraged that address topics, ideas, issues, and strategies that can contribute to participants' professional learning, especially:

- knowing and understanding mathematics more deeply,
- improving instructional effectiveness to produce results with students, and
- expanding awareness of crucial or timely issues.

The meeting's theme calls for presentations that address diverse ways that students learn or demonstrate mathematics, teaching strategies that help a diverse group of students learn, and diverse models of mathematics professional development, and issues of equity and bias. Approximately 20 percent of the program will be selected to address NCTM's professional development Focus of the Year, ***Developing Algebraic Thinking***.

We especially encourage K-12 teachers to submit proposals to share their first-hand classroom experiences and observations.

Information about the types of presentations, answers to frequently asked questions, criteria for selection of proposals, and the speaker proposal form are available online at www.nctm.org/meetings. **The deadline for proposals is May 1, 2004.**

We hope to see you in Anaheim in 2005 for a fantastic professional development and networking experience that you won't find anywhere else!

Cathy Seeley
NCTM President-Elect

Bettye Forte & Carol A. Edwards
Program Cochairs

Mathematics Education Service and Achievement Awards

Congratulations to the 2003 MESA Awardees:

K - 12:
Allison Colvin, Campbell County Middle School
Wendy Hertzenberg, Reiley Elementary
Janet Higgs, Longest Elementary
Shirley Mann, New Haven Elementary
Kathleen Wonderling, Dixie Heights High School

College:

Dr. Steve Newman, Northern Kentucky University

Education Professional
Kenneth Wright, Scott County Public Schools

Amy Herman, Editor

Kathy Mowers, Website Adaptation

Wrong UserID