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President's Message
September 2016 *by George Reese, ICTM President*

Board President's
Message: The Challenges
around the Corner
George Reese
August 29, 2016

The ICTM Fall Conference is just around the corner, and like last year, we are joining with the Illinois Science Teachers Association (ISTA) to offer a larger and richer experience. New this year is a joint conference program. In the spirit of integrated STEM, only the titles and session descriptions will provide distinction between the math and science. You will also notice that there are several sessions on computational thinking. Also new this year, the program will only be available electronically before the conference. However, everyone will get a print copy at the conference.

We are planning for an invigorating conference this year, starting with the keynotes. I encourage all members to go on the ICTM.org site and check out the 10-minute videos for each of our keynote speakers. **Doug Clements, PhD,** University of Denver**,** renowned expert in teaching early childhood and elementary school mathematics will give the Friday keynote**.** Saturday morning's keynote is **Matt Larson,** National Council of Teachers of Mathematics (NCTM) President, who is a dynamic speaker. I have seen him speak twice now, and both times learned important information about the history of mathematics instruction that made me realize why the new pedagogies we are attempting are so important, and why we MUST work together to make a reality of the equitable, high quality mathematics teaching and learning that is at the core of ICTM's mission.

While you are at the conference please make a special effort to attend the poster sessions on Saturday. This is the second year for posters, and I hope we can grow this portion of our program.

Finally, I want to encourage all members to become involved in the organization beyond the conference. In the coming year, we will have Webinars and Task Force meetings through which we hope to more actively engage ICTM members throughout the year, not just during the big events like the annual conference and the contest. We need your help and ideas.

George Reese
reese@illinois.edu

LAYING THE FOUNDATION FOR SUCCESS

Do not forget about the
66th Annual ICTM Conference
from October 7th - 8th
Pere Marquette, Peoria, Illinois

Registration is still open!

Visit **www.ictm.org** for
more information

Board Chair Report
by Jackie Murawska, *ICTM Board Chair*

**Board Chair   Report
August 2016**
by Jackie Murawska

Welcome back to a new school year, ICTM friends! We are looking forward to seeing you all at our Annual Conference to be held on Oct. 7-8, 2016 in Peoria. Early bird registration deadline is September 15th, so register soon! At the April 30, 2016 board meeting, the board approved the 2016 election results and award winners. We will welcome our new board members and celebrate the work of the 2016 award winners at the Awards Ceremony on Friday, October 7th in Peoria. The board also approved a partnership with ISTA to cosponsor the Illinois STEM Educator Award to be presented at the conference. In addition, a motion was passed to provide free exhibit space for NCTM and ICTM affiliates, with the understanding that if there is a nominal cost for the booth, it will be paid by the affiliate. And new this year, a $25 per person discount for full early bird two-day conference registrations for district teams of 5 or more is available.

At the August 20, 2016 meeting, the board discussed final preparations for the 2016 ICTM Conference, the 2017 NCTM Regional Conference (which will be held in Chicago), and site arrangements for the 2018 ICTM Conference. It was announced that ICTM's application to become an official PDH provider through ISBE has been approved! So a motion to create an ICTM board job position called Professional Development coordinator was passed. The board also approved the Complex Instruction Consortium to be admitted as an official ICTM Affiliate. Lastly, a few new task forces were created to afford board members the opportunity to work together between our scheduled board meetings and present their findings at subsequent board meetings.

The next board meeting will be in Bloomington, IL and is scheduled for December 10, 2016.

Illinois Mathematics Teacher

Journal

call for articles

The editors invite submissions from both new and experienced authors, and accept articles on a range of topics, including:

- innovative classroom activities and lessons
- applications to the classroom of pedagogical research and best practices
- examples of implementing standards
- reviews of recent books on pedagogy
- any other articles that will support the professional development of ICTM members

Please send submissions to **imt@ictm.org**.
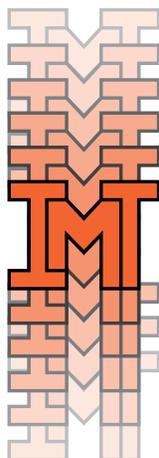
Math Musings with Martin

The worst part of a sin x infection is that it comes back periodically.

Submitted by Martin Funk, ICTM Director 9–12

ICTM List Serve Update

Do you receive e-mails from the ICTM List Serve? If you answered no, then consider subscribing today. Subscribing to the List Serve is one benefit of your ICTM membership. E-mails sent through the List Serve often give information about upcoming conferences, details about professional development opportunities, information about ICTM awards and scholarships, links to math related websites and news articles, and questions/announcements from other math teachers around the state. All subscribers to the List Serve can send out messages to the recipient list. To sign up, visit www.ICTM.org and sign-in to the member login on the left hand side. You can create a new account if needed using your ICTM member number. Once logged in, select "List Serve" under the Membership tab. Here you will find simple directions about subscribing and how to send messages. Subscribe today!

NCTM Reminder:

Help your professional organizations support each other! When renewing your *National Council of Teachers of Mathematics* Membership online, don't forget to checkmark the *Affilate Rebate* box and designate ICTM as your affiliate organization. NCTM's Affiliate Rebate program provides a per-member rebate to ICTM based on this feedback. Your attention to this detail helps provide support for your local professional organization.

Do you know someone deserving of an ICTM Award?

My name is Eric Bright, newly elected ICTM Board Member and ICTM's Excellence in Middle School Mathematics award winner for 2012. I just want to tell you that being the recipient of that award changed my life. Really! Besides the honor of being selected for the award, my career path changed as I realized that ICTM was a place for me to be an agent of positive change for mathematics education in Illinois. Receiving that award emboldened and empowered me to not just change my classroom for the better but to strive for positive changes in the world at large. I've been working on that ever since.

The ICTM award really just meant the world to me, and you can bestow that same honor and affirmation on another deserving educator. And there's an award for everyone at every stage in their career. There are awards for excellence in mathematics teaching at the elementary, middle school, secondary, and post-secondary levels as well as a Promising New Teacher Award. The Max Beberman Award honors someone who directly contributes to mathematics education by training future teachers, writing curriculum, or performing educational research. The Lee Yunker Award is for exemplary leadership in mathematics education. The Fred Flener Award honors those who provide opportunities for students to explore mathematics outside of the classroom. Finally, the Distinguished Lifetime Achievement Award is for those who have dedicated their life's work to this great profession.

You can find all of the specific criteria for each award on the ICTM website, and the nomination process is quick and simple. Nominate that special mathematics educator in your life to show them that they truly have made a difference!

The award criteria, nomination process overview, and application form can be found at: https://ictm.memberclicks.net/ictm-awards

As Scholarship Co-Chairs, one of our favorite things to do is give away scholarships to promising young mathematics teachers either in their first year of teaching or their senior year in college. They apply in the spring while they are still juniors or seniors if they are mathematics majors or elementary education majors with a concentration in mathematics.

Maria Christina Gianni

This year we awarded $1500 each to Maria Christina Gianni from the University of Illinois at Champaign-Urbana teaching her first year at Gombert Elementary in Aurora, and Amy Wieting from Illinois State University where she is a senior. These deserving young ladies show a great deal of potential to become future ICTM stars.

The scholarship committee would like to thank everyone who donated to the scholarship fund as well as members who assisted in collecting donations. Without your support, ICTM could not give these awards to deserving college junior and seniors. We also would like to thank our readers who help evaluate the applications.

Amy Wieting

If you did not donate and would like to, please send a check payable to ICTM Scholarship. The check can be mailed to Sue and Randy Pippen, 24807 Winterberry Lane, Plainfield, IL 60585.

Applications for scholarships may be made by visiting https://ictm.memberclicks.net/ictm-scholarships and click on scholarship. All application information and forms are downloadable. Please reach out and encourage college juniors and seniors to apply for the ICTM Scholarships, due each year in March. There is a downloadable application with fill-in blanks to make it easier.

Towards a New View of Mathematics Education

Evan Taylor

"Now I can't pledge allegiance to your flag
Cause I can't find no reconciliation with your past
When there was nothing equal for my people in your math
You forced us in the ghetto and then you took our dads"

Lupe Fiasco, "Strange Fruition"

"They schools ain't teachin us, what we need to know to survive"

Dead Prez, "They School"

I believe that mathematics education should be based on the individual's community's needs. Answering questions such as how can we provide for ourselves and our families? How can I grow a garden in this food desert? What makes my community a food desert? What makes my community, but no others a food desert? What does mathematics have to do with any of these questions? Am I a mathematician? Is my community filled with mathematicians?

In the Fall of my first year of teaching (2015) the president of the Illinois Council of Teachers of Mathematics, George Reese, reached out to me.. He called and stated that he would like to come out and observe my class because he had heard such great things about me and my mathematics instruction. He got this insight from two different programs that I worked with as an undergraduate, the first program being the CHANCE Program at the University of Illinois at Chicago. I ended up working with the CHANCE program accidentally due to a misread email. The program sent out a call for a mathematics teachers for a high school STEM Academy. I thought it was open to any who applied, but they were initially looking for a graduate student. After

sending an email and having my faculty mentor, Danny Martin, vouch for me, I was offered the job to teach high school mathematics. I'd never before taught high school mathematics, but was merely interested in teaching and trying new ideas and concepts with mathematics.

Throughout the program I taught the students cryptology and some basic applications of cryptology in the real world when looking into careers and how the world was impacted by numbers. I talked to them briefly about how those in power control what narrative the numbers tell you. Most days, this would lead to in-depth discussions about mathematics and its relation to their lived experiences, alongside conversations about the music that I played as we encrypted and decrypted messages using algebra. Later on that same summer, I reached out again to teach a small series of lessons to a group of middle school students. I decided that I would teach them about calculus and how it relates to their lived experiences. (Note: I have never taken Calculus, but I did take Precalculus and learning how to teach introductory calculus courses at UIC.) I began the lesson by playing Chance the Rapper's, "Pusha Man" and had the students to think about the lyrics of the song where Chance analyzes Chicago's summers. The weekend before was July 4th, and there were many shootings in Chicago. I asked students to hypothesize why more shootings happened around a particular time, but in analyzing their answers I had them to correlate their answers to a graph. The graph depicted the number of shootings (y-axis) and the time (x-axis). Students were able to vocalize and breakdown the graph easily when it was connected to their lived experiences and were more engaged as a result. We went on later to evaluate how I believe that calculus is really just storytelling using a graph. The job of the mathematician is merely to state what is happening at various points of the

story. When this connection was made, students were then tasked to engage in various activities, graph their data and then retell the story of what happened at various points of the line on the graph. At the end of the mini-series, students were excited to know that they had known calculus all along but had never been shown it had anything to do with their lives.

In the fall of my senior year at the University of Illinois at Chicago, I was afforded another opportunity to teach a series of lessons to a group of students within a STEM Academy. They could probably do higher levels of math than I could, so I made it my goal to have them analyze mathematical practices and formulas. I had the students engage in experiments about the Pythagorean Theorem, I pushed them to question all formulas and all things taught. One day I had all of the students sit on top of the tables, for nothing more than to destroy ideas and constructs of normalcy. I spent time teaching them lessons about how mathematics and justice coincide, and how they could use their mathematical gifts to help address injustices. I was pretty sure that I was going to lose my job after I spent a majority of class time getting students to change and question their seating arrangements until they found the most unsegregated arrangement possible. Students began to grow closer to each other through a new model and perspective of teaching and learning mathematics that focused more on community than memorization of theorems. I was also able to keep my job, and the directors of the program loved my teaching style and methodology.

In the winter of my senior year, I taught a lesson to the fifth graders in the classroom I was student teaching in about the idea that one does not always equal one. The discussion was predicated on our evaluation of the United States bombing of Hiroshima. The students were able to engage in in-depth conversations about whether or not the United States justified in their bombing of Hiroshima. We analyzed numbers, ethics, and I even read an excerpt to them from John Hersey's Hiroshima. Students were able to mathematically and morally dissect the numbers and did not merely take the numbers as they were. They had to dig in and analyze what stories the numbers were telling, but also what stories the numbers were not telling. In the same year, I had another lesson in which the students analyzed Hurricane Katrina and the morality of stealing during the hurricane. Students had varied responses which were all reflective of their own experiences.

It should be noted that as a student at UIC I concentrated in mathematics. Throughout my schooling I was very interested in mathematics. However, I was not one of the golden children who was gifted with insane mathematical abilities. I merely wanted to push myself and see what all of the advanced and affluent children were engaging in. In middle and high school, I was often one of the only Black students in my Honors mathematics classes. Outside of mathematics classes, though, I was surrounded by my other African-American and Latino students who had no access

to these classes despite their capacity to learn. It was not until I got to UIC and began to research ethnomathematics and the mathematics that is inside of people's cultural identities. I then began to wonder how many more students would attempt challenging mathematical ideas and concepts that are connected to their lived experiences? How many more Black students would be interested in calculus if they understood applications it has to issues of justice or even its application to sports? How many more parents would spend time teaching their elementary aged children the cultural mathematics of dominoes or spades?

The previous questions and ideas are the reason why I believe I was chosen to serve as the Director-At-Large for the Illinois Council of Teachers of Mathematics. I want to foster a new view of mathematics education that investigates the mathematics within our cultural activities, giving power back to communities. Just imagine the value students would see in their culture when they realize the mathematics involved. Students realizing that they are mathematicians is predicated on our redefinition of what a mathematician is and what a mathematician does. Students must be able to see the local girls and boys playing basketball as mathematicians just as they see Albert Einstein as a mathematician. This work is already being done by many scholars, but I want to take it to the streets and use the work to empower communities to see how academic excellence has always resided within their cultural practices.

The Illinois Council of Teachers of Mathematics is affording me this opportunity to do so and I hope that within the year we can see changes happen beginning in Illinois and spreading across the state. I know I am starting this year by teaching my third graders first how to play Pokemon, dominoes and Yu-Gi-Oh and then having them to examine the mathematics involved. I know I will once again have my students consider the question what is a mathematician and what is mathematics, in hopes that they will answers stating themselves to be mathematicians and their everyday activities to be mathematical.

Are you a mathematician?

Is your answer based on what you consider mathematics?

Or is your answer based on what others deem to be mathematics?

I have a dream that we will all one day lean towards the former...

Behind Enemy Lines: Teacher Directions

This activity is meant to be a review of systems of linear equations and inequalities. Some of the questions (the linear inequality systems) force the students to solve via graphing, but the systems of linear equations can be solved using any method. Students may them graphically as well, but it can begin to clutter the graph if they choose to do so. There is also one solution that is a fraction which would be difficult to see on the graph at this scale.

Extensions: If you'd like to enhance this activity, you can add speeds to the helicopters, fake missiles, and such and parameterize the system. This allows you to not only see where things cross, but whether or not they actually would intercept each other within the constraints of time.

REMEMBER, this is an exercise. No trainees are actually harmed in this mathematical exercise. It is only a training mission!

Behind Enemy Lines

Welcome to a training exercise for the elite U.S. Navy Seals squadron known as the Vigorous Vinculums. In the following scenario, we have a stranded unit of soldiers behind enemy lines that we need to save. The border between the two sides is the x-axis on the map where the Vigorous Vinculums control below the axis and the Radical Ratios (pretending to be the bad guys for us in this training exercise) control above the axis. Try to get the stranded unit home by answering the following questions:

1. The Bad Guy Base located at (-7,4) has radar which reaches the area described by the following system of linear inequalities. Graph the radar zone on the map and shade the area red. (10 pts)

    a. $-4x+3y\leq40$

    b. $2x+7y\leq14$

    c. $-x+5y\geq10$

2. The Bad Guy Base located at (11,4) has radar which reaches the area described by the following system of linear inequalities. Graph the radar zone on the map and shade the area green. (10 pts)

    a. $x+3y\leq23$

    b. $-8x+7y\geq-60$

    c. $11x+2y\geq36$

3. The Vigorous Vinculums first sent a helicopter to pick up our stranded troops. The Radical Ratios shot a "missile" (remember, this is just a training exercise) from their base at (-7,4) at the helicopter forcing it to make a landing. We know the trajectory of both the helicopter and the "missile." Where did the helicopter make the emergency landing? (10 pts)

    a. Helicopter trajectory: $-2x+3y=12$

    b. Missile trajectory: $-x+5y=27$

4. Knowing that we now have two stranded teams on the ground behind enemy lines, the order was sent for both the helicopter group and the original stranded unit to make their way to Mt. Marcy. The Radical Ratios responded by sending out troops to intercept them before they could make it back to friendly territory. Given the trajectory of both teams, where would the Radical Ratios' troops from the base at (11,4) intercept our stranded unit? (10 pts)

    a. Stranded unit trajectory: $3y=4x$

   b. Radical Ratios troop trajectory: $y=4$

5. Given the trajectory of both teams, where would the Radical Ratios' troops from the base at (-7,4) intercept the downed helicopter team? (10 pts)

    a. Grounded helicopter team trajectory: $y=2x$

    b. Radical Ratio troop trajectory: $x+4y=9$

6. The Vigorous Vinculums next responded by sending their own troops to intercept the Radical Ratios' troops. Where would a team from the base at (10,-3) intercept the Radical Ratios given their trajectories? (10 pts)

    a. Vigorous Vinculum interception squadron: $5x+2y=44$

    b. Radical Ratios troop trajectory: $y=4$

7. Where would a team from the base at (-5,-6) intercept the Radical Ratios given their trajectories? (10 pts)

    a. Vigorous Vinculum interception squadron: $-9x+2y=33$

    b. Radical Ratios troop trajectory: $x+4y=9$

8. We know that when traveling at high speeds in unfamiliar territory, troops rarely travel in an exactly straight line. If the stranded unit headed to Mt. Marcy could have a variance of ±1/3 for their slope, what would be the system of inequalities that would define their zone of travel? Draw this zone on the map and shade the area yellow. (15 pts)

9. If the downed helicopter troops headed to Mt. Marcy could have a variance of ±1 for their slope because they lost their compass in the crash, what would be the system of inequalities that would define their zone of travel? Draw this zone on the map and shade the area blue. (15 pts)
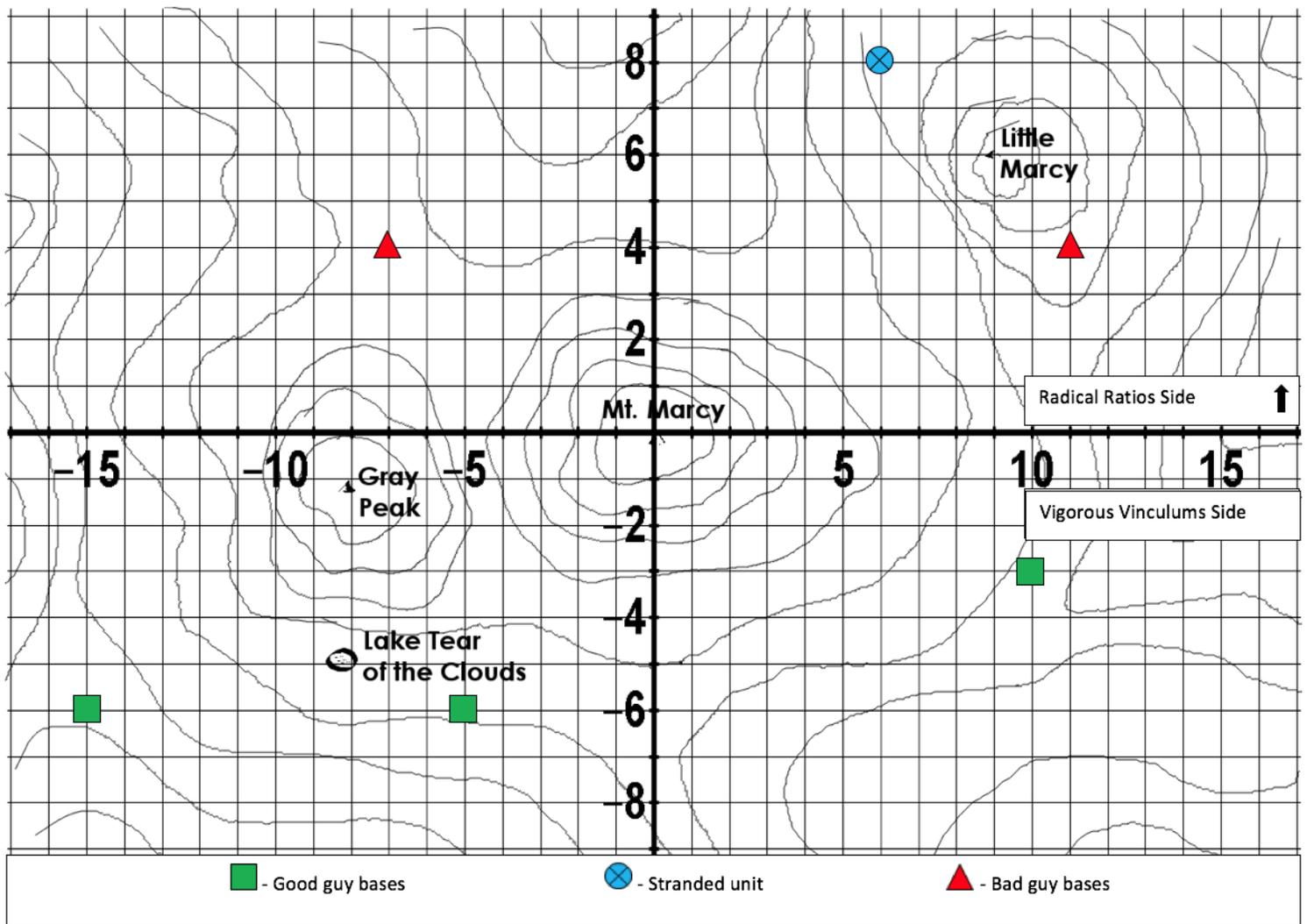
Behind Enemy Lines: Answers

Welcome to a training exercise for the elite U.S. Navy Seals squadron known as the Vigorous Vinculums. In the following scenario, we have a stranded unit of soldiers behind enemy lines that we need to save. The border between the two sides is the x-axis on the map where the Vigorous Vinculums control below the axis and the Radical Ratios (pretending to be the bad guys for us in this training exercise) control above the axis. Try to get the stranded unit home by answering the following questions:

1. The Bad Guy Base located at (-7,4) has radar which reaches the area described by the following system of linear inequalities. Graph the radar zone on the map and shade the area red. (10 pts) Students should only shade in the overlapping area of the system giving a triangular area.

   a. $-4x+3y \leq 40$ Trying to put this in slope-intercept form gives a fraction y-intercept which is difficult to graph, so finding the x-intercept may be easier. Then use the slope to graph more points identifying your line.

   b. $2x+7y \leq 14$ This inequality is easily transformed into slope-intercept form for graphing.

   c. $-x+5y \geq 10$ This inequality is easily transformed into slope-intercept form for graphing.

2. The Bad Guy Base located at (11,4) has radar which reaches the area described by the following system of linear inequalities. Graph the radar zone on the map and shade the area green. (10 pts) Students will end up with a triangular radar area again.

   a. $x+3y \leq 23$ Both the y- and x-intercept are fractions in this case, so finding a point such as (2,7) to start from may be beneficial. However, thinking of the context of the situation, you know that two of the three radar lines come from the tower at point (11,4). Checking the inequality, we see that (11,4) is on the associated line of the inequality, so we can start there and use the slope to graph.

   b. $-8x+7y \geq -60$ Both intercepts again are unpleasant fractions, but the radar tower itself at (11,4) works again. Start there and use the slope to graph.

   c. $11x+2y \geq 36$ Graphing using slope-intercept form starts you at the point (0,18) which is off the graph. However, using the slope to move forward we know that the next point would be at (2,7). You can graph from there.

3. The Vigorous Vinculums first sent a helicopter to pick up our stranded troops. The Radical Ratios shot a "missile" (remember, this is just a training exercise) from their base at (-7,4) at the helicopter forcing it to make a landing. We know the trajectory of both the helicopter and the "missile." Where did the helicopter make the emergency landing? (10 pts) Note I'm not parameterizing, so we assume where the lines would cross is where the pretend missile meets the pretend helicopter.

   a. Helicopter trajectory: $-2x+3y=12$ Solve the system by any method to get the point (3,6).

   b. Missile trajectory: $-x+5y=27$

4. Knowing that we now have two stranded teams on the ground behind enemy lines, the order was sent for both the helicopter group and the original stranded unit to make their way to Mt. Marcy. The Radical Ratios responded by sending out troops to intercept them before they could make it back to friendly territory. Given the trajectory of both teams, where would the Radical Ratios' troops from the base at (11,4) intercept our stranded unit? (10 pts) Again, we don't know speed to parameterize, so assume they would bump into each other.

   a. Stranded unit trajectory: $3y=4x$ Solve the system by any method to get the point (3,4).

   b. Radical Ratios troop trajectory: $y=4$

5. Given the trajectory of both teams, where would the Radical Ratios' troops from the base at (-7,4) intercept the downed helicopter team? (10 pts)

   a. Grounded helicopter team trajectory: $y=2x$ Solve the system by any method to get the point (1,2).

   b. Radical Ratio troop trajectory: $x+4y=9$

6. The Vigorous Vinculums next responded by sending their own troops to intercept the Radical Ratios' troops. Where would a team from the base at (10,-3) intercept the Radical Ratios given their trajectories? (10 pts)

   a. Vigorous Vinculum interception squadron: $5x+2y=44$ Solve by any method to get the point (7 1/5,4). Not all answers are integers!

   b. Radical Ratios troop trajectory: $y=4$

7. Where would a team from the base at (-5,-6) intercept the Radical Ratios given their trajectories? (10 pts)

   a. Vigorous Vinculum interception squadron: -9x+2y=33 Solve by any method to get the point (-3,3).

   b. Radical Ratios troop trajectory: x+4y=9

8. We know that when traveling at high speeds in unfamiliar territory, troops rarely travel in an exactly straight line. If the stranded unit headed to Mt. Marcy could have a variance of ±1/3 for their slope, what would be the system of inequalities that would define their zone of travel? Draw this zone on the map and shade the area yellow. (15 pts) The key here is realizing that the slope will change, but the lines must still go through the original point of (6,8). Since the original line they were traveling on was $y=4/3\,x$, modifying the slope ±1/3 gives us $y=x+b_1$ and $y=5/3\,x+b_2$. Using the point they started at of (6,8) we can slope for the intercepts giving the inequalities $y\le x+2$ and $y\ge 5/3\,x-2$.

9. If the downed helicopter troops headed to Mt. Marcy could have a variance of ±1 for their slope because they lost their compass in the crash, what would be the system of inequalities that would define their zone of travel? Draw this zone on the map and shade the area blue. (15 pts) Follow the same process as above. They start from (3,6) with an original slope of two, so the new equations will slopes of one and three respectively and then go through the point (3,6). This gives the inequalities $y\le x+3$ and $y\ge 3x-3$.

Created by Eric Bright, 2016

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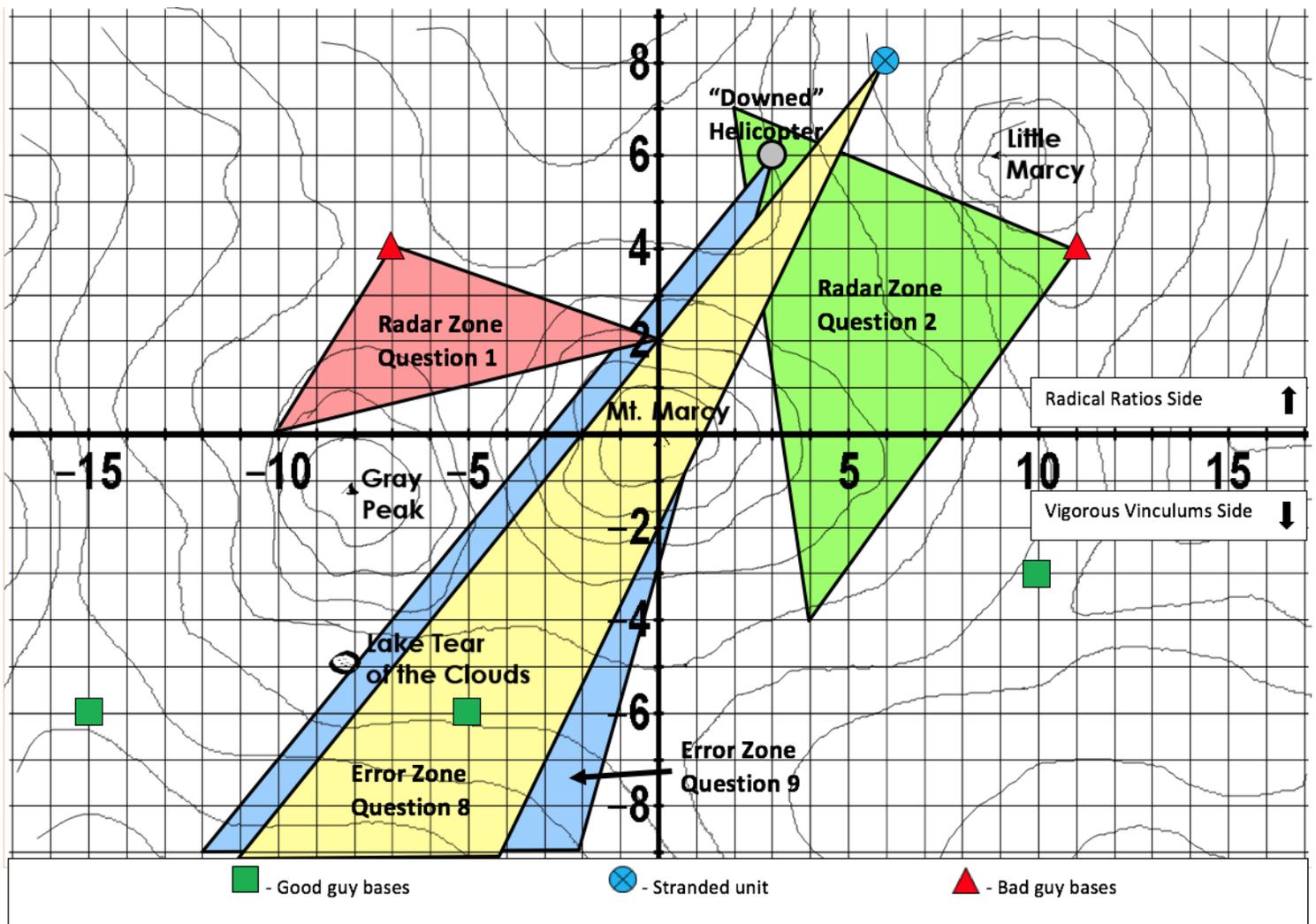
Welcome the Newest ICTM Affiliate Member
"The Complex Instruction Consortium"

Visit the website at: **sites.google.com/site/complexinstruction/**

Or on Twitter at: **@complexinstruct**

The Complex Instruction Consortium is a network of math educators dedicated to improving math education through ongoing collaboration, online discussions, sharing resources, and in-person workshops. With a focus on group-work, rich mathematical problems and tasks, and the social aspects of the classroom, members of the Complex Instruction Consortium learn how to create effective classroom environments that support learning for all students. The Complex Instruction Consortium has two innovative and engaging workshops per year, which are free to all educators.

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Why You Should Join

- **Connect with other educators working to improve mathematics education.**

- **Contribute to mathematics education.**

- **Stay current about regional, state and national meetings.**

- **Attend conferences at reduced rates.**

- **Receive the ILLINOIS MATHEMATICS TEACHER, a journal with articles about teaching and learning mathematics at levels from kindergarten to college.**

- **Receive the ICTM BULLETIN with classroom activities, news and information about professional development opportunities.**

CALL FOR ARTICLES
Can you help?

The Illinois Mathematics Teacher is always looking for new reviewers and articles.
If you would like to volunteer as a reviewer or have an article to submit, please contact the editors at **imt@ictm.org**.

We look forward to hearing from you.

NCTM Unveils New Innov8 Conference

St. Louis, MO

November 16-18, 2016

ICTM ANNUAL MEETING

Peoria, IL

October 7-8, 2016

Upcoming Events

060190