www.kcatm.net

KANSAS CITY AREA TEACHERS OF MATHEMATICS

The Summation

VOLUME 17, ISSUE 1 SPRING 2017

SPECIAL POINTS OF INTEREST:

- Next NCTM Meeting
- Contests

INSIDE THIS ISSUE:

Art in Mathematics

-Jan LaFevers

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Some of my earliest memories of childhood are the times spent with my parents enjoying nature. Both parents practiced pointing out the many wonders in the great outdoors and a great deal of this was observing and exploring all the patterns. Everything from leaves and pinecones to ripples in the pond and creek water. Then came the more abstract observations of images in the clouds or bark on a tree. There was a sense of wonderment and discovery every-

where. Never did it occur to me that this was building my understanding of mathematics. I did embrace the connection to art and science without any resistance.

Most of my early artwork was natural patterns (*Yes, I was an artist before I was a mathematics teacher*). I loved to draw flowers and leaves and everything else that I could find in the woods. At the age of six I was creating macramé pieces with my mother and brother (*Picture above is similar, but my daughter latched onto my original piece.)* I loved the patterns created by the knots and then I had a bag to carry my small toys in. Learning to work with my hands to create pieces of artwork is my foundation for understanding mathematics. So, why is it so difficult for teachers to incorporate art into curriculum for mathematics and science? What are some of your earliest memories of learning about patterns? What about measurement?

We are all aware of STEM now being called STEAM (Arthur Yidi, 2017), but what does this mean for the classroom and teachers? The time to rebuild curriculum is overwhelming

Ceiling mosaic in the Library of Congress, Washington, D.C. (2016)

Art in Mathematics continued

and sometimes the resources are just not readily available. At least that was my first thought, but then my focus was on the Common Core State Standards and working with those expectations. Here is the good news! Most art projects meet the objectives in CCSS when you start to see the mathematical connections. I had a quilt pattern lesson that was used for fraction, decimal and percent equivalence. NCTM Teaching Children Mathematics: Math by the Month (Christine Gallego, 2009) offers many other ideas and has a similar lessons from 2009 and another 2007 article "Masterpieces to Mathematics: Using Art to Teach Fraction, Decimal, and Percent Equivalents" (Christopher Scaptura, 2007)

NCTM resources are a good place to start for making this move in the development of curriculum that meets STEAM education ideology and engages students in mathematical thought processes. Consider the Common Core Standards Math Practice 2: *Reason abstractly and quantitatively.* I found the article "Artist? Mathematician? Developing both enhances learning!" (Sarah B. Bush, 2015) very encouraging for what I have felt missing in my instruction. Just to be sure not leave out our more advanced mathematicians, simply google snowflake geometry and explore the endless ways to talk about fractals and the "Koch Snowflake" including "A Snowflake Project: Calculating, Analyzing and Optimizing with the Koch Snowflake" (Bolte, 2002) article.

I hope that some of this will inspire and promote integration of more art into your mathematic lessons. Remember that we have access to one of the best collections of resources through the NCTM) (National Council of Teachers of Mathematics, 2017)

Bibliography

Arthur Yidi. (2017, March 3). *STEM to STEAM*. Retrieved from STEM to STEAM: http://stemtosteam.org/

Bolte, L. A. (2002, September 1). A Snowflake Project: Calculating, Analyzing, and Optimizing with the Koch Snowflake. *Mathematics Teacher, 95*(6), pp. 414-419.

Christine Gallego, D. S.-B. (2009, February 1). The Fine Art of Mathematics. *Teaching Children Mathematics, 15*(6), pp. 352-353.

Christopher Scaptura, j. S. (2007, August 1). Masterpieces to Mathematics: Using Art to Teach Fraction, Decimal, and Percent Equivalents. *Mathematics Teaching in the Middle School, 13*(1), pp. 24-28.

National Council of Teachers of Mathematics. (2017, March 3). *NCTM*. Retrieved from NCTM: http://www.nctm.org/

Brain Teaser —for All

—Rita Barger

Brain Teasers

Last issue's brain teaser asked you to find weird fractions where omitting a common digit from the numerator and denominator doesn't change its value. The example given was to eliminate the 6 in 26/65 to get 2/5. I had no one submit correct answers. One that I know of is 16/64.

For this month, let's do a money problem. You have $1.19 in coins, but cannot make exact change for a dollar. What coins do you have?

Have fun. As always, please send your answers to me at bargerr@umkc.edu. I would like to list names of those who solve the teaser in the next newsletter.

In the Spirit of Math vs Nature

The Fibonacci sequence is shown below, with each term equal to the sum of the previous two terms. If you take the ratios of successive terms, you get 1, 2, 3/2, 5/3, 8/5, 13/8, and so on. But as you proceed through the sequence, these ratios get closer and closer to a fixed number, known as the Golden Ratio.
1, 1, 2, 3, 5, 8, 13,...Using the rule that defines the Fibonacci sequence, can you determine the value of the Golden Ratio?

Solution

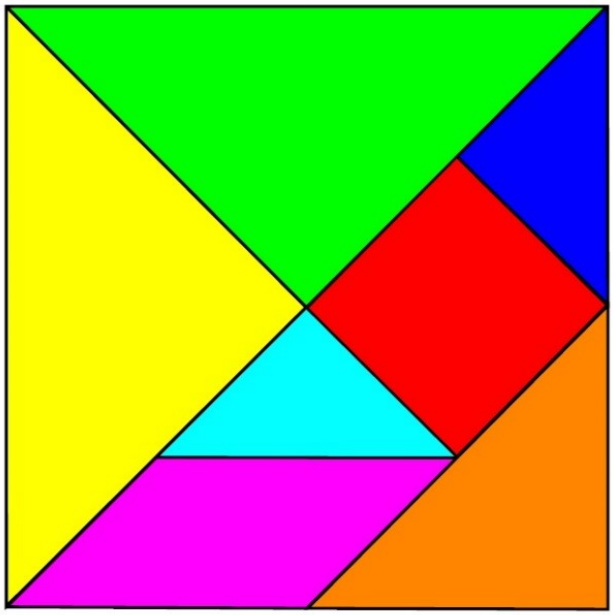
VOLUME 17, ISSUE 1

Active Learning Classrooms
—Sarah Hicks

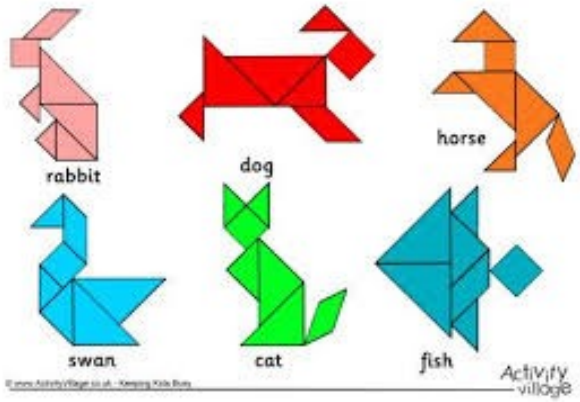
Tangrams in the Classroom

Collaboration, communication, and creative thinking are higher-order 21st century skills that are in high-demand and strongly correlate mathematical practices. With puzzles and brainteasers, you can facilitate an atmosphere of collaboration and teamwork in your classroom and during after-school programs or clubs. I have found tangrams, geometry-oriented set of problems aimed at improving visual discrimination and spatial abilities, actively engage students in these practices. For some students, this visual-spatial challenge is fun; for others, for others, not so much because they struggle (even with a peer). The accomplishment for all, though, is that they persevere in problem solving as they find a solution (an important mathematical practice). Additionally, many can and will effectively engage in peer collaboration, which requires practice with communication skills both of which are 21st century skills.

To play tangrams, students must move and rotate seven shapes to form given images (see an example in the images pg. 5).You can purchase plastic sets of the seven pieces that fit together as a square, or you can find an online printable set that you can make and use for free. Once you have the seven pieces, find different shapes (e.g. a bunny, a goose, a house) that are provided with a purchased or online set. Then, challenge students to figure out how to put the pieces together to form the given shape. I like to print out the worksheets for some to give easier access as they get started; students can place pieces directly on the worksheet to verify and see how and when their placement of the pieces works. An extension could be: ask students to design their own image, trace it, and then pass it along to peers to see if they can solve it.



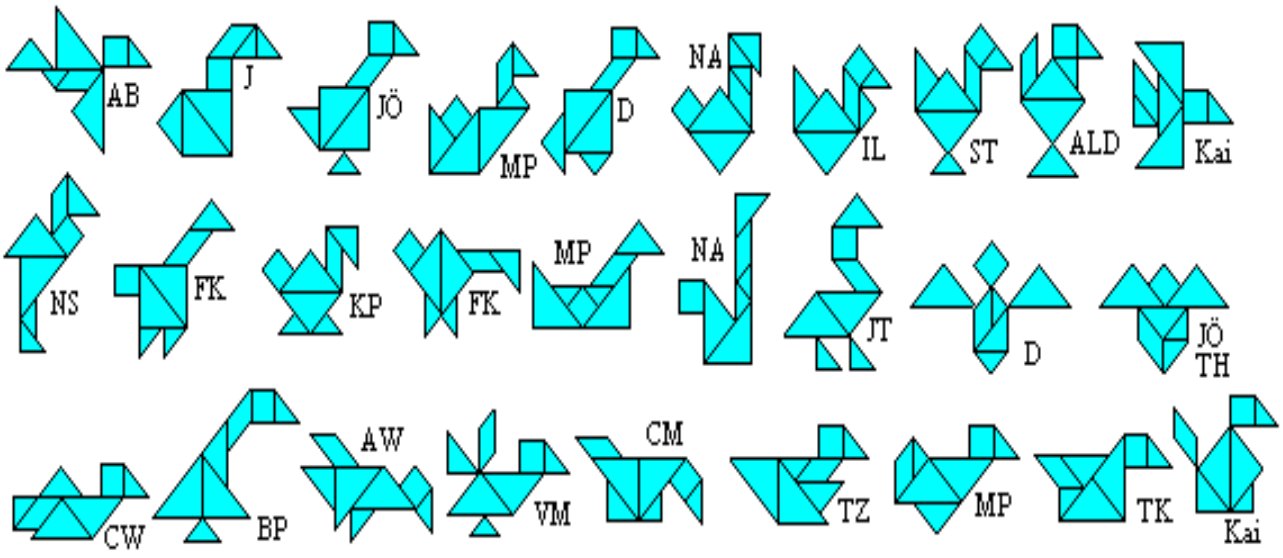
Putting the problem before the method [as accomplished with tangrams] encourages visual thinking, creativity, problem-solving, and communication (Boaler, 2016). I encourage us, as mathematics teachers, to consider ways in which we can continue to provide students opportunities to develop visual-spatial thinking skills. Design thinking, an approach to innovation, utilizes visual-spatial thinking skills – another reason to invest time in these types of experiences.



Sarah Hicks, Ph.D. February 2017

Reference

Boaler, J. (2016). *Mathematical mindsets: unleashing students' potential through creative math, inspiring messages, and innovative teaching.* San Francisco: CA. Josey-Bass.



Announcements

VOLUME 17, ISSUE 1

KCATM 38th Annual Math Contests –

Who: Elementary, Middle and High School Students

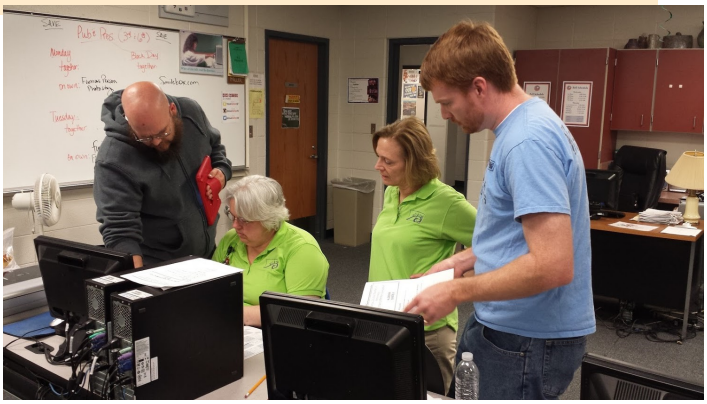
When: March 25, 2017

Where: Olathe East High School

14545 W. 127th St., Olathe, KS 66062

Email your school registration forms by March 17, 2017

NO LATE registrations will be accepted due to the placement of students in testing rooms.



2016 Math Contest coordinators JoAnn Hiatt and Monica McWhorter at work with volunteers

Entry Fees:

SCHOOL/TEAM registration: $40 per grade per school. (This includes ONE free KCATM membership per school.) Please limit the # of students to a max. of **7 per grade which includes the school's Mathletics team.**

SCHOOL OPEN Registration: If your school has fewer than 4 students per grade level, you may pay $10 per student. Please adjust this for accuracy at the time of payment on the day of the contest.

INDIVIDUAL students: Students may register **without** a school sponsor at a cost of $10 per student. Please include the attending school and current grade level. Parents will be asked to help proctor exams.

See http://www.kcatm.net/contest.html for additional information

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For more information about membership with KCATM, go to www.kcatm.net or contact Rita Barger at bargerr@umkc.edu.

2017 Board Meeting

May 20 , 2017 at 10:00 am

Arrupe Hall, Room 114 at Rockhurst University.

2016 Mathletes at work in Olathe East High School

2017 KCATM Math Contest

You're invited to participate…

HIGH SCHOOL Coordinator: Michael Round

This is the 2nd Year as an online contest! We recognize you are often involved in many outside of school activities and it is hard to add one more weekend event to your schedule. Therefore, participate by locating the contest exam online at kcatm.net and return it to Mr. Mike Round via email within the given time frame. We hope you will challenge yourself with the problems. You can also collaborate with peers or seek help from more knowledgeable others – much like the work of mathematicians. You may even learn some math while participating!

- **Yes, an ONLINE contest**
- **No fee**
- **2 levels: 9/10 and 11/12**
- **25 problems**
- **2 week window**
- **Goal: Engage students in learning and doing mathematics**
- **TOP individual students will be recognized at the KCATM banquet, which will be the last week in April at JCCC.**
- **Find the contest exam at kcatm.net this March**

38th Annual KCATM 4th - 5th Math Contest

Saturday – March 25, 2017

Olathe East High School

14545 W. 127th St., Olathe, KS 66062

Registration forms are due March 17, 2017. *NO late registrations will be accepted.*

Payment can be made by credit card (online or at contest), school PO (# needed), cash (at contest), or check (KCATM).

See www.kcatm.net for past exams, information, and links to grade level registrations or see links below.

ELEMENTARY

Contest Coordinators: JoAnn Hiatt and Monica McWhorter

Entry FEES:

SCHOOL/TEAM registration: $40 per grade per school. (This includes ONE free KCATM membership per school.)

Four students per grade compete in the individual tests. More than one school team can be formed (an additional $40) or additional students from the school added ($10 per person). NEW this year: Only ONE Mathletics team of exactly three students can compete for medal from your school, but you may add a 2nd team, as long as we have table space. This team will not be playing for medals, but they will be scored and results will be available. **Home schools may join together to form one Mathletics team.**

INDIVIDUAL students: Students may register **without** a school sponsor at a cost of **$10 per student**. Please include the attending school and current grade level of the student. ***Parents must be willing to help proctor exams.***

Contest Times: 4th Grade – 8:15 AM to 9:15 AM
5th Grade – 9:45 AM to 10:45 AM

Awards: 10:15 AM (Location to be announced)
11:45 AM (Location to be announced)

Events: The KCATM Elementary Math Contest is a math contest for students in GRADES 4-5. The student **MUST** be in 4th grade to compete in the 4th grade contest, and in 5th grade to complete in the 5th grade contest. The competition is divided into two parts: Written exams and a Mathletics team event. Students may be enrolled in **either** the written exams **or** in the Mathletics team event, as these events run simultaneously. *Substitutions can be made the day of the contest. Three students must be present for the Mathletics competition.*

Calculators and pencils are the responsibility of each individual student or school.
NO calculators can be used on the 1st exam: Number Sense (Number and Operations).
Students may use scientific calculators, but please NO graphing calculators at this level.

Written Tests: Each school may send a **maximum of FOUR students** per grade level to take the written individual tests. Each of the three written tests will be **15-minutes** in length with problem solving woven into the tests.

TEST 1: Number Sense *(NO calc.)*; **TEST 2:** Geometry and Measurement; **TEST 3:** Algebraic Reasoning and Data

Scoring: The number correct out of 40 will be entered on the computer. Individual awards will be based on the total correct.

Awards: We will recognize 1st, 2nd, and 3rd overall for 4th grade and 5th grade (combination of all three tests). Medals will be given to top 8 scorers for each test and the Mathletics teams. Ribbons will be given to 9-20th places for each test. Certificates of Attendance will be available electronically for coaches to complete for all participants.

Mathletics: Schools may send **ONE** team of **exactly three students** to compete in the **team problem-solving contest event**. *(Below-grade students may fill in IF needed.)* If the team does not have 3 students the tests will be scored, but the students will not be awarded medals. Medals will be given to the top 8 Mathletics teams. A second team may be formed on a first come first serve basis, no medals will be awarded.

Awards Banquet: The **top 3 medalists** in the individual tests, the **top 3 overall** winners for 4th and 5th grade, and the **FIRST PLACE Mathletics** team members will be recognized at the Annual KCATM Banquet the last week in April **at JCCC.**

Sponsors: Schools must provide at least **one sponsor** per grade level. The sponsor does not need to be a teacher. Each sponsor will work as a test proctor, Mathletics scorekeeper, or grader *(teachers only)* during the contest. A person may sponsor more than one grade level. Please have your Proctors report to the check-in room (500 hall) at 7:45 (4th) and 9:15 (5th) for tests. There is **NO registration check-in for the students, as they will report directly to their rooms.** *An email with student room assignments will be sent to the sponsors or parent contact the week of the contest*

To register: Register online; grade links are available on the KCATM website: www.KCATM.net or linked below.

SCHEDULE

Individual Tests *Students report to their testing room. Do not go into the room without a proctor in the room.*	**MATHLETICS (Main Gym)** **Please report to your table early!**	**Awards** Students who are not present for the awards can have a member of their team pick it up during the ceremony. Please send a list of students needing awards after the contest to KCATM.Contest@gmail.com
4th Grade - 8:15	**8:00** *Students report to table; Awards follow*	**Approximately 10:15** *(Location to be announced)*
5th Grade - 9:45	**9:30** *Students report to table; Awards follow*	**Approximately 11:45** *(Location to be announced)*

MIDDLE SCHOOL

38th Annual KCATM 6th, 7th, and 8th Math Contest

Saturday – March 25, 2017

Olathe East High School

14545 W. 127th St., Olathe, KS 66062

Registration forms are due March 17, 2017. *NO late registrations will be accepted.*

Payment can be made by credit card (online or at contest), school PO (# needed), cash (at contest), or check (KCATM).

See www.kcatm.net for past exams, information, and links to grade level registrations or see links below.

Contest Coordinators: JoAnn Hiatt and Monica McWhorter

Only students currently enrolled in **grades 6, 7 or 8** are eligible to participate in the MS Contest. The student MUST compete in the student's current school grade in school. **NEW this year: Each school may enter up to eight students to compete per team per grade. Placement is based on expected grade for ALGEBRA 1.**

- **ACCELERATED: Students who will be taking (or are taking) algebra in 6th or 7th grade.**

NON-ACCELERATED: Students who will be taking (or are taking) algebra in 8th or 9th grade.

The eight students can be a mix of accelerated or non-accelerated students. Substitutions may be made the day of the contest (in the testing room) and will receive a testing # according to his/her correct division. **Each student takes ALL 4 exams**.

Entry FEES:

SCHOOL/TEAM registration: $40 per grade per school. (This includes ONE free KCATM membership per school.)

A maximum of eight students per grade can compete in the individual tests. More than one school team can be formed (an additional $40) or additional students from the school added ($10 per person). NEW this year: Only ONE Mathletics team of exactly three students can compete for medal from your school, but you may add a 2nd team. This team will not be competing for medals, but they will be scored and results will be available. **Home schools may join together to form 1 team.**

INDIVIDUAL students: Students may register **without** a school sponsor at a cost of **$10 per student**. Please include the attending school and current grade level of the student. ***Parents and sponsors MUST be willing to help proctor exams.***

Calculators: Scientific or graphing calculators (Ex: TI-73, TI-83, TI-84) can be used. *No Qwerty keypad calculators or TI-Nspire CAS calculators are allowed.* Students must **furnish their own pencils and calculators.**

6th Grade: (All 4 students will take ALL exams.)		**7th Grade AND 8th Grade: (All 4 students will take ALL exams.**	
8:30-8:50	TEST 1: Number Sense ***(NO** calc.)*	9:30-9:50	TEST 1: Number Sense ***(NO** calc.)*
9:00-9:20	TEST 2: Geometry	10:00-10:20	TEST 2: Geometry
9:30-9:50	TEST 3: Statistics and Probability	10:30-10:50	TEST 3: Statistics and Probability
10:00-10:20	TEST 4: Algebraic Reasoning	11:00-11:20	TEST 4: Algebraic Reasoning and Functions
11:00	**Mathletics – Main Gym (6th grade)**	**12:15**	**Mathletics – Main Gym (2 teams – ONE 7th grade and ONE 8th grade)**

Awards: The top **eight** individuals in each event in each division will receive medals. **Ribbons will be given to students from 9th-20th place. Ties will NOT be broken**, but consecutive award places will be skipped (i.e. tie for 1st place means 2nd place will be skipped and 3rd place will be awarded, similarly for ribbons).

Top 6th, 7th, 8th Graders: One overall winner for each grade level will be determined by total points on the individual tests.

First place students in each individual test and the Top 6th Grader, Top 7th Grader, and Top 8th Grader will be recognized at the Annual KCATM Awards Banquet at JCCC's Regnier Center. The **TOP Mathletics teams** will also be invited to the banquet. ***Invitation letters will be emailed to the sponsors.***

Mathletics: Each school may have a maximum of **3 members** on their team. Schools will compete against each other for the **top 3 places**, receiving a plaque for their school. Calculators SHOULD be used. Scratch paper will be provided.

To register: Register online; grade links are available on the KCATM website: www.KCATM.net or linked below.

SCHEDULE

Accelerated Non-accelerated	**INDIVIDUAL TESTING** *Students report to their testing room. Do not go into the room without a proctor in the room.*	**MATHLETICS** **6th grade team** **7th grade team; 8th grade team** *Students report to table*	**AWARDS** *Students who are not present for the awards can have a member of their team pick it up during the ceremony. Coaches will send names to us for those who do not get their award on Saturday.*
6th	**8:30**	**11:00** Large Gym *Awards follow*	**12:45** Location to be announced ***(only Medal winners will be announced)***
7th **8th**	**9:30**	**12:15** Large Gym *Awards follow*	**1:30** Large Gym ***(only Medal winners will be announced)***