Kansas City Area Teachers of Mathematics
2012 KCATM Math Contest

MATHLETICS

GRADES 7&8

INSTRUCTIONS

- **WRITE YOUR TEAM NUMBER AND SCHOOL NAME ON THE LINE PROVIDED ON THE FRONT OF EACH SHEET EACH TIME YOU BEGIN A NEW PROBLEM.**
- **Do NOT turn this page** until instructed to do so.
- **WRITE YOUR TEAM NUMBER AND THE ANSWER ON EACH BACK PAGE. This will be checked and recorded for each problem.**
- You **may use calculators** on this test.
- ***Scratch paper can be used*.** Do **NOT** write on the team number card!
- Use the π **key** on your calculator for pi.
- You **may not use rulers, protractors, or other measurement devices** on this test.

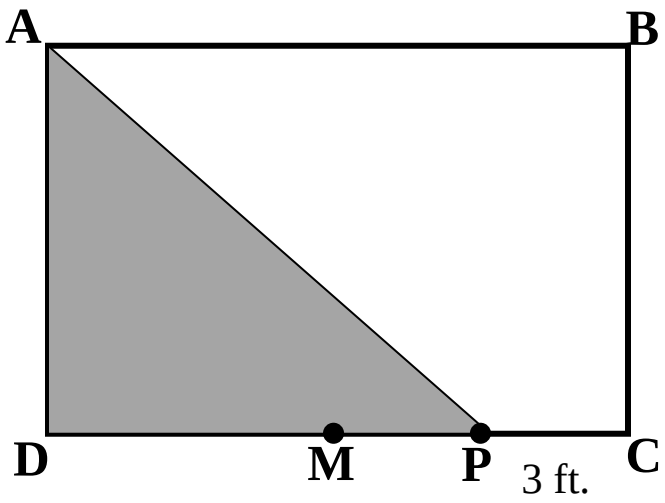
IF THE QUESTION DEALS WITH MEASUREMENT, YOU MUST LABEL ALL ANSWERS CORRECTLY.

Team Number: ____ School: _____

Problem 1 **3 points**
3 minutes

Given: ABCD is a rectangle. P is the midpoint of $\overline{MC}$ and M is the midpoint of $\overline{DC}$. Triangle APD is an isosceles right triangle. ABCP is a trapezoid.

What is the difference between the **area of the unshaded** region and the **shaded region**?



Answer:_____ sq. units

TEAM # _____

School: _____

Question #2

2 points, 2 minutes

Problem 2 **2 points**
2 minute

In a group of 10 people, 60 percent have brown eyes. Two people are to be selected at random from the group.

What is the probability that **neither** person selected will have brown eyes?

Your answer may be a reduced fraction, a decimal, or a percent.

http://puzz.freepolls.com

Answer:_____

TEAM # _____

School: _____

Question #3

1 point, 1 minute

Problem 3 **1 point**
1 minute

You recently returned from a trip. Today is Thursday. You returned three days before the day after the day before tomorrow. On what day did you return?

Answer:_____

TEAM # _____

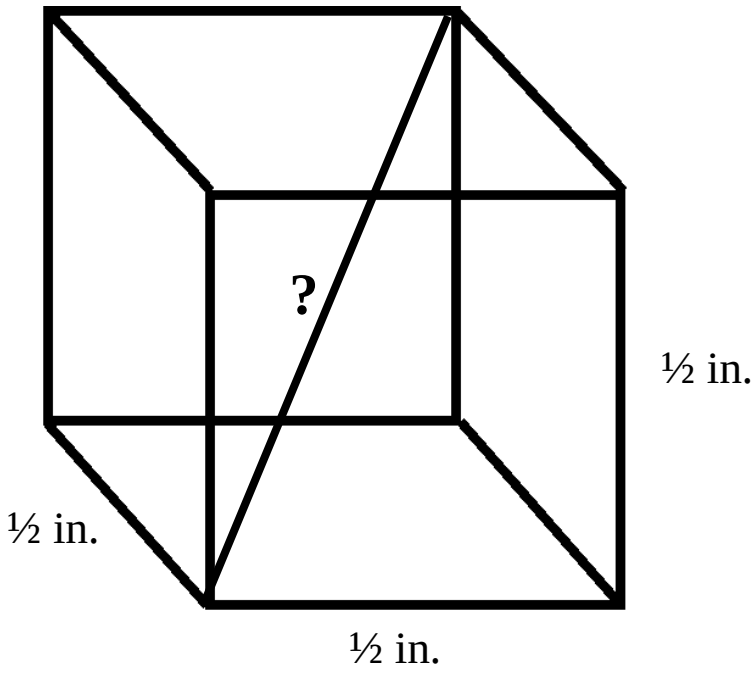
School: _____

Question #4

2 points, 2 minutes

Problem 4 **2 points**
2 minutes

A cube with edges ½ inch long is shown below. What is the length, in inches, of a **diagonal** that runs from one corner of the cube to the opposite corner? Your answer may be **exact or approximate**. Round the answer to the nearest thousandth place.



Answer:_____

TEAM # _____

School: _____

Question #5

2 point, 2 minute

Problem 5 **2 points**
2 minutes

If $n = 8$ and $16 \cdot 2^m = 4^{n-8}$, then $m = ?$

Answer:_____

TEAM # _____

School: _____

Question #6

3 points, 3 minutes

Problem 6 **3 points**
3 minutes

Which of the following equations can be used to solve the problem below?

a. $14 = 2x + 3x - x$

b. $x + ½ x + 1/6x + 2/3x = 14$

c. $14 – 1/3 – ½ - 2/3 = x$

d. $4x – 14 = 5$

Four friends of Rosco's have ages that total 14. Arlo is half of Sal's age. Lucas is 1/3 of Arlo's age. Rene is 2/3 of Sal's age. How old are are Rosco's friends

Circle Answer: A B C D
Arlo's age: _____
Sal's age: _____
Lucas' age: _____
Rene's age: _____

TEAM # _____

School: _____

Question #7

1 point, 1 minute

Problem 7 **1 point**
1 minute

For all nonzero real numbers p, t, x, and y such that $\frac{x}{y} = \frac{3p}{2t}$, what is the expression for t ?

Answer:_____

TEAM # _____

School: _____

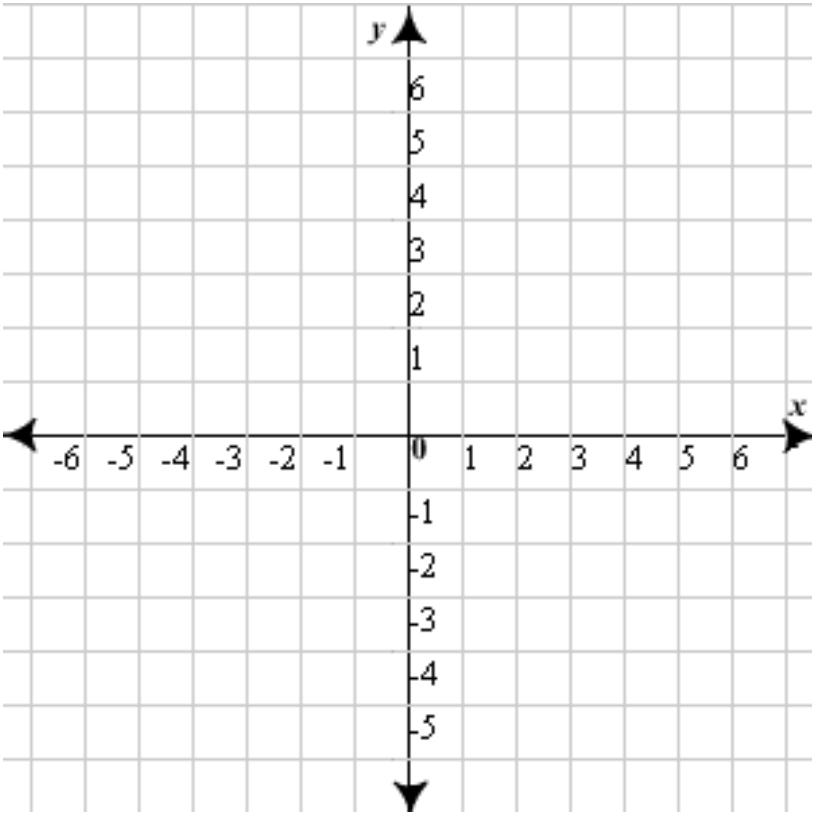
Question #8

2 points, 2 minutes

Problem 8 **2 points**
2 minutes

Graph the points (2,0) and (0.-2). If a line is the **perpendicular bisector** of the line segment joining the endpoints (2, 0) and (0. -2), **what is the equation of the perpendicular bisector** in slope-intercept form?

(The points must be graphed correctly to be awarded a correct answer.)



Answer: _____

TEAM # _____

School: _____

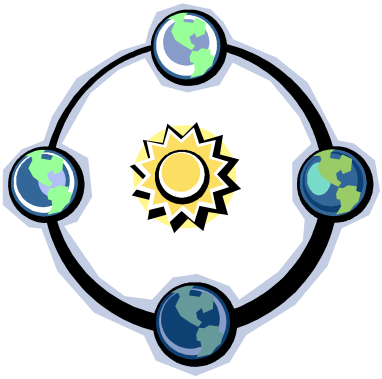
Question #9

2 points, 2 minutes

Problem 9 **2 points**
2 minutes

The year 2012 is Leap Year. This means that the calendar year will be aligned with the orbit of the earth around the sun making up for the 365.25 day orbit needed. The radius of the earth's orbit is 150,000,000 km. What is the **difference between the distance the earth travels in a 365 day year orbit and the 366 day Leap Year orbit happening this year?** Round your answer to the nearest whole number.

Use the π button on your calculator for calculations.



Answer:_____

TEAM # _____

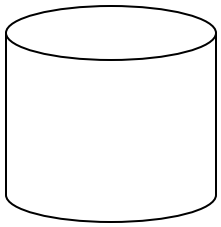
School: _____

Question #10

1 point, 1 minute

Problem 10 **1 point**
1 minute

The diameter and height of a right circular cylinder are equal.



If the volume of the cylinder is 2 cubic meters, what is the height of the cylinder? Round your answer to the nearest hundredth of a meter.

Formula: $V = \pi r^2 h$

Answer:_____

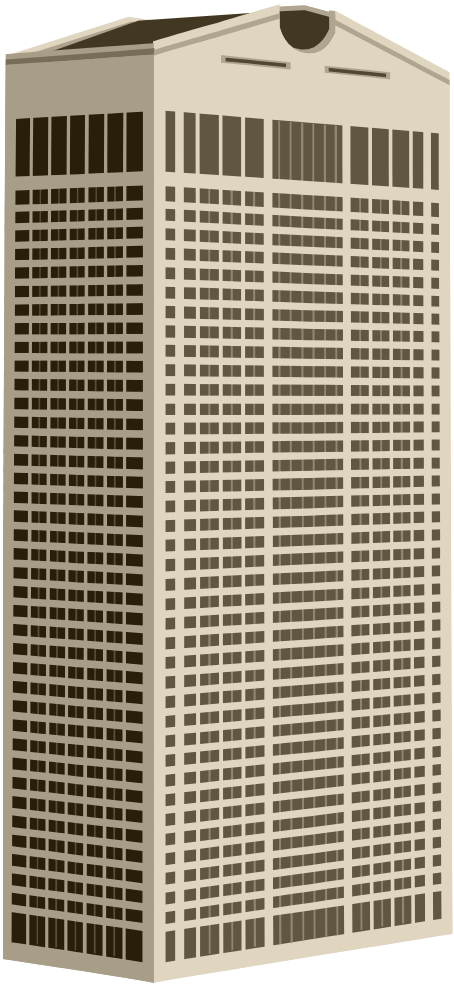
TEAM # _____

School: _____

Question #11

2 points, 2 minutes

Problem 11 **2 points**
2 minutes



You are in New York at a building that has 1200 stairs. You are running down the stairwell 2 steps at a time. Your brother is coming up the stairs 3 steps at a time. If you start at the top and your brother starts at the bottom, how many stairs were stepped on by both you and your brother, not including the stop and start positions?

Answer:_____ steps

TEAM # _____

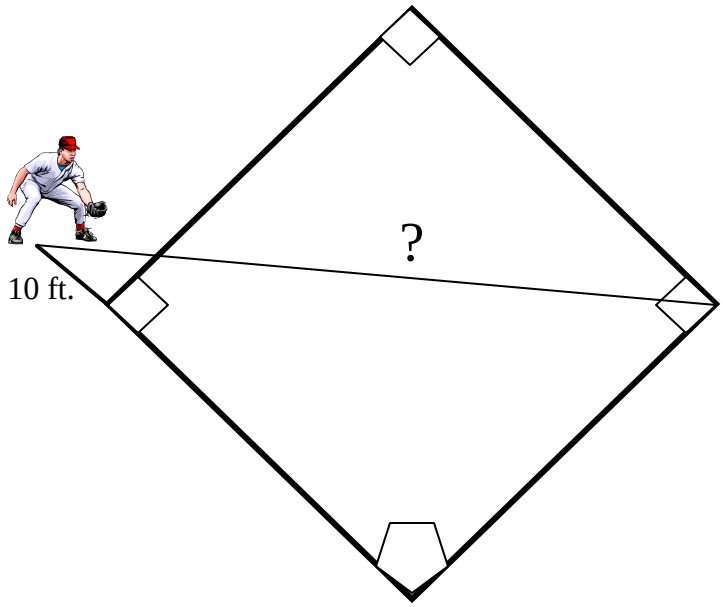
School: _____

Question #12

2 points, 2 minutes

Problem 12 **2 points**
2 minutes

A baseball field has 90 ft. baselines. The fielders stand off of the bases when the ball is fielded. The third baseman is 10 ft. behind the 3rd base. How far is the throw to 1st base from that position? Round your answer to the nearest tenth.



Answer:_____ ft.

TEAM # _____

School: _____

Question #13

3 points, 3 minutes

Problem 13 **3 points**
3 minutes

Elliot was pleased to note that there were a number of new movies releasing this month that he really wanted to see. Since he hated going to the movies alone, he checked with his friends and several expressed an interest in joining him. Although each of his friends wanted to see just one of the movies on his list, they'd conveniently all picked different movies so he had all of his selections covered. They went to see the movies in the evening the week after the movie released. The day of the week varied however depending upon the schedules of the friend joining him. **Determine the <u>title of the movie</u>** that Elliot went to see on the release date of January 23rd .

1. "Heavenly Stars" released on January 30th but Elliot didn't see it on a Thursday night. Nathan went with Elliot on a Monday night but they didn't see "Victorious".
2. George didn't join Elliot on a Wednesday night. Elliot saw the movie that released on January 9th on a Friday night but not with Tim.
3. "The Affair" came out a week after the movie that Elliot saw with George but a week before the movie that Elliot saw on a Thursday night.
4. Elliot did not see the movie that released on January 16th on a Tuesday night.
5. Elliot saw "At Midnight" before he went with Brad but two weeks after "Just Before Dawn".
6. Lester went to see the movie that released on January 2nd but not on a Wednesday night.

Answer:_____

TEAM # _____

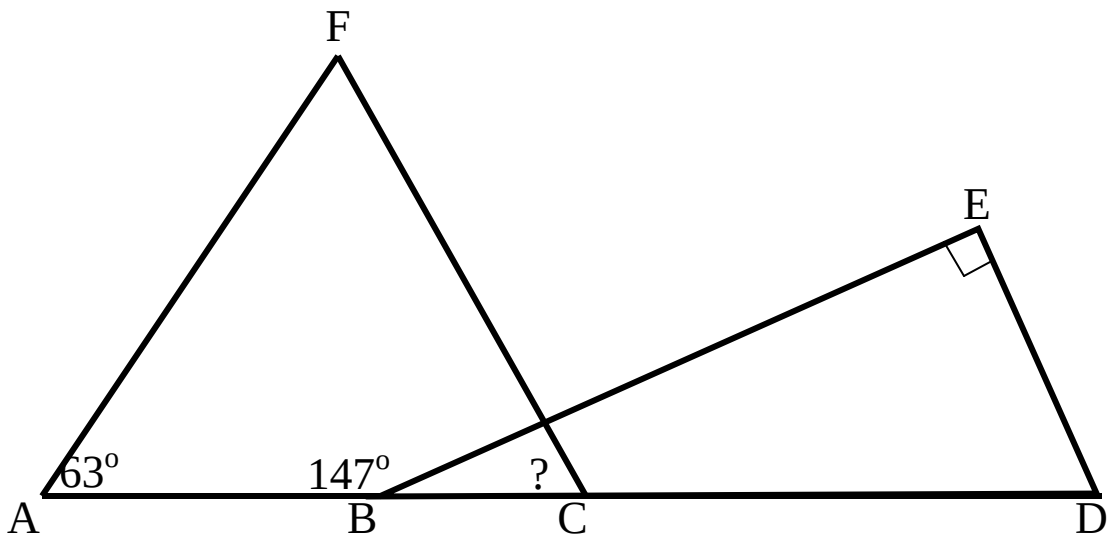
School: _____

Question #14

2 points, 2 minutes

Problem 14 **2 points**
2 minutes

In the figure below, *A*, *B*, *C*, and *D* are collinear, $\overline{FC}$ is parallel to $\overline{ED}$, $\overline{BE}$ is perpendicular to $\overline{ED}$, and the measures of $\angle FAB$ and $\angle EBA$ are as marked. What is the measure of $\angle FCB$?



Answer:_____

TEAM # _____

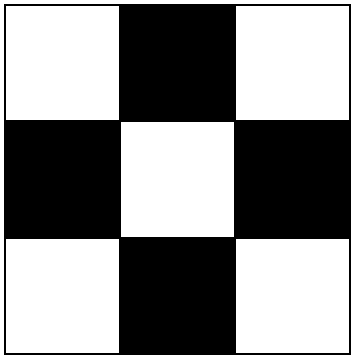
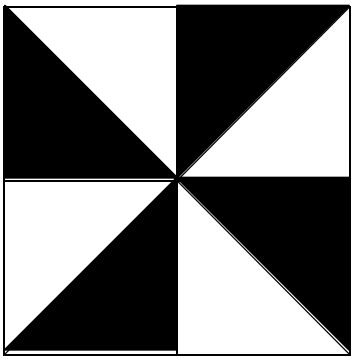
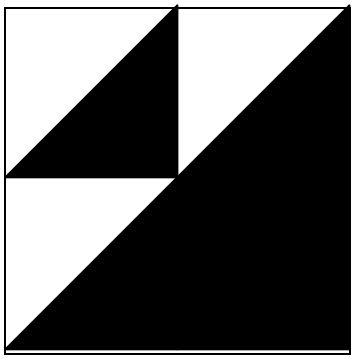
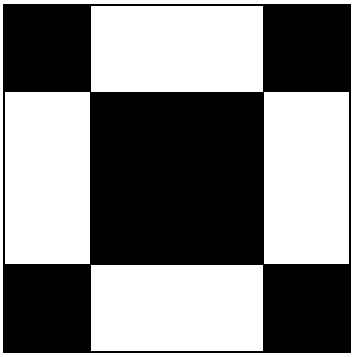
School: _____

Question #15

2 points, 2 minutes

Problem 15 **2 points**
2 minutes

What is the **difference between the largest fractional amount of the square** that is shaded compared to the **smallest fractional amount of the square that is shaded**? Leave your answer as a reduced fraction.

A. 	B. 
C. 	D. 

Answer:_____

TEAM # _____

School: _____

Question #16

3 points, 3 minutes

Problem 16 **3 points**
3 minutes

A neighborhood recreation program serves a total of 280 children who are either 11 years old or 12 years old. The sum of the children's ages is 3,238 years. How many 11-year-old children does the recreation program serve?

Answer:_____; _____, _____

TEAM # _____

School: _____

Question #17(Tie Breaker)

2 points, 2 minutes

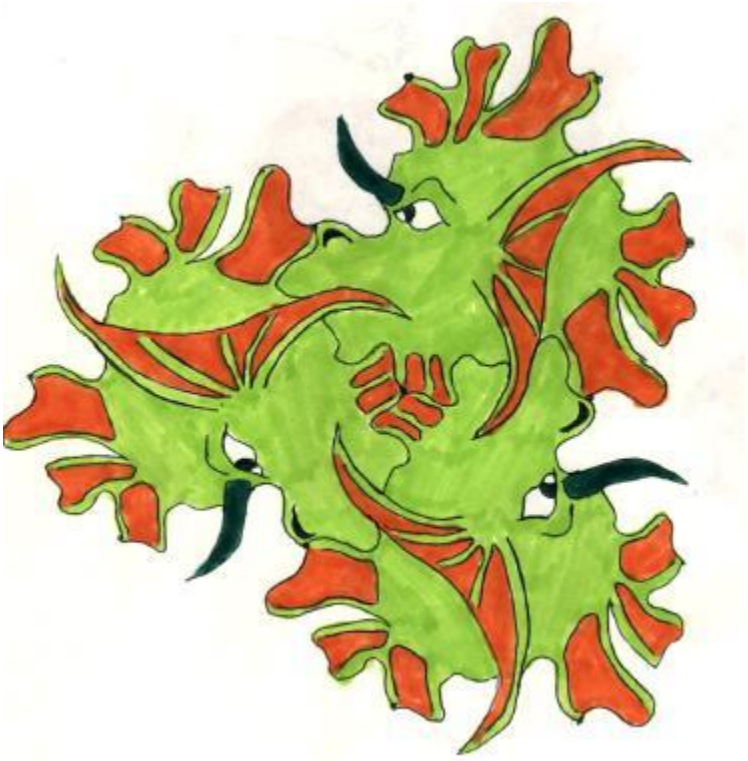
Problem 17 (Tie Breaker) **2 points**
2 minutes

This tessellation is from students from Farragut High School.

Website: http://www.howe-two.com/nctm/tessellations/examples/

What is the original shape that was modified?

Give the name of two transformations that the student used to create the new shape from the original shape.



Answer:_____

TEAM # _____

ANSWER KEY

1. 27 sq. ft.
2. 4/25 or 0.16 or 16%
3. Tuesday

ANSWER: Tuesday. The day before tomorrow is today - Thursday. The day after that is Friday. Three days before Friday is Tuesday, which is the answer. The original version of this puzzle was created by Terry Stickels. http://puzz.freepolls.com/cgi-bin/pollresults/294

4. 0.866 in. or $\frac{\sqrt{3}}{2}$ in.
5. -4
6. B; Arlo is 3, Sal is 6, Lucas is 1, and Rene is 4
7. $\frac{3py}{2x}$
8. y = -1x or y = -1x + 0
9. 942,477,796 km *(1 revolution or 1 circumference)*
10. 1.37 meters
11. 199 steps *Pattern:* number of steps/6) – 1. Therefore: 1200/6 – 1 = 199 steps that *both* step on.
12. 134.5 ft.
13. "At Midnight" *(with Tim, Thursday)*

Movie Title	Release Date	Day of the Week	Friend's Name
"At Midnight"	January 23rd	Thursday	Tim
"Heavenly Stars"	January 30th	Wednesday	Brad
"Just Before Dawn"	January 9th	Friday	George
"The Affair"	January 16th	Monday	Nathan
"Victorious"	January 2nd	Tuesday	Lester

14. 57^{o}

15. 13/72 *(5/8 – 4/9)*

16. 122 eleven year olds *(158 twelve year olds)*
17. Hexagon or eq. triangle
    Possible answers: translation, rotation, midpoint rotation.