Kansas City Area Teachers of Mathematics
2012 KCATM Contest

Mathletics

Grade 6

Instructions:

- Do **NOT** turn this page until instructed to do so.
- WRITE YOUR **TEAM NUMBER** AND **SCHOOL NAME** ON THE LINE PROVIDED ON THE FRONT OF EACH SHEET EACH TIME YOU BEGIN A NEW PROBLEM.
- You **may** use calculators on this test (*not* cell phone calculators).
- Blank scratch paper can be used. Do **NOT** write on the team number card.
- You may **not** use rulers, protractors or other measurement devices on this test.

Team Number: _____ School: _____
Team Members: _____ Gr: _____
_____ Gr: _____
_____ Gr: _____

Problems # 1-3

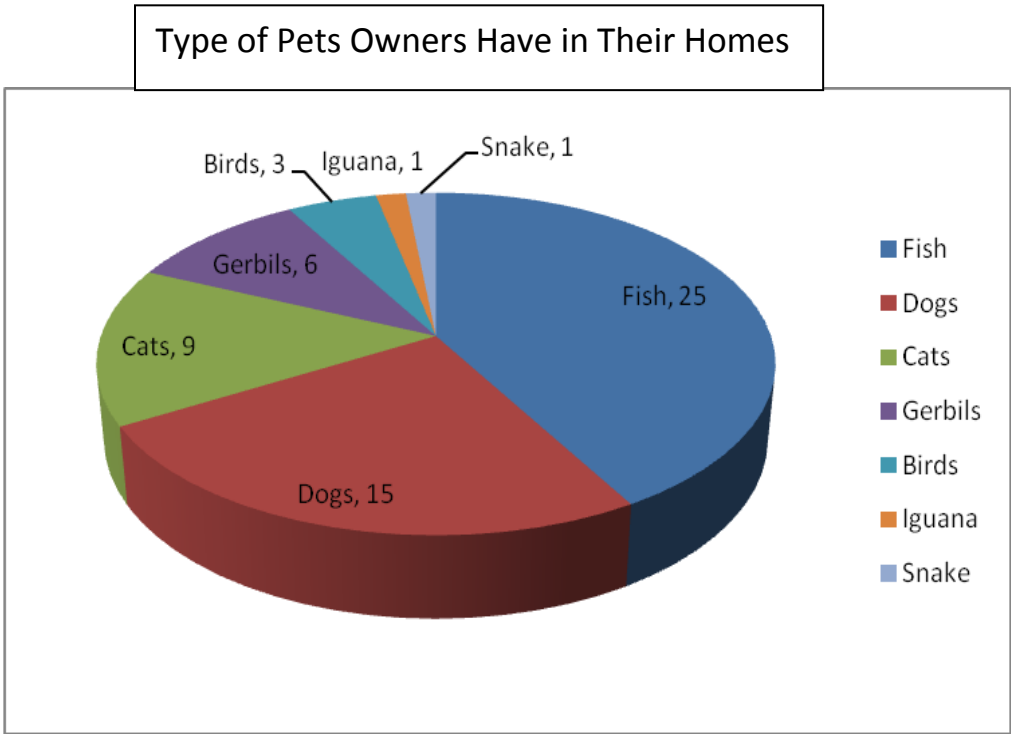
This is a relay problem.

Problems 1-3 *(3 minutes, 3 points)*

1. **What is the square root of: a half of a fourth of 5000**?

Answer: _____

2. Use the pie chart below to determine which pet has _____ as the total in the
(answer from #1)
type of pet. **Find the percent of the entire circle for this animal.** (Round your answer to the nearest whole percent.



Answer: _____

3. _____ % of people in the United States are currently undecided on who to
(answer from #2)
vote for President in 2012. If there are 200,000,000 people in the United States who are eligible to vote, **how many are undecided who to vote for at this time?**

Answer: _____ people

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Problem # 4

Do NOT turn the page until you are told to do so.

Team Number: _____ School: _____

Problem 4 *(3 points, 3 minutes)*

Mia Heart sampled chocolate candies for 5 days the week before Valentine's Day. At the end of five days of sampling, Mia had 160 candies left. Use the information in the boxes to help you **determine how many candies there were originally** before Mia started sampling on February 7th.

February 7	**February 8**	**February 9**	**February 10**	**February 11**
M. Heart ate **1/5 of the total number.**	M. Heart ate **1/6 of the original number**.	M. Heart ate **2/9 of the original number**.	M. Heart ate **half as many today as were eaten yesterday.**	M. Heart **ate only 2 samples**.

Answer: _____ original candies to sample.

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Problem # 5

Do NOT turn the page until you are told to do so.

Team Number: _____ School: _____

Problem 5 *(3 minutes, 3 points)*

There have been some strange laws for cats across the United States. Solve the algebra problems to solve the conundrum for three of them. Each number answer stands for the letter of the alphabet below. It doesn't matter if it is positive or negative. Example: #8 is $x^2 = 16$, therefore x = 4 or -4. Place "D" above all 8s.

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26

1	$4x - 7 = -11$	8	$x^2 = 16$; x = 4 or -4 → D
2	$-x + 9 = -3$	9	$(123 \div x) = 41$
3	$100 - x^2 = 19$	10	$-4(3 + 6) = 2x$
4	$20 - 27 = -x$	11	$3x = 69$
5	$(x \div 4) + 7 = 9$	12	$x^5 = 32$
6	$5(x + 6) = 130$	13	$4x = 12 + 3x$
7	$x^2 - 50 = -25$	14	$-40 + x = -21$

Answer these questions:

A. In Zion, IL, it is illegal for anyone to give this to a cat:

___	___	___	___	___	___	___	D	___	___	___	___	___
1	2	3	4	5	6	7	8	9	3	4	1	10

B. In Sterling, CO a cat cannot legally run loose without wearing:

___	___	___	___	___	___	___	___	___	___
1	6	1	3	2	2	3	4	5	6

C. In Cresskill, NJ, cats must do this to warn birds they are nearby:

___	___	___	___	___	___	___	___	___	___	___	___	___	___
11	7	1	10	6	5	10	7	7	12	7	13	2	14

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Problem # 6

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Team Number: _____ School: _____

Problem 6 *(3 minutes, 3 points)*

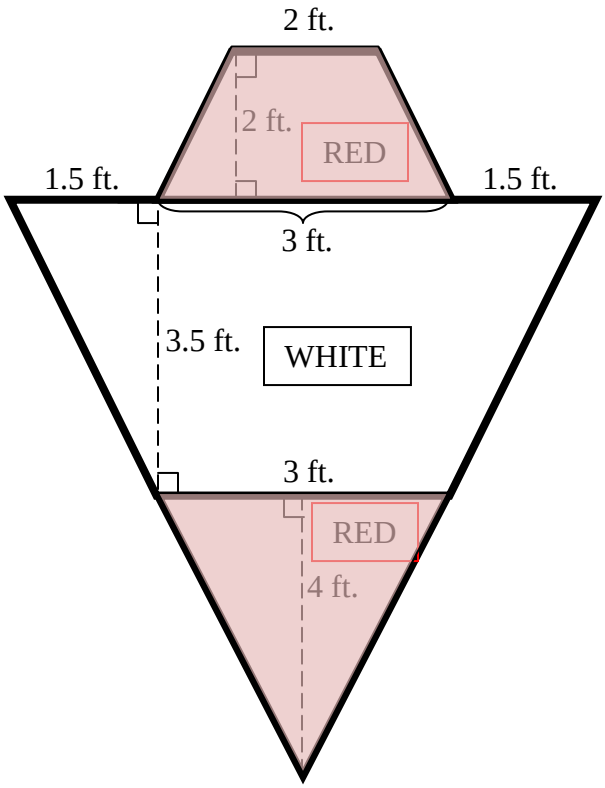
Members of the basketball team are painting a design of an arrowhead on the floor of the basketball court. The special paint they are buying costs $15.80 per pint. **One pint of this paint covers nine square feet** of the surface. **They are using two colors.** The center section is white and both outside areas are red.

How much will the paint cost for this project?

Formulas:

Area of trapezoid: $A = \frac{1}{2} h (b_1 + b_2)$

Area of triangle: $A = \frac{1}{2} bh$



Answer: The cost is $_____

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Problem # 7

Do NOT turn the page until you are told to do so.

Team Number: _____ School: _____

Problem 7 *(2 minutes, 2 points)*

Airplane Seats

An airplane has a total of 168 seats. There are 6 seats in each row. Half of the rows were full of passengers. The rest of the rows had two empty seats in each row. The nearest tenth of a percent, what percent (to the nearest tenth of a percent) of the plane was full?

Answer: _____

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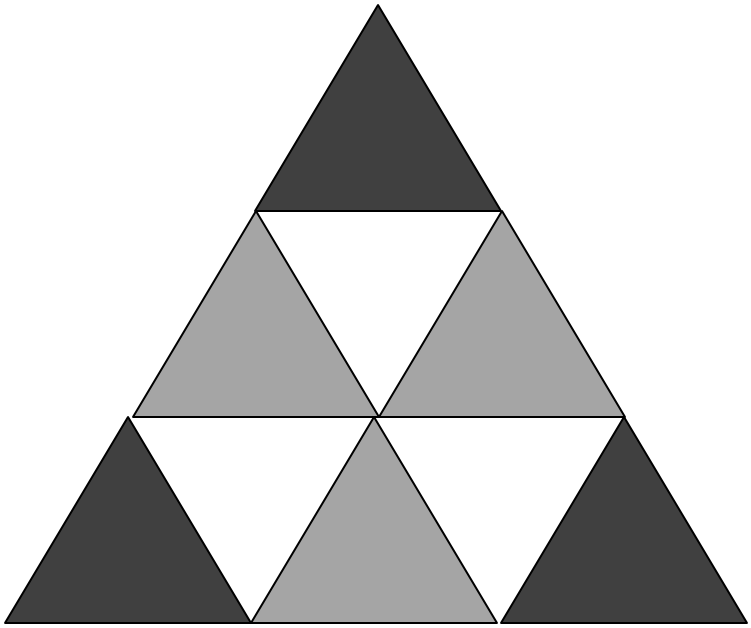
Problem # 8

Do NOT turn the page until you are told to do so.

Team Number: _____ School: _____

Problem 8 *(3 points, 3 minutes)*

Given this figure, answer all questions correctly:



A. How many triangles are in this figure?

B. How many parallelograms are in this figure?

C. How many trapezoids are in this figure?

Answer: A. _____ B. _____ C. _____

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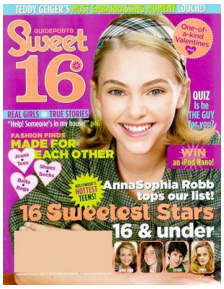
Problem # 9

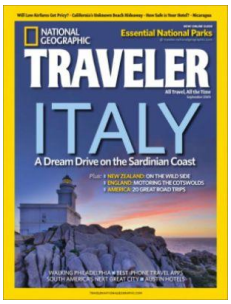
Do NOT turn the page until you are told to do so.

Team Number: _____ School: _____

Problem 9 *(2 points, 2 minutes)*

At the checkout counter there are a variety of magazines that can be purchased. You are interested in the six shown below. You have money enough to purchase three. How many different ways can you select 3 out of the six magazines if order does not matter?





Answer: _____

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Problem # 10

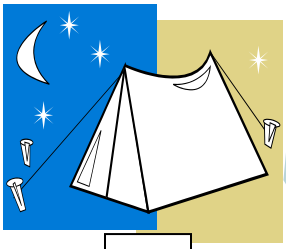
Do NOT turn the page until you are told to do so.

Team Number: _____ School: _____

Problem 10 *(3 points, 3 minutes)*

By the time the five campers get to their campsite, each one has an ailment: poison ivy, a fever, blisters, a sprained ankle, or sunburn. Each is in a separate tent. Use the clues and the diagram to figure out who has a sprained ankle.

- The person with a fever is tenting between the person with the poison ivy and the person with blisters.
- Anna's tent is between Laura's and Henry's.
- Grant and Henry have tents on the ends.
- The person with the fever is next to Grant.
- A person on the end has sunburn.
- Laura is in Tent #3.
- Laura does not have poison ivy.
- The camper in Tent #2 has a fever.
- Terrance wore plenty of sunscreen.
- A boy has a fever.
- Terrance is next to Laura.

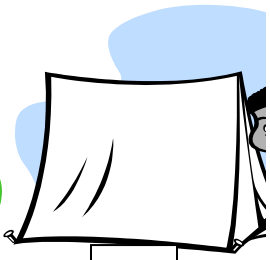


#1

#2

#3

#4



#5

Answer: _____ has a sprained ankle.

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Problem # 11

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Team Number: _____ School: _____

Problem 11 *(2 points, 2 minutes)*

Two brothers are practicing together to improve their logic skills. They each have a good chance of setting new records in their age categories. **The product of their ages is 108. The sum of their ages is greater than 20 and less than 40.** Find the three possible sets of ages for this pair of brothers.

(You must have all possible pairs of ages listed.)

Answers: The ages of the brothers could be: _____and_____

_____and_____

or _____and_____

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Problem # 12

Do NOT turn the page until you are told to do so.

Team Number: _____ School: _____

Problem 12 *(3 points, 3 minutes)*

Missing Numbers

Each letter represents a different number 1-9. Each letter stands for the same number throughout the problem. Figure out what number each letter represents.

1. $\begin{array}{r} 7\ 7 \\ \times\quad T \\ \hline 3\,8\,T \end{array}$ **T = ___**	**2.** $\begin{array}{r} D\ 7 \\ \times\quad H \\ \hline D\ 2\ 3 \end{array}$ **D = ___ H = ___**
3. $\begin{array}{r} 2\ 5 \\ \times\quad N\ S \\ \hline 9\ 0\ 0 \end{array}$ **N = ___ S = ___**	**4.** $\begin{array}{r} 9\ R \\ \times\quad 6 \\ \hline 5\ 5\ R \end{array}$ **R = ___**
5. $5M\overline{)10047}$ $\quad 19P$ **M= ___ P = ___**	**6.** $L\overline{)8.8}$ $\quad 1.1$ **L = ___**

Answer:

1. **T = _____**
2. **D = _____ H = _____**
3. **N = _____ S = _____**
4. **R = _____**
5. **M = _____ P = _____**
6. **L = _____**

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Problem # 13

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Team Number: _____ School: _____

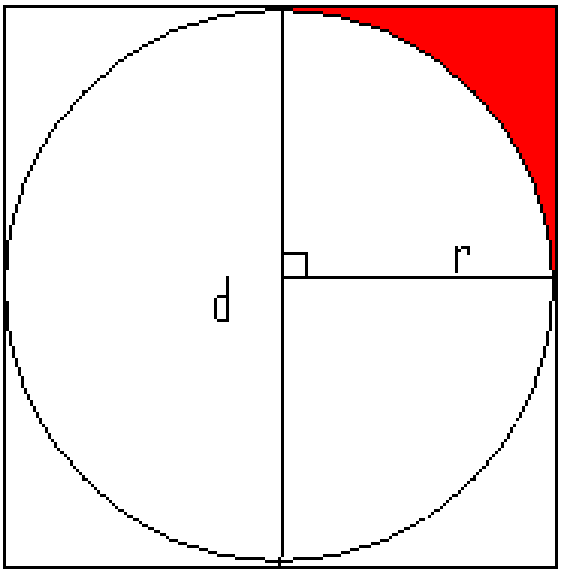
Problem 13 ***(1 point, 1 minute)***

Find the area of the shaded region between the circle and the square. The radius of the circle is 6 cm. Round your answer to the nearest tenth of a centimeter.

Formula:

Area of circle: $A = \pi r^2$

Area of square: $A = s^2$



Answer: _____ sq. cm.

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Problem # 14

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Team Number: _____ School: _____

Problem 14 *(3 points, 3 minutes)*

February is the month of “Love” with Valentine’s Day. There are 24 different ways the letters of the word “Love” can be arranged. If the words were put in alphabetical order, which number would the word “LOVE” be?

L O V E

1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	

Answer: _____

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Problem # 15

Do NOT turn the page until you are told to do so.

Team Number: _____ School: _____

Problem 15 **(2 points, 2 minutes)**

Look for a pattern in the pyramid of numbers below. What would the next line of six numbers be?

1
1 1
2 1
1 2 1 1
1 1 1 2 2 1
? ? ? ? ? ?

Answer: ____ ____ ____ ____ ____ ____

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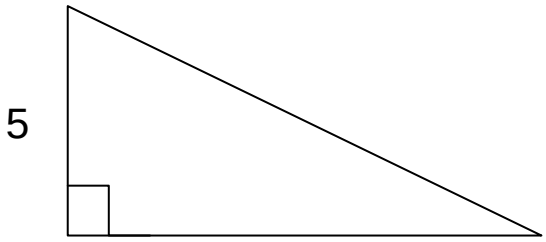
Problem # 16

Do NOT turn the page until you are told to do so.

Team Number: _____ School: _____

Problem 16 *(1 point, 1 minute)*

To be a Pythagorean Triple, the 3 sides of a right triangle must all be Natural numbers that satisfy: $a^2 + b^2 = c^2$ where a and b are the legs and c is the hypotenuse of the right. If the shortest leg is 5, what would be the values of the other two sides?



Answer: _____ and_____

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Answer Key

1. 25
2. 42%
3. 84,000,000 people
4. 540 candies
5. a lighted cigar, a tail light, wear three bells
6. $63.20
7. 83.3% (140 passengers/168 seats)
8. A. 13 triangles B. 15 parallelograms C. 18 trapezoids
9. 20 different sets of three magazines
10. Anna
11. 4, 27; 6,18; or 9,12 *(must have all three pairs)*
12.. **1. T = 5**
2. D = 4 H = 9
3. N = 3 S = 6
4. R = 2
5. M = 1 P = 7
6. L = 8
13. 7.7 sq. cm
14. 10th place
15. 3 1 2 2 1 1 (frequency of number then the number from previous line)
16. 12 and 13