

Kansas City Area Teachers of Mathematics
2015 KCATM Math Contest

MATHLETICS

GRADE 6

INSTRUCTIONS

- WRITE your TEAM NUMBER and your SCHOOL NAME ON THE LINE PROVIDED ON 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. **NO CELL PHONES!**
- Scratch paper can be used. Do NOT write on the team number card!
- Use the π key on your calculator or 3.14159 as the approximation for pi.
- You may not use rulers, protractors, or other measurement devices on this test.

Team Number: _____ School: _____

Team Members: _____

Problem 1

1 point
1 minute

You plan to travel to England and want to rent a car to drive to Liverpool, approximately 350 km. The trip will take 4 hours. The car has a fuel tank that holds 45 L of fuel. The car consumes 8.5 L of fuel for each 100 km driven. You will start the trip with a full tank of fuel.



How much fuel should be in the tank at the end of the drive to Liverpool?

If the trip takes 4 hours as planned, what is the average rate of speed in km/hr?

Answers: _____ liters
_____ km/hr

School _____ **TEAM #** _____

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Problem # 2

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

Team Number: _____ **School:** _____

Problem 2**2 points****2 minutes**

In some new notational systems, & and # are symbols.

$$A \& B = A \times B \text{ and } A \# B = A - B$$

Using what you know about the relationship of the new symbols to more common symbols, evaluate the following expression.

$$[(3 \& 6) \# 4] \# [3 \& (6 \# 4)]$$

Answer: _____

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Problem # 3

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

Team Number: _____ School: _____

Problem 3**3 points**
3 minutes

**How many whole number multiples of 7
are between 250 and 500?**

Answer: _____

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Problem # 4

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

Team Number: _____ **School:** _____

Problem 4**2 points
2 minutes**

In a 36 minute gym period, 24 students want to play basketball. Only 10 can play at the same time and each student must play the same length of time.



How many minutes does each child play basketball?

Answer: _____

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Problem # 5

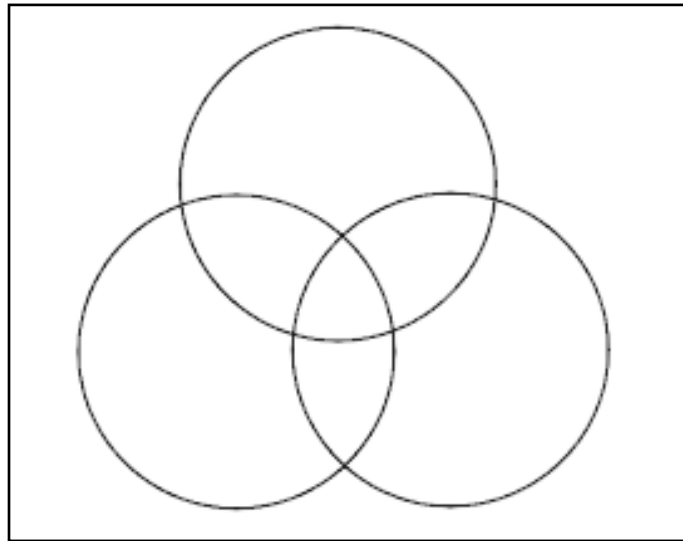
Do NOT turn the page until you are told to do so.

Team Number: _____ **School:** _____

Problem 5

2 points
2 minutes

A veterinarian surveys 26 of his patrons. He discovers that 14 have dogs, 10 have cats, and 5 have fish. Four have dogs and cats, 3 have dogs and fish, and one has a cat and fish. If no one has all three kinds of pets, **how many patrons have none of these pets?**



Answer: _____

School _____ TEAM # _____

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Problem # 6

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

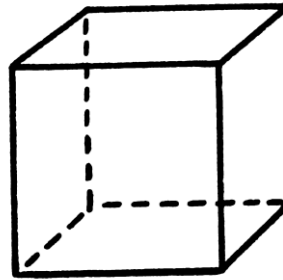
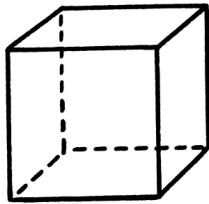
Team Number: _____ **School:** _____

Problem 6

1 point
1 minute

The length of the sides of a cube were increased by 20%.

By what percentage did the surface area increase?



Answer: _____

School _____ **TEAM #** _____

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Problem # 7

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

Team Number: _____ **School:** _____

Problem 7

3 points
3 minutes

For how many positive integer values of n for both

$$\frac{n}{3} \text{ and } 3n$$

are the evaluated expressions three-digit whole numbers?

Answer: _____

School _____ TEAM # _____

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Problem # 8

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

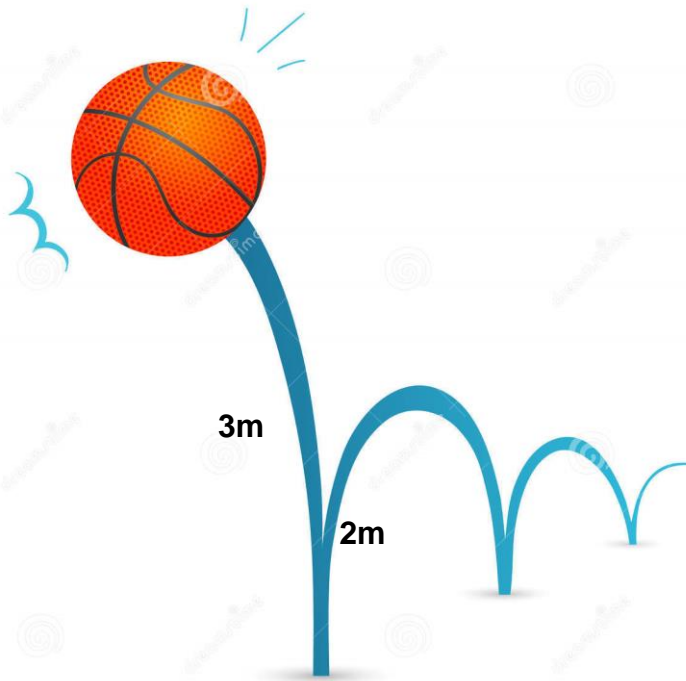
Team Number: _____ **School:** _____

Problem 8

2 points
2 minutes

A basketball is dropped from a height of 3 meters. On its **first bounce it rises to a height of 2 meters**. It keeps falling and bouncing $\frac{2}{3}$ of its previous bounce.

Which bounce will be the first to NOT rise to a height of at least 0.5 meters?



Answer: _____

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Problem # 9

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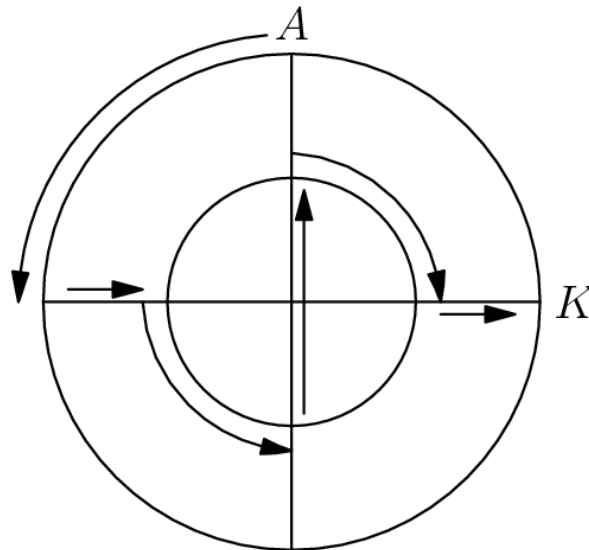
Problem 9

3 points

3 minutes

Two concentric circles have radii 10 meters and 20 meters. A mouse runs along the path as shown by the arrows starting at A and ending at K.

How many meters does the mouse run? Leave your answer in terms of π meters.



Answer: _____ meters

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Problem # 10

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

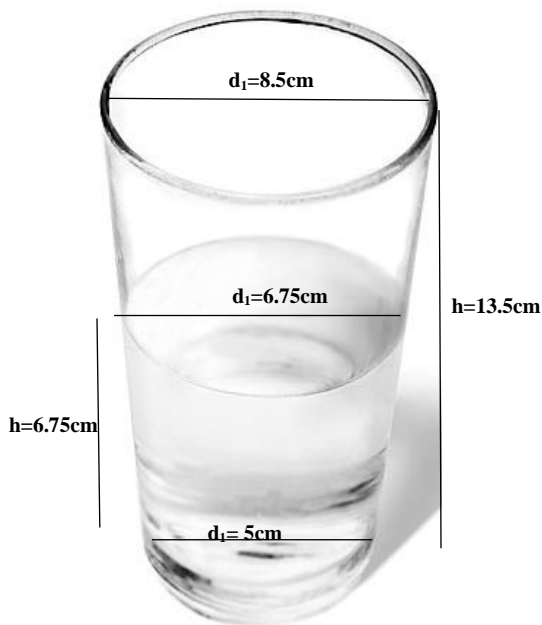
Team Number: _____ **School:** _____

Problem 10

3 points

3 minutes

Your mom asked for a half of a glass of lemonade. The glass you used was larger at the top than at the bottom. You know that if you were to fill the glass up to $\frac{1}{2}$ of the height, the amount in the lower half will be less than the upper half. If you were to fill the glass to half the height, how much less than **half** of the total volume (cu. cm) would be in the glass? *Round to the nearest hundredth.*



$$\text{Volume} = \left(\frac{r_1 + r_2}{2} \right)^2 \pi h$$

Answer: _____ cu.cm

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Problem # 11

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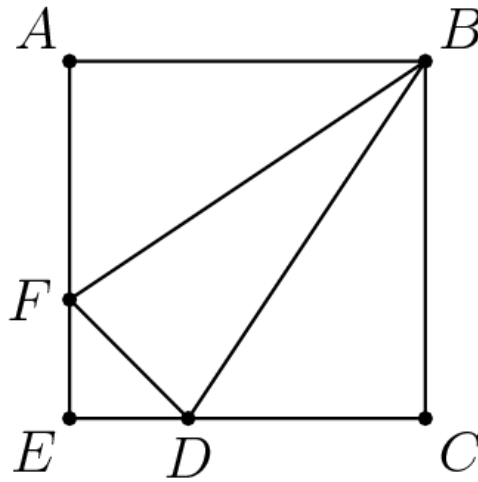
Team Number: _____ **School:** _____

Problem 11

3 points
3 minutes

Given: Square ABCE, $AF = 2FE$ and $CD = 2DE$

What is the ratio of the area of the isosceles triangle BDF to the area of the square ABCE?



- (A) $\frac{1}{6}$ (B) $\frac{2}{9}$ (C) $\frac{5}{18}$ (D) $\frac{1}{3}$ (E) $\frac{7}{20}$

Answer: _____

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Problem # 12

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

Team Number: _____ **School:** _____

Problem 12

2 points

2 minutes

What value goes in the 3rd box from the end to get an answer of 30 for Garfield?

Math Conundrums, Incentive Publications, 2009

Headed for Trouble!

It looks as if Garfield is headed for trouble. You can help him navigate Bone-Breaker Boulevard. Solve this long, winding problem correctly, and he just might avoid a major crash along the way. Read ALL the directions below before you start.

As Garfield moves along the sidewalk, he must ADD the value of each section to the previous section. However, when he comes to one of the seven sections with obstructions, he must leap over it and SUBTRACT the value of that section. When he gets to the end, he will have a total of 30.

Answer: _____

School _____ TEAM # _____

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Problem # 13

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

Team Number: _____ **School:** _____

Problem 13

3

points
3 minutes

Anna and Barney went shopping with \$33 between them. Anna started out with \$3 more than Barney, but spent twice as much as he did. Anna ended up with two-thirds as much money as Barney. **How much did Barney spend?**



Answer: _____

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Problem # 14

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Problem 14

3 points
3 minutes

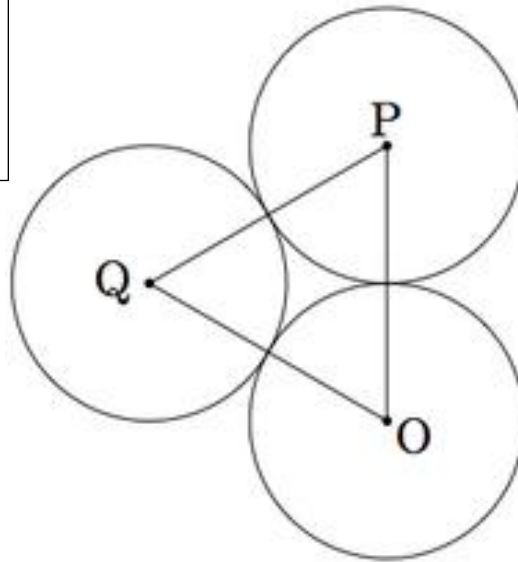
Given: the radii of all three circles is 10 meters.

What is the area of the small section between the circles that is on the inside of the equilateral triangle?

Round your answer to the nearest tenth.

Area of Eq. Triangle:

$$A = \frac{s^2\sqrt{3}}{4}$$



Answer: _____sq. meters

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Problem # 15

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

Team Number: _____ **School:** _____

Problem 15**3 points****3 minutes**

A man has 9 children born at the same interval apart.

Ex: 1,2,3,4,... ; 1,3,5,7,...

The sum of the squares of the children's ages is equal to the square of his own age. The youngest child is greater than 1.

What is his age?

Answer: _____

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Problem # 16

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

Team Number: _____ **School:** _____

Problem 16

2 points
2 minutes

Use the pattern: $2, -2^2, 2^3, -2^4, 2^5, -2^6, \dots$

Find sum of the **first fourteen numbers** in the sequence.

Answer: _____

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Problem # 17

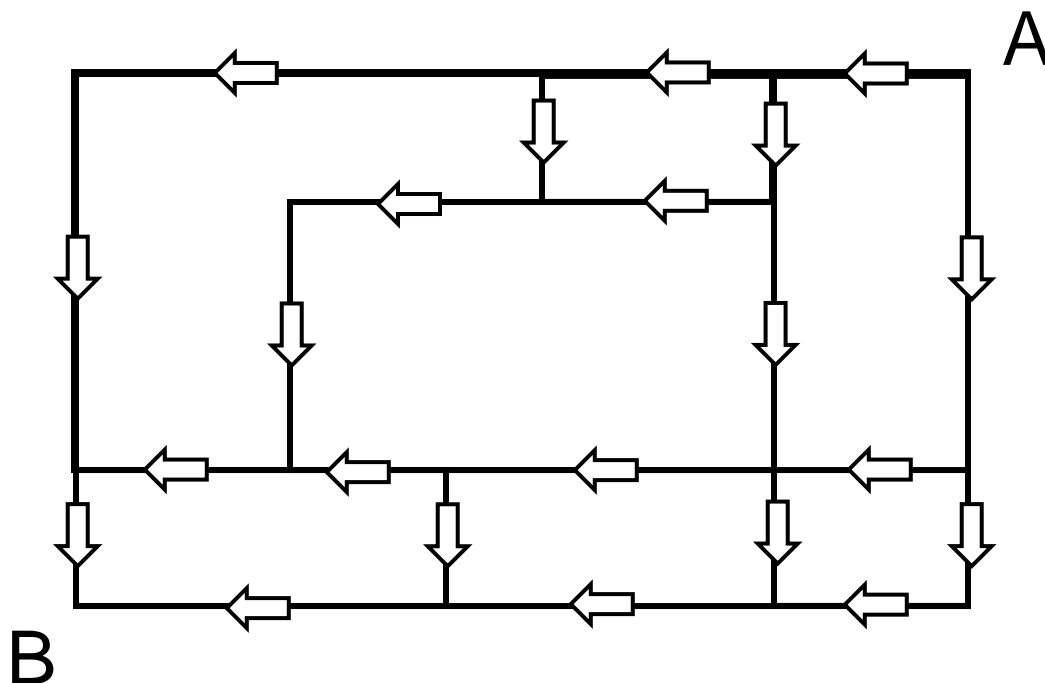
Do NOT turn the page until you are told to do so.

Team Number: _____ **School:** _____

Problem 17

3 points
3 minutes

How many different paths can be made from A to B, starting at A and ending at B?



Answer: _____

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Problem # 18 - Bonus

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

Team Number: _____ **School:** _____

Problem 18 - Bonus

3 points
3 minutes

$$\text{If } \frac{4^x}{2^{x+y}} = 8 \quad \text{and} \quad \frac{9^{x+y}}{3^{5y}} = 243$$

and x and y are real numbers, then **xy** = ____ .

- A) 12/5
- B) 4
- C) 6
- D) 12
- E) -4

Answer: _____

School _____ **TEAM #** _____

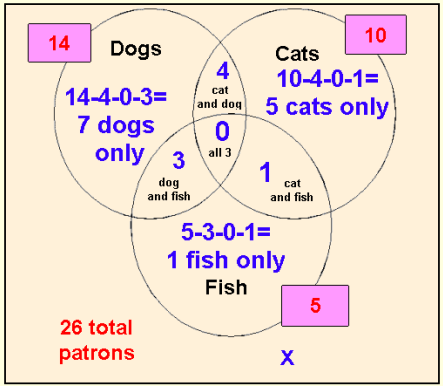
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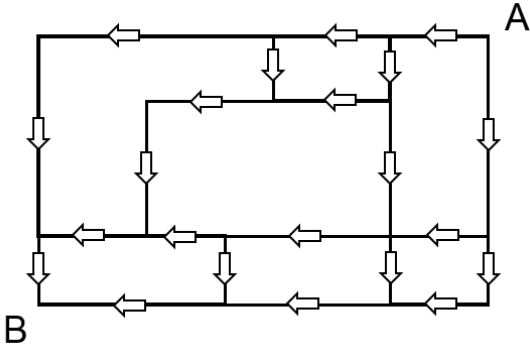
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ANSWER KEY

Answers:

#	PTS	Solutions
1	1	15.25 L; 87.5 km/hr
2	2	8
3	3	36
4	2	<p>15</p> <p>(If ten players can play at a time and gym period is 36 minutes, that makes a total of 360 “player minutes” possible. Dividing that among 24 players would result in each player getting 15 minutes of playing time.)</p>
5	3	<p>5</p>  <p>26 total patrons</p> <p>$7 + 4 + 0 + 3 + 1 + 5 + 1 + x = 26$</p> <p>$21 + x = 26$</p> <p>$x = 5$ patrons have none of these animals</p> <p>http://www.regentsprep.org/regents/math/algebra/AP2/PracVenn.htm</p>
6	1	<p>The increase was 44%.</p> <p>(It can't be a specific unit measurement because there was no given measurement.)</p>
7	3	<p>34</p> <p>(The smallest n can be is 300 (300/3 is 100) and the largest n can be 333 (333*3 is 999). So, 300, 301, 302,... 333 are all positive integer values that result in the expressions having three-digit values.</p> <p><u>Randy: 12 – check answer before test</u></p>

8	2	5 th bounce
9	2	$20\pi + 40$ (approx.: 102.83 m)
10	3	58.57 cu. cm less than half (should be close depending on their round offs) $241.55 - 182.98 = 58.57$ cu. cm
11	3	C: $5/18 = 2.5/9$
12	2	66
13	3	\$6.00 (If Anna spent twice as much as Barney, that would mean that for each dollar he spends, she spends 2. She started with \$18, and he started with \$15. When she is down to $2/3$ the amount he has (\$6 and \$9 respectively), she has spent \$12 and he has spent \$6.)
14	3	16.1 sq. meters
15	2	The dad is 48. Kids ages are 2,5,8,11,14,17,20,23,26 Sum of squares is 2304.
16	2	-10,922
17	3	 <p>10 paths</p>
18	3	$xy = 4$ $x = 4, y = 1$