"Math is Cool" Championships – 2010-11

Sponsored by:

8th Grade – November 5th, 2010

Individual Multiple Choice Contest

1 In Mathlandia, all residents have a calculator or a slide rule. If 1350 have a calculator, 787 have a slide rule, and 127 have both, how many people reside in Mathlandia?

A) 1996 B) 1883 C) 2137 D) 2010 E) Answer not given

For the next two problems use the following table which represents the election results from a recent Mathlandia election. Initiatives and propositions are two types of measures that voters vote on. (Some values intentionally left blank.):

Measure	Votes in favor	Votes opposed	Total Votes
Initiative A	33	67	100
Initiative B		50	197
Initiative C	58		112
Proposition 1	600	300	
Proposition 2	200	200	400

2 How many more votes were cast in favor of Initiative B than were cast in favor of Initiative C?

A) 14 votes B) 75 votes C) 89 votes D) 114 votes E) Answer not given

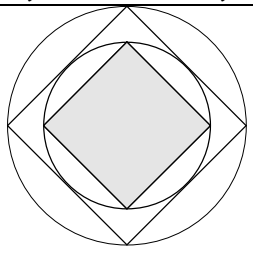
3 To pass an initiative requires that at least 50% of the total votes be in favor, while to pass a proposition requires that greater than 60% of the total votes be in favor. How many of the measures on the ballot passed in this election?

A) 1 measure B) 2 measures C) 3 measures D) 4 measures E) 5 measures

4 The president of Mathlandia decrees that a certain positive number shall be the official number of the land because six less than the square of the number is equal to ninety more than four times the number. What is the official number of the land?

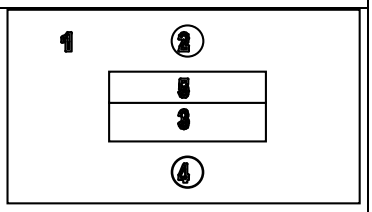
A) -8 B) 1 C) 8 D) 12 E) Answer not given

5



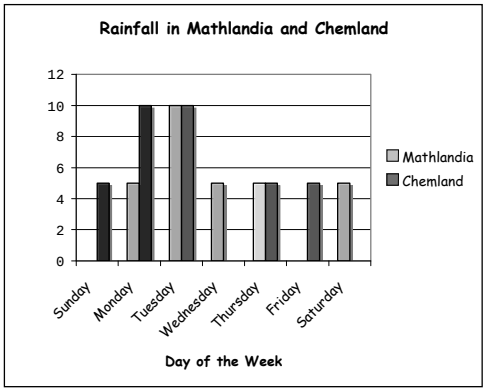
The official seal of Mathlandia above is a square inscribed in a circle inscribed in a square inscribed in a circle. If the area of the shaded region is 36 cm^2, what is the circumference of the largest circle in cm?

A) 12 cm B) $24\sqrt{2}$ cm C) 12π cm D) 24 cm E) Answer not given

6	Mathlandia has a famous 102-foot tall tree in the middle of town. Lee, who is six feet tall, is standing in the tree's shadow. How long is the tree's shadow if Lee can stand a maximum of 128 feet away from the tree before the sun hits the top of his head? A) 76 ft B) 128 ft C) 136 ft D) 140 ft E) 152 ft
7	Mathlandia's governing body consists of a president and a council of 5 members. How many different governing bodies may be made from 4 seventh graders and 4 eighth graders if the council must have at least 2 members from each grade level? A) 120 B) 960 C) 144 D) 432 E) 720
8	Mathlandia settled on the design above with five regions (numbered 1-5) for its new flag. Mathlandia has five available colors. How many ways can Mathlandia color its flag if no region can touch a region of the same color?  A) 760 B) 960 C) 2625 D) 2010 E) Answer not given

Use the following graph for question 9:

This graph shows the rainfall for the week in Mathlandia and neighboring Chemland. In both cities, it rains either 0 inches, 5 inches, or 10 inches a day.



9	During the week, a Chemland resident was planning to visit Mathlandia. If it rained that day in Chemland, what is the probability that it also rained in Mathlandia? A) 5/7 B) 3/5 C) 2/7 D) 2/5 E) 1
10	What is the length in feet of the space diagonal of a right rectangular prism with sides of length five, eight, and ten feet? A) 23 ft B) $2\sqrt{21}$ ft C) $3\sqrt{21}$ ft D) 21 ft E) 43 ft

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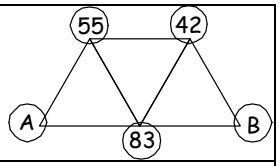
8th Grade – November 5th, 2010

Team Contest

1	In the figure at right, the numbers in the three circles at the vertices of each triangle add up to 180. What is the sum of the numbers that go in circles A and B? 
2	Circle C has a radius in centimeters that is an integer number (whole number). The closest integer to the area of circle C (in square cm) is 154. What is the closest integer to the circumference of circle C (in cm)?
3	How many squares with side length two inches will it take to cover a square with perimeter one hundred twelve inches?
4	A regular icosahedron is a solid (3-dimensional) figure with 20 faces, each an equilateral triangle. How many edges does a regular icosahedron have?
5	Convert 42 pounds per square foot to ounces per square inch. If your answer is not a whole number, give it as a reduced common fraction.
6	My diary for November starts on page 63 and continues on consecutive pages, all of which I numbered in order. If I wrote 566 digits in numbering the pages I used for November (including page 63), how many pages did I use in November?
7	Two dice are rolled and a 2-digit counting number (positive integer) is created using the number showing on the first die as the tens digit and the number showing on the second die as the units digit. What is the sum of all such numbers that are divisible by 2 but not by 4?
8	At ShapeKo Warehouse, Geo George buys 8 spheres, 3 cones, and 7 cylinders, for a total cost of exactly $100. All items of the same shape cost the same whole number of dollars. Spheres cost more than cylinders, but cones are the most expensive of all. What is the least possible cost, in dollars, of one cone?
9	Find the sum of the six smallest <u>consecutive</u> counting numbers (positive integers) that include no prime numbers.
10	The hands of Amanda's new clock move at the correct speed, but the minute hand travels backwards (counterclockwise). Amanda sets the clock correctly at 2:30 PM. At what correct time that afternoon, to the nearest whole minute, will the two hands first be 180° apart?

"Math is Cool" Championships – 2010-11

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8th Grade – November 5th, 2010

Pressure Round Contest

1	I am thinking of a counting number that can be divided by both 3 and 5 without remainder. At least one of its digits is a 3, and at least one of its digits is a 5. All of its digits are either 3 or 5. What is the smallest my number could be?
2	Of the following, give the letters of all that are correct. If none is correct, answer "none". A) $\frac{1}{2}-\frac{2}{3}=-\frac{1}{6}$ B) 0 ÷ 0 = 1 C) 6% of 180 = 30 D) 2 x 2 = 4 x 2 = 8 x 2 = 16 x 2 = 32 E) $24 \div \frac{1}{2} = 12$
3	Randy counted by 3s and wrote as he counted, starting with 17. That is, he began by writing "17, 20", and so on. What was the 100th <u>digit</u> Randy wrote?
4	Each term in the following inequality is a common fraction, not necessarily reduced. What is the largest possible sum of $A+B$? $\frac{1}{8}<\frac{2}{A}<\frac{1}{B}<\frac{3}{4}$
5	Andy rolls a fair octahedral die (with 8 equal faces, numbered 1 through 8) and tells Bob truthfully that the number showing is even. As a reduced fraction, what is the probability that the number showing is prime?

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8th Grade – November 5th , 2010

Mental Math Contest

PERSON 1		
1.1	What is the area in square centimeters of a circle with diameter eight centimeters?	16π [square centimeters]
1.2	What is the probability of obtaining a sum of ten on a roll of two dice?	1/12
1.3	What is the sum of the first five positive EVEN integers?	30
1.4	How many factors does one-hundred twenty have?	16 [factors]
PERSON 2		
2.1	What is the remainder when two hundred thirty three is divided by five?	3
2.2	Evaluate: Twelve squared.	144
2.3	What is the length in centimeters of the diagonal of a square of side length three centimeters?	$3\sqrt{2}$ [cm]
2.4	How many ways are there to arrange the letters in the word BANANA , spelled B-A-N-A-N-A?	60 [ways]
PERSON 3		
3.1	What is the volume in, cubic feet, of a right rectangular prism with sides of length five, eight, and ten feet?	400 [cubic feet]
3.2	My dog ran across the width of my lawn at six meters per second. If she took five seconds to cross, how many meters wide is my lawn?	30 [meters]
3.3	Evaluate: Three raised to the fourth power.	81
3.4	What is the y-intercept of the line defined by the equation: y minus 2 equals three times the quantity x plus two? Express your answer as a coordinate pair x comma y.	(0,8)
PERSON 4		
4.1	What is the circumference in inches of a circle with diameter six inches?	6π or 6 pi [inches]
4.2	Evaluate: Five squared minus three squared.	16
4.3	What is the sum of the integers from negative five through positive seven inclusive?	13
4.4	What is the surface area in square yards of a regular tetrahedron with edges of length two yards?	$4\sqrt{3}$ [square yards]

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8th Grade – November 5th, 2010

COLLEGE KNOWLEDGE BOWL ROUND #1 - SET 1

#	Problem	Answer
1	What is the sum of all of the perfect squares greater than the square of one and less than the square of six?	54
2	If John was three times my age five years ago, and he is now twice my age, how many years old will I be in thirteen years?	23 [years old]
3	On Archibald the Angry Aardvark's amble to the aquarium, he notices that the shadow of an apple tree is 120 feet long while the shadow of his body is 10 feet long. If Archibald is one and a half feet tall, how many feet tall is the apple tree?	18 [feet]
4	Find the positive difference between the mean and the median of the following set of data: 4, 8, 15, 16, 23, 42 Answer as a reduced fraction.	5/2
5	Name all irrational numbers in the following list: one-fourth, square-root of five, square-root of nine, pi, and eight point two	$\sqrt{5}$ and π [Order does not matter]
6	A right triangle has a hypotenuse of length 13 inches and one leg of length 5 inches. What is the length, in inches, of the other leg?	12 [inches]
7	Helen has a list of the whole numbers from 1 to 50 inclusive. She erases all multiples of two and all multiples of three. How many numbers are left on her list?	17 [numbers]
8	How many ways are there to seat 7 people around a circular table, given that Bob and Carla must be seated next to each other?	240 [ways]
9	I draw one card from a standard 52-card deck. What is the probability that my card is either a club or a jack?	4/13
10	The chance that Miya will run on any given day when it is sunny is seventy percent, but when it is raining the chance that Miya will run on that day drops to thirty percent. Given that tomorrow has a forty percent chance of raining, what is the probability, as a percent, that Miya goes for a run? Assume that when it rains, it rains all day.	54 [%]

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COLLEGE KNOWLEDGE BOWL ROUND #2 – SET 2

#	Problem	Answer
1	Sylvester the Sly Slytherin is seeking socks from his stash, with his eyes shut. He has six sky-blue socks, seven sea-green socks, and seventeen silver socks. What is the smallest number of socks Sylvester could select such that he is sure he has a pair of every shade?	26 [socks]
2	The sum of the digits of my two-digit number is half of my number. What is my number?	18
3	I open my book at random. The sum of the numbers on the two pages facing me is one hundred seventy-three. What is the number of the next page?	88
4	What is the sum of one hundred fifty-five and negative one hundred seventy-three?	-18
5	Dark Helmet is trying to eat Pizza the Hut, who has a mass of 300 kilograms. If Pizza is able to gain weight at a rate of 10 kilograms a minute, and Dark Helmet can eat at a rate of 30 kilograms a minute, how many minutes does it take before Dark Helmet has completely consumed Pizza the Hut?	15 [minutes]
6	What is the sum of the distinct prime factors of 374?	30
7	If I reverse the digits of Harshini's age, the number is 63 more than her age. How many years old is Harshini, if she is at least 20 years old?	29 [years]
8	Smokey the Bear is trying to prevent forest fires. If the probability that he will prevent any given forest fire is four-fifths, what is the probability that he will prevent one fire and then fail to prevent the next one?	4/25
9	Oliver likes olives. He gives three-fourths of his olives to his best friend Olivia. Then his enemy Oscar steals half of the remaining olives, and finally his father Ollivander eats three olives. There are now four olives left. How many olives did Oliver have at the beginning?	56 [olives]
10	How many ways are there for a CEO to choose a secretary, a vice-president, and a manager from a group of 8 people?	336 [ways]

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COLLEGE KNOWLEDGE BOWL ROUND #3 - SET 3

#	Problem	Answer
1	What is the sum of four, forty four, four hundred forty four and four thousand?	4492
2	Suman, Miya, Harshini, Jimmy, and Mitchell are playing Frisbee in the dark. How many ways are there for the Frisbee to be thrown around such that each person is in contact with the Frisbee exactly once?	120 [ways]
3	What is the probability that in four flips of a fair coin I get four heads?	1/16
4	Find the surface area in square inches of a cylinder with height 4 inches and radius 2 inches.	24 pi [square inches]
5	When a number is divided by 5 the quotient is 14 and the remainder is 2. What is the number?	72
6	Dalton the Dashing Debonair Delinquent rolls a pair of dice. He desires a sum of seven or eight. What is the probability that his dream will come true?	11/36
7	What is the least common multiple of 48 and 32?	96
8	Matt walks up 3 stair steps. If there is a three-fourths chance that any given stair will creak, what is the probability that at least one stair will not creak?	37/64
9	The side lengths of a square increase by a factor of two. By what factor does the area of the square increase?	4
10	Biff has fewer than 100 children. If he can line his children up in rows of 10 with 4 left over, rows of 11 with 8 left over, and rows of 3 with 2 left over, how many children does he have?	74 [children]

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COLLEGE KNOWLEDGE BOWL ROUND #4 - SET 4

#	Problem	Answer
1	What is the area, in square inches, of a trapezoid with two bases of length 3 inches and 15 inches with a height of 11 inches?	99 [square inches]
2	Express the product of zero point zero zero five and one point three in scientific notation.	6 point 5 times 10 to the negative 3
3	Order the following values from greatest to least, and give your answer as a sequence of three letters: A equals thirteen over twenty-one; B equals three over five; and C equals seven over eleven.	CAB
4	The scale of the blueprint for Suman's palace is 1 to 144. If the rectangular grand ballroom has a length of five inches and a width of four inches on the blueprint, what is the area of the actual grand ballroom, in square feet?	2880 [square feet]
5	What is the sum of the possible integer solutions to the inequality: "x is greater than three and less than 11"	49
6	Rosa worked math problems every day starting on December 21st, 2010, and ending on February 14th, 2011. How many days did Rosa work math problems?	56 [days]
7	Angle A is complementary to Angle B, and Angle B is supplementary to Angle C. If Angle C is 114 degrees, what is the degree measure of Angle A?	24 [degrees]
8	What is the sum of all of the remainders from dividing 100 by the first nine positive integers?	12
9	The area of a square is 144 square inches. What is the perimeter, in feet, of the square?	4 [feet]
10	I have two types of egg cartons. One type can hold 3 eggs and the other can hold 5 eggs. How many different combinations of cartons can I have if I want to place exactly 70 eggs in the cartons, with no empty spaces?	5 [combinations]

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COLLEGE KNOWLEDGE BOWL ROUND #5 - SET 5

#	Problem	Answer
1	What is one-tenth of the greatest common factor of 148 and 12?	2/5
2	Evaluate 36 squared minus 28 squared.	512
3	I am making four dozen cookies. If each cookie requires eight chocolate chips, and I can buy sixteen chocolate chips for five cents, how many CENTS will the chocolate chips for my cookies cost?	120 [cents]
4	On the way to Timbuktu, I trek 400 miles in 10 hours, but on the return trip it takes me only 6 hours. What is my total average speed in miles per hour?	50 [miles per hour]
5	Mr. Clymer is chasing after his daughter Katie, who has a head start of 102 feet. If Mr. Clymer can run at a rate of 10 feet per second and Katie can run at a rate of 4 feet per second, how many seconds does it take for Mr. Clymer to catch up to Katie? Express your answer as a decimal rounded to the nearest hundredth.	17 [seconds]
6	An urn contains 4 green marbles, 10 red marbles and 6 yellow marbles. Darryl draws a marble, records its color, and returns it to the urn. He repeats this 240 times. How many times should he expect to draw a yellow marble?	72 [times]
7	Kenneth the Kooky Kangaroo hops one mile on Monday, three miles on Tuesday, five miles on Wednesday, and so on. On what day of the week does Kenneth hop three hundred fifty three miles?	Tuesday
8	How many ways are there to arrange 4 people in a circle?	6 [ways]
9	If there are two norbits in three biffs, and five biffs in two ehos, how many norbits are there in twelve ehos?	20 [norbits]
10	What is the maximum possible area, in square feet, that I can enclose in a rectangle with 24-foot rope?	36 [square feet]

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COLLEGE KNOWLEDGE BOWL ROUND #6 - SET 6

#	Problem	Answer
1	What is the sum of the first 13 positive odd integers?	169
2	What is the product of the following numbers: 7, 13, 8, 20, 0, 1, and 5.	0
3	Solve the following equation: 5 times "x" plus eleven equals 3 times "x" minus fifty-five	-33
4	My tree house is a rectangular prism with interior dimensions of 6 feet by 5 feet by 8 feet. If I have a 3-foot by 6-foot door and no windows, what is the surface area of the walls, floor and ceiling in square feet?	218 [square feet]
5	The three angles of a triangle are $12x+4$ degrees, $11x+2$ degrees, and $6x$ degrees. What is x?	[x =] 6
6	In ordering my omelet, I have 3 meat options, 4 vegetable options, and 4 topping options. If I must pick 1 meat, 2 vegetables, and 1 topping, how many different omelets can I order?	72 [omelets]
7	The first 6 terms of the Fibonacci sequence are 1, 1, 2, 3, 5, and 8. What is the 12th term?	144
8	A tree at Ghormley Meadow Camp is 144 years old. Each ring in the tree trunk represents 1 year and adds 1 inch to the overall diameter of a tree. Assuming at 0 years the tree has a diameter of 0, what is the circumference of the tree, in feet?	12 pi [feet]
9	I walk north for 10 minutes, then east for 24 minutes. If my rate of walking is constant, how many minutes will it take me to return to my starting point by the shortest route?	26 [minutes]
10	A cell divides into two separate cells every half hour. If there is one cell at 3:00 PM, how many cells will there be at 6:00 PM the same day?	64 [cells]

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COLLEGE KNOWLEDGE BOWL ROUND - EXTRA

#	Problem	Answer
1	Subtract the smallest prime factor of 2010 from the largest prime factor of 2010.	65
2	Felix the Friendly Farmer has foxes and finches on his farm. If there are 32 legs and 12 heads, how many finches are there? HINT: A finch is a bird.	8 [finches]
3	What is the area in square units of a regular hexagon with side lengths of 2 units?	$6\sqrt{3}$ (6 root 3 or 6 times the square root of 3 [square units]

Math is Cool" Championships – 2010-11

8th Grade – November 5th, 2010

School Name_____Team #_____

Proctor Name_____Room #_____

STUDENT NAME_____

Final Score:

KEY

First Score

(out of 20)

INDIVIDUAL MULTIPLE CHOICE - 15 minutes – 20% of team score

This test is the only test where you will be penalized for incorrect responses. You will receive 2 points for a correct letter response, 0 points for leaving it blank and -1 point for an incorrect response. It is not necessary to write your personal name on the test, but you may put it at the bottom of the test so your coach will be able to give you back the correct test. This test is taken individually, but it is part of your team score, including zeros for missing team members. Your team score will be calculated by taking the mean of your four team members' scores. When you are prompted to begin, tear off the colored sheet and begin testing. ***Since this is a multiple choice test, ONLY a letter response should be indicated as an answer on the answer sheet.*** *No talking during the test.*

DO NOT WRITE IN SHADED REGIONS

	Answer	-1, 0 or 2	-1, 0 or 2
1	D		
2	C		
3	C		
4	D		
5	C		
6	C		
7	D		
8	B		
9	B		
10	C		

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Final Score:

KEY

School Name_____Team #_____

Proctor Name_____Room #_____

First Score

(out of 10)

STUDENT NAME_____

Team Contest – Score Sheet

TEAM TEST - 15 minutes – 30% of team score

When you are prompted to begin, tear off the colored sheet and give a copy of the test to each of your team members and begin testing. Each problem is scored as ***1 or 0****. Record all answers on the colored answer sheet.*

DO NOT WRITE IN SHADED REGIONS

	Answer	1 or 0	1 or 0
1	97		
2	44 [cm]		
3	196 [squares]		
4	30 [edges]		
5	14/3 [oz/sq in]		
6	201 [pages]		
7	366		
8	[$] 8		
9	555		
10	3:14 [PM]		

"Math is Cool" Championships – 2010-11

8th Grade – November 5th, 2010

Final Score:

KEY

First Score

School Name_____Team #_____

Proctor Name_____Room #_____

STUDENT NAME_____

PRESSURE ROUND - 10 minutes – 15% of team score

When it is time to begin, you will be handed a packet of questions. There is a copy of the questions for each team member. Two minutes after the start of the test you are expected to submit an answer for one of the questions (it can simply be a guess). The maximum value of this answer is 1 point. In another two minutes you are expected to submit another answer to one of the four remaining questions; its maximum value is two points. This process will continue until all the questions are answered and each consecutive question's worth will go up by one point. You must submit your answers on the colored sheets given to you. If you do not have an answer at the end of a two minute period, you must still submit an answer sheet with an identified question number on it. Failure to do so will result in loss of points. This event is timed, and you will be given a verbal 5 second warning and told to hold your answer sheet up in the air. You may keep working as the sheets are collected.

Pressure Round Answers

	Answer
1	3555
2	A
3	4
4	22
5	1/4