"Math is Cool" Championships – 2010-11

Sponsored by:

7th 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

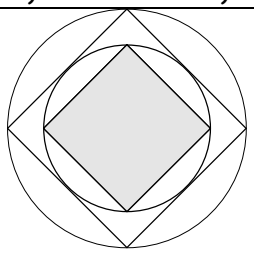
3 To pass an initiative requires that at least 50% of the total votes be in favor, while to pass a proposition requires that greater than 60% of the total votes be in favor. How many of the measures on the ballot passed in this election?

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

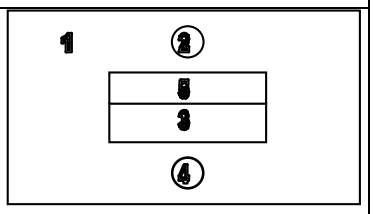
5



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?

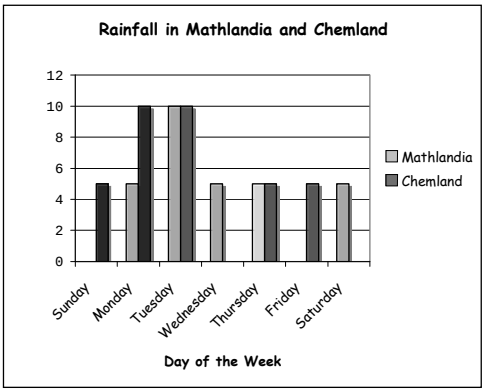
A) 12 cm B) $24\sqrt{2}$ cm C) 12π cm D) 24 cm E) Answer not given

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 4 members. How many different governing bodies may be made from 4 seventh graders and 4 eighth graders if the council must have 2 members from each grade level? A) 120 B) 960 C) 72 D) 144 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 & 10:

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	What is the difference in inches between the mean number of inches Chemland received per day and the median number of inches Chemland received per day? A) 0 in B) 1 in C) 2 in D) 3 in E) 4 in
10	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

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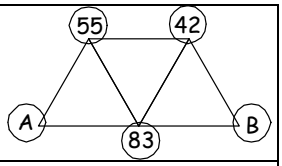
7th Grade – November 5th, 2010

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	When my number is added to the sum of 83 and 91, the result is equal to the product of 38 and 19. What is my number?
3	How many squares with side length two inches will it take to cover a square with perimeter one hundred twelve inches?
4	Each polygonal surface of a 3-dimensional figure is called a face. A pyramid is named for the shape of its base. How many faces does an octagonal pyramid have?
5	A garden shop has flowering plants on sale at five for $10. The regular price is $3.47 each. I brought exactly enough money to the shop to buy 12 of the flowering plants at the regular price. How many MORE plants can I buy for this money at the sale price?
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?

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7th Grade – November 5th, 2010

Pressure Round Contest

1	How many multiples of seven are greater than twenty-seven but less than one hundred twenty-seven?
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	A certain type of gravel is 20 percent sand, 30 percent small pebbles, and 50 percent medium-sized rocks. If sand weighs 30 pounds per cubic foot, small pebbles weigh 24 pounds per cubic foot, and medium rocks weigh 18 pounds per cubic foot, how many pounds do 10 cubic feet of this gravel weigh?
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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7th 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 zero heads in two flips of a fair coin? Express your answer as a fraction.	1/4
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 BIFF, spelled B-I-F-F?	12 [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 largest number of points at which three distinct circles can intersect?	6 [points]
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 feet, of a right rectangular prism with sides of length five, eight, and ten feet?	340 [sq ft]

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COLLEGE KNOWLEDGE BOWL ROUND #1 - SET 1

#	Problem	Answer
1	The difference between a number that is greater than 321 and 321 is 12. What is the number?	333
2	What number must be added to both the numerator and the denominator of the fraction 16 over 21 so the fraction reduces to 5 over 6?	9
3	It takes the wool from 7 sheep to make a coat. The wool from how many sheep are needed to make 12 coats?	84 [sheep]
4	What is the sum of all of the perfect squares greater than the square of one and less than the square of six?	54
5	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]
6	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]
7	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
8	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]
9	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]
10	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]

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COLLEGE KNOWLEDGE BOWL ROUND #2 - SET 2

#	Problem	Answer
1	What number must be subtracted from both the numerator and the denominator of the fraction 69 over 102 so the fraction rduces to 5 over 8?	14
2	What is the lowest common multiple of 18 and 27?	54
3	What is the product of 13 and 23?	299
4	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]
5	The sum of the digits of my two-digit number is half of my number. What is my number?	18
6	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
7	What is the sum of one hundred fifty-five and negative one hundred seventy-three?	-18
8	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]
9	What is the sum of the distinct prime factors of 374?	30
10	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]

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COLLEGE KNOWLEDGE BOWL ROUND #3 - SET 3

#	Problem	Answer
1	Two numbers sum to 10 while there difference is 2. What is the larger of the two numbers?	6
2	How many numbers are between 11 and 93? This does not include 11 and 93.	81 [numbers]
3	Joe needs to buy some 44 cent stamps. What is the maximum number of 44 cent stamps can he buy with 2 dollars?	4 [stamps]
4	What is the sum of four, forty four, four hundred forty four and four thousand?	4492
5	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]
6	What is the probability that in four flips of a fair coin I get four heads?	1/16
7	Find the surface area in square inches of a cylinder with height 4 inches and radius 2 inches.	24 pi [square inches]
8	When a number is divided by 5 the quotient is 14 and the remainder is 2. What is the number?	72
9	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
10	What is the least common multiple of 48 and 32?	96

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COLLEGE KNOWLEDGE BOWL ROUND #4 - SET 4

#	Problem	Answer
1	What is point two as a reduced fraction?	1/5
2	What is the largest of three consecutive integers that sum to 18?	7
3	The candidate for president of Math land received 314 votes of the 400 votes cast. How many votes did the candidate not receive?	86 [votes]
4	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]
5	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
6	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
7	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]
8	What is the sum of the possible integer solutions to the inequality: "x is greater than three and less than 11"	49
9	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]
10	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]

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COLLEGE KNOWLEDGE BOWL ROUND #5 - SET 5

#	Problem	Answer
1	What is the area of a right triangle, in square inches, with legs of length 12 inches and 17 inches?	102 [square inches]
2	What is the sum of the reduced numerator and denominator of the fraction 55 over 65?	24
3	Sally bought an outfit with a price tag of twenty dollars with sales tax of eight percent. How much, in dollars, did she pay in sales tax?	[$] 1.60
4	What is one-tenth of the greatest common factor of 148 and 12?	2/5
5	Evaluate 36 squared minus 28 squared.	512
6	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]
7	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]
8	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]
9	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]
10	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

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COLLEGE KNOWLEDGE BOWL ROUND #6 - SET 6

#	Problem	Answer
1	The sum of 45, 13 and a number is 100. What is the number?	42
2	What is the next number in the sequence 1, 7, 13, 19?	25
3	What perimeter of a rectangle, in inches, with side lengths of 14 inches and 35 inches?	98 [inches]
4	What is the sum of the first 13 positive odd integers?	169
5	What is the product of the following numbers: 7, 13, 8, 20, 0, 1, and 5.	0
6	Solve the following equation: 5 times "x" plus eleven equals 3 times "x" minus fifty-five	-33
7	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]
8	The three angles of a triangle are $12x + 4$ degrees, $11x + 2$ degrees, and $6x$ degrees. What is x?	[x =] 6
9	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]
10	The first 6 terms of the Fibonacci sequence are 1, 1, 2, 3, 5, and 8. What is the 12th term?	144

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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√3 (6 root 3 or 6 times the square root of 3 [square units]

Math is Cool" Championships – 2010-11

7th 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	A		
10	B		

"Math is Cool" Championships – 2010-11

7th Grade – November 5th, 2010

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	548		
3	196 [squares]		
4	9 [faces]		
5	8 [plants]		
6	201 [pages]		
7	366		
8	[$] 8		
9	555		
10	3:14 [PM]		

"Math is Cool" Championships – 2010-11

7th 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	15 [multiples]
2	A
3	4
4	222 [pounds]
5	1/4