"Math is Cool" Masters – 2012-13

Sponsored by:

December 1, 2012

7th & 8th Grade Mental Math Contest

Follow along as your proctor reads these instructions to you. Your Mental Math score sheet is on the back.

GENERAL INSTRUCTIONS applying to all tests:

- *Good sportsmanship is expected throughout the competition by <u>all</u> involved, both competitors and observers. Display of poor sportsmanship may result in disqualification.*
- *Calculators or any other aids may not be used on any portion of this contest.*
- *Unless stated otherwise, all rational, non-integer answers need to be expressed as reduced common fractions except in case of problems dealing with money. In the case of problems requiring dollar answers, answer as a decimal rounded to the nearest hundredth (ie, to the nearest cent).*
- *All radicals must be simplified and all denominators must be rationalized.*
- *Units are not necessary as part of your answer unless it is a problem that deals with time and in that case, a.m. or p.m. is required. However, if you choose to use units, they must be correct.*
- *Leave all answers in terms of π where applicable.*
- *Do not round any answers unless stated otherwise.*
- *Record all answers on the colored cover sheets in the answer column only.*
- *Make sure all answer sheets have all the information (name, team number, etc.) at the top of the sheet filled out.*
- *Tests will be scored as a 0 if answers are not recorded on the answer sheets.*
- *Blank answer sheets and answer sheets with no name will be scored as a 0.*

<u>Mental Math</u> – 30 sec per question

8 problems read orally to everyone - Approximately 8% of Individual Score - 25% of team score

When it is time to begin, the proctor will read the first question twice. You may not do any writing or talking while arriving at a solution. Once you have a solution, record it on the sheet in front of you. ***You may not change or cross out answers once you have written an answer down. If there are eraser marks, write-overs, or crossed-out answers, they will be marked wrong.*** *Once all students have laid their pencils on the desk, another question will be asked. If a student doesn't lay his/her pencil down, the maximum wait time is 30 seconds after completion of the second reading of the question before another question is asked. You may continue to work on a problem while the next question is being read. The value of each question is a one or zero. Each student will be asked the same eight questions. Individual scores used to determine individual placing will be determined by the sum of the Mental Math score and the Individual Test score for each individual. In addition, the top three Mental Math scores from one team will be totaled and doubled and will contribute to 25% of the team score.*

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7th & 8th Grade – December 1, 2012

Mental Math – 30 sec per question

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#	Problem
1	There are fourteen banana boats. Each banana boat carries sixty-four bananas. If six banana boats get attacked by crocodiles and lose their bananas, how many bananas are left?
2	A palindrome is a counting number that looks the same when you reverse its digits. How many palindromes are between ten and one hundred five?
3	How many square inches of paper would it take to cover the side of a five-inch tall cylindrical soup can having a three-inch radius?
4	If the product of two numbers is ninety-six, and their sum is twenty, what is the greatest common factor of those two numbers?
5	Martha is facing north. If she then turns ninety degrees clockwise, then one hundred eighty degrees clockwise, then two hundred seventy degrees clockwise, which direction would Martha be facing?
6	If I am awake for twelve hours, and spend twenty-five percent of my waking hours listening to music, what is the probability in a percentage that I will not be listening to music during the twelve hours I am awake?
7	What is the second largest three-digit number with three distinct digits that are all prime numbers?
8	A regular hexagon has nine diagonals. How many of these diagonals are parallel to at least one of the sides of the hexagon?

"Math is Cool" Masters – 2012-13

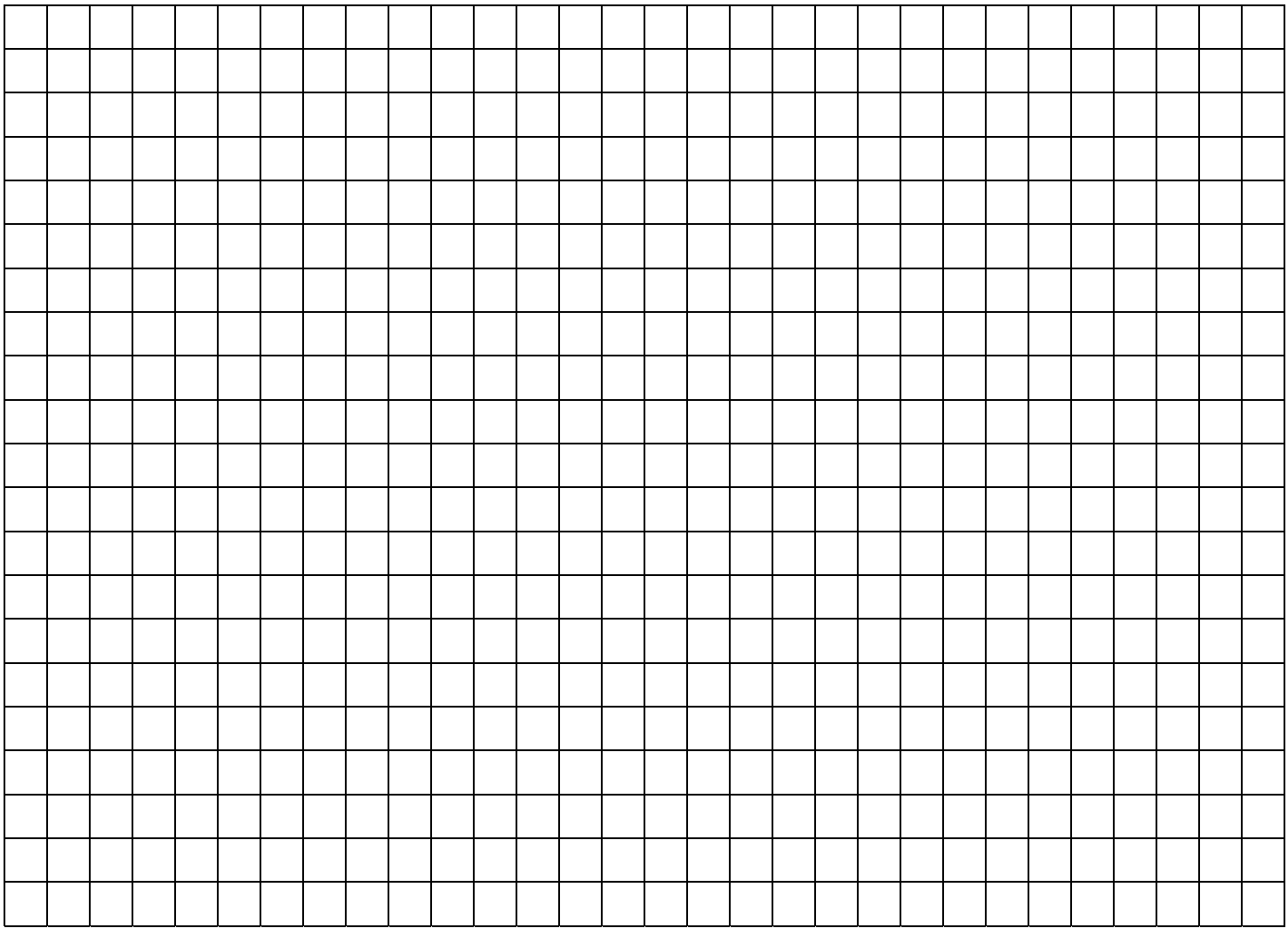
December 1, 2012

Pre-Algebra Individual Contest

Tear this cover sheet and scratch paper off and fill out the top of the colored answer sheet prior to the start of the test. The graph below is for your use, if needed.

INDIVIDUAL TEST – PRE-ALGEBRA - 35 minutes

You may NOT be seated next to anyone from your school. If you are MOVE NOW to avoid being disqualified! When you are prompted to begin, tear off the colored sheet and begin testing. Make sure your name and school are recorded on the answer sheet. The raw score will be 2 points for correct answers to problems 1-30 and 3 points for 31-40. Record your answers on the score sheet. No talking during the test. You will be given a 5 minute time warning.



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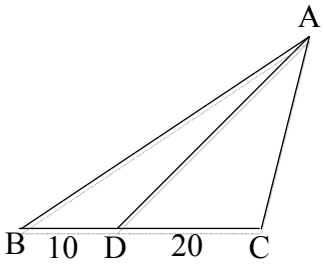
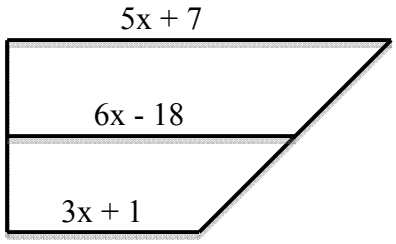
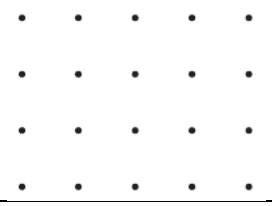
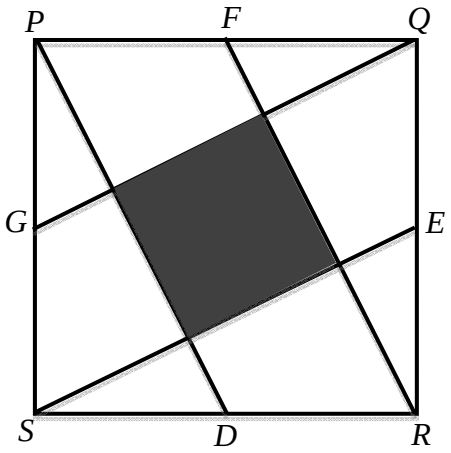
December 1, 2012

Pre-Algebra Individual Contest

	Questions 1-30: 2 points each
1	What is the first digit to the right of the decimal in the quotient of 3 divided by 40.
2	How many positive integer factors does the number 24 have?
3	What is the least common multiple of 3, 5, and 11?
4	What is the positive difference between the greatest three digit number and the greatest one digit number?
5	How many odd numbers are there between 22 and 44?
6	Evaluate: $\frac{1+2+3+4+...+100}{2+4+6+8+...+200}$
7	When the five diagonals of a regular pentagon are drawn, how many non-overlapping regions within the pentagon are created?
8	What is the quotient of 3^7 divided by 3^5?
9	Simplify the following expression by combining like terms: -4 + a - 2b + 4a - b + 7
10	How many quadrants does the graph of y=12x+3 go through?
11	A tank is half full of water. When 5 gallons of water are added, the tank is three-fourths full. What is the maximum number of gallons the tank can hold?
12	What is the greatest common factor of all prime numbers between 10 and 20?
13	Suhmiin has chosen the first four digits of a 5-digit number in such a way that it is possible to make it a palindrome. How many different digits could she pick to complete this 5-digit palindrome?
14	Solve for x: $5^x = 625$
15	Tyson, Sabrina, James and Jayze visit some historic sites in Boston. Sabrina goes to 5 sites, Tyson goes to 1 site, James goes to 4 sites and Jayze goes to 2 sites. If Sabrina and James go to 3 sites together, and otherwise each person visits sites that are different from those visited by the other three, how many different sites are visited?
16	Two congruent circles are positioned on a plane so that their centers are 12 cm apart. What must the number of centimeters in the radius of each circle be in order for them to be externally tangent?
17	Tom the Cat has caught up with Jerry the Mouse. Jerry gets a 3 second head start and runs at 1 foot per second to his mouse-hole, which is 5 feet away. In feet per second, at what minimum speed must Tom run in order to catch Jerry before he reaches his mouse-hole? Answer as a decimal.

18	Bertha is 5 feet tall and stands 105 <u>inches</u> away from a streetlight that is 12 feet tall. How long is Bertha's shadow, in inches?
19	What is the x-coordinate of the point of intersection of the two lines represented by the following two equations? $7x + 2y = 9$ $5x - 4y = 1$
20	The area of ΔABC is 240 ft^2. In square feet, what is the area of ΔABD? Note: Image is not to scale. 
21	Each of the variables a, b, c, d, e, and f represent one of the integers in the set {-4, -2, 0, 2, 4, 6}, not necessarily in that order. What is the greatest possible value of $\frac{a}{b}+\frac{c}{d}+\frac{e}{f}$?
22	A rectangle has integer side lengths and an area of 72 square inches. In inches, what is the largest possible perimeter of this rectangle?
23	A fish has three parts: head, midsection, and tail. A fish's tail is approximately half of the length from its head to the end of its midsection. Its head is approximately one-third of its midsection length. If the fish's head is an inch long, how many inches long is the entire fish?
24	When an entire math class stands equally spaced in a circle, student number 4 is directly opposite student number 12. If fourteen students leave to attend a math competition, how many students are left in the class?
25	Quadrilateral ABCD has vertices A(3,2), B(2,7), C(4,7), and D(5,2). In square units, what is the area of ABCD?
26	Two horses are racing around a 1-mile track. Horse A runs at 30 mph the entire time. If horse B runs at 20 mph on the first quarter of the track, at what speed, in miles per hour, will horse B need to run on the rest of the track to tie horse A?
27	A construction worker is filling a trough with cement. The trough is a rectangular prism 18 feet long, 9 feet wide, and 3 feet deep. How many cubic yards of cement must the construction worker pour?
28	A perfect number is a number where all of its factors, excluding the number itself, sum to the number itself. One formula for generating perfect numbers is $2^{p-1}(2^p-1)$ where p and 2^p-1 both represent prime numbers. What is the fourth largest perfect number?
29	The shape below is a trapezoid and the segment labeled 6x - 18 is its median. What is the value of x? 
30	Solve the equation for y. $\frac{y-2}{2}=\frac{3}{4}+\frac{7-3y}{8}$

Challenge Questions: 3 pts each

31	What is the probability that three cards selected randomly from a standard deck of cards, without replacement, are all odd integers? For example, one possible set of three odd integer cards includes 3 of hearts, 3 of diamonds, and 3 of spades. Ace, Jack, and King are not odd integers.
32	How many ways can $\sqrt{108}$ be written in the form $a\sqrt{b}$, where *a* and *b* are integers, *b* < 108, and *b* has no perfect square factors greater than 36?
33	Anna bets $100 on a game. There are three possible outcomes of her bet. There is a 4/10 probability that she will get her money back and a 50% chance that she will lose her $100. Otherwise she will get her money back plus $50. How many dollars, on average, will Anna gain or lose if she bets $100? Your answer should be positive if she gains, and negative if she loses.
34	In the 4 by 5 array of dots, how many non-square rectangles can be drawn such that all four vertices are on dots of the array? 
35	*D, E, F,* and *G* are the midpoints of the sides of square *PQRS.* Find the area of the shaded region, in square centimeters, given that the perimeter of the outer square is 40 cm. 
36	The speed of light is 3×10^8 meters per second. If Jupiter is 2.25×10^{25} meters from the sun, how many seconds does it take light to reach Jupiter from the sun? Answer in scientific notation.
37	The numbers $1\frac{1}{2}$ and $5\frac{1}{16}$ are terms three and six of the geometric sequence having $\frac{2}{3}$ as term one. What is the positive difference between terms four and five? Answer as a common fraction.
38	A data set with six distinct positive integers has a mean of 26 and a median of 23. If the numbers are listed in order from least to greatest, what is the largest possible value of the 5th term?
39	There is a point (5, 7). Reflect the point across the line with equation $y = \frac{1}{2}x - \frac{7}{4}$. As an ordered pair (x, y), what are the coordinates of the reflected point?
40	In base ten, find the sum of the first fifteen terms of the following sequence: $10_2, 21_3, 32_4, 43_5, 54_6, 65_7, 76_8, 87_9, 98_{10}, \ldots$

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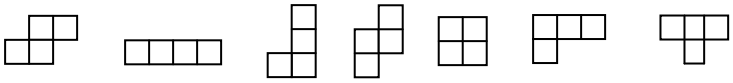
7th Grade – December 1, 2012

Individual Multiple Choice Contest

USE THE FOLLOWING TABLE FOR PROBLEMS 1-3



In the game of Tetris the object is to fit tetrominos (shapes made of four unit squares joined by at least one common side) together across a rectangular board that is ten unit-squares wide. When anywhere from 1 to 4 lines of unit squares are completely covered, they are cleared from the board. The table below shows how points are awarded for clearing from 1 to 4 lines at levels 0 through *n*.

Level	Points for 1 line cleared	Points for 2 lines cleared at once	Points for 3 lines cleared at once	Points for 4 lines cleared at once
0	40	100	300	1200
1	80	200	600	2400
2	120	300	900	3600
. . .	. . .	. . .	. . .	. . .
9	400	1000	3000	12000
n	40*(n+1)*	100*(n+1)*	300*(n+1)*	1200*(n+1)*

1 At level 0, how many times more points do you get for clearing 4 lines at once, than for clearing 1 line?

A) 3 B) 30 C) 300 D) 1160 E) Answer not given.

2 What is the positive difference between the number of points that can be earned for clearing 3 lines at once in level 9 and for clearing 4 lines at once in level 2?

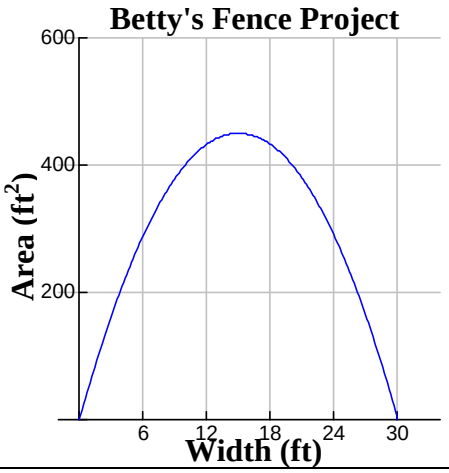
A) 1800 B) 600 C) 0 D) -600 E) Answer not given.

3 In the game of Tetris there are seven figures (as shown above) that can be used to complete a line of unit squares. Any figure that has no reflection line of symmetry has a partner figure that is its own reflection. How many pairs of figures are reflections of each other?

A) 0 B) 1 C) 2 D) 3 E) Answer not given.

USE THE FOLLOWING SCENARIO AND GRAPH FOR PROBLEMS 4-6

Betty wants to build a fence to enclose a rectangular section of her back yard. She has 60 ft of fencing material and her house will serve as one of the walls of the rectangle. The following graph shows possible areas of the rectangle as a function of the width of the rectangle. The equation for the graph is $y = x(60 - 2x)$.



4 When the width of the rectangle is 10 feet, the area is 400 ft^2. At what other width will the area also be 400 ft^2?

A) 21 ft B) 20 ft C) 19.5 ft D) 19 ft E) Answer not given.

5 If the equation for this graph is written in the form $y = ax^2 + bx + c$ then what is the value of a + b + c?

A) 32 B) 56 C) 60 D) 64 E) Answer not given.

6 What is the maximum possible area that can be enclosed in this scenario?

A) 460 ft^2 B) 450 ft^2 C) 435 ft^2 D) 420 ft^2 E) Answer not given.

USE THE FOLLOWING LIST FOR PROBLEMS 7-10.

360 is the smallest positive integer to have exactly 24 factors. These 24 factors are listed as follows in the form $2^a \cdot 3^b \cdot 5^c$. The first column has the smallest six factors of 360 in ascending order, the second column has the 7th through 12th largest factors in ascending order, and so on with the largest factor of 360 at the bottom of the fourth column. For example, $2^0 \cdot 3^0 \cdot 5^0$ is the smallest factor of 24 and it equals 1, while $2^3 \cdot 3^2 \cdot 5^1$ is the largest factor of 360 and it equals 360.

$2^0 \cdot 3^0 \cdot 5^0$	$2^3 \cdot 3^0 \cdot 5^0$	$2^2 \cdot 3^0 \cdot 5^1$	$2^2 \cdot 3^1 \cdot 5^1$
$2^1 \cdot 3^0 \cdot 5^0$	$2^0 \cdot 3^2 \cdot 5^0$	$2^3 \cdot 3^1 \cdot 5^0$	$2^3 \cdot 3^2 \cdot 5^0$
$2^0 \cdot 3^1 \cdot 5^0$	$2^1 \cdot 3^0 \cdot 5^1$	$2^1 \cdot 3^1 \cdot 5^1$	$2^1 \cdot 3^2 \cdot 5^1$
$2^2 \cdot 3^0 \cdot 5^0$	$2^2 \cdot 3^1 \cdot 5^0$	$2^2 \cdot 3^2 \cdot 5^0$	$2^3 \cdot 3^1 \cdot 5^1$
$2^0 \cdot 3^0 \cdot 5^1$	$2^0 \cdot 3^1 \cdot 5^1$	$2^3 \cdot 3^0 \cdot 5^1$	$2^2 \cdot 3^2 \cdot 5^1$
$2^1 \cdot 3^1 \cdot 5^0$	$2^1 \cdot 3^2 \cdot 5^0$	$2^0 \cdot 3^2 \cdot 5^1$	$2^3 \cdot 3^2 \cdot 5^1$

7 How many of the factors of 360 are odd?

A) 6 B) 12 C) 18 D) 24 E) Answer not given.

8 What is the quotient of the 2nd largest factor divided by the 2nd smallest factor of 360?

A) 180 B) 150 C) 120 D) 90 E) Answer not given.

9 What positive integer less than 1000 has exactly 24 factors and is not a multiple of 30?

A) 432 B) 540 C) 560 D) 624 E) Answer not given.

10 What is the prime factorization of the product of all of the factors of 360?

A) $2^{46656} \cdot 3^{256} \cdot 5^1$ B) $2^{36} \cdot 3^{24} \cdot 5^{12}$ C) $2^{24} \cdot 3^{24} \cdot 5^{24}$ D) $2^{18} \cdot 3^{12} \cdot 5^6$ E) Answer not given.

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7th Grade – December 1, 2012

Team Contest

1	When the number of minutes in a year is expressed in scientific notation, what is the exponent of 10?
2	What number must you multiply by 24 to get the same result as the product of 36 multiplied by 42?
3	What is the smallest counting number that could be added to 2012 so that the sum is a multiple of 7?
4	If the side length of a square is increased **by** seventy percent, what is the percent increase in the area of the square?
5	The minute hand of a clock has traveled 2012 degrees since 7:40 PM. To the nearest second, what time is it? Give your answer in the form "hr : min : sec", and include "AM " or "PM".
6	A jar contains only blue marbles and red marbles. If 76% of the marbles in the jar are blue, what is the smallest number of red marbles there could be in the jar?
7	In a Tribonacci sequence, each term after the first three terms is the sum of the three previous terms. If the first three terms of a Tribonacci sequence are {0, 1, 1), what is the 11^{th} term of the sequence?
8	A lucky number is any counting number with two or more digits the same. For example, "33", "828 ", and "777" are all lucky numbers. How many lucky numbers are there less than 1000?
9	A regular tetrahedron is inscribed in a sphere. If the side length of the tetrahedron is 12 centimeters, what is the radius of the sphere, in centimeters?
10	A special die (number cube) is weighted so that the probability of rolling n on one roll of the die is exactly $\frac{1}{n}$ for each of the six values of n. The numbers on five of the faces of this die are 6, 3, 18, 4, and 12. What is the number on the sixth face of the die?

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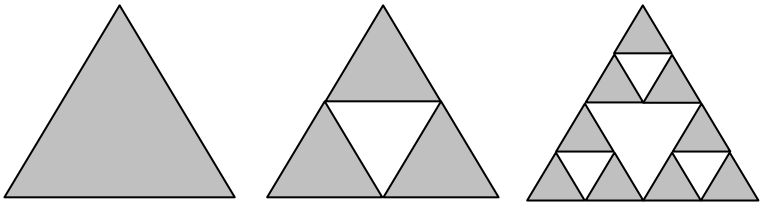
Pressure Round Contest

1	Brian has a deck of cards with integer values from 1 through 5. There are four cards of each value (i.e. four 1's, four 2's, etc.). If Brian draws three cards at random without replacement, what is the probability that the sum of the values of the three cards will be a prime number?
2	If seven liters of a 25% acid solution are mixed with three liters of a 25% acid solution, and then two and a half liters of water are added, what percentage of the resultant mixture is acid?
3	Convert three zero four base five, to base eight.
4	The figure shows stages 0, 1, and 2, of the Sierpinski's Triangle Fractal. The perimeter of the equilateral triangle in stage 0 is 24 cm. If the perimeter of any individual stage's figure is the sum of the edges of all shaded equilateral triangles, then, in centimeters, what is the perimeter of the figure in stage 6? Give your answer as a common fraction.  Stage 0 Stage 1 Stage 2
5	Today's date, when written in the form ab/ab/ab, is 12/01/12. It has one 0, two 2s, and three 1s. In how many days will the next date occur which has the same number of 0s, 1s, and 2s, not necessarily in the same order?

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COLLEGE KNOWLEDGE BOWL ROUND #1 - SET 1

#	Problem	Answer
1	Joe procrastinated and has until ten thirty AM tomorrow to finish his school project. It is nine PM today when Joe finally starts his project, and he needs twelve hours to finish. What is the maximum number of minutes of sleep that Joe can allow himself if he is to finish his project on time?	90 [min]
2	Sally has more than twice as many football trading cards as Billy-Bob. Sally has 79 trading cards. What is the greatest number of trading cards Billy-Bob might have?	39 [trading cards]
3	What is the slope of the line containing the points four comma negative one and seven comma two.	1
4	Nine disgruntled turtles have to split a 63-inch long sandwich. What is the number of inches in the length of the part of the sandwich that each turtle gets if each turtle gets an equal amount?	7 [in]
5	Two of the turtles decide to steal the 63-inch long sandwich and eat it from the ends in. Turtle A eats an inch every 10 seconds, and Turtle B eats two inches every 10 seconds. How many inches of sandwich will Turtle B have eaten when the sandwich is gone?	42 [in.]
6	The turtle that ate more of the sandwich is too slow to escape the hungry hawk. If the turtle runs at half a mile per hour and the hawk flies at 30 miles per hour, how long in seconds will it take the hawk to catch the turtle if it is 1 mile away? Round up to the next second.	123 [sec]
7	The perimeter of a rectangle is 24 centimeters. The length is 4 centimeters less than 7 times the width. Find the dimensions of the rectangle in centimeters.	2 by 10 [cm]
8	There are 12 cats. In the fall, those 12 cats each have 3 kittens. In the following spring, those 12 original cats and their now-grown kittens have 4 new kittens each. How many new kittens are there?	192 [kittens]
9	What is the number of days in the first 5 months of the calendar year in a non-leap year?	151 [days]
10	What is the sum of the first 11 prime numbers?	160

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COLLEGE KNOWLEDGE BOWL ROUND #2 - SET 2

#	Problem	Answer
1	Robert has 27 shirts and 6 pairs of pants. How many different outfits can Robert create?	162 [outfits]
2	How many pints are in 14 gallons?	112 [pints]
3	If a dog barks 3 times in 10 seconds and a cat meows 4 times each time the dog barks, how many barks and meows will occur in 1 hour?	5400 [barks and meows]
4	What is the 4^{th} smallest prime number?	7
5	How many days are there after February 4^{th} and before July 1st in a non-leap year?	146 [days]
6	What is 16 squared minus 12 squared?	112
7	Solve the following equation for x: x plus y equals 47 minus y, when y equals 10.	[x =] 27
8	A triangle has an area of 24 square feet and a height of 10 feet. As a decimal, what is the number of feet in the base of the triangle?	4 point 8 [feet]
9	What is the number of square centimeters in the lateral surface area of a cone with base radius 3 centimeters and slant height 7 centimeters?	21 pi [cm^2]
10	In the Fibonacci sequence, terms have the following pattern: one, one, two, three, five, eight, thirteen, and so on. In the first 15 terms, what is the sum of all terms that are even numbers?	798

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COLLEGE KNOWLEDGE BOWL ROUND #3 - SET 3

#	Problem	Answer
1	If Jerry runs from the bus stop to school at a rate of 6 miles per hour, and leaves the bus stop at five forty-five AM, what time will he arrive at school if the school is 8 miles away from the bus stop? Include AM or PM.	7:05 AM
2	James has 20 dimes and 15 quarters. Rounding to the nearest whole dollar, how many dollars does James have?	[$]6
3	One honey badger decides to court another honey badger by sharing a cobra. If it takes him 20 minutes to eat a cobra by himself, and her 30 minutes to eat a cobra by herself, how long will it take for them to eat it together?	12 [minutes]
4	Two bikers are riding next to each other. How much faster is the first biker going, if she is riding at sixty-eight point seven nine miles per hour, and the other is riding at fifty-one point nine two miles per hour?	16 point 87 [mph]
5	What is the greatest possible value of any of five distinct positive integers with a mean of 11?	45
6	What is the y-intercept of the line that is perpendicular to the line with equation 2y equals 3x minus 8 and that passes through the point 3 comma 1? Give your answer as an ordered pair.	zero [comma] three
7	Lacey the dog is on a 5 foot leash attached to the inside corner of two walls. If the supplement of the angle between the walls is 120 degrees, then what is the number of square feet in the area that Lacey can roam?	25 pi over 6 [sq feet] or 25 sixths pi [sq feet]
8	Farmer buys a new ant farm with 250 ants. Each day, two ants hatch and every third day, 2 ants die. How many ants does Farmer have after 4 weeks?	288 [ants]
9	A gallon of gas costs 4 dollars and 9 cents and a gallon of water costs 1 dollar and 98 cents. What is the number of dollars and cents that Bob would spend if he bought 6 gallons of gas and 4 gallons of water?	32 dollars and 46 cents Or 'thirty-two forty-six'
10	A trapezoid has an area of 10 square feet and bases whose lengths are integers that differ by two. What is the smallest possible integer number of inches in the height of the trapezoid?	1 [foot]

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COLLEGE KNOWLEDGE BOWL ROUND #4 - SET 4

#	Problem	Answer
1	If x equals 3, y equals 6, and xyz equals 72, what is the value of z?	4
2	A right isosceles triangle has two sides of length square root of 8 inches. What is the number of inches in the length of the third side?	4 [inches]
3	A dragon is born with a ten-foot wingspan and its wingspan increases at a rate of 2.5 feet per year. As a decimal, how many feet wide is its wingspan after 63 years?	167 point 5 [feet]
4	How many letters are in the word Mississippi, if you take out all the "i's"?	7 [letters]
5	The sides of a seven-sided die are numbered 1 through 7. Bill rolls it 3 times. What is the probability that he gets a 7 then a 3 then a 7 again.	1 over 343 or one three [hundred[and]] forty-third
6	Caleb is buying a new car with 3 different sets of tires, 6 paint colors, and 4 headlight types to choose from. If he chooses 1 set of tires, 1 paint color, and 1 type of headlight, in how many ways can he select these features for his car?	72 [ways]
7	How many positive integer factors are there for one thousand two hundred sixty?	36
8	What is 97 times 93?	9021
9	A circle has a radius of 12 meters. If the radius is increased by 25 percent, how many square meters are in the increase in the circle's area?	81 pi [m^2]
10	How many units from the origin is the vertex of the graph of the function y equals x squared minus 4x plus 11?	square root of 53 [units] or root 53 [units] or radical 53 [units]

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COLLEGE KNOWLEDGE BOWL ROUND #5 - SET 5

#	Problem	Answer
1	What is the mean of the following set of data: three, six, twenty, sixteen, five	10
2	What is the slope of the line with equation negative 5x plus 6y equals 17?	5 over 6 or five sixths
3	In how many ways can you rearrange the letters in the word PINGPONG?	5040
4	Write the repeating decimal, point three nine three nine three nine etcetera as a common fraction.	13 over 33 or thirteen thirty-thirds
5	Solve the following system of equations for y: 8x plus 2y equals 158 and 3x plus 7y equals 228.	[y=] 27
6	What is the number of square meters in the surface area of a sphere with diameter 8 meters?	64 pi [m^2]
7	What is the number of inches in the perimeter of a regular hexagon with an area of six hundred times the square root of 3 square inches?	120 [in]
8	What is the probability of rolling a standard die and flipping two coins, and getting a 6, a head, and a tail?	1 over 24 or one twenty-fourth
9	What is the number of square inches in the area of a parallelogram with a base of 12 inches and a height of 4.5 inches?	54 [in^2]
10	Jeff takes 30 cards and writes the first 30 counting numbers on them, one number per card. He then draws two cards at random, without replacement. As a simplified fraction, what is the probability that both his cards have prime numbers on them?	3 over 29 or three twenty-ninths

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COLLEGE KNOWLEDGE BOWL ROUND #6 - SET 6

#	Problem	Answer
1	Sally rides her bicycle downhill at 60 miles per hour for 30 seconds. How many miles did Sally ride downhill?	1 over 2 [mile] or one half [mile]
2	The Ghostbusters are called twice per day. They catch two ghosts for every call. How many ghosts are caught in January?	124 [ghosts]
3	What is the slope of the line that passes through the points 1 comma 6 and 3 comma 24?	9
4	Bob buys a 24-pack of pencils. Each pencil lasts for 3 days. If he loses 5 of them, how many days will this pack of pencils last?	57 [days]
5	A triangle has side lengths of 5, 6, and 7 centimeters. A similar triangle has a perimeter of 27 centimeters. As a decimal, what is the number of centimeters in the length of its longest side?	10 point 5 [cm]
6	What is the number of cubic centimeters in the volume of a sphere with diameter 6 centimeters?	36 pi [cm^3]
7	Solve the following equation for x: y squared minus x equals y plus x, when y equals 3.	[x =] 3
8	How many prime numbers are between 30 and 84?	13 [prime numbers]
9	What is the difference between the 2^{nd} largest and the 2^{nd} smallest positive integer factors of 2012?	1004
10	Chuck has 3 dollars. If he has 3 times as many nickels as dimes and the same amount of quarters as nickels, how many dimes does he have?	3 [dimes]

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7th & 8th Grade – December 1, 2012

COLLEGE KNOWLEDGE BOWL ROUND – EXTRA

#	Problem	Answer
1	How many unit cubes are needed to build four [PAUSE] three by three by three cubes?	108 [unit cubes]
2	What is the fourth smallest positive composite number?	9
3	In a book with 115 pages, how many times does the digit 6 appear among the page numbers, assuming every page is numbered.	21 [times]

Final Score:

KEY

(Out of 8)

"Math is Cool" Masters -- 2012-13

School:_____ Room # ____ Team #____

Name: _____Proctor: _____

7th & 8th Grade

Mental Math – 30 sec per question

8 problems read orally to everyone - Approximately 8% of Individual Score - 25% of team score

When it is time to begin, the proctor will read the first question twice. You may not do any writing or talking while arriving at a solution. Once you have a solution, record it on the sheet in front of you. ***You may not change or cross out answers once you have written an answer down. If there are eraser marks, write-overs, or crossed-out answers, they will be marked wrong.*** *Once all students have laid their pencils on the desk, another question will be asked. If a student doesn't lay his/her pencil down, the maximum wait time is 30 seconds after completion of the second reading of the question before another question is asked. You may continue to work on a problem while the next question is being read. The value of each question is a one or zero. Each student will be asked the same eight questions. Individual scores used to determine individual placing will be determined by the sum of the Mental Math score and the Individual Test score for each individual. In addition, the top three Mental Math scores from one team will be totaled and doubled and will contribute to 25% of the team score.*

	Answer	1 or 0	1 or 0
1	512 [bananas]		
2	10 [palindromes]		
3	30π [sq in]		
4	4		
5	South		
6	75 [percent]		
7	752		
8	3 [diagonals]		

Math is Cool" Masters – 2012-13

7th Grade – December 1, 2012

Final Score:

KEY

Student Name_____

Proctor Name_____Room #_____

First Score

(out of 20)

SCHOOL NAME_____ Team #_____

INDIVIDUAL MULTIPLE CHOICE - 15 minutes – 10 problems – 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	B		
2	B		
3	C		
4	B		
5	E (58)		
6	B		
7	A		
8	D		
9	E (864 or 416)		
10	B		

"Math is Cool" Masters – 2012-13

7th Grade – December 1, 2012

Final Score:

KEY

SCHOOL NAME_____Team # ____

First Score

(out of 10)

Proctor Name_____Room #_____

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	5		
2	63		
3	4		
4	189 [percent]		
5	1:15:20 AM		
6	6 [marbles]		
7	149		
8	261 [numbers]		
9	$3\sqrt{6}$ [*cm*]		
10	9		

"Math is Cool" Masters – 2012-13

7th Grade – December 1, 2012

Final Score:
KEY

First Score

Proctor Name_____Room #_____

SCHOOL NAME_____Team #_____

PRESSURE ROUND - 10 minutes – 5 problems - 5 rounds – 15% of team score

When it is time to begin, you will be handed a packet of five problems. There is a copy of the problems for each team member. Two minutes after the start of the test you are expected to submit an answer for one of the problems (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 problems; its maximum value is two points. This process will continue until all the problems are answered and each consecutive problem'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 problem 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. If a team answers the same question more than once, only the first answer will be scored and the other attempts will be ignored.

Pressure Round Answers

	Answer
1	31/95
2	20 [%]
3	$117_{[8]}$
4	$\frac{2187}{8}$ [cm]
5	9 [days]

Final Score:
(Out of 8)

"Math is Cool" Masters -- 2012-13

School:_____ Room # ____ Team #____

Name: _____Proctor: _____

7th & 8th Grade **Mental Math** – 30 sec per question

8 problems read orally to everyone - Approximately 8% of Individual Score - 25% of team score

When it is time to begin, the proctor will read the first question twice. You may not do any writing or talking while arriving at a solution. Once you have a solution, record it on the sheet in front of you. ***You may not change or cross out answers once you have written an answer down. If there are eraser marks, write-overs, or crossed-out answers, they will be marked wrong.*** *Once all students have laid their pencils on the desk, another question will be asked. If a student doesn't lay his/her pencil down, the maximum wait time is 30 seconds after completion of the second reading of the question before another question is asked. You may continue to work on a problem while the next question is being read. The value of each question is a one or zero. Each student will be asked the same eight questions. Individual scores used to determine individual placing will be determined by the sum of the Mental Math score and the Individual Test score for each individual. In addition, the top three Mental Math scores from one team will be totaled and doubled and will contribute to 25% of the team score.*

	Answer	1 or 0	1 or 0
1			
2			
3			
4			
5			
6			
7			
8			

Math is Cool" Masters – 2012-13

7th Grade – December 1, 2012

Final Score:

First Score

(out of 20)

Student Name_____

Proctor Name_____Room #_____

SCHOOL NAME_____ Team #_____

INDIVIDUAL MULTIPLE CHOICE - 15 minutes – 10 problems – 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			
2			
3			
4			
5			
6			
7			
8			
9			
10			

"Math is Cool" Masters – 2012-13

7th Grade – December 1, 2012

Final Score:

SCHOOL NAME_____Team # ____

First Score
(out of 10)

Proctor Name_____Room #_____

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			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Final Score:

KEY

"Math is Cool" Masters – 2012-13

December 1, 2012

STUDENT NAME: _____ **School Name:** _____

Proctor Name: _____ Team #: _____ Room #: _____

PRE-ALGEBRA Individual Contest – Score Sheet

DO NOT WRITE IN SHADED REGIONS

	Answer	1 or 0	1 or 0
1	0		
2	8 [factors]		
3	165		
4	990		
5	11 [odd numbers]		
6	1/2		
7	11 [regions]		
8	9		
9	5a - 3b + 3 [or Equiv]		
10	3 [quadrants]		
11	20 [gallons]		
12	1		
13	1 [digit]		
14	[x=] 4		
15	9 [sites]		
1-15 TOTAL:			

	Answer	1 or 0	1 or 0
16	6 [cm]		
17	2.5 [ft/sec]		
18	75 [inches]		
19	[x =] 1		
20	80 [ft^2]		
21	2		
22	146 [inches]		
23	6 [in.]		
24	2 [students]		
25	10 [$units^2$]		
26	36 [mph]		
27	18 [yds^3]		
28	8128		
29	[x=] 11		
30	[y=] 3		
16-30 TOTAL:			

	Answer	1 or 0	1 or 0
31	28/1105		
32	3 [ways]		
33	-[$]45 or -[$]45.00 or Lose [$]45[.00]		
34	44 [rectangles]		
35	20 [cm^2]		
36	7.5×10^{16} [seconds]		
37	9/8		
38	53		
39	(10, -3)		
40	1465		
31-40 TOTAL:			

PRE-ALGEBRA

Final Score:

KEY

"Math is Cool" Masters – 2012-13

December 1, 2012

STUDENT NAME: _____ **School Name:** _____

Proctor Name: _____ Team #: _____ Room #: _____

ALGEBRA Individual Contest – Score Sheet

DO NOT WRITE IN SHADED REGIONS

	Answer	1 or 0	1 or 0
1	990		
2	11 [odd numbers]		
3	165		
4	9		
5	86 [integers]		
6	5a - 3b + 3 [or equiv]		
7	1/2		
8	3 [quadrants]		
9	[x=] 4		
10	8a + 12		
11	20 [gallons]		
12	1		
13	1 [digit]		
14	9 [sites]		
15	6 [cm]		
1-15 TOTAL:			

	Answer	1 or 0	1 or 0
16	2 [students]		
17	146 [inches]		
18	[x =] 1		
19	2		
20	[x=] 11		
21	$96+24\sqrt{2}$ [meters]		
22	6 [in.]		
23	18 [yds^3]		
24	$\sqrt[3]{6}$		
25	4/9		
26	36 [mph]		
27	[y=] 3		
28	8128		
29	28/1105		
30	3 [ways]		
16-30 TOTAL:			

	Answer	1 or 0	1 or 0
31	$\sqrt{6}\,[cm]$		
32	-[$]45 or -[$]45.00 or Lose [$]45[.00]		
33	44 [rectangles]		
34	7.5 x 10^{16} [seconds]		
35	20 [cm^2]		
36	9/8		
37	53		
38	(10, -3)		
39	$y=-2x^2+4x+30$		
40	1465		
31-40 TOTAL:			

ALGEBRA

Final Score:

KEY

"Math is Cool" Masters – 2012-13

December 1, 2012

STUDENT NAME: _____ **School Name:** _____

Proctor Name: _____ Team #: _____ Room #: _____

GEOMETRY Individual Contest – Score Sheet

DO NOT WRITE IN SHADED REGIONS

	Answer	1 or 0	1 or 0
1	86 [integers]		
2	5a - 3b + 3 [or Equiv]		
3	$3\sqrt{2}$ [feet]		
4	1/2		
5	672 [g]		
6	3 [quadrants]		
7	11 [regions]		
8	80 [ft^2]		
9	8a + 12		
10	6 [cm]		
11	20 [gallons]		
12	[x=] 11		
13	1 [digit]		
14	146 [inches]		
15	[y=] 3		
1-15 TOTAL:			

	Answer	1 or 0	1 or 0
16	2 [students]		
17	6 [in.]		
18	[x =] 1		
19	2		
20	8128		
21	$96+24\sqrt{2}$ [meters]		
22	6 [cm]		
23	18 [yds^3]		
24	$\sqrt[3]{6}$		
25	10 [$units^2$]		
26	36 [mph]		
27	$4\sqrt{3}$ [m]		
28	28/1105		
29	3 [ways]		
30	$\sqrt{6}\,[cm]$		
16-30 TOTAL:			

	Answer	1 or 0	1 or 0
31	-[$]45 or -[$]45.00 or Lose [$]45[.00]		
32	44 [rectangles]		
33	7.5×10^{16} [seconds]		
34	20 [cm^2]		
35	9/8		
36	53		
37	(10, -3)		
38	$12-8\sqrt{2}$ [in^2] or $4(\sqrt{2}-1)^2$ [in^2] or equiv		
39	$y=-2x^2+4x+30$		
40	1465		
31-40 TOTAL:			

GEOMETRY