"Math is Cool" Masters – 2015-16

December 5, 2015

Total Correct: KEY

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	3 [digits]		
2	[x =] 18		
3	360		
4	24 [licorice dogs]		
5	15		
6	5 [integers]		
7	71/105		
8	500000 [inches]		
9	14		
10	6 [orders]		
11	32 [centimeters]		
12	[a =] -3		
13	2 [holes per second]		
14	110		
15	4 [ways]		
1-15 TOTAL:			

	Answer	1 or 0	1 or 0
16	1/2		
17	1/2		
18	15 [anteaters]		
19	20 [%]		
20	09/12/15		
21	9		
22	46 [paths]		
23	[x =] 33		
24	(-8, 0)		
25	$33\frac{1}{3}$ [%] or $\frac{100}{3}$ [%] or $33.\overline{3}$ [%]		
26	402/613		
27	45		
28	5x - 4y = -12		
29	195 [°]		
30	4		
16-30 TOTAL:			

	Answer	1 or 0	1 or 0
31	7		
32	3/7		
33	37		
34	48 [cm^2]		
35	41		
36	3614.4 [seconds]		
37	$\frac{6}{\sqrt{3}}$ [cm] or $2\sqrt{3}$ [cm]		
38	[Mr.] Blue		
39	28/143		
40	221.5π [ft^2] or $\frac{443\pi}{2}$ [ft^2]		
31-40 TOTAL:			

PRE-ALGEBRA

Total Correct:

"Math is Cool" Masters – 2015-16

December 5, 2015

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			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
1-15 TOTAL:			

	Answer	1 or 0	1 or 0
16			
17			
18			
19			
20			
21			
22			
23			
24			
25			
26			
27			
28			
29			
30			
16-30 TOTAL:			

	Answer	1 or 0	1 or 0
31			
32			
33			
34			
35			
36			
37			
38			
39			
40			
31-40 TOTAL:			

PRE-ALGEBRA

"Math is Cool" Masters – 2015-16

December 5, 2015
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 all 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 problems dealing with money. In the case of problems requiring dollar answers, answer as a decimal rounded to the neares 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.*

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.*

"Math is Cool" Masters – 2015-16

7th & 8th Grade – December 5, 2015
Mental Math Contest

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.*

#	Problem
1	What is the number of square feet in the area of a square with a side length of one yard?
2	What is the product of one hundred ninety and one-half?
3	What percent of five is fifteen?
4	The mean of a set of six numbers is eighteen. What is the sum of the six numbers?
5	As a common fraction, what is the probability of drawing a card from a standard deck of cards that is not a red queen?
6	As a common fraction, what is the number of miles per minute in the speed of a car traveling thirty miles per hour?
7	On a coordinate plane, the point with coordinates one comma two is translated five units to the right. What is the sum of the coordinates of the new point?
8	As a common fraction, what fraction of the two-digit integers less than twenty have a units digit that is greater than its tens digit?

“Math is Cool” Masters – 2015-16

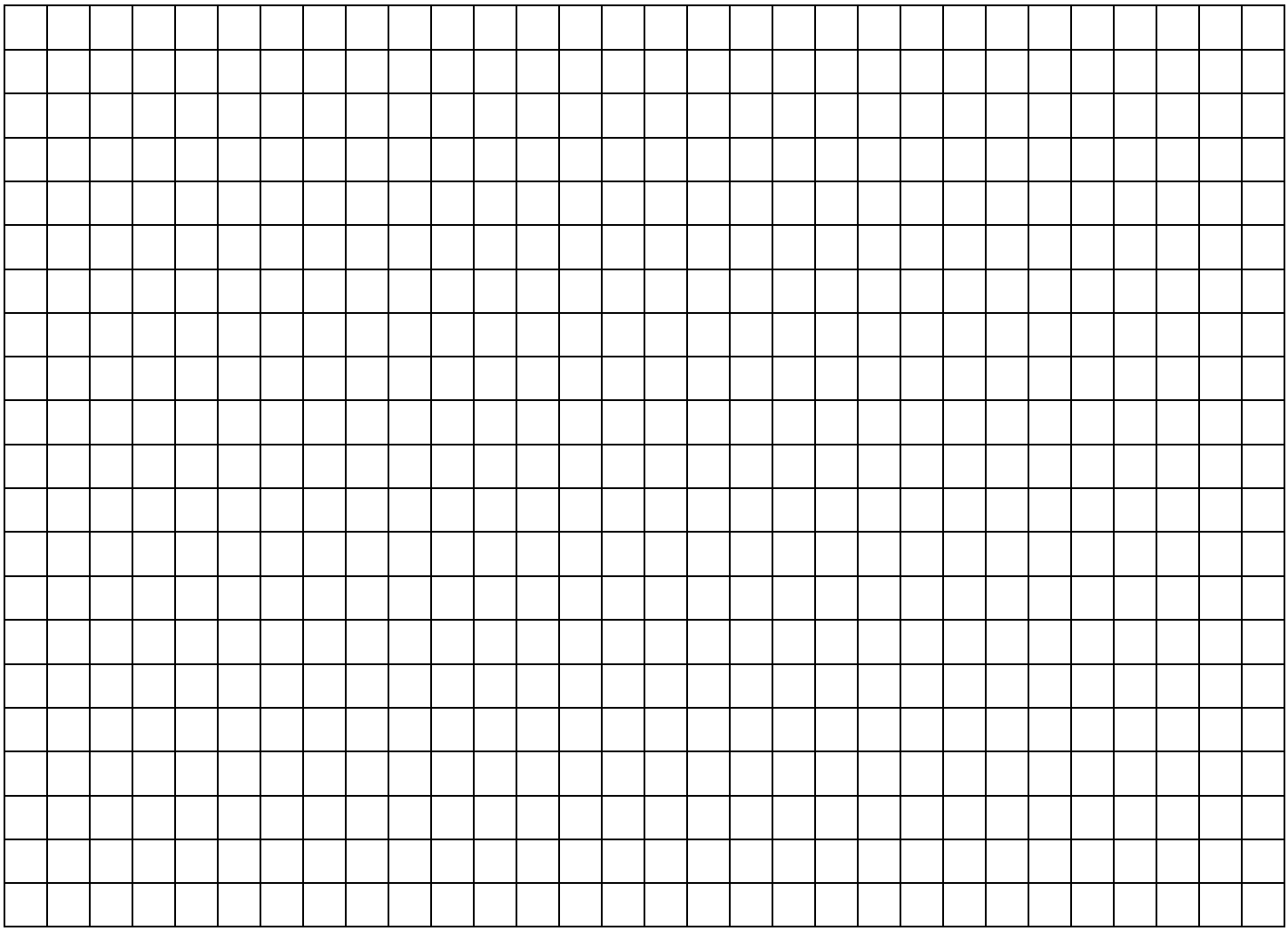
December 5, 2015

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.

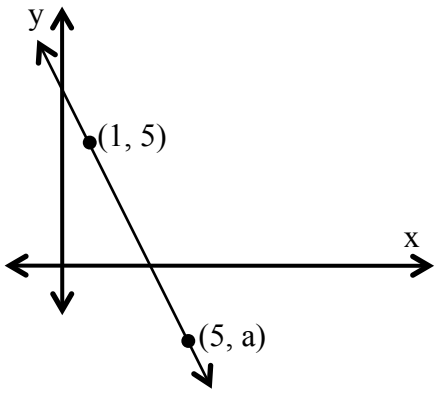
INDIVIDUAL TEST – PRE-ALGEBRA - 35 minutes

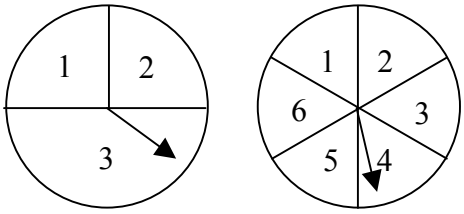
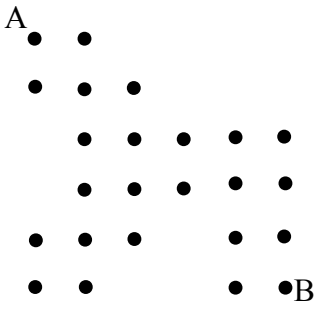
You may NOT be seated next to anyone from your school. If you are MOVE NOW to avoid being disqualified! When you are prompted to begin, tear off the colored sheet and begin testing. Make sure your name and school are recorded on the answer sheet. The raw score will be 2 points for correct answers to 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.



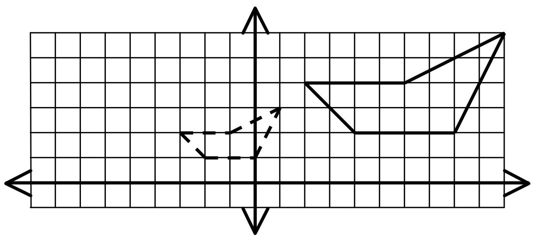
"Math is Cool" Masters – 2015-16

December 5, 2015
PRE-ALGEBRA - Individual Contest

	Questions 1-30: 2 points each
1	What is the number of digits in the product of 31 and 32?
2	What is the value of x for the following equation: 10x - 50 = 130
3	Evaluate: (13 + 7)(16 - 7)(50 - 48)
4	Amy gives Marco half of her licorice dogs. Marco gives a third of the licorice dogs he got from Amy to Aisha. Aisha eats all four of the licorice dogs she gets from Marco. How many licorice dogs did Amy have to start with?
5	If a * b = $\frac{3ab}{10}$, what is the value of 100*0.5?
6	What is the number of odd integers between 10 and 20?
7	What is the sum of $\frac{1}{3}+\frac{1}{5}+\frac{1}{7}$?
8	What is the number of inches in the radius of a circle with a circumference of 1000000π inches?
9	If 10x - 7x is greater than 40, what is the smallest possible integer value of x?
10	In how many distinct orders can the letters of the word TRY be arranged?
11	What is the number of centimeters in the perimeter of a square whose area is 64 cm^2?
12	The slope of the line shown is -2. What is the value of a? 
13	Elsa can three-hole punch 200 sheets of paper in 5 minutes. How many holes per second is this?
14	What is the sum of the consecutive integers from 5 to 15, including 5 and 15?
15	A marching band has twenty-seven members. What is the number of possible ways to arrange the members in rows each having the same number of people?
16	If Georgie spins the two spinners, what is the probability that the sum of the two resulting numbers

	is even? Assume the spinners stop at random locations on the circles when spun, that sections 1 and 2 have the same area as each other and combine to have the same area as section 3 on the left spinner, and that all 6 sections have the same area on the right spinner. 
17	Fred writes WASH ME in the dust covering the outside of a dirty window. From inside the window all of the letters appear as horizontal reflections of what he originally wrote. As a common fraction, what is the ratio of letters that appear different after the reflection to letters that appear unchanged after the reflection?
18	Four bears and two anteaters weigh the same as two cows. Three bears weigh the same as one cow and six anteaters. One cow and one bear weigh the same as twenty-two anteaters. What is the number of anteaters that weigh the same as one cow?   
19	The movie The Hobbit: An Unexpected Journey is 3 hours 10 minutes long. The Hobbit: The Desolation of Smaug is 3 hours 15 minutes long and The Hobbit: The Battle of the Five Armies is 3 hours long. Daniel is having a party to watch all three Hobbit movies. When he and his friends have watched all of the first two movies and 1 hour 7 minutes of the third, he notices that his friends are asleep. At this moment what percent of the total combined running time of the three movies is still left to watch in the third movie?
20	The date August 17, 2015 can be written in the form 08/17/15. When written in this form, the three numbers can be arranged to form a Pythagorean Triple, because $8^2 + 15^2 = 17^2$. Written in the form xx/xx/xx, what was the next such Pythagorean Triple date? Be sure to include a 0 in the tens place for any single-digit numbers. Hint: this date has already occurred.
21	What is the third digit after the decimal in the decimal representation of $\frac{4}{31}$?
22	What is the number of distinct paths that can be drawn from A to B if your pencil may only be moved one unit down or one unit right each time it is moved. Assume the space between any two horizontally or vertically adjacent dots is one unit. 
23	Solve for x: $\frac{3x-15}{12} = 7$

24 On the graph shown below the dashed figure is the image after a dilation with scale factor of $\frac{1}{2}$. In (x, y) form, what are the coordinates of the center of dilation?



25 When two friends share an apartment, they each pay $600 per month. If a third friend moves in and the three share the rent equally, by what percent does each of the original two friends' share decrease?

26 In a survey, 2918 people were asked whether they ski, snowboard, do both or do neither. The results are shown in the table. As a common fraction, what is the probability that someone who completed the survey skis given that they also snowboard?

		Snowboard	
		yes	no
Ski	yes	1206	775
	no	633	302

27 Let a equal the sum of all positive odd two-digit integers. Let b equal the sum of all positive even two-digit integers. What is the value of a - b?

28 Rewrite the following linear equation in the form Ax + By = C, where A, B and C are integers whose greatest common factor is 1 and A is positive:

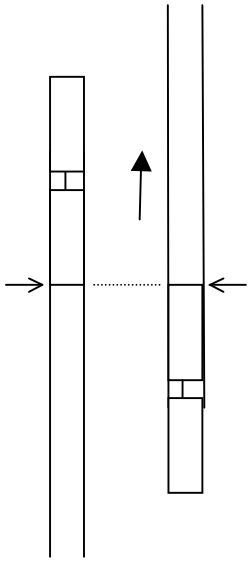
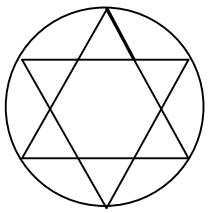
$$y = \frac{5}{4}x + 3$$

29 Gretchen's school day begins at 8:40 am and lets out at 3:10 pm. In degrees, what is the measure of the larger angle between the hour hand's position at the start of the school day and its position at the end of the school day?

30 The mean of three positive integers is 60. Exactly two of the integers are odd and distinct from each other. These two odd integers have two digits and have the property that one is the same as the other but with its digits reversed. What is the smallest possible value of the even integer?

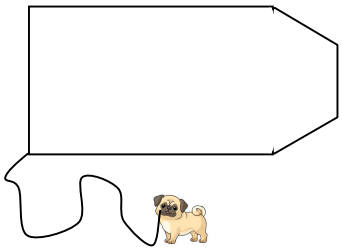
A

Challenge Questions: 3 pts each

31	The base-x number 1234_x equals 466 in base-10. What is the value of x?
32	Cham Kancellor wants his jersey to have a two-digit prime number on the back that remains a prime number when the digits are reversed. If a number is chosen at random from the set of two-digit prime numbers, as a common fraction, what is the probability that Cham will get what he wants?
33	If $x - y = 5$ and $xy = 6$, then what is the value of $x^2 + y^2$?
34	A rectangular prism has dimensions 3 by 6 by 8 cm. An amount of water with a volume of 48 cm^3 fills the prism to within 2 cm of the top. What is the number of square centimeters in the area of the rectangular face on which the prism rests?
35	The expression $\sqrt{10+\sqrt{10+\sqrt{10+\ldots}}}$ is equivalent to the expression $\frac{1\pm\sqrt{a}}{2}$, where a is a positive integer. What is the value of a?
36	A train that is a tenth of a mile long leaves the station traveling northbound at an average speed of 45 miles per hour. A second train that is a fifth of a mile long leaves the same station at the same time traveling southbound at an average speed of 30 miles per hour. After how many seconds will the back ends of the two trains be exactly 75 miles apart? Assume that the fronts of the trains are lined up as shown in the diagram. Give your answer as a decimal. 
37	A regular six-pointed star is inscribed in a circle with radius 6 centimeters as shown. What is the number of centimeters in the length of $\overline{AB}$? 

6 ft

10 ft
shed

38	Three of the following statements are false. 1. Mr. Red: "Mr. Blue did it". 2. Mr. Blue: "Mr. Red did it". 3. Mr. Green: "Mr. Blue's telling the truth". 4. Mr. Yellow: "Mr. Green's not lying". Who did it?
39	Mary has three red cards and six black cards. Larry has eight red cards and five black cards. Larry randomly chooses three of his cards and gives them to Mary. What is the probability that Mary then has more red cards in her hand that Larry has left in his?
40	Benji is tied to the corner of a shed in the middle of an open field, as shown. The perimeter of the shed resembles a rectangle on three sides and the three sides on the right are in the shape of half of a regular hexagon. The two long straight sides of the shed are each 10 feet long and the straight side on the left is 6 feet long. Benji's leash is 16 feet long. In terms of π, what is the number of square feet in the area of the yard over which Benji can walk? 

PRE-ALGEBRA

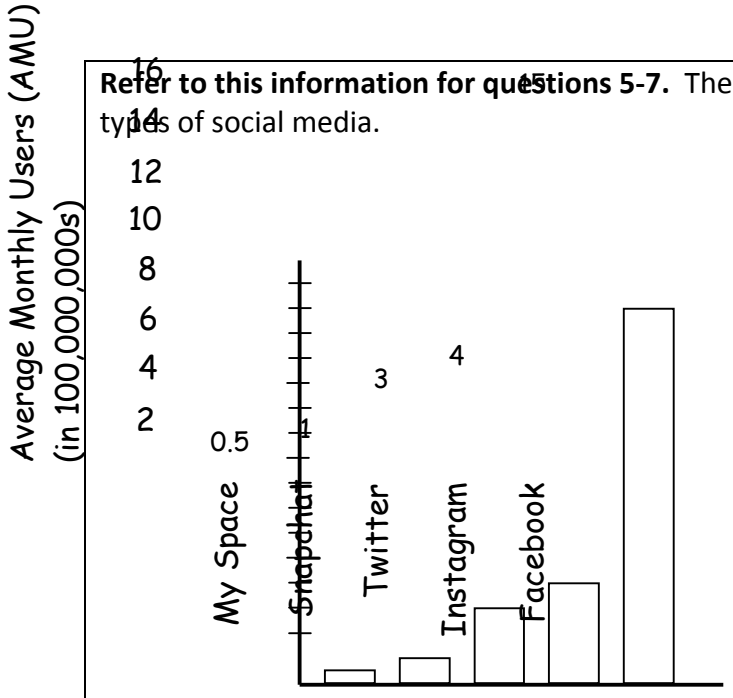
"Math is Cool" Masters – 2015-16

7th Grade – December 5, 2015
Individual Multiple Choice Contest

Refer to this information for questions 1-4. The number 2 is the smallest number that has two distinct factors. Its factors are {1 and 2}. The smallest number that has three distinct factors is 4 and the factors are {1, 2, and 4}. The smallest number with four distinct factors is 6 and the factors are {1, 2, 3, and 6}.	
1	What is the smallest number that has five distinct factors? A) 18 B) 16 C) 15 D) 12 E) 10
2	What is the name for the set of numbers that have exactly two distinct factors? A) composite numbers B) even numbers C) perfect square numbers D) prime numbers E) irrational numbers
3	What is the smallest number that has seven distinct factors of which none is a perfect square? A) 24 B) 32 C) 50 D) 64 E) All numbers have at least one perfect square factor.
4	What is the positive difference between the smallest number with eight distinct factors and the smallest number with nine distinct factors? A) 24 B) 12 C) 8 D) 6 E) 4

Continue with questions 5-10 on the back page.

Refer to this information for questions 5-7. The bar graph shows the number of users of five different types of social media.



5	How many times more AMU does Instagram have than My Space? A) 2 B) 4 C) 6 D) 8 E) 30
6	If the average number of Friends per Facebook account is 338, what is the total number of Facebook Friends? A) $507x10^{11}$ B) $50.7x10^{11}$ C) $5.07x10^{11}$ D) $50.7x10^{9}$ E) $5.07x10^{10}$
7	Mel has 338 Friends on his Facebook account and they all are Friends of each other and no one else. One day he and all of his Facebook Friends post one comment each on each other's timelines. What is the total number of posts that occur? A) 56953 B) 57291 C) 114244 D) 115462 E) Answer not given.

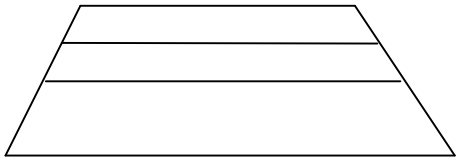
Refer to this information for questions 8-10. A square with side length 4 centimeters has a perimeter of 16 cm and an area of 16 cm^2. For this square the perimeter and area are numerically equivalent. A circle with radius 2 centimeters has a circumference and area that are numerically equivalent. A sphere with radius 6 centimeters has a surface area ($S=4\pi r^2$) and a volume ($V=\frac{4}{3}\pi r^3$) that are numerically equivalent.

8	What is the number of centimeters in the side length of a cube such that its surface area and volume are numerically equivalent? A) 6 B) 5 C) 4 D) 3 E) 2
9	What is the number of centimeters in the radius of a circle whose circumference is numerically 4 times its area? A) $\frac{1}{8}$ B) $\frac{1}{4}$ C) $\frac{1}{2}$ D) 1 E) 2
10	What is the number of centimeters in the radius of a sphere whose surface area is numerically 4 times its volume? A) $\frac{1}{4}$ B) $\frac{2}{3}$ C) $\frac{3}{4}$ D) 4 E) 12

"Math is Cool" Masters – 2015-16

7th Grade – December 5, 2015

Team Contest

1	Boris is knitting a sweater. He can knit three rows every five minutes on average. His sweater will take 132 rows to complete. What is the number of minutes he will need to knit the sweater?
2	What is the sum of the distinct prime factors of 2015?
3	In trapezoid ABCD, AG = GE, BH = HF, AE = ED, BF = FC, AB = 22 in, and CD = 36 in. As a decimal, what is the number of inches in the length of $\overline{GH}$? 
4	An urn contains 9 red marbles and 7 blue marbles. As a common fraction, what is the probability of drawing three blue marbles in a row without replacement?
5	What is the largest three-digit perfect square having the property that each of its digits is a nonzero perfect square?
6	What is the arithmetic mean of the following set of numbers? Give your answer as a mixed number in base 10. 11_2, 22_3, 33_4, 44_5, 55_6, 66_7, 77_8, 88_9, 99_{10}
7	For $-20 \le x \le 20$, what is the number of solutions consisting of integer values for both x and y in the equation 3x - 5y = 11?

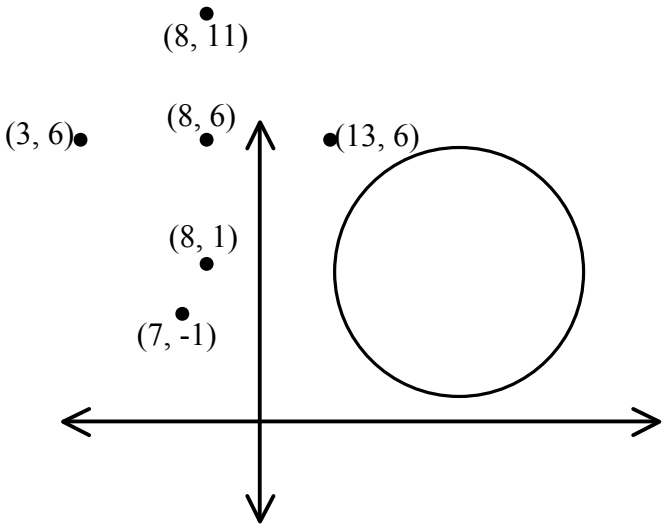
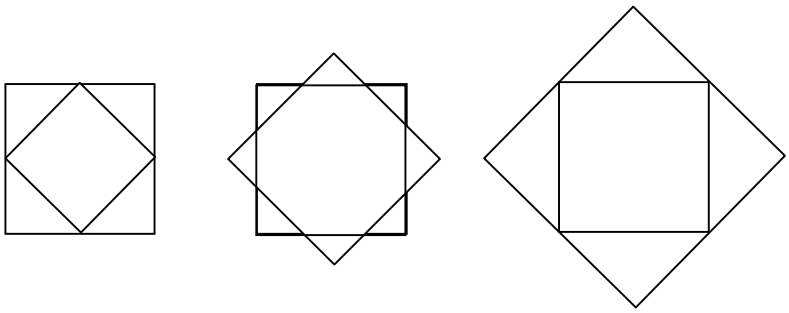
8	On the coordinate plane shown below, the circle has the equation $(x - 8)^2 + (y - 6)^2 = 25$. There are an infinite number of lines that can be drawn through the point (7, -1), some that intersect the circle in two points, some that intersect the circle in one point, and some that intersect the circle in no points. As an inequality in the form $a < m < b$, where a represents the smallest slope and b represents the largest slope, what is the range of possible slopes of all lines which intersect the circle in two points? 
9	A data set with eleven distinct positive integers has a range of 40, a mean of exactly 25, and a median of 24. What is the largest possible value in the data set?
10	As a decimal, what is the number of centimeters in the radius of a hemisphere whose surface area is numerically equivalent to its volume?

Figure 1 Figure 2 Figure 3

"Math is Cool" Masters – 2015-16

7th Grade – December 5, 2015
Pressure Round Contest

1	A math class at Brown Middle School has twenty-nine students who are either 7^{th} or 8^{th} graders. In this class fifteen of the students are girls and eight of the students are 7^{th} graders. There are two 7^{th} grade girls. How many 8^{th} grade boys are there?
2	How many integers from 1 to 50 are multiples of 3, multiples of 4, or both?
3	Each figure below is made of one square with horizontal and vertical sides and one square with slanted sides. In all three figures the squares with horizontal and vertical sides are congruent. In figure 1, the slanted square has its vertices at the midpoints of the sides of the horizontal and vertical square. In figure 2, both squares are congruent and all 8 small right triangles are congruent. In figure 3, the horizontal and vertical square has its vertices at the midpoints of the sides of the slanted square. The side lengths of the three slanted squares, from smallest to largest, can be represented by the series, $s, s \cdot a, s \cdot a^2$. What is the value of a? 
4	What is the number of right triangles that can be drawn such that three of the dots are vertices? Assume the dots are evenly spaced horizontally and vertically.
5	A rectangle has a width of 5 inches. Its length is 60% longer than the width. What is the number of inches in the perimeter of the rectangle?

"Math is Cool" Masters – 2015-16

7th & 8th Grade – December 5, 2015

COLLEGE KNOWLEDGE BOWL ROUND #1 – SET 1

#	Problem	Answer
1	Imagine two congruent squares. The first one has its sides doubled and the second one has its sides divided in half. As a common fraction, what is the ratio of the area of the small square to the area of the large square?	$\frac{1}{16}$ or one over sixteen
2	In miles per hour, what is the positive difference between the speed of an object traveling ten miles per minute and one traveling ten minutes per mile?	594 [miles per hour]
3	What is the sum of the digits in the decimal representation of five eighths?	13
4	What is the number of seconds that elapse during a twenty-nine minute stretch of time?	1740 [seconds]
5	The product of the first ten positive integers is a seven-digit number. How many of those digits are zeros?	2 [digits]
6	What is the mean of the positive integers from forty thousand to forty thousand three hundred?	40150 (forty thousand one hundred and fifty)
7	A triangle drawn on a coordinate plane encloses a region consisting of some complete unit squares and some partial squares. What is the number of complete unit squares enclosed by the triangle whose vertices have coordinates zero comma zero, five comma zero, and zero comma five?	10 [complete unit squares]
8	What is the sum of the positive integer factors of thirty-two?	63
9	Two lines have the equations two x minus three y equals six and four x plus three y equals negative six. How many units from the origin is their point of intersection?	2 [units]
10	George has two coins that could be pennies, nickels, dimes or quarters. As a decimal and in cents, what is the median of all the possible values that his two coins could have?	17.5 [cents]

"Math is Cool" Masters – 2015-16

7th & 8th Grade – December 5, 2015

COLLEGE KNOWLEDGE BOWL ROUND #2 – SET 2

#	Problem	Answer
1	What is the sum of the first five perfect cubes?	225
2	How many positive integer factors does one hundred and ten have?	8 [factors]
3	Evaluate: forty-five plus forty-seven plus forty-nine plus fifty-one plus fifty-three plus fifty-five?	300
4	I flip five fair coins. As a common fraction, what is the probability that exactly three show tails?	$\frac{5}{16}$ or five over sixteen
5	If three woodchucks could chuck four pounds of wood in five minutes, how many pounds could a woodchuck chuck in half an hour? Assume all woodchucks chuck at the same average rate.	8 [pounds]
6	How many ways are there to arrange the letters in the word TOE-KEY-OH, spelled T-O-E-K-E-Y-O-H?	10080 [ways]
7	How many positive integer four-digit palindromes exist?	90 [palindromes]
8	What is the measure, in degrees, of the lesser angle between the minute and hour hand on a clock at ten thirty PM?	135[°]
9	I have a box of apples. One-seventh of the apples are rotten and get thrown away. I gave a dozen of the remaining apples to Alex, and then Bobby and Carl stole two-thirds of those remaining. I ate the last six apples. How many of the apples were rotten?	5[apples]
10	Jimmy of Slowville is driving from his house to school. He drives at an average speed of three thousand six hundred miles per hour until he gets halfway there. He then drives at an average speed of one mile per hour for the rest of the trip, due to engine trouble. It takes him two hours and two seconds overall to get to school. What is the distance, in miles, between Jimmy's house and school?	4[miles]

"Math is Cool" Masters – 2015-16

7th & 8th Grade – December 5, 2015

COLLEGE KNOWLEDGE BOWL ROUND #3 – SET 3

#	Problem	Answer
1	A room is full of kittens and puppies. There are a total of seventy-two paws and thirty-six ears. Assume all of the animals have four legs and two ears and that there are at least two kittens. What is the maximum possible number of puppies in the room?	16 [puppies]
2	Point A has coordinates two comma three. What is the sum of the coordinates of A-prime after A is rotated one hundred eighty degrees about the origin?	-5
3	What is the product of eleven and three hundred thirty-three?	3663
4	It takes three teachers three hours to write thirty-six test problems. Assuming the three teachers work at the same average rate, what is the number of minutes it would take for one teacher to write six test problems?	90 [minutes]
5	What is the largest three-digit multiple of seventeen?	986
6	In the equation y equals twelve x minus twenty-four, what is the value of x when y equals sixty?	[x =] 7
7	The number four hundred and eighty can be written as two to the A power, times three to the B power, times five to the C power, where A, B, and C are positive integers. What is the value of A plus B plus C?	7
8	What is the sum of the positive two-digit integers?	4905
9	The area of circle A is twenty-five pi square centimeters. The radius of circle B is twenty centimeters. How many times greater is the circumference of circle B than the circumference of circle A?	4 [times]
10	Gerald has four science-fiction books and three adventure books. In how many distinct orders can he place them on his shelf if the science-fiction books must stay together?	576 [orders]

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COLLEGE KNOWLEDGE BOWL ROUND #4 – SET 4

#	Problem	Answer
1	Given the equation negative two x squared plus six x plus ten, what is the value of y when x equals negative three?	-26
2	What is the number of centimeters in the height of a trapezoid with an area of twenty-four square centimeters and bases of length five and seven centimeters?	4 [cm]
3	What is the equation of the line, parallel to the y-axis, which passes through the point with coordinates, negative nine comma six?	x = -9
4	How many positive integer factors does the number one hundred and twenty have?	16 [factors]
5	A rectangle has sides of thirty and twenty-four inches. A second rectangle is drawn inside the first rectangle such that its sides are parallel to the sides of the first rectangle. If the distance between each pair of parallel sides is two inches, what is the number of inches in the perimeter of the inside rectangle?	92 [inches]
6	Morris buys three erasers for eighty-eight cents each and one twenty-four pack of pencils for six dollars and thirty-nine cents and there is no sales tax. As a number of cents, what is the amount of change he receives if he pays with a ten dollar bill?	97 [cents]
7	What is the product of two hundred ninety-eight and three hundred and two?	89996
8	On a coordinate plane, the point with coordinates two comma one is translated five units to the left. What is the sum of the coordinates of the new point?	-2
9	What is the largest composite number less than three hundred?	299
10	Arty is taking a multiple choice quiz. There are five questions, each with four answer choices, only one of which is correct. Arty guesses on all five questions. As a common fraction, what is the probability that he answers four correctly?	$\frac{15}{1024}$

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COLLEGE KNOWLEDGE BOWL ROUND #5 – SET 5

#	Problem	Answer
1	In the inequality two x plus five is less than or equal to twelve, what is the largest possible integer value of x?	3
2	After a basketball game every one of the fifteen players on team A gives every one of the seventeen players on team B a high five. What is the total number of high fives that occur?	255 [high fives]
3	What is the least common multiple of ten, twenty, and thirty-five?	140
4	How many prime numbers are there between thirty-five and fifty-five?	5 [prime numbers]
5	As a common fraction, what is the sum of two-thirds plus one-eighth?	$\frac{19}{24}$
6	The area of a triangle is fifty square meters. What is the number of meters in the height of the triangle, if the length of the base is twenty meters?	5 [meters]
7	Ben is two years older than Simon. In one year, Ben will be twice Simon's age. How many years old is Simon now?	1 [year]
8	In terms of pi, what is the number of cubic centimeters in the volume of a cylinder with a radius of four point five centimeters and a height of twelve centimeters?	243π [cm^3]
9	In the expression A over B plus C over D, each of the variables A, B, C, and D, is replaced with a distinct member of the set, two, three, five, and seven. As a common fraction, what is the maximum value this expression can have?	$\frac{31}{6}$
10	A data set has twenty positive integer values. The mean of the data set is ten. What is the largest possible value of the median of the data set?	17

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COLLEGE KNOWLEDGE BOWL ROUND #6 – SET 6

#	Problem	Answer
1	What is the number of diagonals in a convex nonagon?	27 [diagonals]
2	How many distinct prime factors does ninety-six have?	2 [prime factors]
3	As a common fraction, what is four-fifths divided by nine-tenths?	$\frac{8}{9}$
4	What is the base ten number, twenty, in base two?	$10100_{[2]}$
5	What is the product of twenty-three and twenty-nine?	667
6	Millie brushes her teeth twice a day, for one hundred and fifty seconds each time, every day without fail. In hours and minutes, how much time does she spend brushing her teeth during the month of December?	2 hours 35 minutes
7	Michael eats half of a cake on Monday. On Tuesday, he eats half of what remains of the cake. Each day for the next three days (W, Th, F) he eats half of what remains. What fraction of the original cake is left after he eats his portion on Friday?	$\frac{1}{32}$
8	A rectangular prism has dimensions two by four by six centimeters. What is the number of cubic centimeters in the volume of a similar prism whose corresponding sides are twice as long?	384 [cm^3]
9	Solve the following equation for x: two x over three minus five over six equals two over nine. Answer as a common fraction.	$\frac{19}{12}$
10	A circle with radius three units and center zero comma zero is drawn on a coordinate plane. How many points with integer coordinates are on or are inside the circle?	29 [points]

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COLLEGE KNOWLEDGE BOWL ROUND – EXTRA

#	Problem	Answer
1	In terms of pi, what is the number of square centimeters in the area of a circle with circumference of twenty-six pi?	169π [cm^2]
2	As a decimal, what is the number of degrees in the measure of the larger angle formed by the hands of a clock at nine forty-five?	$337.5^{[\circ]}$
3	If x over y equals two-thirds and y over z equals three-fourths, as a common fraction, what does x over z equal?	$\frac{1}{2}$

Final Score:

KEY

(Out of 8)

"Math is Cool" Masters -- 2015-16

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	9 [square feet]		
2	95		
3	300 [percent]		
4	108		
5	$\frac{25}{26}$		
6	$\frac{1}{2}$ [miles per minute]		
7	8		
8	$\frac{4}{5}$		

Math is Cool" Masters – 2015-16

7th Grade – December 5, 2015

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	D		
3	E		
4	B		
5	D		
6	C		
7	E (114,582)		
8	A		
9	C		
10	C		

"Math is Cool" Masters – 2015-16

7th Grade – December 5, 2015

Final Score: KEY

First Score (out of 10)

SCHOOL NAME _____ **Team #** _____

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	220 [minutes]		
2	49		
3	25.5 [inches]		
4	1/16		
5	441		
6	$41\frac{2}{3}$		
7	8 [solutions]		
8	$-\frac{4}{3} < m < \frac{3}{4}$		
9	55		
10	4.5 [cm]		

"Math is Cool" Masters – 2015-16

7th Grade – December 5, 2015

Final Score: KEY

Proctor Name _____ Room # _____

First Score

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	8 [8^{th} grade boys]
2	24 [integers]
3	[a =] $\sqrt{2}$
4	72 [right triangles]
5	26 [in]

Final Score:

(Out of 8)

"Math is Cool" Masters -- 2015-16

School: _____ Room # _____ Team # _____

Name: _____ Proctor: _____

7th & 8th Grade <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.*

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

Final Score:

Math is Cool" Masters – 2015-16

7th Grade – December 5, 2015

Student Name _____

Proctor Name _____ Room # _____

SCHOOL NAME _____ **Team #** _____

First Score

(out of 20)

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 – 2015-16

7th Grade – December 5, 2015

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			