"Math is Cool" Championships – 2013-14

November 8, 2013

Total Correct: KEY

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

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

7th & 8th Grade Individual Contest – Score Sheet
DO NOT WRITE IN SHADED REGIONS

	Answer	1 or 0	1 or 0
1	4		
2	-1		
3	7.2×10^{-6}		
4	7		
5	[m=] -3		
6	[$] 4		
7	3 [or 3rd or III]		
8	6		
9	23		
10	12 [students]		
11	7/11		
12	208 [seeds]		
13	18 [assignments]		
14	7 [inches]		
15	166 [pieces of candy]		
1-15 TOTAL:			

	Answer	1 or 0	1 or 0
16	[x=] 49		
17	10 [¢]		
18	66		
19	6 [acrobats]		
20	True		
21	[x=]16		
22	[x=] -11/3		
23	14 [players]		
24	[$]100.43		
25	66		
26	3		
27	24 [hours]		
28	120 [games]		
29	60 [white squares]		
30	[x=] 9		
16-30 TOTAL:			

	Answer	1 or 0	1 or 0
31	B, D, E, I [any order] <u>or</u> C, E, G, I [any order]*		
32	$39\ feet\ 8\frac{3}{8}\ inches$ *		
33	35 [lengths]		
34	(-6,0)		
35	15 [values]		
36	81π [cu in]		
37	180 [ways]		
38	292.5 [deg]		
39	4		
40	$8\pi - 16$ [square units]		
31-40 TOTAL:			

*31: [either answer correct; only one answer required]

*32: [units required]

Total Correct:

"Math is Cool" Championships – 2013-14

November 8, 2013

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

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

7th & 8th Grade 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:			

*31: [either answer correct; only one answer required]

*32: [units required]

"Math is Cool" Championships – 2013-14

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November 8, 2013

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 cas problems dealing with money. In the case of problems requiring dollar answers, answer as a decimal rounded to the neare 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" Championships – 2013-14

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7th & 8th Grade – November 8, 2013

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	Larisa had 30 pieces of candy that she is going to divide among her four friends. After she gave all of her friends an equal number of whole pieces of candy, how many pieces of candy were left over?
2	What is the area in square inches of a right triangle with legs of length 14 inches and 10 inches?
3	The milk from one cow can supply enough milk for 9 families. At this rate, how many families can milk from 12 cows supply?
4	Two items were purchased for a total price of 12 dollars. One item cost one dollar less than the other. How many dollars did the less expensive item cost?
5	Farmer Joe was delivering big straw bales. He had 22 straw bales that weighed a total of eleven thousand pounds. After delivering eight bales, how many pounds of straw did he have left to deliver?
6	What is ten to the power of **zero** PLUS ten to the power of **negative one** PLUS ten to the power of **negative two** PLUS ten to the power of **negative three** PLUS ten to the power of **negative six**? Express your answer as a decimal.
7	Every day has 24 hours. Ali sleeps 3/7 of the day, Bob sleeps 10.4 hours per day, and Connie sleeps 2/5 of the day. Who sleeps for the longest time each day?
8	Find the value of the following expression, and give your answer as a reduced fraction: the product of **zero point seven repeating** and **negative three-fifths** PLUS the product of **sixty percent** and **negative five-thirds**.

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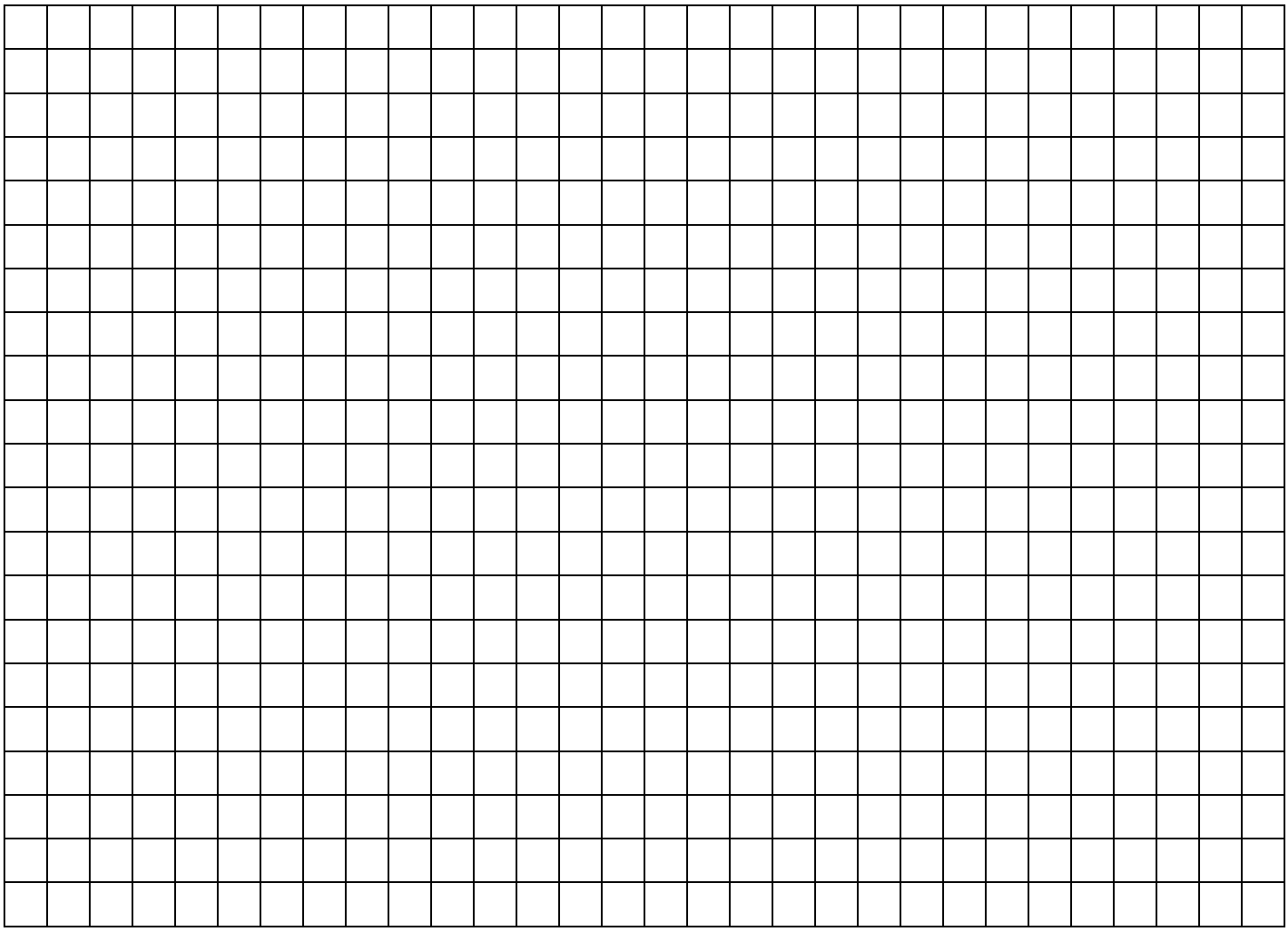
7th & 8th Grade Individual Contest

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 - 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" Championships – 2013-14

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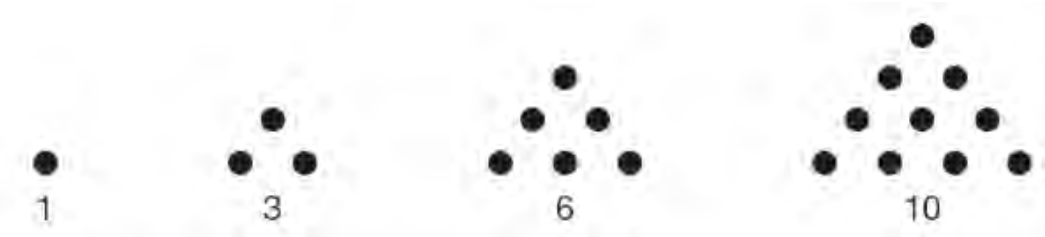
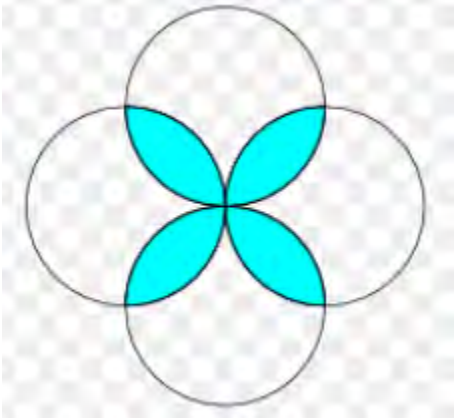
7th & 8th Grade Individual Contest

	Questions 1-30: 2 points each
1	Evaluate x^2 when x = -2.
2	What is the largest negative integer?
3	Write 0.0000072 in scientific notation.
4	What is the missing number in this sequence? 1, 3, 5, ____, 9
5	What is the slope of the line y = 5 – 3x?
6	Kallie bought two items. One item cost twice as much other and she paid a total of $6. How much, in dollars, did the more expensive item cost?
7	What quadrant is the point (-3,-2) located in?
8	What is the greatest common factor of 12, 36 and 54?
9	When my number is divided by 7, the quotient is 3 and the remainder is 2. What is my number?
10	The teacher numbered all the students in her class 1 through 30. She then asked all the students numbered 7 through 18 (including 7 and 18) to go into the hall. How many students were sent into the hall?
11	A math class has 14 girls and 8 boys. If a student is chosen at random from this class, what is the probability that the chosen student is a girl? Answer as a reduced fraction.
12	Joe wanted to find out how many seeds were in a bag without counting all of them. He found that 13 seeds weighed one ounce. How many seeds are in the bag if it contains one pound of seeds and each seed has the same weight?
13	At the beginning of the school year, Caleb did not turn in the first two assignments in his math class and he was given a zero on both of them. Caleb decided he wanted to get his grade up to a 90%. Assuming all assignments have the same value, how many perfect assignments will Caleb need to turn in, in a row, to have a 90% average?
14	The area of a rectangle is 56 square inches and the length of two sides are 8 inches. What is the length, in inches, of one of the remaining sides?
15	Frank has 4,328 pieces of candy to share with his 26 friends. He gives each of his friends the same maximum number of whole pieces of candy and keeps the rest for himself. How many pieces of candy did each of his friends get?
16	Solve for x: 3(3x - 2) – 5(4 - 2x) = 4 + 2(9x + 4) + 11
17	Felicia bought 12 pencils for math class, each the same price. She spent a total of $1.30, which included an 8% sales tax. What was the price before tax of one pencil, in cents?

18	What is the sum of all possible remainders when a positive integer (counting number) is divided by 12?
19	Each acrobat in a circus act is the same size and shape. For one of their acts, an acrobat stands on another's shoulders, then another acrobat stands on his shoulders, and so on. The height of one circus acrobat is 5 foot 6 inches. The height of a stack of 3 circus acrobats 15 feet 10 inches. How many circus acrobats standing as described are needed to make a stack that is 31 feet 4 inches in height?
20	Determine whether the converse of the following conditional statement is True or False. If a quadrilateral has 4 equal angles then it is a square.
21	Two angles are complementary. One measures (3x+2) degrees, while the other measures (2x+8) degrees. Find the value of x.
22	One solution for the following equation is 5. What is the other solution? $\|3x - 2\| = 13$
23	The Lind-Ritzville Football team has 45 players. Of the 45 players, 30 snow-ski and 25 water-ski, while 4 do neither. How many players both water-ski and snow-ski?
24	Janet purchased a pair of pants priced at $93.25. If the sales tax rate is 7.7%, how much will Janet need to pay the cashier? Answer as a decimal number of dollars rounded to the nearest whole cent.
25	How many dots would be in figure 11?  Figure 1 Figure 2 Figure 3 Figure 4
26	Evaluate $11 - 2\sqrt{26 - 10x^2}$ when x = -1
27	Bohanan can dig a hole 3 feet by 4 feet by 2 feet deep in 2 hours. Digging at the same rate, how many hours will it take Bohanan to dig a hole 6 feet by 8 feet by 6 feet deep? (The holes have the shape of a rectangular prism.)
28	There are 16 teams in the National Mathematics league of future Einstein's. If each team plays each other team only once during the season, how many total games will be played during the season?
29	An 11 by 11 checkerboard has white and black squares. If each corner of the checkerboard is black, how many squares on the checker board are white?
30	The mean, median, and mode are all the same for the following set of data: {5, 7, 9, 11, 13, x }. What is the value of x.

Challenge Questions: 3 pts each

31	Shelley went shopping at three different stores and bought at least one item from each store. She started with $150 and came home with $16.09 in change. Assuming no tax on the items, write the letter of each item she bought. **Store 1** Item A-$ 70.32 Item B-$ 42.32 Item C-$ 21.27 **Store 2** Item D-$ 30.27 Item E-$ 31.16 Item F-$ 41.32 **Store 3** Item G-$ 51.32 Item H-$ 16.16 Item I-$ 30.16
32	When carpenters build houses they use the Pythagorean Theorem often throughout the building process. The decimal answer they get from using the Pythagorean Theorem must be converted so the measurement can be read on a measuring tape. Convert 39.6988664826 feet to the nearest eighth of an inch. Answer with the maximum whole number of feet and a whole number or mixed number of inches. **Include the unit labels with your answer**. Your answer should be in the same form as the following example: "14 feet 3 5/8 inches".
33	A triangle has side lengths of 33 and 18 units. How many different possible side lengths can the third side have if the third side is a counting number?
34	What are the new coordinates of the point (3,-1) after it has been rotated counterclockwise 90^o around the point (-2,-5)? Give your answer as an ordered pair (x, y).
35	Chris writes a certain fraction that has one digit in the numerator and one digit in the denominator. How many different values less than or equal to one-half could Chris's fraction have?
36	A right cylinder of radius 3 inches is cut on a slant by a plane so that the height has a maximum of 10 inches and a minimum of 8 inches diametrically opposite the maximum. What is the volume in cubic inches of this figure?
37	Laura has a ruby, a diamond, two identical emeralds, two identical opals, and a sapphire. In how many distinct ways can she arrange these seven gemstones in a circle?
38	The time is 6:45. What is the degree measure of the larger angle between the hands of the clock? If your answer is not a whole number, express it as a **decimal**.
39	Find the integer value of the following expression: $\sqrt{10 + 4\sqrt{6}} - \sqrt{10 - 4\sqrt{6}}$
40	Find the number of square units in the area of the shaded region if the radius of all the circles is 2 units. Ignore the checkerboard background. 

"Math is Cool" Championships – 2013-14

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7th Grade – November 8, 2013

Individual Multiple Choice Contest

USE THE FOLLOWING INFORMATION TO ANSWER QUESTIONS # 1-3.
Biff and Eho were driving west across the State of Washington on highway I-90. While passing through Moses Lake, they saw a freeway sign with the following information:
George 30 miles
Ellensburg 71 miles
Seattle 177 miles
Assume that George, Ellensburg and Seattle are collinear, and that all are west of Moses Lake.

1	Which of these three towns are Biff and Eho closest to when they are driving through Moses Lake? A) George B) Ellensburg C) Seattle
2	Eho subtracted two of the numbers on the sign and got 106. What does this number mean? A) The distance between George and Ellensburg B) The distance between George and Seattle C) The distance between Ellensburg and Seattle. D) The distance between Moses Lake and Seattle E) Answer not given.
3	Biff added two numbers from the sign together and got 101. What does this number mean? A) The distance between George and Ellensburg B) The distance between George and Seattle C) The distance between Ellensburg and Seattle. D) The distance between Moses Lake and Ellensburg. E) Answer not given.

USE THE FOLLOWING INFORMATION TO ANSWER QUESTIONS # 4-8.
Hugh and Freddy are harvesting barley to help feed the world. The combine that harvests the grain in the field cuts a path 20 feet wide as it travels around the field. The diameter of the combine's drive tire is 6 feet. Hugh knows that a square with side length 660 feet is equal in area to ten acres.

4	How many square feet are in one acre? A) 4356 B) 43560 C) 48400 D) 435600 E) Answer not given.
5	How many feet will the combine need to travel to cut an acre of barley? A) 2000 B) 2178 C) 4356 D) 24200 E) Answer not given.
6	In one day Hugh and Freddy harvested 36.4 tons of barley. If a bushel of barley weighs 50 pounds, how many bushels of barley did they harvest in that one day? A) 1.37 B) 86.4 C) 0.728 D) 1820 E) Answer not given.
7	Approximately how many times does the combine's drive tire need to turn in order for the combine to travel 2000 feet? Give the **closest** of the following answers. A) 106 B) 12000 C) 333 D) 167 E) 71
8	One day Hugh and Freddy cut a 5-acre field that had an average yield of 3 tons per acre and an 8-acre field that had an average yield of 2 tons per acre. Which answer below gives the closest approximate yield per acre for that day? A) 31 tons B) 0.4 tons C) 2.5 tons D) 2.4 tons E) 15.5 tons

USE THE FOLLOWING INFORMATION TO ANSWER QUESTIONS # 9-10. Sally and Suzie are building a pool in their backyard. The pool is rectangular and measures 15 feet by 21 feet, and the top of the pool is flush with the ground. The county code requires that a fence be put around the pool. Sally and Suzie decide to put a 6-foot wide rectangular border around the pool with a fence on the outside edge of the border. The border will be made of concrete 4 inches thick.	
9	What is the length in feet of the outer perimeter of the border? A) 96 B) 110 C) 120 D) 891 E) Answer not given.
10	The fence will have posts spaced every 3 feet. How many posts are needed for the fence? A) 12 B) 36 C) 40 D) 44 E) Answer not given.

"Math is Cool" Championships – 2013-14

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8th Grade – November 8, 2013

Individual Multiple Choice Contest

USE THE FOLLOWING INFORMATION TO ANSWER QUESTIONS # 1-2.
Biff and Eho were driving west across the State of Washington on highway I-90. While passing through Moses Lake, they saw a freeway sign with the following information:
George 30 miles
Ellensburg 71 miles
Seattle 177 miles
Assume that George, Ellensburg and Seattle are collinear, and that all are west of Moses Lake.

1	Eho subtracted two of the numbers on the sign and got 106. What does this number mean? A) The distance between George and Ellensburg B) The distance between George and Seattle C) The distance between Ellensburg and Seattle. D) The distance between Moses Lake and Seattle E) Answer not given.
2	Biff added two numbers from the sign together and got 101. What does this number mean? A) The distance between George and Ellensburg B) The distance between George and Seattle C) The distance between Ellensburg and Seattle. D) The distance between Moses Lake and Ellensburg. E) Answer not given.

USE THE FOLLOWING INFORMATION TO ANSWER QUESTIONS # 3-7.
Hugh and Freddy are harvesting barley to help feed the world. The combine that harvests the grain in the field cuts a path 20 feet wide as it travels around the field. The diameter of the combine's drive tire is 6 feet. Hugh knows that a square with side length 660 feet is equal in area to ten acres.

3	How many square feet are in one acre? A) 4356 B) 43560 C) 48400 D) 435600 E) Answer not given.
4	How many feet will the combine need to travel to cut an acre of barley? A) 2000 B) 2178 C) 4356 D) 24200 E) Answer not given.
5	If the drive tire on the combine is turning at 23 revolutions per minute, approximately how many miles per hour is the combine traveling? Give the **closest** of the following answers. A) 4.1 B) 4.5 C) 4.7 D) 4.9 E) 5.1
6	In one day Hugh and Freddy harvested 36.4 tons of barley. If a bushel of barley weighs 50 pounds, how many bushels of barley did they harvest in that one day? A) 1.37 B) 86.4 C) 0.728 D) 1820 E) Answer not given.
7	Simplify: $(2x^3y^4)^3$ A) $2x^9y^{12}$ B) $8x^6y^7$ C) $6x^9y^{12}$ D) $8x^9y^{12}$ E) Answer not given.

USE THE FOLLOWING INFORMATION TO ANSWER QUESTIONS # 8-10. Sally and Suzie are building a pool in their backyard. The pool is rectangular and measures 15 feet by 21 feet, and the top of the pool is flush with the ground. The county code requires that a fence be put around the pool. Sally and Suzie decide to put a 6-foot wide rectangular border around the pool with a fence on the outside edge of the border. The border will be made of concrete 4 inches thick.	
8	What is the length in feet of the outer perimeter of the border? A) 96 B) 110 C) 120 D) 891 E) Answer not given.
9	The fence will have posts spaced every 3 feet. How many posts are needed for the fence? A) 12 B) 36 C) 40 D) 44 E) Answer not given.
10	Suzie needs to get the concrete ordered for the border of the pool. How many cubic yards of concrete should she order? A) 192 B) 64/9 C) 768 D) 769/9 E) Answer not given.

"Math is Cool" Championships – 2013-14

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7th Grade – November 8, 2013

Team Contest

1	What is the area in square centimeters between two concentric circles, one with radius six centimeters and one with diameter six centimeters?
2	When 200 is divided by $\frac{1}{2}$, the quotient is the same as the quotient of what number divided by 20?
3	Isabel wrote down a 4-digit positive integer (counting number), divisible by 3 but not by 23. Its first (thousands place) digit is a factor of both 15 and 16. Its last two digits are both prime numbers, and are different. Its second digit is the sum of its last two digits. What number did Isabel write down?
4	When four copies of a positive integer are multiplied together (eg, $2 \times 2 \times 2 \times 2$), the product is called a perfect fourth power. What is the smallest perfect fourth power greater than 100,000?
5	The average (arithmetic mean) of my number and your number is X. The average of X and your number is 28. If my number is 4, what is your number?
6	From a distance of 60 feet, John throws a fastball to Austin at a speed of one hundred miles per hour. How many seconds from the time of release does Austin have until the ball reaches him? If your answer is not a whole number, give it as a reduced common fraction. **NOTE**: 1 mile = 5280 feet
7	A bowl holds red marbles and blue marbles. The number of red marbles is 80% of the number of blue marbles. The blue marbles make up what **fraction** of the total number of marbles?
8	All robots of the same model work at the same constant rate to make widgets. Model T's work at half the rate of Model A's, and Model V's work at twice the rate of Model A's. A group of 12 "Model A" robots can product 120 widgets in 15 hours. Another group of 12 robots consists of 6 "Model T" robots and 6 "Model V" robots. How many hours would it take this group of Model T's and Model V's to produce 240 widgets?
9	Biff thinks of an integer B such that $60 < B < 70$. Eho thinks of an integer E such that $80 < E < 90$. The sum of the digits of the **product** of B and E is 17, and the sum of the digits of the **sum** of B and E is 6. Give all possible values for Biff's number B.
10	Amanda has N books on a shelf, all different, and wants to select two of them to take on a trip. The number of different sets of two books she can choose is the 3-digit number 15d, where "d" represents a missing digit. What is the sum of N and d?

"Math is Cool" Championships – 2013-14

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8th Grade – November 8, 2013

Team Contest

1	When 200 is divided by $\frac{1}{2}$, the quotient is the same as the quotient of what number divided by 20?
2	Isabel wrote down a 4-digit positive integer (counting number), divisible by 3 but not by 23. Its first (thousands place) digit is a factor of both 15 and 16. Its last two digits are both prime numbers, and are different. Its second digit is the sum of its last two digits. What number did Isabel write down?
3	When four copies of a positive integer are multiplied together, the product is called a perfect fourth power. What is the smallest perfect fourth power greater than 100,000?
4	The average (arithmetic mean) of my number and your number is X. The average of X and your number is 28. If my number is 4, what is your number?
5	Anne has twice as many apples as Barbara. If Anne took X more apples, she would have 83 apples. If Barbara took X more apples, she would have 49 apples. What is X?
6	From a distance of 60 feet, John throws a fastball to Austin at a speed of one hundred miles per hour. How many seconds from the time of release does Austin have until the ball reaches him? If your answer is not a whole number, give it as a reduced common fraction. **NOTE**: 1 mile = 5280 feet
7	A bowl holds red marbles and blue marbles. The number of red marbles is 80% of the number of blue marbles. If there are fewer than 150 marbles in the bowl, what is the largest number of red marbles there could be in the bowl?
8	All robots of the same model work at the same constant rate to make widgets. Model T's work at half the rate of Model A's, and Model V's work at twice the rate of Model A's. A group of N "Model A" robots can product 120 widgets in 15 hours. Another group of N robots consists of half "Model T" robots and half "Model V" robots. How many hours would it take the group of Model T's and Model V's to produce 250 widgets?
9	Biff thinks of an integer B such that $60 < B < 70$. Eho thinks of an integer E such that $80 < E < 90$. The sum of the digits of the **product** of B and E is 17, and the sum of the digits of the **sum** of B and E is 6. Give all possible values for Biff's number B.
10	Amanda has N books on a shelf, all different, and wants to select two of them to take on a trip. The number of different sets of two books she can choose is the 3-digit number 1<u>d</u>3, where "<u>d</u>" represents a missing digit. What is the sum of N and <u>d</u>?

"Math is Cool" Championships – 2013-14

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7th Grade – November 8, 2013

Pressure Round Contest

1	How many right triangles with sides having whole-number lengths have a perimeter that is less than 100 units?
2	Biff and Eho took a 90-mile trip, partly by bus and partly by walking. The trip took 5 hours altogether. They walked one-ninth of the distance, and took one-fifth of the total time to do so. In miles per hour, how fast was the bus traveling?
3	Bob, Carol and David each need pencils. Six pencils are distributed among them so that each person gets at least one pencil. In how many ways can the pencils be distributed?
4	How many positive integers less than 200 are divisible by either 3 or 7 or both?
5	A standard 52-card deck has 2 jokers added, making it a 54-card deck. What is the probability of randomly drawing the two jokers from this deck in the first two draws without replacement? Answer as a reduced fraction.

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8th Grade – November 8, 2013

Pressure Round Contest

1	How many right triangles with sides having whole-number lengths have a perimeter that is less than 100 units?
2	A standard 52-card deck has 2 jokers added, making it a 54-card deck. What is the probability of randomly drawing the two jokers from this deck in the first two draws without replacement? Answer as a reduced fraction.
3	Two diagonals are drawn from vertex A of regular pentagon ABCDE. What is the degree measure of angle CAD?
4	How long is the line segment drawn from the point 2 comma 3 to the point 8 comma 11?
5	Bob, Carol and David each need pencils. Six pencils are distributed among them so that each person gets at least one pencil. In how many ways can the pencils be distributed?

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COLLEGE KNOWLEDGE BOWL ROUND #1 – SET 1

#	Problem	Answer
1	What is the greatest common factor of 54 and 72?	18
2	Christy has 2 pairs of shoes, 7 shirts, 5 skirts, and 3 scarfs. If she uses one pair of shoes and one of every other item to make an outfit, how many different outfits can she make?	210 [outfits]
3	Mary is going to school, which is 2 miles away. She rides her bike at 12 miles per hour for half the distance and walks at 3 miles per hour for the other half. How many minutes does it take for her to get to school?	25 [minutes]
4	A closed rectangular box has side lengths of 3, 4 and 5 inches. What is the total surface area of the box in square inches?	94 [sq in]
5	It is 7:42 PM on Tuesday. How many minutes is it until 8:42 PM the next Thursday?	2940 [minutes]
6	What is the number of units in the hypotenuse of a right triangle with legs of 5 and 12 units?	13 [units]
7	The shadow of a 10-foot-tall post is 15 feet. What is the length in feet of the shadow of a 42-foot-tall tree?	63 [feet]
8	How many cups are in 60 gallons?	960 [cups]
9	A company has five hundred thousand dollars a month in expenses, and earns ten million dollars a year. How many years will it take them to make a profit of thirty-eight million dollars? If your answer is not a whole number, give it as a mixed number.	9 ½ [years]
10	Five hockey pucks and three hockey sticks cost $23. Five hockey pucks and one hockey stick cost $20. How much does one hockey puck cost? Answer as a decimal number of dollars.	[$] 3.70

"Math is Cool" Championships – 2013-14

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7th & 8th Grade – November 8, 2013

COLLEGE KNOWLEDGE BOWL ROUND #2 – SET 2

#	Problem	Answer
1	Find the product of sixty-three times seventy-seven.	4851
2	How many prime numbers are between 10 and 40?	8 [primes]
3	The measures of the angles in a triangle are in the ratio of 3 to 4 to 5. What is the degree measure of the smallest angle?	45 [degrees]
4	What is the probability of getting exactly 1 head when flipping 5 coins? Express your answer as a reduced fraction.	5/32 OR five over thirty-two
5	Joe leaves Spokane going to Seattle at noon traveling at 40 miles per hour. Barbara leaves Spokane at 1:00 PM the same day, traveling at 60 miles per hour along the same road. If they both move at a constant rate, at what time of day does Barbara catch up to Joe? ("AM" or "PM" is a necessary part of your answer.)	3:00 PM
6	The volume of a cube is 8 cubic centimeters. What is the length in centimeters of an edge of the cube?	2 [centimeters]
7	A coat is originally priced at 80 dollars. What is the total cost, in dollars, after applying a discount of 20 percent and sales tax of 10 percent?	[$] 70.40
8	Franklin can run one mile in 5 minutes, and each additional mile takes him a minute longer than the last. How many minutes will it take him to run 5 miles?	35 [minutes]
9	This year, Mark will be 2 years younger than twice Annie's age. If the sum of Mark and Annie's ages is 67 years, how many years old is Annie?	23 [years]
10	How much greater is the sum of the distinct prime factors of 2012 than the sum of the distinct prime factors of 2013?	430

"Math is Cool" Championships – 2013-14

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7th & 8th Grade – November 8, 2013

COLLEGE KNOWLEDGE BOWL ROUND #3 – SET 3

#	Problem	Answer
1	Subtracting one from thirteen times my number leaves ninety. What is my number?	7
2	A wheel moving at a constant rate makes 10 full revolutions every minute. How many degrees does the wheel turn in three and one-half minutes?	12600 [degrees]
3	Bob's luggage is thirty percent below the fifty-pound weight limit. How many pounds does his luggage weigh?	35 [pounds]
4	Kate has three different math books, one music book, and one language book to put on her shelf. How many ways can she put them in a row on the shelf if the math books must stay together?	36 [ways]
5	The year is 2013. How many years will pass before the next closest year that uses the digits '2', '0', '1', '3', where no number was in the position it was previously in?	1089 [years]
6	Jay's scores for 3 math tests are 82, 91, and 90. What must he score on his fourth test to bring his average up to 90?	97
7	A pen contains some pigs and some chickens. If there are 11 heads and 32 legs, how many more chickens than pigs are in the pen?	1 [more chicken]
8	Each interior angle of a regular polygon is 120 degrees. How many sides does this polygon have?	6 [sides]
9	A rectangle has a perimeter of 36 units. What is the area, in square units, of this rectangle if its length is twice the width?	72 [sq units]
10	The number one thousand two hundred twenty-one is a palindrome. What must be added to obtain the next higher palindrome?	110

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COLLEGE KNOWLEDGE BOWL ROUND #4 – SET 4

#	Problem	Answer
1	Find the perimeter in centimeters of a square with an area of 169 square centimeters.	52 [centimeters]
2	How many edges does a cube have?	12 [edges]
3	What is the sum of the eighth, sixth and twelfth **odd** positive integers?	49
4	The diameter of one circle equals the radius of another. What is the ratio of the area of the small circle to the area of the larger circle?	1 to 4 OR 1 over 4 OR one-fourth
5	Michael's total bill is 17 dollars and 30 cents. If he wants to tip 20 percent of his total bill, how much will his tip be, as a decimal number of dollars?	[$]3.46
6	How many diagonals can be drawn in a heptagon?	14 [diagonals]
7	At every hour, a 12-hour clock chimes once for each hour of the time. (For example, it chimes 4 times at four o'clock.) How many times does the clock chime in 4 days?	624 [times]
8	As a reduced fraction, what is the probability of getting a composite number on one roll of a standard cubical die?	1/3 OR one over three
9	One positive number is 19 times another positive number. The difference between the two numbers is 360. Find the larger of the two numbers.	380
10	Sharon rolls two tetrahedral dice whose faces are numbered one through 4. What is the probability that the sum of the bottom faces equals 6?	3/16

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COLLEGE KNOWLEDGE BOWL ROUND #5 – SET 5

#	Problem	Answer
1	How many ways can you arrange the 7 Harry Potter novels in a row on a shelf?	5040 [ways]
2	Kyle makes 30 percent of his free throws. If he shoots 40 free throws, how many can you expect him to make?	12 [free throws]
3	What is the second term in an arithmetic sequence if the first term is negative 2 and the fourth term is positive 13?	3
4	How many positive integer factors does 60 have?	12 [factors]
5	If the average weight of a cow is 1500 pounds, how many **tons** will a herd of 44 cows weigh altogether?	33 [tons]
6	What is the volume in cubic units of a cone with height 4 units and radius 6 units?	48pi [cubic units]
7	A bag has 3 red, 3 blue, and 3 green marbles. Find the probability of randomly drawing a red marble then a blue one, without replacement. Answer as a reduced fraction.	1/8 OR one over eight
8	Three angles of a quadrilateral are 35 degrees, 72 degrees, and 100 degrees. What is the measure, in degrees, of the other angle?	153 [degrees]
9	As a reduced common fraction, find the sum of the **reciprocals** of the following three numbers: two, five, and seven	59/70 OR fifty-nine over seventy
10	When a bird flaps its wings 3 times per second, it flies at **forty point five** miles per hour. When the bird flaps its wings 3 times in **two** seconds, it flies at **twenty point two five** miles per hour. How fast would the bird be flying in miles per hour if flaps its wings seven times in two seconds? Answer as a decimal.	47.25 OR forty-seven point two five [miles per hour]

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COLLEGE KNOWLEDGE BOWL ROUND #6 – SET 6

#	Problem	Answer
1	Peter has 85 Facebook friends and 20 friend requests. If 75 percent of his requests become his friends, how many friends will he have in total?	100 [friends]
2	John has 2 red, 3 green, and 4 blue gloves. How many gloves must he take out to be sure that he will have a pair of gloves of the same color?	4 [gloves]
3	My favorite whole number has a remainder of 3 when divided by 4 and a remainder of 4 when divided by 5. What is my favorite number if it is between 10 and 30?	19
4	Twelve of the students in Mrs. Green's class like purple and fifteen like yellow. Five students like both yellow and purple. How many students like yellow but not purple?	10 [students]
5	What is the greatest prime factor of 385?	11
6	A cow can graze 12 square feet of grass in 24 minutes. At this rate, how many minutes will it take her to graze a rectangular field of grass that is 14 feet by 17 feet?	476 [minutes]
7	Carol has 64 pennies in three different piggy-banks. The ratio of pennies in the three banks is 3 to 5 to 8. How many pennies are in the bank with the fewest pennies?	12 [pennies]
8	The product of two consecutive numbers is 380. What is their sum?	39
9	Of ten people surveyed, three people like fish and the others do not like fish. Sally made a circle graph of that information. What is the measure in degrees of the central angle of the sector of the graph representing the people who like fish?	108 [degrees]
10	Jane earns 8 dollars an hour and John earns 10 dollars per hour. If Jane worked two hours longer than John and together they earned 124 dollars, how many hours did John work?	6 [hours]

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COLLEGE KNOWLEDGE BOWL ROUND – EXTRA

#	Problem	Answer
1	Write "zero point four five" as a reduced fraction.	9/20
2	What is the number of seconds in a day?	86,400 [seconds]
3	What is the cube root of 27 squared?	9

Final Score:

KEY

(Out of 8)

"Math is Cool" Championships -- 2013-14

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 [pieces of candy]		
2	70 [square inches]		
3	108 [families]		
4	[$]5.50		
5	7000 [pounds]		
6	1.111001		
7	Bob		
8	$-\frac{22}{15}$ or $\frac{-22}{15}$ or $\frac{22}{-15}$		

Math is Cool" Championships – 2013-14

7th Grade – November 8, 2013

Final Score:

KEY

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	A		
2	C		
3	E		
4	B		
5	B		
6	E (1456)		
7	A		
8	D		
9	C		
10	C		

Math is Cool" Championships – 2013-14

8th Grade – November 8, 2013

Final Score:

KEY

Student Name_____

First Score

(out of 20)

Proctor Name_____Room #_____

SCHOOL NAME_____ Team #_____

INDIVIDUAL MULTIPLE CHOICE - 15 minutes – 10 problems – 20% of team score

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	Answer	-1, 0 or 2	-1, 0 or 2
1	C		
2	E		
3	B		
4	B		
5	D		
6	E (1456)		
7	D		
8	C		
9	C		
10	B		

"Math is Cool" Championships – 2013-14

7th Grade – November 8, 2013

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	27π [sq cm]		
2	8000		
3	1752		
4	104,976		
5	36		
6	9/22 [seconds]		
7	5/9		
8	24 [hrs]		
9	[B =] 65 or 67 [either order]		
10	21		

"Math is Cool" Championships – 2013-14

8th Grade – November 8, 2013

Final Score: KEY

SCHOOL NAME_____ **Team #** _____

First Score

(out of 10)

Proctor Name_____Room #_____

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DO NOT WRITE IN SHADED REGIONS

	Answer	1 or 0	1 or 0
1	8000		
2	1752		
3	104,976		
4	36		
5	15 [apples]		
6	9/22 [seconds]		
7	64 [red marbles]		
8	25 [hrs]		
9	[B =] 65 or 67 [either order]		
10	23		

Final Score:
KEY

First Score

"Math is Cool" Championships – 2013-14

7th Grade – November 8, 2013

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	17 [triangles]
2	20 [miles per hour]
3	10 [ways]
4	85 [integers]
5	1/1431

Final Score:
KEY

First Score

"Math is Cool" Championships – 2013-14

8th Grade – November 8, 2013

Proctor Name_____Room #_____

SCHOOL NAME_____Team #_____

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

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Pressure Round Answers

	Answer
1	17 [triangles]
2	1/1431
3	36 [degrees]
4	10 [units]
5	10 [ways]

Final Score:

(Out of 8)

"Math is Cool" Championships -- 2013-14

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			

Final Score:

Math is Cool" Championships – 2013-14

7th Grade – November 8, 2013

First Score

(out of 20)

Student Name_____

Proctor Name_____Room #_____

SCHOOL NAME_____ Team #_____

INDIVIDUAL MULTIPLE CHOICE - 15 minutes – 10 problems – 20% of team score

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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" Championships – 2013-14

8th Grade – November 8, 2013

Final Score:

Student Name_____

Proctor Name_____Room #_____

SCHOOL NAME_____ Team #_____

First Score
(out of 20)

INDIVIDUAL MULTIPLE CHOICE - 15 minutes – 10 problems – 20% of team score

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

"Math is Cool" Championships – 2013-14

7th Grade – November 8, 2013

Final Score:

SCHOOL NAME_____ **Team #** _____

First Score
(out of 10)

Proctor Name_____Room #_____

Team Contest – Score Sheet

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DO NOT WRITE IN SHADED REGIONS

	Answer	1 or 0	1 or 0
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

"Math is Cool" Championships – 2013-14

8th Grade – November 8, 2013

Final Score:

SCHOOL NAME_____ **Team #** _____

First Score
(out of 10)

Proctor Name_____Room #_____

Team Contest – Score Sheet

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DO NOT WRITE IN SHADED REGIONS

	Answer	1 or 0	1 or 0
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			