"Math is Cool" Championships – 2014-15

November 7, 2014

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:			

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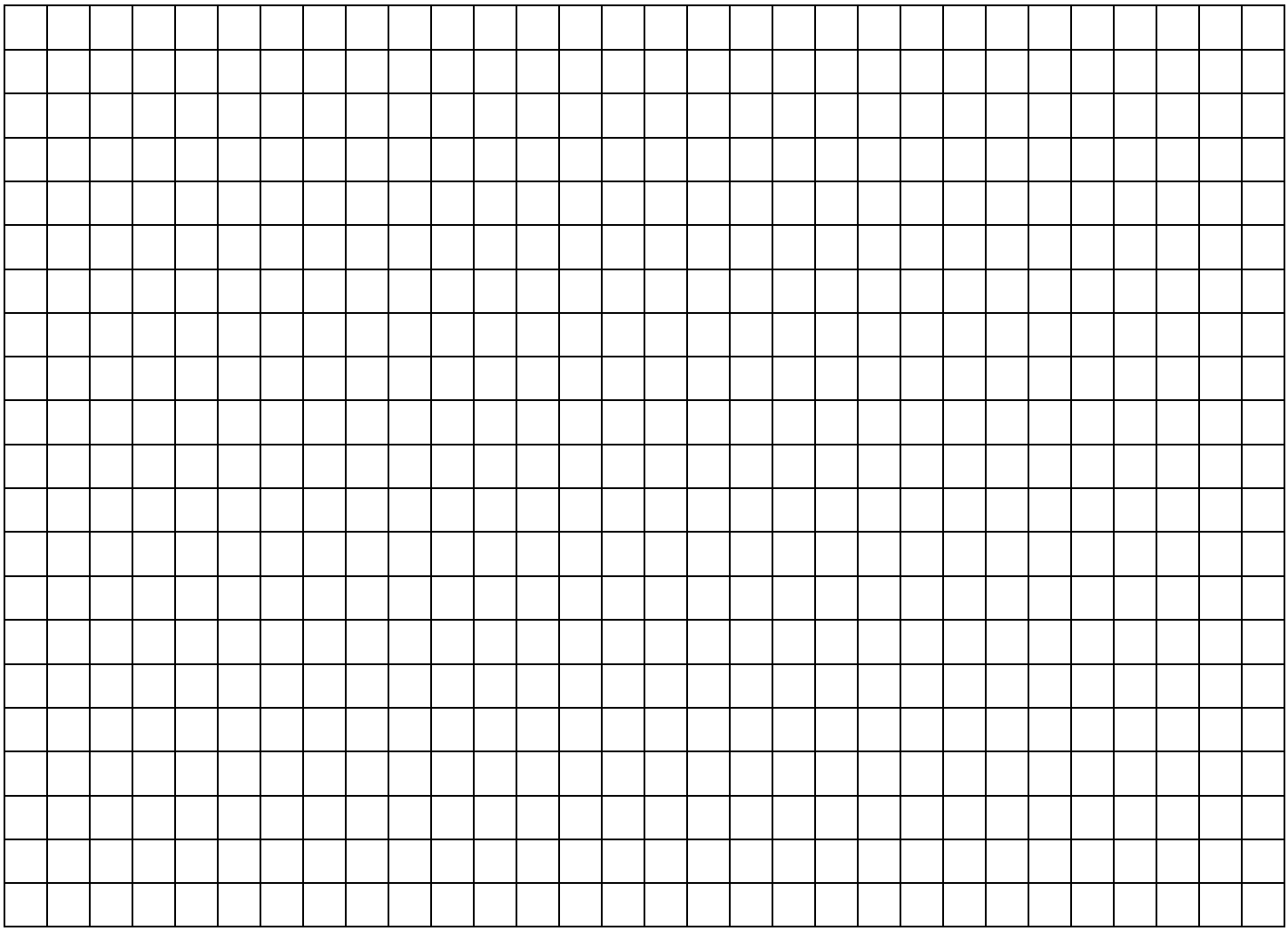
Tear this cover sheet and scratch paper off and fill out the top of the colored answer sheet prior to the start of the test. The graph below is for your use, if needed.

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.



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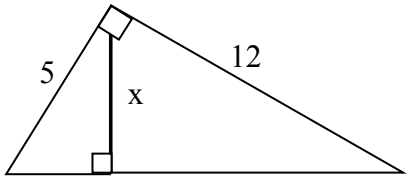
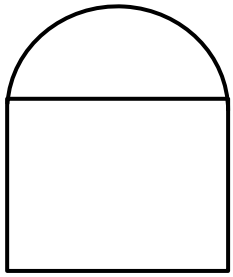
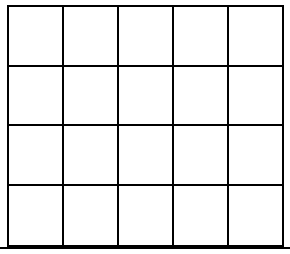
	Questions 1-30: 2 points each
1	What is the sum of 8301 and 9799?
2	Is $\sqrt{11}$ a natural number, whole number, integer, rational number, or irrational number?
3	Evaluate: $5\frac{3}{10} - 3\frac{6}{7}$ and write the answer as a reduced improper fraction.
4	Solve for x: x + 8 = 13
5	What is the slope of the line given by the equation y = 4x + 5?
6	Two angles are complementary. The measure of one angle is 33^0. What is the measure, in degrees, of the other angle?
7	Each week the Hansen family eats a total of 18 eggs. How many dozen eggs will the family eat in 6 weeks?
8	Three hundred and twenty-five balloons need to be distributed evenly to 13 clowns. How many balloons will each clown get?
9	The area of a rectangle is 30 square centimeters. The lengths of one pair of opposite sides are each 3 centimeters. What is each of the lengths, in centimeters, of the other pair of opposite sides?
10	What is the area of a circle with radius 7 feet?
11	Evaluate: $3x^2 - b$ if x = -2 and b = -1
12	A store owner increased the price of all the items in her store by 10%. What would the new price be, in dollars, of items that were originally $20.00?
13	Malala drove 180 miles in 3 hours. What was her average speed in miles per hour?
14	When Malala walks, the length of each stride is 3 feet. If Malala walked 102 feet, how many strides did she take?
15	The distance from Spokane to Ellensburg is 165 miles. Moses Lake is on the road between Spokane and Ellensburg. The distance from Moses Lake to Spokane is 98 miles. How far, in miles, is it from Moses Lake to Ellensburg?
16	Simplify and write with only positive exponents: $\frac{(3xy^3)^2}{xy^{-4}}$
17	Do the following three points lie in a straight line? (3, 2), (6, 14), and (1, 6). Answer with either Yes or No.
18	Find the largest single-digit positive integer u such that the number u232u is a 5-digit number that is divisible by 4?

19	A and B are distinct positive integers such that three-digit numbers 1AB and 1BA are perfect squares. What is the product of A and B?
20	Find the length x in the figure shown. 
21	A bouncy ball is initially released from a height of 12 feet. After each bounce the ball bounces to ¾ its previous height. After which bounce will the ball reach less than half its initial height?
22	A cylinder and sphere have the same volume and the same radius. For both figures the radius is decreased to 1/3 its initial radius. After the decrease in radii, what is the ratio of the volume of the cylinder to the volume of the sphere?
23	There are 18 people at a party. Seven of the people want cake and seven of the people want ice cream. A third of the people want neither cake nor ice cream. How many people want both cake AND ice cream?
24	Kailash is currently 6 times older than Malala's. In twenty years, their ages will add up to 5! + 18. How old is Malala right now?
25	Malala buys a bag with colored wrecking balls. She has 5 yellow balls, 3 black balls, 9 white balls, and 7 gray balls. If she chooses 2 balls without replacing them, what is the probability that they will both be black?
26	Kailash sells *z* tacos for *c* dollars. You decide to buy *x* tacos while your friend decides to buy *x* + 10 tacos. How much more does your friend pay than you pay in terms of *c*, *x*, and *z*?
27	The figure below consists of a square and a semicircle. If the area of the figure is $27 + \frac{27}{8}\pi$, what is the perimeter of the figure? (Leave answers in simplest radical form.) 
28	Bessie the cow is tied to an external corner of Kailash's barn by a 20 meter rope. The barn is in the shape of a rectangle with length 35 meters and width 10 meters. How many square meters can the cow graze around the barn?
29	Malala starts to sing at 4:00 p.m. When she is done singing, she realizes that the hour hand of the clock has rotated 380 degrees since she began singing. At what time did she stop singing?
30	How many rectangles of any size can be drawn in the 5 x 4 array of unit squares below: 

Challenge Questions: 3 pts each

31	The first 8 terms of a sequence are 0, 1, 1, 2, 3, 5, 8, 13. Given that the 16th term of the sequence is 610 and the 18th term is 1597, find the 20th term.
32	If $f(x) = 3x + b$, $g(x) = x^2 - 2$, and $f(g(x)) = 3x^2 - 2$ then b equals?
33	Kailash always has a 3/4 chance of winning any game he plays. What is the probability that out of 5 games he plays, he wins 2 and loses 3?
34	If $x + \frac{1}{x} = 5$ then what is $x^2 + \frac{1}{x^2}$?
35	Malala has \$2.32. She only has quarters, dimes and pennies. If she has 19 coins altogether, what is the largest number of pennies she could have?
36	Solve for x if $\frac{24\sqrt{x-2y}}{y} = 4$
37	If $\sqrt{(y+1) + \sqrt{(y+1) + \sqrt{(y+1) + \sqrt{(y+1) + \cdots}}}} = 3$, what is y?
38	What is the units digit of the following sum: $2^3 + 13^9 + 11^{134} + 2014^4$?
39	What is the smallest positive integer n that satisfies the equation: $$n^{n+1} = \frac{(n+3)!}{n} - (100\sqrt{n} + 36)$$
40	How many right triangles can be formed by connecting three points in the grid below?