"Math is Cool" Championships – 2014-15

11th & 12th Grade – October 22, 2014

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			
2			
3			
4			
5			
6			
7			
8			
9			
10			

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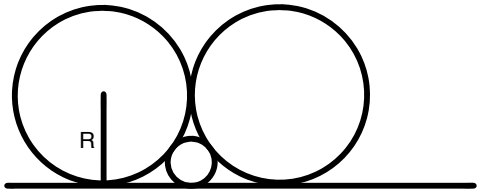
Team Contest

1	The symbol Π stands for product. Evaluate: $$\prod_{k=2}^{2014}\left(1-\frac{1}{k}\right)$$
2	Solve for *y*: $$\log_3(3y+1)-\log_3(y-1)=\log_3(9)$$
3	Two distinct circles each with radius, *R*, are tangent to each other and separately to a line. A third circle is tangent to each other two and to the line. What is the radius of the smaller circle in terms of *R*? 
4	Find the solutions of the equation $x^3-4x^2-x+4=0$.
5	Find the number of lattice points in the first quadrant of the Cartesian Plane that are on the line with equation $x+4y=128$. A lattice point is a point with integer coordinates.
6	What is the sum of all solutions, in radians, to $$4\sin^2(2\theta)=3, \text{ where } 0\le\theta<\pi?$$
7	Let $i=\sqrt{-1}$. Simplify the following in the form $a+bi$: $$\frac{(1+i)^2(3-i)}{2-2i}$$
8	Richard chooses five distinct elements from the first seven smallest positive integers. If Richard tells Stacey the product of the numbers he chose, Stacey would not be able to tell whether the sum of Richard's chosen numbers was even or odd. What is the product of the numbers Richard chose?
9	Evaluate: $1+\sqrt{(23)(24)(25)(26)+1}$
10	A sequence is defined by $a_0=N$ and for $n\ge1$, $a_n=n^2-a_{n-1}$. If $a_{20}=14$, find the value of N.

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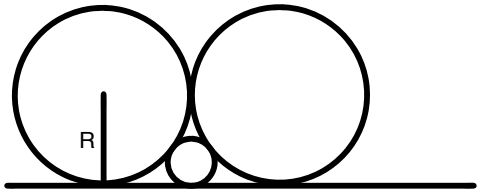
3	Two distinct circles each with radius, *R*, are tangent to each other and separately to a line. A third circle is tangent to each other two and to the line. What is the radius of the smaller circle in terms of *R*? 
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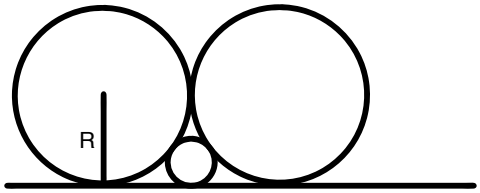
3	Two distinct circles each with radius, *R*, are tangent to each other and separately to a line. A third circle is tangent to each other two and to the line. What is the radius of the smaller circle in terms of *R*? 
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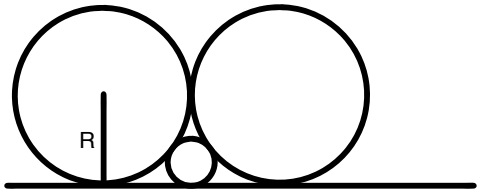
3	Two distinct circles each with radius, *R*, are tangent to each other and separately to a line. A third circle is tangent to each other two and to the line. What is the radius of the smaller circle in terms of *R*? 
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