

Name: _____



Rocket City Math League
Discovery Round 2 Test

2008-2009
Round 3

1. In the Milk Chocolatey Way there are currently 3^3 planets. If the Death Star destroys 2^2 of these planets, how many will be left? <i>(1 point)</i>	
2. Evaluate: 2^{14} <i>(1 point)</i>	
3. If $A \cup B = \{1,2,3,4,\dots,100\}$ and $A \cap B = \{50\}$ then what is the sum of the elements that are in either set A or set B but not in both? <i>(1 point)</i>	
4. $\frac{11x-2}{x^2+x-6} = \frac{A}{x+3} + \frac{B}{x-2}$ What is A+B? <i>(1 point)</i>	
5. If $a \sin b = 4$ and $a \cos b = 2$, what is the largest possible value of a? <i>(2 points)</i>	
6. Lihkin travels only along the curve parametrically defined by the equations $x^2 = t + 1$ and $y = t + 7$. Werdna travels only along the curve defined parametrically by the equations $x = t - 2$ and $y = t^2 - 4$. Find the x-value of the point at which Lihkin and Werdna could meet. <i>(2 points)</i>	
7. How many zeroes are at the end of $((3!)!)!$? <i>(2 points)</i>	
8. If A, B, and C are three different vertices of a regular decagon, what is the maximum possible value of the measure of $\angle ABC$ in degrees? <i>(2 points)</i>	
9. A Plutonian police officer named Kirtap comes across an excessively evil expression: $(6\#(7\#(8\#(9\#(\dots(2007\#(2008))))\dots))$ that can only be defeated if Kirtap simplifies it. Luckily, Kirtap knows that $x\#y =$ the number of ways in which you can choose y objects from a group of x distinct objects. Simplify the evil expression. <i>(3 points)</i>	
10. Find the last nonzero digit in the expansion of $20!$. <i>(3 points)</i>	
11. There are 5 distinct alien children and there are 10 identical balloons at Ruomalg's party. In how many ways can you distribute the balloons to the children at Ruomald's party if each child can receive any whole number of balloons ranging from 0 to 10 balloons? (Assume all the balloons are given out) <i>(3 points)</i>	
12. Lihkin's Galactic Maharba is a vicious creature, and must be kept inside of a barn in the shape of an equilateral triangle with side length 18. He (Maharba) is tied with a rope of length 6 to a pole that is inside the barn and is equidistant from the three vertices of the barn. If Maharba cannot go through the walls of the barn, what is the area of the region on which he can walk? <i>(4 points)</i>	

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