Name_____

Rocket City Math League

Apollo (Algebra II) Test

2008-2009
Round 1

Answers must be written inside the adjacent answer boxes. All answers must be written in exact, reduced, simplified, and rationalized form. All decimals and mixed numbers must be written as improper fractions unless otherwise specified. **No calculators, books, or other aides may be used. You will be allowed 45 minutes to complete the test.**

1. Xenon travels to a Martian party 15,540 miles away. If it takes Xenon 13.6 hours to travel to the party and 6.4 hours to return home, what is Xenon's average speed in miles per hour for her entire round trip? *(1 point)*	
2. The number of BANGs (Blackhole/Antimatter Nullification Guns) in the galaxy is always a prime number. If Nadon destroyed 6 BANGs simultaneously and this rule holds true, what is the smallest possible number of BANGs that could have existed in the galaxy before Nadon destroyed six BANGs? *(1 point)*	
3. Sunny pays *a* dollar bills and *b* cents, where $b < 100$, for a bag of moon chips. Given that *a* is the prime component and *b* is the composite component of the solution (x,y) to: 3x-y=99 and x+2y=131, then what is the price of a bag (in dollars and cents) of moon chips? *(1 point)*	
4. Gauss and Einsteinium decide to split their galaxy into two parts and count the number of black holes in their respective halves. Gauss always counts in base 4 and Einsteinium always counts in base 8. Gauss counts 321_4 black holes and Einsteinium counts 456_8 black holes. Finally, Gauss and Einsteinium convert their numbers to base 10, add the numbers, and publish their final result. What number of black holes did they publish? *(1 point)*	
5. The Intergalactic Patroller (IP) only travels in straight line segments. It locates the Galactic Speeder broken down in the middle of the galaxy. The captain of the IP plots the position of his ship at the y intercept of the function $y = x^2 - 12x + 35$, where x and y are measured in light years and the Galactic Speeder is located at the vertex of the same function. If the IP travels in a straight line segment to the Galactic Speeder, how many light years does the IP have to travel? *(2 points)*	
6. The planet Plarkton contains a natural number of Zings and natural number of Zaps. If the sum of the number of zings and number of Zaps is less than 20 and the product of the number of Zings and number of Zaps is less than 84, what is the greatest possible value of (number of Zings) ^{3} + (number of Zaps) ^{3}? *(2 points)*	
7. Gunners for BANGS have to go to school before they're allowed to fire BANGs. Zeldon has to go to school for 3 years, and Mortar has to go school for 5 years. The zeros of the function $a(x) = x^3 - 15x^2 + 71x - 105$ describe the possible number of years a gunner can go to school. If Coronoto has to go to school for a number of years that is not equal to either 3 or 5, for how many years must he go to school? *(2 points)*	
8. Oyo has a list of all of the prime numbers between 1 and 100. If he randomly selects 2 different numbers from the list, what is the probability that their sum is even? *(2 points)*	
9. Officials from Lurania have paid Earth's scientists to determine the number of stars in the Luranian galaxy. Earth's scientists have determined that (in base 10) the number of stars in the Luranian galaxy is the smallest composite number that has no prime divisors less than 101. Since the Luranians only accept numbers in base 8, what number must the Earth scientists report to the Luranians? *(3 points)*	
10. Five blue aliens (Bob, Billy, Betty, Bobby, Borat) and three green aliens (Gary, Grey, Gargarx) are the only aliens trained to be on the spaceflight crew. If the crew must contain at least 2 blue aliens, no more than 2 green aliens, and no more than 5 aliens total, how many distinct spaceflight crews could there be? *(3 points)*	
11. Find the harmonic mean of the real values of x that satisfy the following equation: $\log(x^2 + 6) = \log(6x^2 - 5x + 6) - \log(x)$. *(3 points)*	
12. Jack Galactic Sparrow has taken a certain number of alien hostages from the planet Blarkton. If this number is the smallest integer greater than 290 that can be expressed as the sum of two distinct perfect squares in at least three different ways, how many alien hostages has he taken from Blarkton? *(4 points)*	