



Rocket City Math League Apollo Test

**2007-2008
Round 2**

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. **No calculators, books, or other aides may be used.**

<p>1. The ship, Zanophobe, is leaving from the planet Zeninia for the planet Zorgetta. For each mile of atmospheric travel, the ship uses 0.875 gallons of fuel; however, every lightyear traveled in space only uses 0.125 gallons of fuel. There are 56 miles between takeoff and leaving the atmosphere, 560 lightyears between Zeninia and Zorgetta, and 32 miles after entering Zorgetta's atmosphere and the landing pad. What is the minimum amount of fuel, in gallons, that the ship needs to make this trip? (1 point)</p>	
<p>2. The number of stars visible from Jack's window at night is equal to $(6!+6) - (5!+5) + (4!+4) - (3!+3) + (2!+2) - (1!+1)$. How many stars are visible from Jack's window at night? (1 point)</p>	
<p>3. In the Chocolatey Way, moons are equal to one-half of a Klat and planets are equal to one Klat. There are an unknown number of moons, but the overall total of Klats is 84400. If there are six moons to every planet, find the number of moons. (1 point)</p>	
<p>4. First contact with the Planx was made 2 years ago. The year of first contact was the smallest number that was divisible by 1, 2, 3, 4...13, 14, and 15. What is the current year? (1 point)</p>	
<p>5. Freddy the space merchant is trying to sell two engines. He lands on the planet Klarnoff, the home of the Klarians. The Klarians have two hands with four fingers each, so their offer for the engines is in base 8. If they buy the engines for 43210₈ gold coins each, then how many total gold coins does Freddy get in base 10? (2 points)</p>	
<p>6. Zorgians live on the planet Glanx. Each Zorgonian has 4 arms and 3 legs. Each arm has 2 hands and each leg has 1 foot. Each hand has 6 fingers and each foot has 4 toes. Every finger and toe has exactly 1 nail on it. If there are 100 Zorgonians on the planet Glanx, then how many Zorgonian nails are there? (2 points)</p>	
<p>7. Jonathan is a space mechanic on Pluto. In order to figure out what is wrong with the HMS Blair, Jonathan needs to solve the logarithmic equation $\log_4 2x + \log_4 25 - \log_4 50 = \log_{16} (6x - 9)$. Find the solution of this logarithmic equation. (2 points)</p>	
<p>8. In the new Tri-Level space station, there are 520 Level A apartments, 320 Level B apartments and 100 Level C apartments. Between 2 and 20 people can reside in any of the residential apartments described. If the maximum number of people that reside on the Tri-Level space station is x and the minimum number of people that reside there is y, evaluate $\frac{169x}{13y} + \frac{x!}{(x-1)!} \cdot y^{-1} - \sqrt{y}$. (2 points)</p>	
<p>9. Find the solutions to the equation $x^4 - 6x^3 + 5x^2 + 30x - 50 = 0$ over the complex plane if one of the solutions is $3+i$. (3 points)</p>	
<p>10. On the planet of Taltonia, there are 929 days in one year. The first person to rule Taltonia reigned for 13 days, and the next ruler ruled for 24 days. If the length of the reign of each new ruler of Taltonia is equal to the sums of the lengths of the reigns of the two previous rulers, find the length of the reign of the 15th ruler of Taltonia in <u>years</u>. (3 points)</p>	
<p>11. James SpaceBond is playing a dice game at the Casino GalaticaRoyale in Montegalatica Carlo, a city on Venus. James rolls two dice cubes, each with the numbers 1 through 6. If James' roll adds to 7, he achieves "007" status. If James's rolls add to any other number, then the evil Legalactic Chiffre kills James. There is a small catch in the game, however. Both of the dice that James throws are biased so that the chance of throwing each face value is proportional to that value. What is the probability that James achieves "007" status? (3 points)</p>	
<p>12. There are only three species of creatures on the planet Iobreidlos. Zithorians live for 320 years. The Nairohitz live for 24 years. The lifespan of a Zin is 172 years. The average lifespan on the planet Iobreidlos, where only these three species live, is 246 years. If the number of creatures on Iobreidlos is less than 20, and there is at least one of each species on the planet, how many different ordered triples (x, y, z) can be written to describe the possible populations of each species Zithorians, Nairohitz and Zins, respectively, on the planet? (4 points)</p>	

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