Name_____ Math Level_____

Rocket City Math League

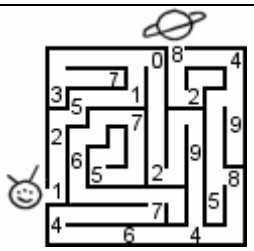
Mercury Test

2004-2005
Round 3

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, and all times must specify AM or PM (unless requested otherwise in the problem). **No calculators, books, or other aides may be used.**

1. Tsol is lost! Luckily, he can find his way back home using the Intergalactic Maze of Seventh-Dimensional Pathways.

There is a single path (in the maze pictured to the right) that will lead Tsol back to his home planet. This path does not cross any lines, immediately reverse direction, or travel outside the maze. Find the sum of the numbers that Tsol will cross while traveling along this path. *(1 point)*



2. The winning Madiator at this year's Madiator World Cup on Mars must destroy 1000 robots in the fastest time. Tram finishes in $(3 + \sqrt{2})$ hours, Nait in $^{133}/_{35}$ hours, Sna in (2.3837 + 1.298) hours, Itra in $(2.6 - 0.24)^2$ hours, and Am in $(3 + 8 \div 10)$ hours. Who wins the Madiator World Cup? *(1 point)*

3. If Space 'R Us manufactures 800 spacesuits and must sell 60% of them to pay off its debts in full, what is the minimum number of spacesuits that must be sold in order for Space R' Us to gain a positive profit? *(1 point)*

4. It takes 70 years for a spaceship to travel from Earth to Mars. NASA decides that the astronauts should be put in hypersleep for only the first 15% and last 15% of the trip. For how many months will the astronauts be out of hypersleep during their trip from Earth to Mars? *(1 point)*

5. The number of stars in the Milky Way Galaxy is 80 less than 2 times the number of stars in the Andromeda Galaxy. If the Archon Galaxy has 218 less stars than the Milky Way Galaxy does, and there are 622 stars total in all three galaxies, how many stars are in the Archon Galaxy? *(2 points)*

6. E.T.'s head weighs one pound. When he puts on his bicycle helmet, the combined weight of his head and helmet sums to the positive root of $x^3 + 3x^2 - 4x - 12$. Find the weight in pounds of E.T.'s helmet. *(2 points)*

7. A shuttle's flight path is always perpendicular to the line $y = -2x$, where x represents time in seconds and y represents position in miles. Using this information, how many miles does the shuttle fly in 2 minutes? *(2 points)*

8. One-fourth of NASA's astronauts attended this year's Astronautical Reunion. One-third of the attending astronauts went home after an hour. Then, five-sixths of the remaining astronauts also left a while later. The remaining 98 astronauts stayed at the Reunion until it ended. How many astronauts are there at NASA? *(2 points)*

9. Evaluate: 1 – 2 + 3 – 4 + 5 – 6 + . . . – 1968 + 1969. *(3 points)*

10. Each letter in the problem below represents a unique single-digit number. Assuming the problem is set up as a typical multiplication problem and the calculations are correct, what is the sum of R+C+M+L? *(3 points)*

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   R C M L
   ×   L M
 ---------
   L R C P M
 + R C M L C
 ---------
   6 5 4 0 3
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11. Find the next term in the following sequence: -7, -10, -12, -12, -9, -2, 10… *(3 points)*

12. There are 100 astronauts and 100 lockers on a space station. One astronaut first opens all the lockers. Then, the second astronaut changes the position of every other locker beginning with the second locker (closing the 2nd, 4th, 6th, etc.). The third astronaut changes every third locker (closes the 3rd, opens the 6th, closes the 9th, etc.). If this pattern continues through all 100 astronauts, how many lockers will remain open after the last astronaut changes the 100th locker? *(4 points)*

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