MagMaR 2015
Wild Round

Name: _____

School: _____

Team ID: _____

Grade: _____

Date: March 29, 2015

Problems: 40

Time: 20 minutes

Maximum Score: $1 \times 40 = 40$

Type: Individual

Score: _____

Do not start until instructed to do so!

Calculators, slide rules, books, computers, other electronic devices, are all prohibited. Similarly, graph paper, protractors, rulers, and compasses are not allowed at the competition. You may not collaborate with any other contestants during this round.

Please record your answers only in the blanks below; the ones provided on the test are only for convenience. Only answers recorded on this cover page will be graded.

1.	2.	3.	4.	5.
6.	7.	8.	9.	10.
11.	12.	13.	14.	15.
16.	17.	18.	19.	20.
21.	22.	23.	24.	25.
26.	27.	28.	29.	30.
31.	32.	33.	34.	35.
36.	37.	38.	39.	40.

1. What is $\frac{1+3+5}{2+4+6} - \frac{2+4+6}{1+3+5}$?

1. _____

2. How many prime numbers less than 100 are divisible by 2?

2. _____

3. The answer to this question is twice the answer to question #37.

3. _____

4. There is an angle of $37°$. Find the complement of the complement of the complement of the complement of the complement of that angle.

4. _____

5. Snorlax-with-Amulet-coin is very good at making money. Each day, he can double the amount of money he has. If he starts with $1, how many days will it take him to become a millionaire?

5. _____

6. We have a set of 40 cards such that for each integer from 1 to 10, there are four cards with that number written on it. Alice and Bob each draw a card from the deck, without replacement. What is the probability that Alice's card has a larger number than that of Bob's?

6. _____

7. I am thinking of a certain positive integer. I perform the following operations on it in this order: add 1, multiply by 2, divide by 4, add 3, my result is 6. What was the original number that I was thinking of?

7. _____

8. Find the sum of all solutions to $x = \sqrt{2 - x}$.

8. _____

9. The side lengths of a cube are doubled. By what percent does the volume increase?

9. _____

10. A number cube is rolled 3 times. What is the probability that all 3 rolls are different?

10. _____

11. In how many other ways can 2^{36} be written in the form m^n, where m and n are positive integers?

11. _____

12. Let the answer to this problem be a. If $a = k^a$, what is k^2?

12. _____

13. JoKo is extremely nervous about Mathcounts States. He is currently agonizing over which items to use during the contest. Given he has 4 lucky pencils, 2 protractors, 7 rulers, and 1 pair of glasses, how many different ways can he select one of each category to use?

13. _____

14. Maggy is baking brownies (more than 1), but unfortunately, whether she decides to split up the brownies evenly among 3, 4, 5, or 6 people, she has one leftover brownie. What is the smallest number of brownies that Maggy is baking?

14. _____

15. For how many integers n is $\frac{20}{n}$ an integer?

15. _____

16. Two flagpoles are 16 feet apart. If their heights are 30 feet and 42 feet, what is the distance between the tops of the two poles?

16. _____

17. Magmar is buying trophies for a math contest. He needs to choose three team trophies and nine individual trophies. Assuming all the trophies must be different and there are 11 trophies suitable for individual awards and 6 trophies suitable for team awards, how many different combinations of trophies can Magmar choose?

17. _____

18. If thirty Squirtles can fill a lake in five hours, how many minutes does it take for twelve squirtles to fill up the same lake?

18. _____

19. A cube is inscribed in a sphere of radius $\frac{9}{2}$. What is the volume of the cube?

19. _____

20. Four six-sided dice are rolled. What is the probability that all four numbers on the top of the die are either all even or all odd?

20. _____

21. What is the remainder when 3^{2015} is divided by 8?

21. _____

22. Calculate the sum of the digits of 1000000000000001^4.

22. _____

23. How many integers between 40 and 50 are prime?

23. _____

24. Crystal scored a 99, 89, 92, and 85 on her math tests. What score does she need on her next test in order to have an average score of 93?

24. _____

25. Emolga is a flying squirrel and wants to visit all the trees in the nearby neighborhood. The trees are at lattice positions (x, y) (x, y are integers) such that $-1 \le x \le 1$ and $-1 \le y \le 1$. If Emolga starts from the tree at $(1, 1)$ and can only fly to trees a distance of 1 away, in how many different ways can Emolga visit all the trees exactly once?

25. _____

26. A restaurant has five entrees, four appetizers, and three desserts. How many ways are there to order two different entrees, one appetizer, and one dessert?

26. _____

27. Three perpendicular cuts divide a sphere with radius 1 into eight identical pieces. Find the surface area of one of these pieces.

27. _____

28. Pikachu eats $\frac{3}{7}$ of a pie. Piplup eats $\frac{11}{27}$ of an identical pie. Pachirisu eats $\frac{5}{13}$ of another identical pie. Who has the most leftovers of their pie?

28. _____

29. Two positive integers have a greatest common divisor of 12 and a least common multiple of 84. Find their sum.

29. _____

30. A year is a leap year if and only if the year number is divisible by 400 (such as 2000) or is divisible by 4 but not 100 (such as 2012). Brians birthday is Saturday, July 4, 1998. What day of the week will Brian's birthday be in 2015?

30. _____

31. When an Alakazam tries to arrange his students in rows of 9, he has 5 leftover. When he arranges his students in rows of 7, he has 2 left over. What is the least number of students he could have?

31. _____

32. MagMar the Pokemon is not great with math, so when he evaluated $x + 5 * 2$, he forgot to use the order of operations. Fortunately, he still came up with the right answer. Find x.

32. _____

33. Brian has a $\frac{1}{10}$ chance of getting into MIT, a $\frac{1}{2}$ chance of getting into Berkeley, and a $\frac{1}{5}$ chance of getting into Stanford, with all probabilities independent of each other. What is the probability that Brian is accepted by at least one of these colleges?

33. _____

34. Diglett is cramming for his biology test and reads pages 418 to 480 before collapsing from exhaustion. How many pages did he read?

34. _____

35. If $x + \frac{1}{x} = 4$, then what is the value of $x^2 + \frac{1}{x^2}$?

35. _____

36. $ABCDEFGH$ is a regular octagon. Find the ratio of $\frac{CG}{BD}$.

36. _____

37. The answer to this question is twice the answer to question #3.

37. _____

38. A triplet (x, y, z) is called *nice* if $x + y + z$ is even. How many nice ordered triples (x, y, z) are there such that x, y, z are distinct elements of $\{1, 2, 3, 4, 5\}$?

38. _____

39. Luna is five times older than Stella. Five years ago, Luna was ten times older than Stella. What is the sum of their current ages?

39. _____

40. Tiancheng the Turtle lives on a three-dimensional grid. He initially starts at the origin (0,0,0), and is trying to reach Brian the Bear's house at coordinates (3,1,4). How many different sequences of moves can he make such that he reaches Brian's house in the minimum number of moves. (A move consists of moving one unit in the x,y, or z directions).

40. _____