

MagMaR 2013

Wild Round

Name: _____

School: _____

Team ID: _____

Grade: _____

Date: January 19, 2013

Problems: 40

Time: 10 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.

Problems are not necessarily sorted by order of difficulty.

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. How many arithmetic sequences with only integer terms start with 1 and end with 2013?

1. _____

2. Compute the sum $21 + 23 + \cdots + 99$.

2. _____

3. In a sequence of numbers, the n^{th} term is 3 less than the square of the previous term. If $a_1 = 1$, what is a_9 ?

3. _____

4. A right triangle has two sides of length 5 and 13. What is the largest possible length of the third side of the triangle?

4. _____

5. A point P is chosen inside of a square of side length 2. What is the probability that P is not within 1 unit of the center of the square?

5. _____

6. If the block is 7 units wide and 9 units tall, what is the perimeter of the figure?

6. _____

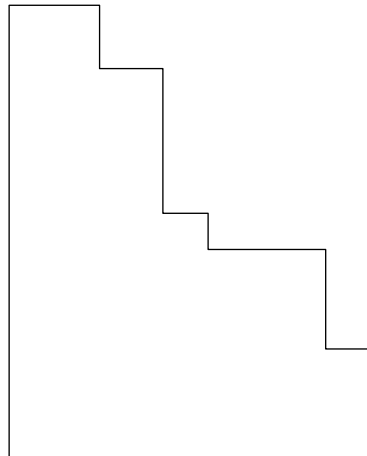


Figure 1: Problem 6

7. Pokeblocks and Stabblocks are sold in cylindrical cans. A can of Pokeblocks has a radius of 2 and height of 5, while a can of Stabblocks has a radius of 3 and height of 3. What is the ratio of the volume of a can of Pokeblocks to the volume of a can of Stabblocks?

7. _____

8. Triangle ABC has a perimeter of 42. Points M and N are on sides AB and AC respectively such that $MN \parallel BC$. If $AB = 18$ and $AM = 8$, then what is the perimeter of triangle AMN ?

8. _____

9. The angles of a polygon form an arithmetic sequence. If the largest angle has a measure of 168° and the smallest has a measure of 120° , what is the sum of all of the angles in the polygon, in degrees?
9. _____
10. Right triangle ABC with $\angle B = 90^\circ$ has $AB = 3$ and $BC = 4$. Let M be the midpoint of side AC . What is the length of MB ?
10. _____
11. Two children can finish six cakes in three hours. How many minutes does it take four children to finish two cakes if each child eats at the same rate?
11. _____
12. In a triathlon, Peter runs 10 miles in 2 hours, bikes 7 miles in 40 minutes, and swims 9 miles in 100 minutes. What is Peter's average rate throughout the race in miles per hour?
12. _____
13. Alan leaves Boston at 12:00 P.M. and drives to D.C. at an average of 50 miles per hour. Barry leaves D.C. later at 1:00 P.M. and drives toward Boston along the same road at an average of 30 miles per hour. If the distance between Boston and D.C. is 440 miles, at what time do they meet?
13. _____
14. Express the value of $\sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2 + \cdots}}}}$ in simplest form.
14. _____
15. Compute the product $77 \times 91 \times 143$.
15. _____
16. A recipe that makes 24 cookies calls for 4 cups of flour and 3 cups of water. How many cookies can be made with 3 cups of flour and 2 cups of water?
16. _____
17. The average age of 18 boys is 12 years old, and the average age of 12 girls is 17 years old. After two 28 year-olds leave the group, what is the average age of the remaining 28 people?
17. _____
18. Compute 111^3 .
18. _____
19. If 14 callops are worth 9 jints, 12 spanters are worth 7 callops, and 3 gogs are worth 5 spanters, how many gogs is 20 jints worth?
19. _____
20. Express the product $20\frac{5}{6} \times 18\frac{3}{5}$ as mixed number.
20. _____

21. How many prime numbers less than 50 satisfy that the sum of their digits is equal to another prime number?
21. _____
22. Let $a \star b = \frac{1}{a} + \frac{1}{b}$. Compute $(1 \star 2) \star (3 \star 4)$.
22. _____
23. In a school, 40% of the boys and 50% of girls participate in math contests. If 42% of the entire school participates in math contests, what percent of the school population is female?
23. _____
24. Compute the sum of reciprocals of the positive factors of 28.
24. _____
25. Find the remainder when 7^{2013} is divided by 11.
25. _____
26. The value of $11 \times 10 \times 9 \times \cdots \times 2 \times 1$ is in the form 3_9_6800. What is the sum of the two blank digits?
26. _____
27. Ronald is buying pencils in packs of 10 and 13. If he buys at least one pack of each, what is the largest number of pencils he cannot purchase exactly?
27. _____
28. What is the smallest positive integer n such that the product $n \cdot (n + 1) \cdot (n + 2) \cdot (n + 3) \cdot (n + 4)$ ends with two 0's?
28. _____
29. What is the smallest positive integer that leaves a remainder of 5 upon division by 7 and 7 upon division by 9?
29. _____
30. A pineapple under the sea has four doors. How many ways can Patrick enter the house through one door and exit through a different door?
30. _____
31. There are 24 people in math club, 17 people in chess club, and 8 in both clubs. How many people are in at least one club?
31. _____
32. Two dice are rolled. What is the probability that the total number of dots on the top faces add up to a multiple of 6?
32. _____
33. A fair coin is flipped 7 times. What is the probability of flipping at most 3 heads?
33. _____

34. A burger can have possible condiments of lettuce, tomatoes, onions, and pickles. How many combinations of condiments are possible? A burger can have no condiments on it.
34. _____
35. One spinner is divided into three equal sections labeled 1, 4, and 5. The other spinner is divided into 100 equal sections labeled 1, 2, 3, ..., 100. Both spinners are spun. What is the probability that the sum of the two numbers is even?
35. _____
36. What is the sum of the distinct prime factors of 1599?
36. _____
37. If 2 pens and 1 notebook is worth \$3.10, and 1 pen and 2 notebooks is worth \$3.50, how much is 1 pen and 1 notebook worth, in dollars?
37. _____
38. In how many ways can four students Albert, Berta, Candice, and Denise line up for lunch?
38. _____
39. How many integers satisfy that $|x - 3| \leq 6$ and $|2x + 5| \leq 8$?
39. _____
40. The Youtube video Gangnam Style had 10,000,000 views in the beginning of August 2012 and 100,000,000 views in the beginning of September 2012. On average, how many views did the video get each day in the month of August 2012, to the nearest million?
40. _____