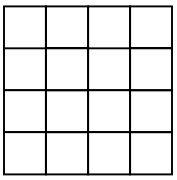
2007 Primary Math World Contest Tryouts Problems

Name: _____ DOB: _____ Age:_____

20 problems (ordered from easiest to the hardest) in 45 mins. No calculator. Only correct answer counts, no partial credit.

1) The numbers 1 through 16 are entered into a square grid with four rows and four columns. The sum of the numbers in each of the columns is the same. What is that sum?



2) What is the ones' digit of the product 9 x 9 x 9 x 9 x 9 x 9 x 9 x 9 x 9 x 9?

3) If YOURS plus MINE is equal to YOURS minus MINE, what is MINE equal?

4) Make a correct addition problem by replacing each of the variables: A, B, and C with a digit.

What is the sum of A+B+C?

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  4 3 A 2
  3 5 B
+ C 6 2 7
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  8 2 9 3
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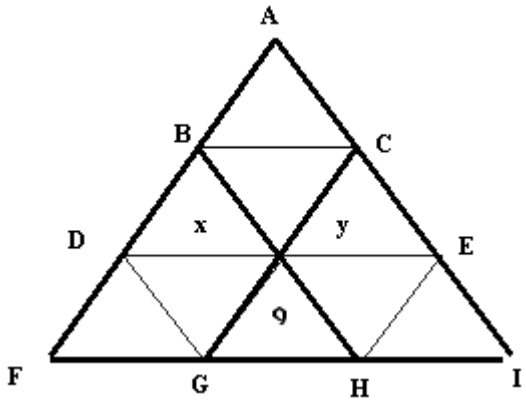
5) What is the smallest positive integer A such that the result of "2007 + A" when written out contains no 2's, 0's or 7's among its digits?

6) The number 9 has been placed into one of the small triangles. Place the digits 1 through 8, inclusive, into the other eight small triangles so that the sum of the four numbers in each of these three triangles: **ADE, BFH,** and **CGI**, **is equal to 21.** What is the value of **x + y ?**



7) Johnny was reading a book and was counting the number of "1"s that appeared in the page numbers. He counted that there were 24 ones. If the book starts on page 1, how many pages does the book contain?

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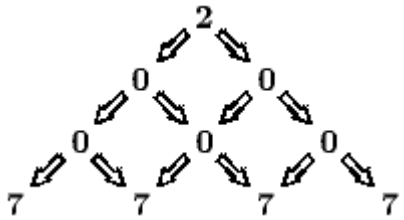
8) For how many whole numbers between 100 and 999 does the product of the ones' and tens' digits equal the hundreds' digit?

9) With how many ways can you get the number 2007 while following the arrows on the figure?



10) Larry thinks of a number, and whispers it to Mary. Mary either adds two to the number or doubles it, and whispers the result to Nancy. Nancy takes that number and either subtracts 3 or divides the number by 3. The final result she announces is 10. What is the largest number Larry may have given Mary?

11) Adam and Bobby are standing in a line with other people, waiting to see a movie. There are at most 30 people in the line.
Adam says: "There are three times as many people after me in this line than before me."
Bobby says: "There are four times as many people after me in this line than before me."
How many people are in the line?

12) The number N = 111 ... 1 consists of 2007 ones. It is exactly divisible by 3. How many zeroes are there in the quotient of $\frac{N}{3}$?

13) What is the value of this expression with 2007 terms? (Note that every third term is subtracted.)
1 + 2 - 3 + 4 + 5 - 6 + 7 + 8 - 9 + … + 2002 + 2003 - 2004+ 2005 + 2006 - 2007

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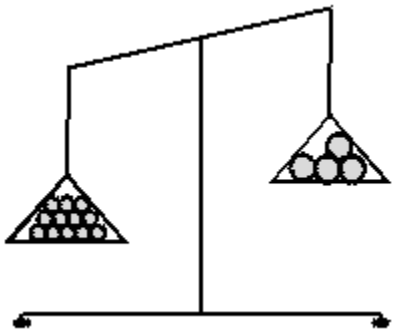
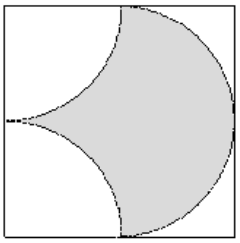
14) There are two sizes of metal balls. Each large ball weighs $1\frac{2}{3}$ times as much as a small ball. Currently the left pan of the balance contains 12 small balls while the right pan has 4 large balls. You are to add a number of balls of either type to the right pan to put the two sides in balance. How many balls of each type to add?

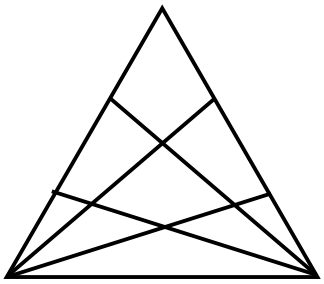


15) Barry asks you to lend him a certain amount of money between 1 cent and 10 cents inclusive. What is the smallest number of coins you need to have in order to be able to give Barry exactly what he asks you for, regardless of what it is?

16) A half circle and two quarter circles determine the shaded region indicated inside a 10 cm ×10 cm square. Find the shaded area in cm^2.



17) How many triangles (of any size) can be found in the diagram shown?



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18) Suppose you take all the positive integers whose digits are all 9's and which have at most 111 digits, and add these integers together. You get the number

$$N = 9 + 99 + 999 + 9999 + \cdots + \overbrace{999\ldots99}^{111 \text{ digits}}$$

where there are 111 numbers added together. What is the sum of the digits of N?

19) A teacher asked Garfield to calculate five 10-digit perfect square numbers. After a lot of arithmetic, Garfield turned in a list of the following five numbers (see below), but he made two mistakes. First, he spilled milk on the paper so that the middle six digits of each number were impossible to read. Second, he made an error in calculating one of the five numbers and that number is not a perfect square. Don't cry over spilled milk, but determine which of these five 10-digit numbers is NOT a perfect square.

A. 315[illegible]84

B. 23[illegible]241

C. 487[illegible]72

D. 518[illegible]36

E. 898[illegible]00

20) Sally and Judy arrive at the ski hill and ride up the chair lift together. They then immediately ski down the hill, immediately ride up the chair lift again, and so on. However, Sally always takes exactly twice as long to ski down the hill as Judy does, so they aren't together very often. Whenever they are at the bottom of the hill at the same time, they ride up the chair lift together. The chair lift takes three times as long to get up the hill as it takes Sally to ski down the hill. Sally leaves after having skied down the hill 25 times. How many times did Sally and Judy ride up the chair lift together?