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# MATHCOUNTS

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■ **Sprint Round Competition** ■  
**Practice Test 1**  
**Problems 1-30**

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Name

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Date

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**DO NOT BEGIN UNTIL YOU ARE  
INSTRUCTED TO DO SO.**

This round of the competition consists of 30 problems. You will have 40 minutes to complete the problems. You are not allowed to use calculators, books, or any other aids during this round. If you are wearing a calculator wrist watch, please give it to your proctor now. Calculations may be done on scratch paper. All answers must be complete, legible, and simplified to lowest terms. Record only final answers in the blanks in the right-hand column of the competition booklet. If you complete the problems before time is called, use the remaining time to check your answers.

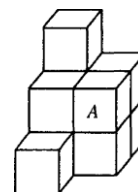
Total Correct	Scorer's Initials

1. Which number is a prime number? 2001, 2004, 2005, 2007, 2011, and 2013.
2. How many obtuse angles are there among the four angles of  $89^\circ$ ,  $126^\circ$ ,  $180^\circ$ , and  $216^\circ$ ?
3. How many of the numbers from 1 to 2011 are simultaneously divisible by 2, 3, and 5?
4. Alex and Bob are standing in front of a big mirror. Alex looks at the mirror and reads the number on Bob's sportswear as shown in the figure. What is the number of Bob's sportswear?



5. How many three-digit positive integers are there such that the three digits are in strictly increased order (like 145) or strictly decreased order (like 321)?
6. In the sequence  $7^1, 7^2, 7^3, \dots, 7^{2011}$ , how many terms have 3 as the units digit?
7. How many integer values of  $x$  if the expression  $\frac{6x+3}{2x-1}$  represents integers?

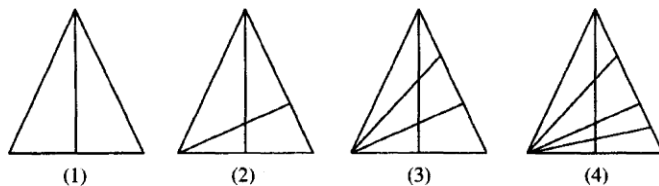
8. Ten congruent cubes are put together as shown in the figure. If the cube A is removed, what is the difference of the surface areas before removing the cube A and after removing the cube A?



9. According to the pattern below, the positive integer 2011 is in the  $n$ th row and  $m$ th column. What is the value of  $n + m$ ?

1	3	5	7
15	13	11	9
17	19	21	23
31	29	27	25
..	..	..	..
..	..	..	..

10.  $a_1, a_2, a_3,$  and  $a_4$  are the number of triangles in Figure (1), (2), (3) and (4), respectively.  $a_1=3, a_2=8, a_3=15, a_4=24$ . What is  $a_9$ ?



11. 2011 students are standing in a row. They are called in such a pattern: 1, 2, 3, 4, 3, 2, 1, 2, 3, 4, 3, 2, ..... What number is the 2011<sup>th</sup> student called?

12. At 3:30 P.M, the acute angle formed by the hour and the minute hands on a clock is  $x^\circ$ . Find the value of  $x$ .

13.  $a$  and  $b$  are prime numbers.  $3a + 2b$  is a prime number less than 20. How many pairs of  $(a, b)$  are there?