Zoom International Math League
Online Mathematics Competition
Sample Problems

The answer to each of these problems is an integer (a positive integer, a negative integer, or 0). There is only one correct answer for each problem.

All answers should be submitted online, in the blank supplied under the question.

The complete contest contains 20 questions, with a time limit of 60 minutes.

Detailed information for the Online ZIML competition can be found online at

http://online-ziml.areteem.org

For registration, please visit

http://event-reg.areteem.org

Division M (Grades up to 8)

M1. The number 2014 can be factored as $2014 = p \times q \times r$, where p, q, r are all prime numbers. What is $p + q + r$?

M2. One day, Bob rode his bike to school. When school is off, he forgot his bike and walked home instead. He spent a total of 40 minutes on the road for the round trip. If he walked for both directions, he would have spent a total of 55 minutes. How many minutes would he spend for the round trip if he rode his bike for both directions?

M3. In quadrilateral $ABCD$, $\overline{BD}$ is perpendicular to $\overline{AD}$ and $\overline{BC}$. Given that $BD = 8, AB = 17, CD = 10$. Find the area of $ABCD$.

Division H (Grades 9-12)

H1. Given a positive integer n, define $S(n)$ to be the sum of its digits. For example, $S(2014) = 2 + 0 + 1 + 4 = 7$. How many four digit numbers n have the sum of digits $S(n)$ equal 9?

H2. The positive integers are listed in the following table (the first 4 rows are given):

			1					
		2	3	4				
	5	6	7	8	9			
10	11	12	13	14	15	16		
...	...	...	...	...	...	...	...	...

What is the middle number of the 100^{th} row?

H3. Triangle ABD is a right triangle, and $\angle B = 90°$. Point C is on side $\overline{BD}$, and $BC = 2, AB = 4$. If $\angle CAD = 45°$, find the length of $\overline{CD}$.