



Mid-Michigan Mathematical Olympiad, Grades 5-6, 7-9 and 10-12 for 2005

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by parmenides51

5-6 p1. Is there an integer such that the product of all whose digits equals 99 ?

p2. An elevator in a 100 store building has only two buttons: UP and DOWN. The UP button makes the elevator go 13 floors up, and the DOWN button makes it go 8 floors down. Is it possible to go from the 13th floor to the 8th floor?

p3. Cut the triangle shown in the picture into three pieces and rearrange them into a rectangle. (Pieces can not overlap.)

<https://cdn.artofproblemsolving.com/attachments/9/f/359d3b987012de1f3318c3f06710daabe66f2.png>

p4. Two players Tom and Sid play the following game. There are two piles of rocks, 5 rocks in the first pile and 6 rocks in the second pile. Each of the players in his turn can take either any amount of rocks from one pile or the same amount of rocks from both piles. The winner is the player who takes the last rock. Who does win in this game if Tom starts the game?

p5. In the next long multiplication example each letter encodes its own digit. Find these digits.

$$\begin{array}{r}
 \\
 * \\
 \hline
 \\
 + \\
 \hline
 c
 \end{array}$$

PS. You should use hide for answers. Collected here (<https://artofproblemsolving.com/community/c5h2760506p24143309>).

7-9 p1. Prove that no matter what digits are placed in the four empty boxes, the eight-digit number $9999\square\square\square\square$ is not a perfect square.

p2. Prove that the number $m/3 + m^2/2 + m^3/6$ is integral for all integral values of m .

p3. An elevator in a 100 store building has only two buttons: UP and DOWN. The UP button makes the elevator go 13 floors up, and the DOWN button makes it go 8 floors down. Is it possible to go from the 13th floor to the 8th floor?

player who takes the last rock. Who does win in this game if Tom starts the game?

p5. There is an interesting 5-digit integer. With a 1 after it, it is three times as large as with a 1 before it. What is the number?

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