Problemath 10

Every parallelepiped of the $\mathbb{R}^3$ space has the following property: all the plane sections parallel to any one of its faces have the same perimeter as the perimeter of the face. Is there another convex polyhedron of $\mathbb{R}^3$ which has the same property?

Problemath 11

In a TV show, the host shows you 3 closed doors. Behind each of the doors is a box containing a certain amount of money, the amount of which is indicated on the box itself. You are informed that the amounts are all different, but you do not know what they are.

You may choose one door, and you may look at the amount of money contained in the box behind that door. If you wish to stop at that point, you may ask to receive the money, and the game is over. Otherwise, you may want to see what amount of money is behind one of the two remaining doors, but you are not allowed to come back to the previous door. Again, you may want to receive the money, and the game will be over. Otherwise, you may ask that the last door be opened and you may take the money behind it without having received any of the money behind the preceding doors.

What strategy should you use in order to maximize the probability of receiving the largest of the amounts of money, and what is the value of this probability?

Problemath 12

What are the solutions of the equation

$$x_1^{2015} + 2^1 x_2^{2015} + 2^2 x_3^{2015} + \ldots + 2^{2014} x_{2015}^{2015} = 2014 x_1 x_2 x_3 \ldots x_{2015}$$

where $x_1, x_2, x_3, \ldots x_{2015} \in \mathbb{Z}$ **?**

Problemath 13

In the Euclidean plane $\mathbb{R}^2$, is there a countable infinity of points

$$\ldots, p_{-3}, p_{-2}, p_{-1}, p_0, p_1, p_2, p_3, \cdots$$

which have the following property: for every distinct integers a, b, c the points p_a, p_b, p_c are collinear if and only if $a + b + c = 2015$?

Deadline Friday 6 March 14:00