

UW Math Circle  
October 2, 2014

1. You're back in the secret hall at Hogwarts, and Snape is standing outside three different doors. He tells you that Harry Potter is behind only one door and Voldemort is behind the other two doors, so choose carefully! He also tells you that the sign on Harry Potter's door is true and at least one of the other two signs is false.

I  
Voldemort is behind door II.

II  
Voldemort is in this room.

III  
Voldemort is in room I.

Where is Harry Potter?

2. The next time you're in the secret hall, Snape changes the rules on you. He tells you that Harry Potter is behind only one door, Voldemort is behind the other door, and the remaining room is empty. He also tells you that the sign on Harry Potter's door is true and the sign on Voldemort's door is false, while the sign on the empty room can be either true or false.

I  
Room III is empty.

II  
Voldemort is in room I.

III  
This room is empty.

Who is behind which door?

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1. At the Hershey Factory, a giant pot of chocolate is stirred by a giant spoon. The giant spoon is very heavy, so to move the spoon, there are 14 gears arranged in a circle. Unfortunately, one of the gears broke in half! A worker suggested that you remove the broken gear and make a circle with only 13 gears instead. Is this a good idea?



2. Can you fill in the expression  $1 \_ 2 \_ 3 \_ 4 = 0$  with + or - signs to make it true? What about the expression  $1 \_ 2 \_ 3 \_ 4 \_ 5 \_ 6 \_ 7 \_ 8 \_ 9 \_ 10 = 0$ ?

3. If a knight starts at the lower left corner of a chessboard, can he make it to the upper right corner stopping at each square exactly once?



4. Becca numbered the pages of her 234 page notebook from 1 to 468. Ken tore out 33 of these pages and added up the numbers on each page. Could he have gotten 2014 as the sum?