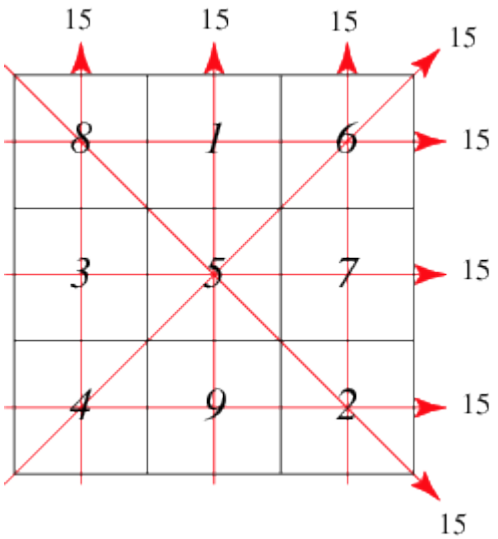
WSMA Math Bowl – March 29, 2014

Creativity Round

1	You have 3 pairs of rocks: 1 red pair, 1 green pair, and 1 yellow pair. In each pair, there is a heavy rock and a light rock; therefore, there are 3 heavy rocks and 3 light ones. However, all the rocks look the same, so there is no way to tell them apart except for by color. If all the heavy rocks weigh the same amount, and all the light rocks weigh the same amount, then, given only 2 balancings, determine which rock is which. Describe your process in detail, including why it works in all cases, and **all** possible cases that may occur while applying it. Example: If I place the red rocks on opposing sides of the scale, I can now tell which rock is the light rock, and which is the heavy one. If I then place the yellow rocks on each side of the scale, I can tell which rock is the heavy one, and which is the light one. However, this forces me to guess on the last rock, which will not always give the right answer, and therefore, is not a complete solution.
2	 A magic square is a grid in which all the rows, columns, and diagonals add up to the same number. Above is a 3x3 magic square. Using all the numbers from 1-16, inclusive, create a 4x4 magic square.
3	Steven, Andrew, and Kunaal predicted the outcomes of the performances of 4 students: Derek, Zach, Adithya, and Sean in WSMA Math Bowl 2014 according to the following: • Steven: Adithya will receive 1st place, and Derek 3rd. • Andrew: Zach will receive 1st place, and Sean 4th. • Kunaal: Sean will receive 2nd place, and Adithya 3rd. After the competition, Steven, Andrew, and Kunaal realized that they each predicted only one person's ranking correctly. Find the actual rankings of the four students, Derek, Zach, Adithya, and Sean. Provide detailed steps of approaching the solution below.

4	101 football teams in the nation are competing against each other. Assuming that each game is independent from each other, can every team have an odd number of games?
5	Using common knowledge, calculate the average speed at which human hair grows in meters per second. Show all work, including rationale behind estimations. An exact answer is not necessary, but the closer your estimation is, the more points you will receive - 3 points for work shown, 1 points for being within a factor of 100, and an additional point for being within a factor of 10.