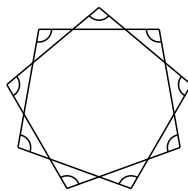# July, 2016 – Grades 5 & 6
Team Questions
Total points: 150 (Each Question is worth 15 points.)
Total pages: 2, Time limit: 90 minutes

Team:_____

1. January 1, 2017 will be a Sunday. In 2017, how many of the 11 days listed below are Sundays?

   Feb. 3, 2017   Mar. 5, 2017   Apr. 7, 2017   May 9, 2017   June 11, 2017   July 13, 2017
   Aug. 15, 2017,   Sept. 17, 2017   Oct. 19, 2017   Nov. 21, 2017   Dec. 23, 2017

2. All the positive integers n for which $2n^2 + 3n + 1$ is divisible by 6 are listed in increasing order. What is the 2016th integer on this list?

3. What is the sum of the degree-measures of the 9 angles marked in the figure shown?

4. Each letter in the 9-digit number MATHISFUN represents a unique digit. If $MATH + ISFUN = 78597$, $MATHI + SFUN = 66555$, and $S \neq 0$, what is the 9-digit number *MATHISFUN*?

5. For how many integers k is $\dfrac{k+2016}{k+3}$ an integer?

6. Tom has constructed two prototypes for his "Death Ray" tower. Tower A can fire a beam of energy five times in five seconds. Tower B can fire ten times in ten seconds. Beams are fired one at a time, and the intervals between any two consecutive beams are constant. Assuming that he starts his watch when the first shot is fired, which tower can fire 12 beams in the shorter time? And how long does it (the quicker tower) take to fire 12 beams?
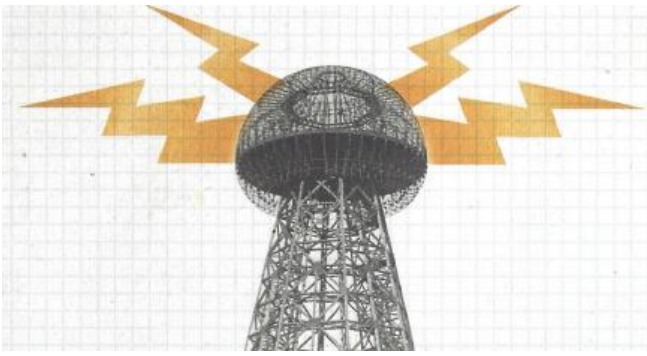
7. Tom's new tower was completed. The total value of the project was one million dollars. The cost of the construction was $900,000 more than the cost of the land. So what did Tom pay for the land?

8. You are a prisoner in a strange land. You have been sentenced to death but are given one chance to live. The king of the land has decided to let you play a simple game to determine your fate:

   You are presented with two clay jars, one containing 100 white stones, and one containing 100 black stones. You are allowed to redistribute these stones any way that you like, but when you are finished all stones must be in the jars. After you have finished, both jars will be shaken up, you will be blindfolded, and you will be presented one of the two jars at random. You will pick one stone out the jar given to you. If the stone is white, your life will be spared. If the stone is black, you will be executed immediately.

   How should you redistribute the stones to give yourself the best chance of survival?

9. You have a dozen identical-looking balls and a balance scale. One of these balls has a slightly different weight from all of the others. What is the minimum amount of times you need to use the balance scale to determine which ball has the unique weight and whether it is heavier or lighter than the others?

10. Alan and Bob, two perfectly intelligent mathematicians, are trying to figure out two different numbers. They know that both numbers are integers between 1 and 100. They also know that neither of the numbers are 1 or 100. Alan knows only the product of the numbers and Bob knows only the sum of the numbers. Alan says to Bob, "I cannot tell what the two numbers are." Bob replies, "I already knew you couldn't." Alan then says, "Ah, now I know the numbers!" Bob replies enthusiastically, "Now I know them too!" What must the two numbers be?