

July, 2016 – Grades **6 & 7**

## Team Questions – Time Limit 1 Hour

Each question is worth 10 points. Calculators are **PROHIBITED**.

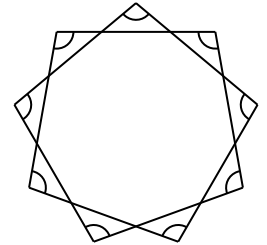
1. January 1, 2017 will be a Sunday. In 2017, how many of the 11 days listed below are Sundays?  
Feb. 3, 2017   Mar. 5, 2017   Apr. 7, 2017   May 9, 2017   June 11, 2017   July 13, 2017  
Aug. 15, 2017   Sept. 17, 2017   Oct. 19, 2017   Nov. 21, 2017   Dec. 23, 2017

2. If  $25^x + 35^x = 49^x$ , what is the value of  $\left(\frac{7}{5}\right)^x$ ?

3. 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?

4. If  $a$  and  $b$  are the unequal roots of  $x^2 + x - 3 = 0$ , what is the value of  $a^4 + 7b^2$ ?

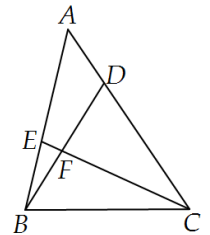
5. What is the sum of the degree-measures of the 9 angles marked in the figure shown?



6. 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  $MATHISFUN$ ?

7. What is the smallest positive integer whose cube ends with three 1s?

8. In  $\triangle ABC$ ,  $D$  is a point on  $\overline{AC}$  such that  $AD:DC = 2:5$ , and  $E$  is a point on  $\overline{AB}$  such that  $AE:EB = 3:2$ . If  $\overline{CE}$  and  $\overline{BD}$  intersect at  $F$ , what is the value of  $BF:DF$ ?



9. If the measure of one angle of a rhombus is  $45^\circ$ , and the sum of the squares of its diagonals is 1, what is the area of this rhombus?

10. There are exactly  $n$  four-element subsets of  $\{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$ . If one finds the sum of the elements in each of these  $n$  subsets, what would be the sum of these  $n$  sums?