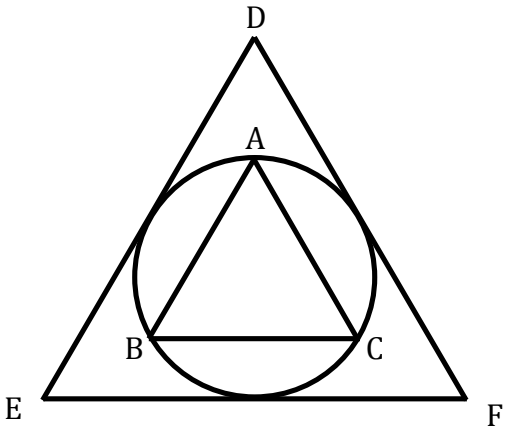
Student Name: _____

1. An equilateral triangle ABC is inscribed inside a circle, which is inscribed inside an equilateral triangle DEF. Determine the ratio of the area of triangle DEF to the area of triangle ABC.



Answer: _____

2. A palindrome is a number that is equal to itself when its digits are read from left-to-right instead of from right-to-left. For example, the number 53235 is a palindrome. How many five-digit palindromes are there whose digits add up to an even number?

Answer: _____

3. There are 64 people, numbered 0, 1, 2, …, 63. Each person is either a truth-teller (who always tells the truth) or a liar (who always lies). If n is even, then person n says, "Person n/2 is a truth-teller". If n is odd, then person n says, "Person n-1 is a liar". Given that person 0 is a truth-teller, find the only liar whose number is divisible by 6.

Answer: _____

4. I have an arithmetic sequence of 25 numbers. The sum of the numbers in the sequence is 100. What is the 13^{th} number?

Answer: _____

5. You roll 10 dice. What is the probability that the sum of the numbers on the 10 dice is divisible by 3?

Answer: _____

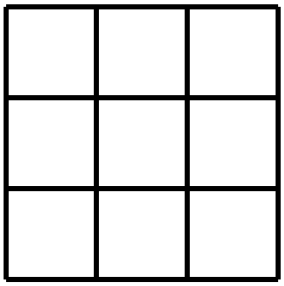
6. Evaluate $\left(\frac{1}{2}\times\frac{1}{3}\right)+\left(\frac{1}{3}\times\frac{1}{4}\right)+\left(\frac{1}{4}\times\frac{1}{5}\right)+\cdots+\left(\frac{1}{99}\times\frac{1}{100}\right)$.

Answer: _____

Student Name: _____

7. A 3x3 grid has a number written in each of the 9 cells, with the following properties:
   a. The product of the numbers in any row is 1
   b. The product of the numbers in any column is 1
   c. The product of the numbers in any 2x2 grid is 5

   What is the value of the middle number in the grid?



Answer: _____

8. Jim only keeps three kinds of coins in his wallet: pennies, nickels, and dimes. How many ways are there for Jim to have 10 coins in his wallet?

Answer: _____