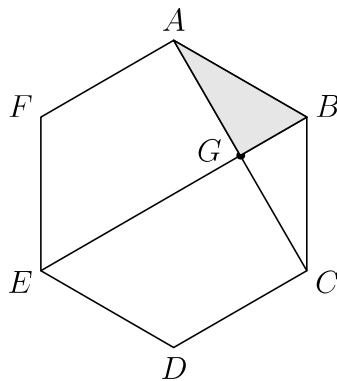


1. _____ For how many numbers n ranging from 1 to 10, inclusive, is $5n + 1$ a prime number?

2. _____ The MIG is planning a lottery to give out prizes after the written tests, and the plan is very special. Contestants will be divided into prize groups in order to potentially receive a prize. However, based on the number of contestants, the ideal number of groups don't work. For example, when dividing into 4 groups, there are 3 left over. When dividing into 5 groups, there's 2 left over. When dividing into 6 groups, there's 1 left over. Finally, when dividing into 7 groups, there are 2 left over. With the knowledge that there are less than 300 participants in the MIG, how many participants are there?

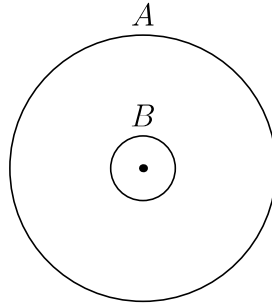
3. _____ 6 cats can eat 6 fish in 1 day, and c cats can eat 91 fish in d days. Given that c and d are both whole numbers, and the number of cats, c , is more than 1 but less than 10, find $c + d$.

4. _____ In regular hexagon $ABCDEF$, lines AC and BE are drawn, and their intersection is labeled G . What fraction of the area of $ABCDEF$ is contained in triangle ABG ?



5. _____ A fair six-sided die is rolled to give a number n . A fair two-sided coin is then flipped n^2 times. Find the expected number of heads flipped. Express your answer as a common fraction.

6. _____ Circles A and B are concentric, with the radius of A being $\sqrt{17}$ times the radius of B. The largest line segment that can be drawn in the region bounded by the two circles has length 32. Compute the radius of circle B.



7. _____ The accuracy of a mystic's prediction is related to the volume of his or her crystal ball by the equation $P = 1 - (0.999)^V$, where P is the probability the mystic's prediction is correct and V is the volume of his ball in cubic centimeters. These crystal balls are sold with radii that are a whole number of centimeters. What is the radius (in centimeters) of the smallest ball that gives the mystic over a 99% chance to make an accurate prediction?
8. _____ A marathon runner has a very peculiar way of training for a marathon. On the first day of week 1, the runner runs a distance equivalent to the first prime number. On the second day, the runner runs a distance equal to the second prime number, continuing this pattern until the 7th day of the week. Each successive week, the runner runs one more mile per day than they did on the same day of the previous week. The runner continues this process until the average distance run each week exceeds the distance of a marathon (26.2 miles). How many weeks does the marathoner train?
9. _____ A certain 4 digit prime number has all prime digits. When any one of the digits is removed, the remaining three digits form a composite number in their initial order (i.e. if 1234 were the answer, then 123, 234, 134, and 124 would have to be composite.) What is the largest possible value of this number?
10. _____ Let $P(x) = x^2 + ax + b$. The two zeros of P , r_1 and r_2 , satisfy the equation $|r_1^2 - r_2^2| = 17$. Give that $a, b > 1$ and are both integers, find $P(1)$.