

1. _____ Square ABCD is drawn. Point E is chosen within square ABCD such that DEC is an equilateral triangle. The distance from E to AB is 3 units. Find the area of square ABCD. Express your answer in simplest radical form.

2. _____ How many positive integers less than or equal to 4,040,000 have an odd number of factors?

3. _____ When rolling four standard 6-sided dice, what is the probability of rolling a 16?

4. _____ Find the area of the region bounded on the coordinate plane by the graphs of $x^2 + y^2 \leq 4$, $x > 0$, and $x - y > 0$. Express your answer in terms of pi.

5. _____ Find the 4-digit number such that, when its digits are reversed, it is multiplied by 9.

6. _____ If point A is (5,73), and point B is (13,37), and point C is (0,y), find y such that AC + BC is minimized.

7. _____ Max and Stella are playing a game. Max will flip an unfair coin with a probability of landing on heads of $\frac{1}{3}$. He will flip the coin and write down a T or H depending on the result (T if tails, H if heads). If the string THH appears before the string HHH, Stella will pay Max \$1. If HHH appears first, Max will pay Stella \$X. Find X so that this is a fair game.
8. _____ Externally tangent circles O and P are drawn, with the radius of P greater than that of O . Point M is selected outside of the circles, such that it lies on a line that is tangent to both circles, and is collinear with O and P . The points of tangency to circles O and P are A and X respectively. If $MA = 2$ and $MX = 6$, find the radius of circle P .
9. _____ Bob has 5 children. He has 6 different chores to assign, one of which is mowing the lawn. Every child will have at least one chore, and none of the three youngest children can be assigned to mow the lawn. How many ways can Bob distribute the chores?
10. _____ A 6-digit number can be divided into two 3-digit groupings (e.g., 613,457 becomes 613 and 457). Call the Schindler Form of the number the number formed when the groupings switch places (the Schindler Form of 613,457 is 457,613). Find the number such that 6 times the number is equivalent to 7 times the Schindler Form of the number.