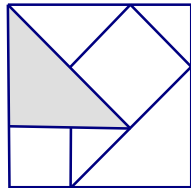


1. When the following sum is evaluated, what is the first digit to the right of the decimal point?

$$1.002019 + 2.002019 + 3.002019 + 4.002019 + 5.002019 + \cdots + 100.002019$$

2. The figure below shows seven shaded polygonal tiles that can be joined together to form a square as shown. Two of the tiles are square, and the other five are isosceles right triangles. If the area of the shaded triangular tile is 18 square centimeters, what is the average of the areas (in square centimeters) of all seven tiles?

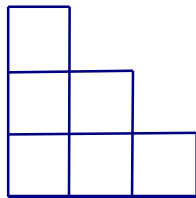


3. A number is *squarish* if the sum of its digits is a perfect square. What is the sum of all two-digit prime numbers that are squarish.

4. Find the smallest positive integer n for which n added to the sum of the digits in n gives 2019.

5. Positive integers a and b are both less than 7. A period of a weeks and b days is exactly three times as long as b weeks and a days. Find $a + b$.

6. How many ways are there to fill each square in the diagram below using 6 distinct integers between 1 and 7 inclusive, such that each number in the diagram is greater than any number immediately below it or immediately to its left?



7. Let n be the product of all of the positive integer divisors of 1,000,000. Let k be the largest integer such that n is divisible by 2^k . Find k .

8. The street address of Cody's house is a five-digit positive integer. The sum of the five digits is 23; the product of the five digits is 512; and when the three-digit number composed of the first three digits (from the left) is divided by the two-digit number composed of the last two digits, the quotient is 13 and the remainder is 14. What is Cody's street address?

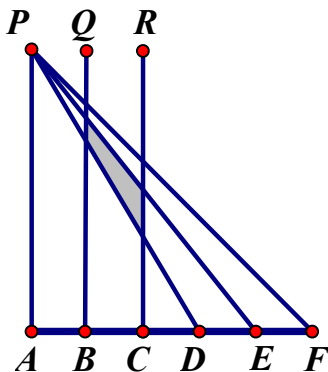
9. Find the smallest positive integer n which has the following properties:
- n is divisible by exactly 8 of the numbers from 1 to 10.
 - The numbers between 1 and 10 which do not divide n are consecutive.

10. A collection of K identical unit cubes are stacked together to make an $N \times (N+1) \times (N+2)$ rectangular prism. The number of unit cubes meeting at least one of the 6 rectangular faces of the rectangular prism is $\frac{K}{2} - 12N$. Find K .

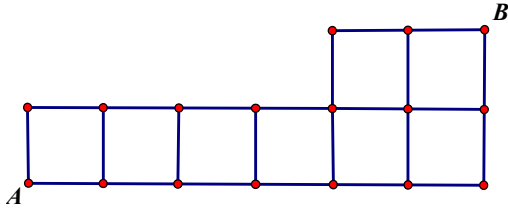
11. A group of 6 friends ordered 12 donuts, 2 each of 6 flavors: chocolate, jelly, blueberry, strawberry, cinnamon and apple-crumb. They each ate two donuts. Three of them ate only one flavor each, and three of them ate two flavors each. How many possibilities are there for who ate which kinds of donuts?

12. In the diagram below, $AP = AF$. The segments AP , BQ and CR are perpendicular to AF .

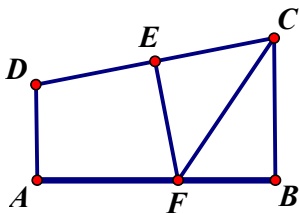
Points B , C , D and E cut AF into congruent segments. What fraction of the area of $\triangle PAF$ is the area of the shaded quadrilateral?



13. Find the number of routes in the diagram below from vertex A to vertex B. A route consists of a sequence of moves from a vertex to an adjacent vertex along an edge. A move may be in any of the four possible directions, but a route may never visit the same vertex twice.



14. In the diagram below, $AD:BC=2:3$, $AD+BC=AB$, E is the midpoint of DC. Segments AD and BC are both perpendicular to AB. EF is perpendicular to DC. Find the ratio $\text{Area } \triangle CEF : \text{Area } \triangle CBF$.



15. A jar contains 20 red balls, 15 green balls and 10 yellow balls. Three balls are selected at random and removed from the jar, and none of them are red. Then a 4th ball is selected at random. What is the probability that the 4th ball is green?