### NMCP 17/18 Admission Test 7-8 (60 min)

1. Maxim works at a bird banding station. While weighing the birds, he notices that the Cooper's Hawk weighs as much as the Robin and the Mockingbird together. The Mockingbird and the Cooper's Hawk together weigh as much as the Kestrel and the Robin together. How many ounces does the Mockingbird weigh, if the Kestrel weighs 96 oz?

Answer

2. Babken bought a bag of peaches at the local market. He gave his sister one third of all the peaches plus one more. Then he gave two thirds of the remaining peaches to his brother. Babken kept the last three peaches for himself. How many peaches did Babken buy?

Answer

3. What is the probability that a randomly chosen point will be located within the shaded part of the square?
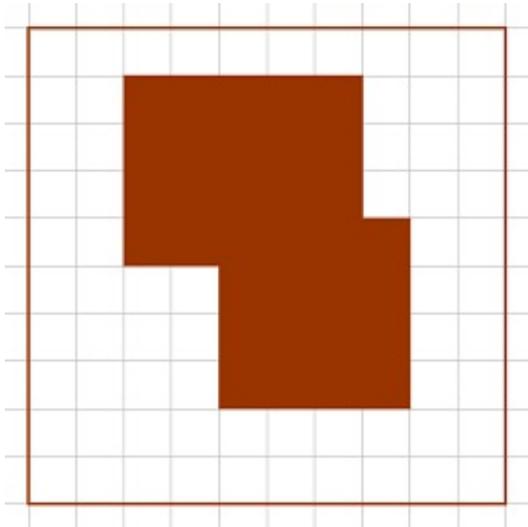
Answer

4. A car drives $\frac{2}{3}$ of the distance of a trip at a speed of 60 mph, and $\frac{1}{3}$ of the distance of a trip at a speed of 50 mph. Find the average speed of the car throughout the trip. Give the answer in mph.

Answer

5. The average of eight consecutive odd integers is 48. What is the range of these eight numbers?

Answer

6. Alice and Becky are playing with animal cards. Alice has 3 hippo cards, 2 giraffe cards, and 1 mongoose card. Becky has 2 giraffe cards, 2 monkey cards, and 2 mongoose cards. Each girl puts one randomly chosen card on the table. What is the probability that the animals on the two cards on the table match?

Answer

7. Each person at the New Year's Party brought a present for every other person. If there are 56 presents in all how many people are at the party?

Answer

8. How many different 6-letter words can be formed with the letters in *LETTER*? (The words formed do not have to be real words.)

Answer

9. In unit square *ABCD*, *M* is the midpoint of $\overline{AB}$ and *N* is the midpoint of $\overline{AD}$. What is the area of $\triangle MNC$?

Answer

10. What is the least natural number that has exactly 5 divisors?

Answer

11. The number $\overline{8A3BC5}$ is a perfect square of a number that is divisible by 3. Find A + B + C if A, B, and C are different digits.

Answer

12. Consider the fractions $\frac{20}{21}$ and $\frac{15}{56}$. Find the greatest number that these fractions can be divided by, so that each of the quotients is a whole number.

Answer

13. What is the greatest power of 3 that is a divisor of 100! ? (Note: $100! = 1 \cdot 2 \cdot 3 \cdots 98 \cdot 99 \cdot 100$)

Answer

14. A grasshopper jumps either one block north, or one block west. He needs to reach the point that is four blocks west and three blocks north of his current position. The grasshopper needs to avoid two dangerous intersections. The first intersection is one block west and one block north of his current position, and the second intersection is two blocks west and two blocks north of his current position. In how many ways can the grasshopper reach the desired destination?

Answer

15. Suppose $a - \dfrac{1}{a} = 5$. Find $a^2 + \dfrac{1}{a^2}$.

Answer

16. Three different numbers are randomly selected from the set $\{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$ and added together. Find the probability that the sum is 20.

Answer

17. Two boys and three girls are randomly seated in 5 chairs around a circular table. Find the probability that the boys are seated next to each other.

Answer

18. Suppose $\dfrac{x^2 + 3xy + 6y^2}{x^2 + y^2} = 2$. Find the sum of all the possible values of $\dfrac{x}{y}$.

Answer

19. A city has three parallel streets and three streets perpendicular to them. Three policemen randomly stationed at three different intersections. Find the probability that all three policemen are on the same street.
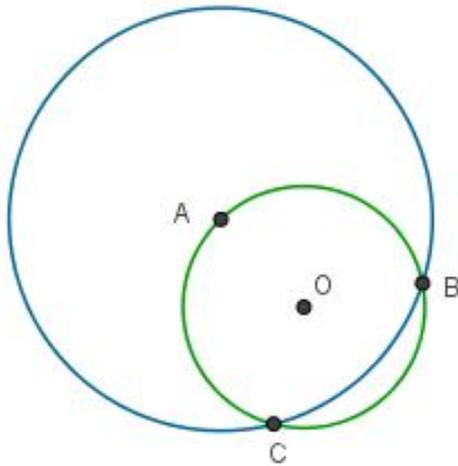
Answer

20. What is the ordering from least to greatest of the following numbers?
$$2^{45}, 6^{18}, 3^{30}, 24^9$$

Answer

21. A circle with center O radius 2 units passes through the center, A, of another circle and intersects it at points B and C. Points A, B, and C divide the circumference of the smaller circle into three equal parts. One-tenth of the area of the smaller circle is outside the larger circle. What part of the area of the larger circle overlaps the smaller circle?
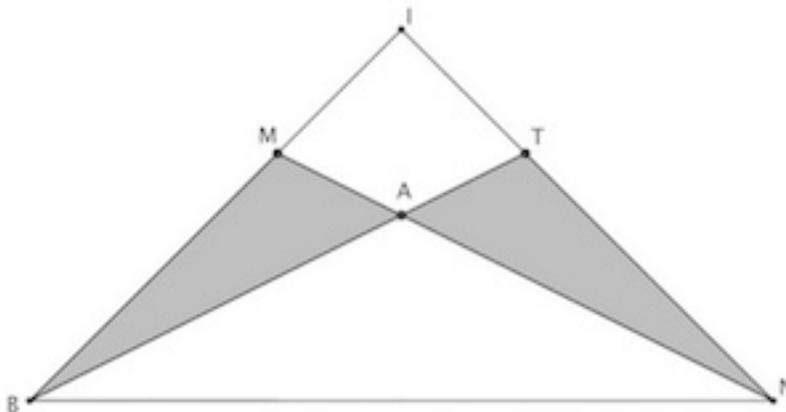
Answer

22. What is the remainder when 2012^{2017} is divided by 11?

Answer

23. Isosceles right triangle BIN has an area of 1 square unit. The ratio of length $\overline{IT}$ to $\overline{TN}$ is 1 : 2. IT equals IM. What is the ratio of the area of the "bat wings" (the shaded region) to the area of the triangle BIN?

Answer

24. There are bottles containing mixtures on a shelf. $\frac{5}{7}$ of the bottles are labeled by date, $\frac{5}{6}$ are labeled by the name of the mixture, and $\frac{3}{5}$ are labeled by weight. What is the minimum number of containers that are labeled by date, by the name of the mixture, as well as by weight?

Answer

25. Arman and Babken are cycling around a 565-meter oval track. They start cycling in opposite directions at the same time. Arman cycles 20% faster than Babken. What is the greatest number of points on the track at which the cyclists can meet?

Answer