
NMCP 17/18 Admission Test 9+ (60 min)

1. For what values of x is $4^x \cdot 8^{2x} = 32^8$?

Answer

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

Answer

3. Two rabbits jump along the edge of the forest. The first rabbit always jumps 1 foot and the second rabbit always jumps 3 inches fewer. They start jumping simultaneously from the same point but in opposite directions. What is the total combined distance, in feet, they jump if they jump an equal number of times, and the first rabbit jumps 7.5 ft farther than the second rabbit?

Answer

4. Find the remainder when $1! + 2! + 3! + \dots + 15!$ is divided by 15.

Answer

5. Suppose the operation $g(x, y)$ is defined for all real numbers x and y as $g(x, y) = \lfloor \frac{x}{y} \rfloor - \left\{ \frac{x}{y} \right\}$, where $\lfloor \frac{x}{y} \rfloor$ is the greatest integer less than or equal to $\frac{x}{y}$, and $\left\{ \frac{x}{y} \right\} = \frac{x}{y} - \lfloor \frac{x}{y} \rfloor$. What is the value of $g(2, -\frac{8}{11})$?

Answer

6. The numbers 1, 3, 5, ..., 15 are placed at the vertices of a cube so that the sum of the four numbers on each face is the same. What is this common sum?

Answer

7. What is the remainder when the number 4^{2017} is divided by 17?

Answer

8. Given the function $f(x) = 2x - 40$, solve $f(f(f(x))) = 0$.

Answer

9. A triangular array of 780 balls has 1 ball in the first row, 2 balls in the second, and so on. There are N balls in the middle row. What is the sum of digits of the number N ?



Answer

10. The operation Δ is defined as $a\Delta b = b + a^b$. Evaluate $((1\Delta 2)\Delta 1) \times ((3\Delta 1)\Delta 2)$.

Answer

11. There are 15 red, 14 green, and 9 yellow balls in a bag. What is the minimum number of balls that Bob needs to take (without looking) so that at least 12 of them are the same color?

Answer

12. Three distinct squares on a chessboard are selected at random. What is the probability that all three squares are white?

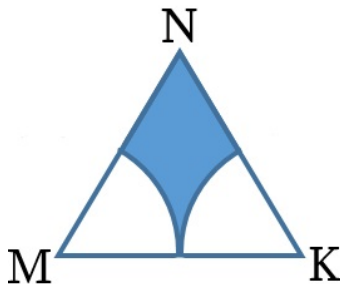
Answer

13. A trapezoid is divided along a diagonal to form two similar triangles. Find the ratio of the lengths of the trapezoid's bases (longer to shorter), if the ratio of the lengths of the trapezoid's legs is 2 : 1.

Answer

14. Equilateral triangle MNK has side length 2 inches. A circle of radius 1 inch is centered at M and a circle of radius 1 inch is centered at K . What is the area of the shaded region?

Answer



15. In how many ways is it possible to pack 1092 ounces of grapes in bags of 4 ounces and 7 ounces only? Each bag must be fully packed

Answer

16. There are 30 markers in a bag. There is at least 1 red marker among any 12 randomly selected markers, and there is at least 1 black marker among any 20 randomly selected markers. How many red markers and how many black markers are in the bag?

Answer

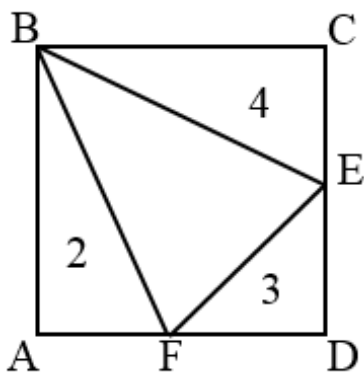
17. A bus travels between towns A and B. It travels half the distance between A and B at 40 mph, and the rest of the distance at 50 mph. On the return trip, the bus travels for the first 2 hours at 35 mph, and the rest of the time at 40 mph. What is the distance between A and B, if the trip from B to A is an hour longer than the trip from A to B?

Answer

18. 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

19. Given: square $ABCD$, $A_{BEC} = 4$, $A_{DEF} = 3$, $A_{ABF} = 2$. Find A_{BEF} .



Answer

20. The natural number N is a perfect square, and the last digit of N is not zero. If you remove the last two digits of N , the new number is also a perfect square. Find the greatest possible N .

Answer

21. There are eight points on a circle. Find the number of polygons you can draw using some combination of these eight points as vertices.

Answer

22. There are 12 small and 15 large basketballs in a box. The probability that a player will successfully make a basket with a small basketball is $\frac{3}{4}$, and the probability that he will successfully make a basket with a large basketball is $\frac{1}{3}$. Find the probability that the player will make his shot a basket if he chooses his basketball at random.

Answer

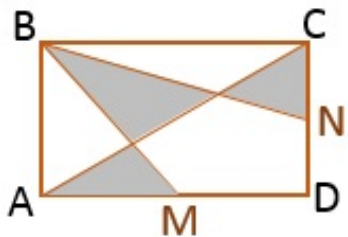
23. Integers a , b , c , and d , not necessarily distinct, are chosen at random from 108 to 2017, inclusively. What is the probability that $ab + 3cd$ is even?

Answer

24. Thirty-six cards are placed facedown on the table. Isabelle turns 30 of them faceup. Then she turns over 19 cards, either faceup or facedown. Next she turns over 21 cards, again either faceup or facedown. After this, all cards are faceup. How many cards were turned three times?

Answer

25. What is the area of the shaded region of the given 7×4 rectangle, if M and N are the midpoints of \overline{AD} and \overline{CD} , respectively?



Answer