1. If the probability of winning a door prize at this years nationals is $\frac{1}{10}$ and independently the chance of winning a trophy is $\frac{1}{3}$, what is the probability of winning neither?

   A) $\frac{17}{30}$ 　　　 B) $\frac{29}{30}$ 　　　 C) $\frac{3}{5}$ 　　　 D) $\frac{2}{3}$ 　　　 E) NOTA

2. If you roll a fair six-sided die 12 times, what is the probability of getting exactly 2 sixes?

   A) $\left(\frac{1}{6}\right)^{10}\left(\frac{5}{6}\right)^{2}$ 　 B) $66\left(\frac{1}{6}\right)^{2}\left(\frac{5}{6}\right)^{10}$ 　 C) $72\left(\frac{5}{6}\right)^{10}$ 　 D) $12\left(\frac{1}{6}\right)^{10}\left(\frac{5}{6}\right)^{2}$ 　 E) NOTA

3. A real number, x, is randomly chosen from the interval [0, 10]. What is the probability that $2x^2 - 17x + 30$ is less than 0?

   A) $\frac{1}{2}$ 　　　 B) $\frac{2}{5}$ 　　　 C) $\frac{3}{10}$ 　　　 D) $\frac{7}{20}$ 　　　 E) NOTA

4. From an ordinary deck of 52 playing cards, two cards are drawn. What is the probability that they are different ranks (the rank is the value of the card: 2, 3, 4, King, Ace, etc.)?

   A) $\frac{12}{13}$ 　　　 B) $\frac{3}{4}$ 　　　 C) $\frac{16}{17}$ 　　　 D) $\frac{13}{17}$ 　　　 E) NOTA

5. If P(E) > 0 and P(F) > 0 then P(E | F) = 0 implies that P(F | E) is
   A) 1 　　　 B) cannot be determined 　　　 C) infinite 　　　 D) 0 　　　 E) NOTA

6. There are 5 boys and 3 girls in a room. If two are selected at random, what is the probability that they are both boys?

   A) $\frac{3}{7}$ 　　　 B) $\frac{1}{2}$ 　　　 C) $\frac{5}{8}$ 　　　 D) $\frac{5}{14}$ 　　　 E) NOTA

7. Arne, Bob, Charlie and Dave run a race and there are no ties. If Arne does not win and Charlie beats Bob, in how ways (orders) could they have finished?
   A) 9 　　　 B) 12 　　　 C) 2 　　　 D) 6 　　　 E) NOTA

8. Two integers are selected with replacement from the set {-5, -4, …, 5}. What is the probability that their product is negative?

   A) $\frac{1}{2}$ 　　　 B) $\frac{71}{121}$ 　　　 C) $\frac{1}{4}$ 　　　 D) $\frac{50}{121}$ 　　　 E) NOTA

9. What is the probability that a number chosen at random from the integers from 1 to 100 inclusive is a multiple of 3 or 4?

   A) $\frac{1}{3}$ 　　　 B) $\frac{3}{4}$ 　　　 C) $\frac{2}{5}$ 　　　 D) $\frac{2}{3}$ 　　　 E) NOTA

10. A game is played by tossing a fair coin until three consecutive heads occur. What is the probability that the game ends on the eighth toss?

    A) $\frac{3}{8}$ 　　　 B) $\frac{13}{256}$ 　　　 C) $\frac{1}{8}$ 　　　 D) $\frac{1}{16}$ 　　　 E) NOTA

11. An urn contains the same number of blue and yellow marbles. Two marbles are drawn without replacement and the probability that they are the same color is $\frac{8}{17}$. How many marbles were in the urn initially?

    A) 18   B) 16   C) 20   D) 10   E) NOTA

12. When I roll a fair six-sided die 6 times, what is the probability that I get one of each number?

    A) $\frac{5}{324}$ B) $\frac{1}{6}$ C) $\frac{1}{36}$ D) $\frac{1}{56}$ E) NOTA

13. Given two vertices of a triangle in the X-Y plane A (0,2) and B (4, 2). The third vertex is randomly chosen from the square formed by (0,0), (0,4), (4,4) and (4,0). What is the probability that the triangle is obtuse?

    A) $\frac{1}{2}$ B) $\frac{(\pi - 1)}{4}$ C) $\frac{3}{4}$ D) $\frac{\pi}{4}$ E) NOTA

14. The Jones' have five children with at least one girl. What is the probability that the youngest child is a girl?

    A) $\frac{3}{4}$ B) $\frac{30}{31}$ C) $\frac{16}{31}$ D) $\frac{2}{3}$ E) NOTA

15. Two distinct integers are chosen randomly from the set {2, 3, 4, …, 10} and one is used as the numerator and the other as the denominator of a fraction. What is the probability that the fraction is in lowest terms?

    A) $\frac{2}{3}$ B) $\frac{11}{18}$ C) $\frac{1}{2}$ D) $\frac{5}{9}$ E) NOTA

16. Tom and Suzanne are playing a board game and they are almost done. It's Tom's turn and he needs to roll a number greater than 3 on a fair six-sided die to win. If he doesn't, Suzanne gets to roll and needs a 5 or 6 to win. They continue taking turns until someone wins. What is the probability that Suzanne wins?

    A) $\frac{1}{3}$ B) $\frac{2}{5}$ C) $\frac{1}{6}$ D) $\frac{1}{4}$ E) NOTA

17. If the P(A) = 0.4, P(A | B) = 0.3 and the P(B | A) = 0.6, what is the P(B)?

    A) 0.7   B) 0.8   C) 0.6   D) cannot be determined   E) NOTA

18. Janne and Kathy play gin rummy all afternoon. Janne won 11 games and Kathy won 5. If all possible winning sequences are equally likely, what is the probability that Janne won the first game?

    A) $\frac{2}{3}$ B) $\frac{5}{8}$ C) $\frac{11}{16}$ D) $\frac{1}{2}$ E) NOTA

19. There are three houses on the block. There are two Mu's living in one house, two Alpha's in another and the last has one Mu and one Alpha. If a Theta goes up to a house at random, knocks and a Mu (a random inhabitant) comes to the door, what is the probability there is another Mu in the house?

    A) $\frac{1}{2}$ B) $\frac{1}{3}$ C) $\frac{3}{4}$ D) $\frac{2}{3}$ E) NOTA

20. Suppose $P(A) = \frac{1}{4}$, $P(B) = \frac{1}{3}$ and $P(A \cap B) = \frac{1}{5}$. What is the $P(A^c \cup B)$, where A^c means the complement of A?

A) $\frac{23}{60}$ B) $\frac{3}{4}$ C) $\frac{4}{5}$ D) $\frac{37}{60}$ E) NOTA

21. One bowl of candy has 6 red and 5 green M&M's. The second bowl has 4 red and 7 green ones. An M&M is taken at random from the first bowl and mixed with the ones in the second bowl. An M&M is then chosen at random from the second dish and found to be green. What is the probability that a green M&M was moved from bowl one.

A) $\frac{5}{11}$ B) $\frac{1}{2}$ C) $\frac{21}{41}$ D) $\frac{20}{41}$ E) NOTA

22. Ninety-six identical squares are laid out in an 8x12 grid. A diagonal line is drawn from one corner to the opposite corner. If a square is chosen at random, what is the probability that the diagonal line passes through it (not just at a corner)?

A) $\frac{1}{8}$ B) $\frac{5}{24}$ C) $\frac{1}{6}$ D) $\frac{1}{4}$ E) NOTA

23. There are 12 apples in a basket and 3 of them have a worm in them. If I take 4 of the apples to a picnic, what is the probability that at least one of them has a worm?

A) $\frac{8}{11}$ B) $\frac{41}{55}$ C) $\frac{3}{4}$ D) $\frac{4}{5}$ E) NOTA

24. John is playing Jim in a best two out three game tennis match. If the probability that John wins a game is $\frac{3}{5}$, what is the probability that he will win the match?

A) $\frac{81}{125}$ B) $\frac{9}{25}$ C) $\frac{21}{25}$ D) $\frac{3}{5}$ E) NOTA

25. In the grid below, an ant travels from A to B in eleven steps (only going down or to the right).

What is the probability the ant goes through corner C?

A) $\frac{4}{11}$ B) $\frac{3}{11}$ C) $\frac{25}{77}$ D) $\frac{30}{77}$ E) NOTA

26. If I randomly permute the digits in the number 11117777, what is the probability that I get a number divisible by 11?

A) $\frac{1}{2}$ B) $\frac{27}{56}$ C) $\frac{18}{35}$ D) $\frac{4}{7}$ E) NOTA

27. Ann and Bobby are playing a matching game. Each player is dealt an Ace, King and Queen and they shuffle them into random order. If they each turn over cards one at a time, what is the probability at least one match will occur?

A) $\frac{1}{3}$ B) $\frac{2}{3}$ C) $\frac{1}{2}$ D) 1 E) NOTA

28. A number is a palindrome if reversing the order of the digits produces the same number. How many more 4-digit palindromes are there than 3-digit ones?
    A) 8100   B) 810   C) 900   D) 9   E) NOTA

29. At the community center, 5 persons prefer to play Bridge, 5 others want to play Poker and the remaining 5 people prefer Go Fish. If we select 4 persons at random (without replacement) then the chance of getting people that prefer each of the games is
    A) $\frac{50}{273}$ B) $\frac{5}{14}$ C) $\frac{50}{91}$ D) $\frac{1}{2}$ E) NOTA

30. I randomly choose a point in a right triangle. What is the probability that the closest vertex to it is the one with a right angle?
    A) $\frac{1}{3}$ B) $\frac{1}{2}$ C) cannot be determined   D) $\frac{3}{8}$ E) NOTA