

Combinatory and probability

1. In a workshop there are 4 kinds of beds, 3 kinds of closets, 2 kinds of shelves and 7 kinds of chairs. In how many ways can a person decorate his room if he wants to buy in the workshop one shelf, one bed and one of the following: a chair or a closet?

- a) 168.
- b) 16.
- c) 80.
- d) 48.
- e) 56.

2. In a workshop there are 4 kinds of beds, 3 kinds of closets, 2 kinds of shelves and 7 kinds of chairs. In how many ways can a person decorate his room if he wants to buy in the workshop one shelf, one bed and one of the following: a chair or a closet?

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- b) 16.
- c) 80.
- d) 48.
- e) 56.

3. Three people are to be seated on a bench. How many different sitting arrangements are possible if Erik must sit next to Joe?

- a) 2.
- b) 4.
- c) 6.
- d) 8.
- e) 10.

4. How many 3-digit numbers satisfy the following conditions: The first digit is different from zero and the other digits are all different from each other?

- a) 648.
- b) 504.
- c) 576.
- d) 810.
- e) 672.

5. Barbara has 8 shirts and 9 pants. How many clothing combinations does Barbara have, if she doesn't wear 2 specific shirts with 3 specific pants?

- a) 41.
- b) 66.
- c) 36.
- d) 70.
- e) 56.

6. A credit card number has 5 digits (between 1 to 9). The first two digits are 12 in that order, the third digit is bigger than 6, the fourth is divisible by 3 and the fifth digit is 3 times the sixth. How many different credit card numbers exist?

- a) 27.
- b) 36.
- c) 72.
- d) 112.
- e) 422.

7. In jar A there are 3 white balls and 2 green ones, in jar B there is one white ball and three green ones. A jar is randomly picked, what is the probability of picking up a white ball out of jar A?

- a) $\frac{2}{5}$.
- b) $\frac{3}{5}$.
- c) $\frac{3}{10}$.

d) $\frac{3}{4}$

e) $\frac{2}{3}$.

8. Out of a box that contains 4 black and 6 white mice, three are randomly chosen. What is the probability that all three will be black?

a) $\frac{8}{125}$.

b) $\frac{1}{30}$.

c) $\frac{2}{5}$.

d) $\frac{1}{720}$.

e) $\frac{3}{10}$.

9. The probability of pulling a black ball out of a glass jar is $\frac{1}{X}$. The probability of pulling a black ball out of a glass jar and breaking the jar is $\frac{1}{Y}$. What is the probability of breaking the jar?

a) $\frac{1}{(XY)}$.

b) $\frac{X}{Y}$.

c) $\frac{Y}{X}$.

d) $\frac{1}{(X+Y)}$.

e) $\frac{1}{(X-Y)}$.

10. Danny, Doris and Dolly flipped a coin 5 times and each time the coin landed on "heads". Dolly bet that on the sixth time the coin will land on "tails", what is the probability that she's right?

a) 1.

b) $\frac{1}{2}$.

c) $\frac{3}{4}$.

d) $\frac{1}{4}$.

e) $\frac{1}{3}$.

11. In a deck of cards there are 52 cards numbered from 1 to 13. There are 4 cards of each number in the deck. If you insert 12 more cards with the number 10 on them and you shuffle the deck really good, what is the probability to pull out a card with a number 10 on it?

- a) $1/4$.
- b) $4/17$.
- c) $5/29$.
- d) $4/13$.
- e) $1/3$.

12. There are 18 balls in a jar. You take out 3 blue balls without putting them back inside, and now the probability of pulling out a blue ball is $1/5$. How many blue balls were there in the beginning?

- a) 9.
- b) 8.
- c) 7.
- d) 12.
- e) 6.

13. In a box there are A green balls, $3A + 6$ red balls and 2 yellow ones.

If there are no other colors, what is the probability of taking out a green or a yellow ball?

- a) $1/5$.
- b) $1/2$.
- c) $1/3$.
- d) $1/4$.
- e) $2/3$.

14. The probability of Sam passing the exam is $1/4$. The probability of Sam passing the exam and Michael passing the driving test is $1/6$.

What is the probability of Michael passing his driving test?

- a) $1/24$.
- b) $1/2$.
- c) $1/3$.
- d) $2/3$.
- e) $2/5$.

15. In a blue jar there are red, white and green balls. The probability of drawing a red ball is $1/5$. The probability of drawing a red ball, returning it, and then drawing a white ball is $1/10$. What is the probability of drawing a white ball?

- a) $1/5$.
- b) $1/2$.
- c) $1/3$.
- d) $3/10$.
- e) $1/4$.

16. Out of a classroom of 6 boys and 4 girls the teacher picks a president for the student board, a vice president and a secretary. What is the probability that only girls will be elected?

- a) $8/125$.
- b) $2/5$.
- c) $1/30$.
- d) $1/720$.
- e) $13/48$.

17. Two dice are rolled. What is the probability the sum will be greater than 10?

- a) $1/9$.
- b) $1/12$.
- c) $5/36$.
- d) $1/6$.

e) $1/5$.

18. The probability of having a girl is identical to the probability of having a boy. In a family with three children, what is the probability that all the children are of the same gender?

a) $1/8$.

b) $1/6$.

c) $1/3$.

d) $1/5$.

e) $1/4$.

19. On one side of a coin there is the number 0 and on the other side the number 1. What is the probability that the sum of three coin tosses will be 2?

a) $1/8$.

b) $1/2$.

c) $1/5$.

d) $3/8$.

e) $1/3$.

20. In a flower shop, there are 5 different types of flowers. Two of the flowers are blue, two are red and one is yellow. In how many different combinations of different colors can a 3-flower garland be made?

a) 4.

b) 20.

c) 3.

d) 5.

e) 6.

21. In a jar there are balls in different colors: blue, red, green and yellow.

The probability of drawing a blue ball is $1/8$.

The probability of drawing a red ball is $\frac{1}{5}$.

The probability of drawing a green ball is $\frac{1}{10}$.

If a jar cannot contain more than 50 balls, how many yellow balls are in the Jar?

- a) 23.
- b) 20.
- c) 24.
- d) 17.
- e) 25.

22. In a jar there are 3 red balls and 2 blue balls. What is the probability of drawing at least one red ball when drawing two consecutive balls randomly?

- a) $\frac{9}{10}$
- b) $\frac{16}{20}$
- c) $\frac{2}{5}$
- d) $\frac{3}{5}$
- e) $\frac{1}{2}$

23. In Rwanda, the chance for rain on any given day is 50%. What is the probability that it rains on 4 out of 7 consecutive days in Rwanda?

- a) $\frac{4}{7}$
- b) $\frac{3}{7}$
- c) $\frac{35}{128}$
- d) $\frac{4}{28}$
- e) $\frac{28}{135}$

24. A Four digit safe code does not contain the digits 1 and 4 at all. What is the probability that it has at least one even digit?

- a) $\frac{1}{4}$

- b) $\frac{1}{2}$
- c) $\frac{3}{4}$
- d) $\frac{15}{16}$
- e) $\frac{1}{16}$

25. John wrote a phone number on a note that was later lost. John can remember that the number had 7 digits, the digit 1 appeared in the last three places and 0 did not appear at all. What is the probability that the phone number contains at least two prime digits?

- a) $\frac{15}{16}$
- b) $\frac{11}{16}$
- c) $\frac{11}{12}$
- d) $\frac{1}{2}$
- e) $\frac{5}{8}$

26. What is the probability for a family with three children to have a boy and two girls (assuming the probability of having a boy or a girl is equal)?

- a) $\frac{1}{8}$
- b) $\frac{1}{4}$
- c) $\frac{1}{2}$
- d) $\frac{3}{8}$
- e) $\frac{5}{8}$

27. In how many ways can you sit 8 people on a bench if 3 of them must sit together?

- a) 720
- b) 2,160
- c) 2,400
- d) 4,320
- e) 40,320

28. In how many ways can you sit 7 people on a bench if Suzan won't sit on the middle seat or on either end?

- a) 720
- b) 1,720
- c) 2,880
- d) 5,040
- e) 10,080

29. In a jar there are 15 white balls, 25 red balls, 10 blue balls and 20 green balls. How many balls must be taken out in order to make sure we took out 8 of the same color?

- a) 8
- b) 23
- c) 29
- d) 32
- e) 53

30. In a jar there are 21 white balls, 24 green balls and 32 blue balls. How many balls must be taken out in order to make sure we have 23 balls of the same color?

- a) 23
- b) 46
- c) 57
- d) 66
- e) 67

31. What is the probability of getting a sum of 12 when rolling 3 dice simultaneously?

- a) $10/216$
- b) $12/216$
- c) $21/216$

- d) $23/216$
- e) $25/216$

32. How many diagonals does a polygon with 21 sides have, if one of its vertices does not connect to any diagonal?

- a) 21
- b) 170
- c) 340
- d) 357
- e) 420

33. How many diagonals does a polygon with 18 sides have if three of its vertices do not send any diagonal? Use the formula: number of diagonals: $n(n-3)/2$ where n is the number of sides. Each vertex sends of $n-3$ diagonals.

- a) 90
- b) 126
- c) 210
- d) 264
- e) 306

34. What is the probability of getting a sum of 8 or 14 when rolling 3 dice simultaneously? Use the formula: number of diagonals: $n(n-3)/2$ where n is the number of sides. Each vertex sends of $n-3$ diagonals.

- a) $1/6$
- b) $1/4$
- c) $1/2$
- d) $21/216$
- e) $32/216$

35. The telephone company wants to add an area code composed of 2 letters to every phone number. In order to do so, the company chose a special sign language containing 124 different signs. If the company used 122 of the signs fully and two remained unused, how many additional area codes can be created if the company uses all 124 signs?

- a) 246
- b) 248
- c) 492
- d) 15,128
- e) 30,256

36. How many 8-letter words can be created using computer language (0/1 only)?

- a) 16
- b) 64
- c) 128
- d) 256
- e) 512

37. How many 5 digit numbers can be created if the following terms apply: the leftmost digit is even, the second is odd, the third is a non even prime and the fourth and fifth are two random digits not used before in the number?

- a) 2520
- b) 3150
- c) 3360
- d) 6000
- e) 7500

38. A drawer holds 4 red hats and 4 blue hats. What is the probability of getting exactly three red hats or exactly three blue hats when taking out 4 hats randomly out of the drawer and returning each hat before taking out the next one? (Tricky)

- a) $\frac{1}{8}$

- b) $\frac{1}{4}$
- c) $\frac{1}{2}$
- d) $\frac{3}{8}$
- e) $\frac{7}{12}$

39. Ruth wants to choose 4 books to take with her on a camping trip. If Ruth has a total of 11 books to choose from, how many different book quartets are possible?

- a) 28
- b) 44
- c) 110
- d) 210
- e) 330

40. A computer game has five difficulty levels. In each level you can choose among four different scenarios except for the first level, where you can choose among three scenarios only. How many different games are possible?

- a) 18
- b) 19
- c) 20
- d) 21
- e) None of the above

41. How many four-digit numbers that do not contain the digits 3 or 6 are there?

- a) 2401
- b) 3584
- c) 4096
- d) 5040
- e) 7200

42. How many five-digit numbers are there, if the two leftmost digits are even, the other digits are odd and the digit 4 cannot appear more than once in the number?

- a) 1875
- b) 2000
- c) 2375
- d) 2500
- e) 3875

43. In a department store prize box, 40% of the notes give the winner a dreamy vacation; the other notes are blank. What is the approximate probability that 3 out of 5 people that draw the notes one after the other, and immediately return their note into the box get a dreamy vacation?

- a) 0.12
- b) 0.23
- c) 0.35
- d) 0.45
- e) 0.65

44. The probability of having a girl is identical to the probability of having a boy. In a family with three children, what is the probability that all the children are of the same gender?

- a) $\frac{1}{8}$.
- b) $\frac{1}{6}$.
- c) $\frac{1}{3}$.
- d) $\frac{1}{5}$.
- e) $\frac{1}{4}$

45. A buyer buys 3 different items out of the newly introduced 10 different items. If two items were to be selected at random, what is the probability that the buyer does not have both the chosen items?

46. A community of 3 people is to be selected from 5 married couples, such that the community does not include two people who are married to each other. How many such communities are possible?

47. There are three secretaries who work for four departments. If each of the four departments has one report to be typed out, and the reports are randomly assigned to a secretary, what is the probability that all three secretaries are assigned at least one report?

48. Jerome wrote each of the integers 1 through 20, inclusive, on a separate index card. He placed the cards in a box, and then drew cards one at a time randomly from the box, without returning the cards he had already drawn to the box. In order to ensure that the sum of all cards he drew was even, how many cards did Jerome have to draw?

49. From (1, 2, 3, 4, 5, 6), one number is picked out and replaced and one number is picked out again. If the sum of the 2 numbers is 8, what is the probability that the 2 numbers included the number 5?

50. Each participant in a certain study was assigned a sequence of 3 different letters from the set {A, B, C, D, E, F, G, H}. If no sequence was assigned to more than one participant and if 36 of the possible sequences were not assigned, what was the number of participants in the study? (Note, for example, that the sequence A, B, C is different from the sequence C, B, A.)

51. In how many ways can 11 # signs and 8* signs be arranged in a row so that no two * signs come together?

52. A bag of 10 marbles contains 3 red marbles and 7 blue marbles. If two marbles are selected at random, what is the probability that at least one marble is blue?

A. $21/50$

B. $3/13$

C. $47/50$

D. $14/15$

E. $1/5$

53. A certain deck of cards contains 2 blue cards, 2 red cards, 2 yellow cards, and 2 green cards. If two cards are randomly drawn from the deck, what is the probability that they will both are not blue?

A. $15/28$

B. $1/4$

C. $9/16$

D. $1/32$

E. $1/16$

54. There are 5 red marbles, 3 blue marbles, and 2 green marbles. If a user chooses two marbles, what is the probability that the two marbles will be a different color?

55. A bag contains six marbles: two red, two blue, and two green. If two marbles are drawn at random, what is the probability that they are the same color?