



MATHS

BOOKS - BITSAT GUIDE

PERMUTATIONS AND COMBINATIONS

Practice Exercise

1. How many 3-digit numbers can be formed by using 1, 2, 3, 4, 5 without repetition of digits?

A. 12

B. 22

C. 50

D. 60

Answer: D



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2. A college offers 10 courses in the morning and 7 in the evening. Find the number of ways a student can select exactly one course, either in the morning or in the evening

A. 10

B. 29

C. 30

D. 17

Answer: D



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3. The number of words from the letters of the words BHARAT in which B and H will never come together, is

A. 360

B. 240

C. 120

D. None of these

Answer: B



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4. In how many ways the letters of the word “ARRANGE” can be arranged without altering the relative positions of vowels & consonants ?

A. 36

B. 26

C. 62

D. None

Answer: A

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5. The sum of the digits in the unit place of all numbers formed with the help of 3,4,5,6 taken all at a time is

A. 432

B. 108

C. 36

D. 18

Answer: B

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6. The total number of different combinations of letters which can be made from the letters of the word MISSISSIPPI, is

A. 150

B. 148

C. 149

D. None of these

Answer: C



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7. If $\frac{{}^n P_{r-1}}{a} = \frac{{}^n P_r}{b} = \frac{{}^n P_{r+1}}{c}$ then

A. $b^2 = a(b + c)$

B. $c^2 = a(b + c)$

C. $ab = a^2 + bc$

D. $bc = a^3 + b^2$

Answer: A



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8. If $m > n$, then the number of ways m men and n women can be seated in a row, so that no two women sit together, is

A. $\frac{m!n!}{(m + n)!}$

B. $\frac{(m + n)!}{m!(n + 1)!}$

C. $\frac{m!(n + 1)!}{(m - n + 1)!}$

D. $\frac{m!(m + 1)!}{(m - n + 1)!}$

Answer: D



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9. If all the letters of the word 'QUEST' are arranged in all possible ways and put in dictionary order, then find the rank of the given word

A. 40

B. 43

C. 45

D. 47

Answer: B



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10. Eight chairs are numbered 1 to 8. Two women and 3 men wish to occupy one chair each. First the women choose the chairs from amongst the chairs 1 to 4 and then men select from the remaining chairs. Find the total number of possible arrangements.

A. 1250

B. 1360

C. 1440

D. 1560

Answer: C



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11. In a class of 10 students, there are 3 girls. The number of ways they can be arranged in a row, so that no 2 girls are consecutive, is $k \cdot 8!$, where k is equal to

A. 12

B. 24

C. 36

D. 42

Answer: D



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12. How many numbers greater than 1000 but not greater than 4000 can be formed with the digits 0 1 2 3 4 repetition of digits being allowed

A. 375

B. 625

C. 125

D. None

Answer: A



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13. The number of words that can be formed by using the letters of the word 'MATHEMATICS' that start as well as end with T, is

A. 90720

B. 28060

C. 713090

D. None of these

Answer: A



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14. Find the total number of permutations of n different things taken not more than r at a time, when each thing may be repeated any number of times.

A. $\frac{n(n^n - 1)}{n - 1}$

B. $\frac{n^r - 1}{n - 1}$

C. $\frac{n(n^r - 1)}{n - 1}$

D. None of these

Answer: C

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15. Consider 23 different coloured beads in a necklace. In how many ways can the beads be placed in the necklace so that 3 specific beads always remain together?

A. $\frac{22!3!}{2}$

B. $\frac{21!3!}{2}$

C. $\frac{20!3!}{2}$

D. $20!3! \times 2$

Answer: C

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16. Six boys and six girls sit along a line alternately in x ways, and along a circle (again alternatively) in y ways, then

A. $x = y$

B. $y = 12x$

C. $x = 10y$

D. $x = 12y$

Answer: D



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17. ${}^n C_r + 2{}^n C_{r-1} + {}^n C_{r-2}$ is equal to

A. ${}^{n+1}C_r$

B. ${}^{n+1}C_{r+1}$

C. ${}^{n+2}C_r$

D. ${}^{n+2}C_{r+1}$

Answer: C



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18. If ${}^nC_{r-1} = 36$, ${}^nC_r = 84$ and ${}^nC_{r+1} = 126$, then r is equal to

A. 1

B. 2

C. 3

D. None of these

Answer: C



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19. The value of expression ${}^{47}C_4 + \sum_{j=1}^5 {}^{52-j}C_3$ is equal to

A. ${}^{52}C_4$

B. ${}^{52}C_2$

C. ${}^{52}C_6$

D. None of these

Answer: A



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20. A sports team of 11 students is to be constituted, choosing atleast 5 from Class XI and atleast 5 from Class XII. If there are 20 students in each of these classes, then in how many ways can the team be constituted?

A. ${}^{20}C_5 \times {}^{20}C_6$

B. $2({}^{20}C_5 \times {}^{20}C_6)$

C. $2({}^{20}C_5)^2$

D. None of these

Answer: B



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21. In how many ways we can select 4 letters from the letters of the word MISSISSIPPI ?

A. 20

B. 21

C. 22

D. 23

Answer: B



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22. There are 5 advanced round candidates in an election and 3 of them are to be elected. A voter can cast any number of votes but not more than three. The number of ways in which he can cast his vote is

A. 5

B. 15

C. 20

D. 25

Answer: D



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23. In how many ways can 6 persons be selected from 4 officers and 8 constables, if atleast one officer has to be included?

A. 224

B. 672

C. 896

D. None

Answer: C



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24. The number of ways in which any four letters can be selected out of the letters of the word 'PCBDCC', is

A. 8

B. 5

C. 7

D. 6

Answer: C



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25. The greatest possible number of points of intersection of 8 straight lines and 4 circles is

A. 32

B. 64

C. 76

D. 104

Answer: D



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26. In a steamer there are stalls for 12 animals and there are cows, horses and calves (not less than 12 of each) ready to be shipped, the total number of ways in which the shipload can be made, is

A. $3^{12} - 1$

B. 3^{12}

C. $(12)^3 - 1$

D. $(12)^3$

Answer: B



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27. In an examination of nine papers, a candidate has to pass in more papers than the number of paper in which he fails in order to be successful. The number of ways in which he can be unsuccessful is a. 256 b. 256 c. 193 d.

A. 255

B. 256

C. 193

D. 319

Answer: B



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28. A box contains 2 white balls, 3 black balls and 4 red balls. The number of ways three balls be drawn from the box, if atleast one black ball is to be included in the draw is

A. 36

B. 42

C. 56

D. 64

Answer: D



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29. A group of 6 is chosen from 10 men and 7 women so as to contain atleast 3 men and 2 women. The number of ways this can be done, if two particular women refuse to serve on the same group, is

A. 8000

B. 7800

C. 7600

D. 7200

Answer: B



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30. A candidate is required to answer 7 questions out of 12 questions, which are divided into two groups, each containing 6 questions. He is not permitted to attempt more than 5 questions from either group. Find the number of different ways of doing questions.

A. 779

B. 781

C. 780

D. 782

Answer: C



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31. A committee of 4 persons is to be formed from 2 ladies, 2 old men and 4 young men such that it includes at least one lady, at least one old man and at most 2 young man. Then, the total number of ways in which this committee can be formed is:

A. 40

B. 41

C. 16

D. 32

Answer: B



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32. Find the number of divisors of 1350. Also, find the sum of all divisors.

A. 25, 3520

B. 24, 3720

C. 6, 2340

D. None

Answer: B



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33. The number of times the digit 5 will be written when listing the integers from 1 to 100, is

A. 271

B. 272

C. 300

D. None

Answer: C



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34. In a certain test, there are n questions. In the test, 2^{n-i} students gave wrong answers to at least i questions, where $i = 1, 2, \dots, n$. If the total number of wrong answers given is 2047, then n is equal to

a. 10 b. 11
c. 12 d. 13

A. 10

B. 11

C. 12

D. 13

Answer: B



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35. v34

A. 5040

B. 6210

C. 385

D. 1110

Answer: C



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36. If the letters of the word SACHIN are arranged in all possible ways and these words are written out as in dictionary, then the word SACHIN appears at serial number 602 (2) 603 (3) 600 (4) 601

A. 602

B. 603

C. 600

D. 601

Answer: D



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37. How many ways are there to arrange the letters in the word GARDEN with the vowels in alphabetical order?

A. 360

B. 240

C. 120

D. 480

Answer: A



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38. The number of ways to sit 3 men and 2 women in a bus such that total number of sitted men and women on each side is 3, is

A. $5!$

B. ${}^6C_5 \times 5!$

C. $6! \times {}^6C_5$

D. $5! + {}^6C_5$

Answer: B



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39. Eighteen guests have to be seated half on each side of a long table. Four particular guests desire to sit on one particular side and three others on the other side. The number of sitting arrangements is

A. ${}^{11}C_7(9!)^2$

B. ${}^{11}C_5(9!)^2$

C. $7 \cdot (9!)^2$

D. $10!9!$

Answer: B



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40. Possible number of words taking all letters at a time such that in each word both M's are together and both T's are together but both A's are not together is

A. $7! \cdot {}^8C_2$

B. $\frac{11!}{2!2!2!} - \frac{10!}{2!2!}$

C. $\frac{6!4!}{2!2!}$

D. $\frac{9!}{2!2!2!}$

Answer: A



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41. There are m points on one straight line AB and n points on another straight line AC , none of them being A . How many triangles can be formed with these points as vertices, if point A is also included?

A. $\frac{mn}{2}(m + n - 2)$

B. ${}^{m+1}C_2 \times {}^nC_1 + {}^{m-1}C_1 \times {}^nC_2$

C. $\frac{mn}{2}(m + n)$

D. None of these

Answer: C



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42. Out of 5 apples, 10 mangoes and 15 oranges, the number of ways of distributing 15 fruits each to two persons is

A. 56

B. 64

C. 66

D. 72

Answer: C



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43. In how many ways 20 identical bananas may be divided among 4 persons and if each person is to be given atleast one banana?

A. 10626, 4845

B. 1771, 969

C. 2024, 1140

D. None of these

Answer: B



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44. A shopkeeper sells three varieties of perfumes and he has a large number of bottles of the same size of each variety in his stock. There are 5 places in a row in his showcase. The number of different ways of displaying the three varieties of perfumes in the showcase, is

A. 6

B. 50

C. 150

D. None of the above

Answer: C



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45. There are 3 letters and 3 envelopes. Find the number of ways in which all letters are put in the wrong envelopes

A. 4

B. 2

C. 6

D. 8

Answer: B



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1. A student is allowed to select at most n books from a collection of $(2n+1)$ books. If the total number of ways in which he can select books is 63 find the value of n .

A. 6

B. n

C. 3

D. None

Answer: C



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2. There are 10 points in a plane, out of which 6 are collinear. If N is the number of triangles formed by joining these points, then :

A. $n \leq 100$

B. $100 < n < 140$

C. $140 < n \leq 190$

D. $n > 190$

Answer: A



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3. Find the value of

$$\frac{{}^8C_0}{6} - {}^8C_1 + {}^8C_2 \times 6 - {}^8C_3 \times 6^2 + \dots + {}^8C_8 6^7$$

A. 0

B. 6^6

C. 6^6

D. $\frac{5^8}{6}$

Answer: D



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4. The number of ways four boys can be seated around a round table in four chairs of different colours, is

A. 24

B. 12

C. 23

D. 64

Answer: A



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5. The number of ways in which four boys can be seated around a round table in four chairs of different colours,

is

A. ${}^{16}C_{11}$

B. ${}^{16}C_5$

C. ${}^{16}C_9$

D. ${}^{20}C_8$

Answer: C



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6. In a cricket championship there are 36 matches. The number of teams if each plays one match with other, is

A. 9

B. 10

C. 8

D. 12

Answer: A



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7. ${}^{n-2}C_r + 2{}^{n-2}C_{r-1} + {}^{n-2}C_{r-2}$ equals :

A. ${}^{n+1}C_r$

B. nC_r

C. ${}^nC_{r-1}$

D. ${}^{n-1}C_r$

Answer: B



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8. v44

A. 18720

B. 18270

C. 17280

D. 12780

Answer: C



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9. If ${}^n P_r = 30240$ and ${}^n C_r = 252$, then the ordered pair (n, r) is equal to

A. (12,6)

B. (10,5)

C. (9,4)

D. (16,7)

Answer: B



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10. In how many ways can 5 boys and 5 girls sit in a circle so that no two boys sit together :

A. $5! \times 5!$

B. $4! \times 5!$

C. $\frac{5! \times 5!}{2}$

D. None

Answer: B



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11. Six X ' s have to be placed in the squares of the figure below, such that each row contains at least one X. In how many different ways can this be done?

A. 27

B. 28

C. 26

D. 35

Answer: C



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12. If ${}^n C_{12} = {}^n C_6$, then ${}^n C_2$ is equal to

A. 72

B. 153

C. 306

D. 2556

Answer: B



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13. A student is allowed to select at most n books from a collection of $(2n+1)$ books. If the total number of ways in which he can select books is 63 find the value of n .

A. 3

B. 6

C. 2

D. None of these

Answer: A



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