**Permutation and Combination**

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| 1. | From a group of 7 men and 6 women, five persons are to be selected to form a committee so that at least 3 men are there on the committee. In how many ways can it be done? |
| |  |  |  |  | | --- | --- | --- | --- | | [**A.**](javascript:%20void%200;) | 564 | [**B.**](javascript:%20void%200;) | 645 | | [**C.**](javascript:%20void%200;) | 735 | [**D.**](javascript:%20void%200;) | 756 | | [**E.**](javascript:%20void%200;) | None of these |  |  |   **Answer & Explanation**  **Answer:** Option **D**  **Explanation:**  We may have (3 men and 2 women) or (4 men and 1 woman) or (5 men only).   |  |  | | --- | --- | | http://www.indiabix.com/_files/images/aptitude/1-sym-tfr.gif Required number of ways | = (7C3 x 6C2) + (7C4 x 6C1) + (7C5) | |  | |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | = | http://www.indiabix.com/_files/images/aptitude/1-sym-oparen-h1.gif | 7 x 6 x 5 | x | 6 x 5 | http://www.indiabix.com/_files/images/aptitude/1-sym-cparen-h1.gif | + (7C3 x 6C1) + (7C2) | | 3 x 2 x 1 | 2 x 1 | | |  | |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | = 525 + | http://www.indiabix.com/_files/images/aptitude/1-sym-oparen-h1.gif | 7 x 6 x 5 | x 6 | http://www.indiabix.com/_files/images/aptitude/1-sym-cparen-h1.gif | + | http://www.indiabix.com/_files/images/aptitude/1-sym-oparen-h1.gif | 7 x 6 | http://www.indiabix.com/_files/images/aptitude/1-sym-cparen-h1.gif | | 3 x 2 x 1 | 2 x 1 | | |  | = (525 + 210 + 21) | |  | = 756. | |

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| 2. | In how many different ways can the letters of the word 'LEADING' be arranged in such a way that the vowels always come together? |
| |  |  |  |  | | --- | --- | --- | --- | | [**A.**](javascript:%20void%200;) | 360 | [**B.**](javascript:%20void%200;) | 480 | | [**C.**](javascript:%20void%200;) | 720 | [**D.**](javascript:%20void%200;) | 5040 | | [**E.**](javascript:%20void%200;) | None of these |  |  |   **Answer & Explanation**  **Answer:** Option **C**  **Explanation:**  The word 'LEADING' has 7 different letters.  When the vowels EAI are always together, they can be supposed to form one letter.  Then, we have to arrange the letters LNDG (EAI).  Now, 5 (4 + 1 = 5) letters can be arranged in 5! = 120 ways.  The vowels (EAI) can be arranged among themselves in 3! = 6 ways.  http://www.indiabix.com/_files/images/aptitude/1-sym-tfr.gif Required number of ways = (120 x 6) = 720. |

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| 3. | In how many different ways can the letters of the word 'CORPORATION' be arranged so that the vowels always come together? |
| |  |  |  |  | | --- | --- | --- | --- | | [**A.**](javascript:%20void%200;) | 810 | [**B.**](javascript:%20void%200;) | 1440 | | [**C.**](javascript:%20void%200;) | 2880 | [**D.**](javascript:%20void%200;) | 50400 | | [**E.**](javascript:%20void%200;) | 5760 |  |  |   **Answer & Explanation**  **Answer:** Option **D**  **Explanation:**  In the word 'CORPORATION', we treat the vowels OOAIO as one letter.  Thus, we have CRPRTN (OOAIO).  This has 7 (6 + 1) letters of which R occurs 2 times and the rest are different.   |  |  |  | | --- | --- | --- | | Number of ways arranging these letters = | 7! | = 2520. | | 2! |   Now, 5 vowels in which O occurs 3 times and the rest are different, can be arranged   |  |  |  | | --- | --- | --- | | in | 5! | = 20 ways. | | 3! |   http://www.indiabix.com/_files/images/aptitude/1-sym-tfr.gif Required number of ways = (2520 x 20) = 50400. |

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| 4. | Out of 7 consonants and 4 vowels, how many words of 3 consonants and 2 vowels can be formed? |
| |  |  |  |  | | --- | --- | --- | --- | | [**A.**](javascript:%20void%200;) | 210 | [**B.**](javascript:%20void%200;) | 1050 | | [**C.**](javascript:%20void%200;) | 25200 | [**D.**](javascript:%20void%200;) | 21400 | | [**E.**](javascript:%20void%200;) | None of these |  |  |   **Answer & Explanation**  **Answer:** Option **C**  **Explanation:**  Number of ways of selecting (3 consonants out of 7) and (2 vowels out of 4)   |  |  | | --- | --- | |  | = (7C3 x 4C2) | |  | |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | = | http://www.indiabix.com/_files/images/aptitude/1-sym-oparen-h1.gif | 7 x 6 x 5 | x | 4 x 3 | http://www.indiabix.com/_files/images/aptitude/1-sym-cparen-h1.gif | | 3 x 2 x 1 | 2 x 1 | | |  | = 210. |   Number of groups, each having 3 consonants and 2 vowels = 210.  Each group contains 5 letters.   |  |  | | --- | --- | | Number of ways of arranging  5 letters among themselves | = 5! | |  | = 5 x 4 x 3 x 2 x 1 | |  | = 120. |   http://www.indiabix.com/_files/images/aptitude/1-sym-tfr.gif Required number of ways = (210 x 120) = 25200. |

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| 5. | In how many ways can the letters of the word 'LEADER' be arranged? |
| |  |  |  |  | | --- | --- | --- | --- | | [**A.**](javascript:%20void%200;) | 72 | [**B.**](javascript:%20void%200;) | 144 | | [**C.**](javascript:%20void%200;) | 360 | [**D.**](javascript:%20void%200;) | 720 | | [**E.**](javascript:%20void%200;) | None of these |  |  |   **Answer & Explanation**  **Answer:** Option **C**  **Explanation:**  The word 'LEADER' contains 6 letters, namely 1L, 2E, 1A, 1D and 1R.   |  |  |  | | --- | --- | --- | | http://www.indiabix.com/_files/images/aptitude/1-sym-tfr.gif Required number of ways = | 6! | = 360. | | (1!)(2!)(1!)(1!)(1!) | |

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| 6. | In a group of 6 boys and 4 girls, four children are to be selected. In how many different ways can they be selected such that at least one boy should be there? |
| |  |  |  |  | | --- | --- | --- | --- | | [**A.**](javascript:%20void%200;) | 159 | [**B.**](javascript:%20void%200;) | 194 | | [**C.**](javascript:%20void%200;) | 205 | [**D.**](javascript:%20void%200;) | 209 | | [**E.**](javascript:%20void%200;) | None of these |  |  |   **Answer & Explanation**  **Answer:** Option **D**  **Explanation:**  We may have (1 boy and 3 girls) or (2 boys and 2 girls) or (3 boys and 1 girl) or (4 boys).   |  |  | | --- | --- | | http://www.indiabix.com/_files/images/aptitude/1-sym-tfr.gif Required number of ways | = (6C1 x 4C3) + (6C2 x 4C2) + (6C3 x 4C1) + (6C4) | |  | = (6C1 x 4C1) + (6C2 x 4C2) + (6C3 x 4C1) + (6C2) | |  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | = (6 x 4) + | http://www.indiabix.com/_files/images/aptitude/1-sym-oparen-h1.gif | 6 x 5 | x | 4 x 3 | http://www.indiabix.com/_files/images/aptitude/1-sym-cparen-h1.gif | + | http://www.indiabix.com/_files/images/aptitude/1-sym-oparen-h1.gif | 6 x 5 x 4 | x 4 | http://www.indiabix.com/_files/images/aptitude/1-sym-cparen-h1.gif | + | http://www.indiabix.com/_files/images/aptitude/1-sym-oparen-h1.gif | 6 x 5 | http://www.indiabix.com/_files/images/aptitude/1-sym-cparen-h1.gif | | 2 x 1 | 2 x 1 | 3 x 2 x 1 | 2 x 1 | | |  | = (24 + 90 + 80 + 15) | |  | = 209. | |

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| 7. | How many 3-digit numbers can be formed from the digits 2, 3, 5, 6, 7 and 9, which are divisible by 5 and none of the digits is repeated? |
| |  |  |  |  | | --- | --- | --- | --- | | [**A.**](javascript:%20void%200;) | 5 | [**B.**](javascript:%20void%200;) | 10 | | [**C.**](javascript:%20void%200;) | 15 | [**D.**](javascript:%20void%200;) | 20 |   **Answer & Explanation**  **Answer:** Option **D**  **Explanation:**  Since each desired number is divisible by 5, so we must have 5 at the unit place. So, there is 1 way of doing it.  The tens place can now be filled by any of the remaining 5 digits (2, 3, 6, 7, 9). So, there are 5 ways of filling the tens place.  The hundreds place can now be filled by any of the remaining 4 digits. So, there are 4 ways of filling it.  http://www.indiabix.com/_files/images/aptitude/1-sym-tfr.gif Required number of numbers = (1 x 5 x 4) = 20. |

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| 8. | In how many ways a committee, consisting of 5 men and 6 women can be formed from 8 men and 10 women? |
| |  |  |  |  | | --- | --- | --- | --- | | [**A.**](javascript:%20void%200;) | 266 | [**B.**](javascript:%20void%200;) | 5040 | | [**C.**](javascript:%20void%200;) | 11760 | [**D.**](javascript:%20void%200;) | 86400 | | [**E.**](javascript:%20void%200;) | None of these |  |  |   **Answer & Explanation**  **Answer:** Option **C**  **Explanation:**   |  |  | | --- | --- | | Required number of ways | = (8C5 x 10C6) | |  | = (8C3 x 10C4) | |  | |  |  |  |  |  | | --- | --- | --- | --- | --- | | = http://www.indiabix.com/_files/images/aptitude/1-sym-oparen-h1.gif | 8 x 7 x 6 | x | 10 x 9 x 8 x 7 | http://www.indiabix.com/_files/images/aptitude/1-sym-cparen-h1.gif | | 3 x 2 x 1 | 4 x 3 x 2 x 1 | | |  | = 11760. | |

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| 9. | A box contains 2 white balls, 3 black balls and 4 red balls. In how many ways can 3 balls be drawn from the box, if at least one black ball is to be included in the draw? |
| |  |  |  |  | | --- | --- | --- | --- | | [**A.**](javascript:%20void%200;) | 32 | [**B.**](javascript:%20void%200;) | 48 | | [**C.**](javascript:%20void%200;) | 64 | [**D.**](javascript:%20void%200;) | 96 | | [**E.**](javascript:%20void%200;) | None of these |  |  |   **Answer & Explanation**  **Answer:** Option **C**  **Explanation:**  We may have(1 black and 2 non-black) or (2 black and 1 non-black) or (3 black).   |  |  | | --- | --- | | http://www.indiabix.com/_files/images/aptitude/1-sym-tfr.gif Required number of ways | = (3C1 x 6C2) + (3C2 x 6C1) + (3C3) | |  | |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | = | http://www.indiabix.com/_files/images/aptitude/1-sym-oparen-h1.gif | 3 x | 6 x 5 | http://www.indiabix.com/_files/images/aptitude/1-sym-cparen-h1.gif | + | http://www.indiabix.com/_files/images/aptitude/1-sym-oparen-h1.gif | 3 x 2 | x 6 | http://www.indiabix.com/_files/images/aptitude/1-sym-cparen-h1.gif | + 1 | | 2 x 1 | 2 x 1 | | |  | = (45 + 18 + 1) | |  | = 64. | |

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| 10. | In how many different ways can the letters of the word 'DETAIL' be arranged in such a way that the vowels occupy only the odd positions? |
| |  |  |  |  | | --- | --- | --- | --- | | [**A.**](javascript:%20void%200;) | 32 | [**B.**](javascript:%20void%200;) | 48 | | [**C.**](javascript:%20void%200;) | 36 | [**D.**](javascript:%20void%200;) | 60 | | [**E.**](javascript:%20void%200;) | 120 |  |  |   **Answer & Explanation**  **Answer:** Option **C**  **Explanation:**  There are 6 letters in the given word, out of which there are 3 vowels and 3 consonants.  Let us mark these positions as under:  (1) (2) (3) (4) (5) (6)  Now, 3 vowels can be placed at any of the three places out 4, marked 1, 3, 5.  Number of ways of arranging the vowels = 3P3 = 3! = 6.  Also, the 3 consonants can be arranged at the remaining 3 positions.  Number of ways of these arrangements = 3P3 = 3! = 6.  Total number of ways = (6 x 6) = 36. |

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| 11. | In how many ways can a group of 5 men and 2 women be made out of a total of 7 men and 3 women? |
| |  |  |  |  | | --- | --- | --- | --- | | [**A.**](javascript:%20void%200;) | 63 | [**B.**](javascript:%20void%200;) | 90 | | [**C.**](javascript:%20void%200;) | 126 | [**D.**](javascript:%20void%200;) | 45 | | [**E.**](javascript:%20void%200;) | 135 |  |  |   **Answer & Explanation**  **Answer:** Option **A**  **Explanation:**   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | Required number of ways = (7C5 x 3C2) = (7C2 x 3C1) = | http://www.indiabix.com/_files/images/aptitude/1-sym-oparen-h1.gif | 7 x 6 | x 3 | http://www.indiabix.com/_files/images/aptitude/1-sym-cparen-h1.gif | = 63. | | 2 x 1 | |

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| 12. | How many 4-letter words with or without meaning, can be formed out of the letters of the word, 'LOGARITHMS', if repetition of letters is not allowed? |
| |  |  |  |  | | --- | --- | --- | --- | | [**A.**](javascript:%20void%200;) | 40 | [**B.**](javascript:%20void%200;) | 400 | | [**C.**](javascript:%20void%200;) | 5040 | [**D.**](javascript:%20void%200;) | 2520 |   **Answer & Explanation**  **Answer:** Option **C**  **Explanation:**  'LOGARITHMS' contains 10 different letters.   |  |  | | --- | --- | | Required number of words | = Number of arrangements of 10 letters, taking 4 at a time. | |  | = 10P4 | |  | = (10 x 9 x 8 x 7) | |  | = 5040. | |

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| 13. | In how many different ways can the letters of the word 'MATHEMATICS' be arranged so that the vowels always come together? |
| |  |  |  |  | | --- | --- | --- | --- | | [**A.**](javascript:%20void%200;) | 10080 | [**B.**](javascript:%20void%200;) | 4989600 | | [**C.**](javascript:%20void%200;) | 120960 | [**D.**](javascript:%20void%200;) | None of these |   **Answer & Explanation**  **Answer:** Option **C**  **Explanation:**  In the word 'MATHEMATICS', we treat the vowels AEAI as one letter.  Thus, we have MTHMTCS (AEAI).  Now, we have to arrange 8 letters, out of which M occurs twice, T occurs twice and the rest are different.   |  |  |  | | --- | --- | --- | | http://www.indiabix.com/_files/images/aptitude/1-sym-tfr.gif Number of ways of arranging these letters = | 8! | = 10080. | | (2!)(2!) |   Now, AEAI has 4 letters in which A occurs 2 times and the rest are different.   |  |  |  | | --- | --- | --- | | Number of ways of arranging these letters = | 4! | = 12. | | 2! |   http://www.indiabix.com/_files/images/aptitude/1-sym-tfr.gif Required number of words = (10080 x 12) = 120960. |

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| 14. | In how many different ways can the letters of the word 'OPTICAL' be arranged so that the vowels always come together? |
| |  |  |  |  | | --- | --- | --- | --- | | [**A.**](javascript:%20void%200;) | 120 | [**B.**](javascript:%20void%200;) | 720 | | [**C.**](javascript:%20void%200;) | 4320 | [**D.**](javascript:%20void%200;) | 2160 | | [**E.**](javascript:%20void%200;) | None of these |  |  |   **Answer & Explanation**  **Answer:** Option **B**  **Explanation:**  The word 'OPTICAL' contains 7 different letters.  When the vowels OIA are always together, they can be supposed to form one letter.  Then, we have to arrange the letters PTCL (OIA).  Now, 5 letters can be arranged in 5! = 120 ways.  The vowels (OIA) can be arranged among themselves in 3! = 6 ways.  http://www.indiabix.com/_files/images/aptitude/1-sym-tfr.gif Required number of ways = (120 x 6) = 720. |