

1. Evaluate completely:  $\frac{50!}{48!}$

- [A] 2450
- [B] not possible, too large to calculate
- [C] 50
- [D] 117600
- [E] None of the above

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Problems 2 - 4 refer to the following question:

Using the digits 1,2,3,5,7,8 and 9.

2. How many different numbers between 70 and 700 with **no** repetition

- [A] 135
- [B] 120
- [C] 140
- [D] 138
- [E] None of the above

3. How many different **Three** digits number can be formed if it must have both odd and even digits **with** repetition

- [A] 218
- [B] 210
- [C] 150
- [D] 200
- [E] None of the above

4. How many different **Four** digit numbers can be formed if it must be odd and must start with 1 **with** repetition.

- [A] 196
- [B] 120
- [C] 245
- [D] 150
- [E] None of the above

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5. The state supreme court has 12 members. In how many ways can the members make 9 to 3 vote?

- [A]  $C(12,3)$
- [B]  $C(12,9)$
- [C]  $C(12,9) \cdot C(3,3)$
- [D]  $C(12,3) \cdot C(9,9)$
- [E] All of the above

6. A group of 6 students are applying for summer jobs. How many ways the group can be divided into 3 cooks, 2 cashiers and 1 dishwasher?

- [A] 20
- [B] 60
- [C] 12
- [D] 720
- [E] None of the above

7. How many different phone number can be formed if it must have 7 digits and cannot start with 0 or 1 and the second digit must be 8 or 7 or 5 with repetition allowed

- [A]  $8 \cdot 2 \cdot 7^5$
- [B]  $8 \cdot 2 \cdot 10^5$
- [C]  $8 \cdot 3 \cdot 10^5$
- [D]  $8 \cdot 3 \cdot 7^5$
- [E] None of the above

8. A test consists of 6 true-false questions and 8 multiple-choice questions, which contain 4 responses each. If each question has only one correct response, how many ways can a student respond to all questions on the test?

- [A]  $2^6 + 4^8$
- [B]  $2^6 \cdot 4^8$
- [C]  $6^2 + 8^4$
- [D]  $6^2 \cdot 8^4$
- [E] None of the above

9. Tom is planning to visit Chicago, Denver, Portland and Seattle. How many possible schedule does he have if has to visit Portland and Seattle one after the other?

- [A] 6
  - [B] 24
  - [C] 12
  - [D] 30
  - [E] None of the above
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*Problems 10-11 refer to the following question:*

A team of 7 people will be selected out of 12 men and 10 women. How many different team can be formed if the team:

10. Must have at least 4 men and at least 2 women

- [A]  $C(12,4) \cdot C(10,3) + C(12,5) \cdot C(10,2)$
- [B]  $C(12,5) \cdot C(10,5) + C(12,4) \cdot C(10,5)$
- [C]  $C(12,4) \cdot C(10,2) + C(12,5) \cdot C(10,2)$
- [D]  $C(12,4) \cdot C(10,3) + C(12,5) \cdot C(10,3)$
- [E] None of the above

11. Must include both sexes.

- [A]  $C(22,7) - C(10,7)$
  - [B]  $C(22,7) - C(12,7)$
  - [C]  $C(22,7) - C(10,7) - C(12,7)$
  - [D]  $C(12,4) \cdot C(10,3) + C(12,5) \cdot C(10,2)$
  - [E] None of the above
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*Problems 12-14 refer to the following question:*

In a box there are : 7 red books, 5 white books and 6 blue books. If 6 books are selected , in how many different ways this can be done if:

12. It must include more than one color

- [A]  $C(18,6) - C(13,6)$
- [B]  $C(18,6) - C(7,6) - C(6,6) - C(5,6)$
- [C]  $C(18,6) - C(7,6) - C(6,6)$
- [D]  $3 \cdot C(7,1) \cdot C(5,1) \cdot C(6,4)$
- [E] None of the above

13. It must include one color only

- [A]  $C(18,6) - C(7,6) - C(6,6)$
- [B]  $C(7,6) + C(6,6)$
- [C]  $C(7,6) + C(6,6) + C(5,6)$
- [D]  $C(18,6) - C(7,6) - C(6,6) - C(5,6)$
- [E] None of the above

14. It must include at least 1 red

- [A]  $C(18,6) - C(7,0)$
- [B]  $C(7,1) \cdot C(11,4)$
- [C]  $C(18,6) - C(11,6)$
- [D]  $3 \cdot C(7,1) \cdot C(11,4)$
- [E] None of the above

15. Three married couples to be seated in a row of 6 chairs. How many seating arrangement are possible if each married couple must sit side by side?  
[A] 48  
[B] 96  
[C] 384  
[D] 192  
[E]None of the above
16. The letters A, B, C, D, E and F are to be randomly arranged in a row. In how many ways this can be created if the letters A, B, C and D must appear together in any order?  
[A] 240  
[B] 6  
[C] 24  
[D] 144  
[E]None of the above
17. Four people attended a party. If each person in the party shakes hand with every other person, how many handshakes will have been made?  
[A] 36  
[B] 12  
[C] 16  
[D] 6  
[E]None of the above
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*Problems 18-21 refer to the following question:*

4 cards to be selected out of 52, in how many different ways this can be done if:

18. They contain all suits  
[A]  $C(13,1).C(13,1).C(13,1).C(13,1)$   
[B]  $4.C(13,1)$   
[C]  $4.C(13,1).C(13,1).C(13,1).C(13,1)$   
[D]  $4.C(13,4)$   
[E]None of the above
19. They contain more than one suit  
[A]  $C(13,1).C(13,1).C(13,1).C(13,1)$   
[B]  $C(52,4) - 4.C(13,4)$   
[C]  $4.C(13,1).C(13,1).C(13,1).C(13,1)$   
[D]  $4.C(13,4)$   
[E]None of the above
20. They contain more than one color  
[A]  $C(26,1).C(26,1).C(26,1).C(26,1)$   
[B]  $C(26,4) + C(26,4)$   
[C]  $C(52,4) - 2.C(26,4)$   
[D]  $C(52,4) - 4.C(26,4)$   
[E]None of the above
21. They contain exactly 3 of the same suit  
[A]  $C(13,1).C(39,3)$   
[B]  $C(13,3).C(39,1)$   
[C]  $4.C(13,1).C(39,3)$   
[D]  $4.C(13,3).C(39,1)$   
[E]None of the above

22. How many different numbers can be formed by rearranging: 1113322
- [A] 210
  - [B] 5040
  - [C] 840
  - [D] 420
  - [E] None of the above
23. There are 6 people to be seated around a circular table, in how many different ways they can be seated?
- [A] 300
  - [B] 240
  - [C] 120
  - [D] 720
  - [E] None of the above
24. A class contains 6 students, how many different ways can a team of 4 players be selected and designate 2 of the 4 player as captain and co-captain?
- [A] 60
  - [B] 4320
  - [C] 180
  - [D] 720
  - [E] None of the above
25. four couples (4 men and 4 women) to be seated in a row of 8 seats. How many can they be seated if all men want to sit together and all women want to sit together?
- [A] 1152
  - [B] 1200
  - [C] 1175
  - [D] 1252
  - [E] None of the above
26. In how many ways can a committee of 4 senators be selected from the 100 members of the U.S. Senates representing the 50 states so that no two committee members are from the same state?
- [A]  $C(50,4) \cdot 2$
  - [B]  $C(50,1) \cdot C(49,1) \cdot C(48,1) \cdot C(47,1)$
  - [C]  $C(50,4) \cdot 4^2$
  - [D]  $C(50,4) \cdot 2^4$
  - [E] None of the above
27. Computer packages are tested one after another as they leave an assembly line and their condition is noted. Packages are classified as normal (N), appearance defect (A), or operating defect (O). Testing stops as soon as 1 operating defect is found, 1 appearance defect is found, or 3 packages are tested. Find how many outcomes in the sample space.
- [A] 6
  - [B] 7
  - [C] 8
  - [D] 9
  - [E] None of the above
28. A box contains 1 red, 2 white and 1 green balls. An experiment consists of drawing balls in succession without replacement, until a red ball is drawn. Draw the tree to find how many outcomes in the sample space
- [A] 9
  - [B] 10
  - [C] 7
  - [D] 8
  - [E] None of the above