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## QUESTIONBANK: PERMUTATION AND PROBABILITY

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This section hosts a number of CAT Level questions on Permutation and Combination, and Probability. For a free PDF download of the Permutation and Combination chapter authored by Mr. Rajesh, [click here](#).

### 1 COUNTING NATURAL NUMBERS

Sum of three *Natural* numbers  $a$ ,  $b$  and  $c$  is 10. How many ordered triplets  $(a, b, c)$  exist?

- A. 45
- B. 36
- C. 54
- D. 28

Correct answer

Explanatory Answer

$(n-1) C (r-1)$

Hard

### 2 COUNTING WHOLE NUMBERS

Sum of three *Whole* numbers  $a$ ,  $b$  and  $c$  is 10. How many ordered triplets  $(a, b, c)$  exist?

- A. 66
- B. 78
- C. 72
- D. 56

Correct answer

Explanatory Answer

$(n+r-1) C (r-1)$

Hard

### 3 COUNTING - TOYS AND BOXES

In how many ways 11 identical toys be placed in 3 distinct boxes such that no box is empty?

- A. 72
- B. 54
- C. 45
- D. 36

Correct answer

Explanatory Answer

Counting

Hard

### 4 PERMUTATION COMBINATION PUZZLE

$a$ ,  $b$ ,  $c$  are three distinct integers from 2 to 10 (both inclusive). Exactly one of  $ab$ ,  $bc$  and  $ca$  is odd.  $abc$  is a multiple of 4. The arithmetic mean of  $a$  and  $b$  is an integer and so is the arithmetic mean of  $a$ ,  $b$  and  $c$ . How many such triplets are possible (unordered triplets)?

- A. 8
- B. 6
- C. 2
- D. 4

Correct answer

Explanatory Answer

P&C Puzzle

Medium

### 5 COUNTING 7 DIGIT NUMBERS

A seven-digit number comprises of only 2's and 3's. How many of these are multiples of 12?

- A. 11
- B. 12
- C. 10
- D. 22

Correct answer

Explanatory Answer

Counting - Number Systems

Medium

### 6 ALPHABETICAL ORDER

If all words with 2 distinct vowels and 3 distinct consonants were listed alphabetically, what would be the rank of "ACDEF"?

- A. 4716
- B. 4720
- C. 4718
- D. 1717

Correct answer Explanatory Answer Word Rearrangements

Hard

## 7 COMBINATORICS BASICS

If we listed all numbers from 100 to 10,000, how many times would the digit 3 be printed?

- A. 3980
- B. 3700
- C. 3840
- D. 3780

Correct answer Explanatory Answer Counting - Number Systems

Medium

## 8 NUMBER SYSTEMS - COMBINATORICS

From the digits 2, 3, 4, 5, 6 and 7, how many 5-digit numbers can be formed that have distinct digits and are multiples of 12?

- A. 36
- B. 60
- C. 84
- D. 72

Correct answer Explanatory Answer Counting - Number Systems

Medium

## 9 NUMBERS IN DIFFERENT BASES

All numbers from 1 to 200 (in decimal system) are written in base 6 and base 7 systems. How many of the numbers will have a non-zero units digit in both base 6 and base 7 notations?

- A. 143
- B. 200
- C. 157
- D. 122

Correct answer Explanatory Answer Base 6 and 7

Hard

## 10 NON-ZERO NUMBERS

All numbers from 1 to 150 (in decimal system) are written in base 6 notation. How many of these will contain zero's?

- A. 25
- B. 20
- C. 35
- D. 45

Correct answer Explanatory Answer Base 6

Medium

## 11 5 DIGIT NUMBERS

How many numbers of up to 5 digits can be created using the digits 1, 2, 3 and 5 each at least once such that they are a multiple of 15?

- A. 24
- B. 18
- C. 15
- D. 12

Correct answer Explanatory Answer Counting - Number Systems 

Medium

## 12 NUMBERS WITH DISTINCT DIGITS

How many odd numbers with distinct digits can be created using the digits 1, 2, 3, 4, 5 and 6?

- A. 975
- B. 960
- C. 978
- D. 986

Correct answer Explanatory Answer Counting 6 Digit Nos. 

Medium

## 13 ALPHABETICAL ORDER

All the rearrangements of the word "DEMAND" are written without including any word that has two D's appearing together. If these are arranged alphabetically, what would be the rank of "DEMAND"

- A. 36

- B. 74  
C. 42  
D. 86

Correct answer Explanatory Answer Word Rearrangements

Medium

#### 14 PROBABILITY AND GP

A and B take part in a duel. A can strike with an accuracy of 0.6. B can strike with an accuracy of 0.8. A has the first shot, post which they strike alternately. What is the probability that A wins the duel?

- A.  $\frac{7}{10}$   
B.  $\frac{12}{23}$   
C.  $\frac{2}{3}$   
D.  $\frac{11}{17}$

Correct answer Explanatory Answer Probability Duel

Hard

#### 15 PROBABILITY BAYES THEOREM

Doctors have devised a test for leptospirosis that has the following property: For any person suffering from leptospirosis, there is a 90% chance of the test returning positive. For a person not suffering from leptospirosis, there is an 80% chance of the test returning negative. It is known that 10% of people who go for testing have leptospirosis. If a person who gets tested gets a +ve result for leptospirosis (as in, the test result says they have got leptospirosis), what is the probability that they actually have leptospirosis?

- A.  $\frac{7}{10}$   
B.  $\frac{8}{11}$   
C.  $\frac{1}{3}$   
D.  $\frac{1}{2}$

Correct answer Explanatory Answer Bayes Theorem

Hard

#### 16 REARRANGING LETTERS

In how many ways can letters of the word ATTITUDE be rearranged such that no two Ts are adjacent to each other?

- A. 6720  
B. 2400  
C. 4320  
D. 1800

Correct answer Explanatory Answer Rearrangement

Medium

#### 17 POSSIBLE INTEGER SOLUTIONS

$2a + 5b = 103$ . How many pairs of positive integer values can  $a, b$  take such that  $a > b$ ?

- A. 7  
B. 9  
C. 14  
D. 15

Correct answer Explanatory Answer Integer Solutions

Medium

#### 18 REARRANGEMENT OF LETTERS - PROBABILITY

If all the rearrangements of the word AMAZON are considered, what is the probability that M will feature between the 2As?

- A.  $\frac{1}{3}$   
B.  $\frac{1}{6}$   
C.  $\frac{2}{5}$   
D.  $\frac{3}{8}$

Correct answer Explanatory Answer Probability

Hard

#### 19 PROBABILITY AND NUMBER THEORY

N is a 3-digit number that is a multiple of 7; what is the probability that it will be a multiple of 5?

- A.  $\frac{1}{5}$   
B.  $\frac{11}{54}$   
C.  $\frac{13}{64}$   
D.  $\frac{13}{66}$

Correct answer Explanatory Answer Probability

Medium

#### 20 PROBABILITY

A boss decides to distribute Rs. 2000 between 2 employees. He knows X deserves more than Y, but does not know how much more. So he decides to arbitrarily break Rs. 2000 into two parts and give X the bigger part. What is the chance that X gets twice as much as Y or more?

- A.  $\frac{2}{5}$
- B.  $\frac{1}{2}$
- C.  $\frac{1}{3}$
- D.  $\frac{2}{3}$

Correct answer Explanatory Answer Probability 

Hard

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## 21 ROLLING A DIE

I roll a die four times. In how many outcomes do we have two throws have the same number and the other two something different?

- A. 720
- B. 480
- C. 360
- D. 350

Correct answer Explanatory Answer Rolling a Die

Medium

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## 22 CARD PACK - SELECTION

In how many ways can be select 5 cards from a card pack such that all 4 suits appear.

- A. 52728
- B. 405646
- C. 685464
- D. 4056

Correct answer Explanatory Answer Card Pack - Selection

Medium

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## 23 ROLLING A DIE

I roll a die 4 times. In how many outcomes will each subsequent throw be greater than the previous one?.

- A. 30
- B. 48
- C. 54
- D. 60

Correct answer Explanatory Answer Rolling a Die

Medium

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## 24 3 DIGIT NUMBER

Find 3 digit numbers such that product of their digits is a natural number less than 5.

- A. 11
- B. 15
- C. 13
- D. 17

Correct answer Explanatory Answer 3 Digit Number

Medium

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## 25 3 DIGIT NUMBER - SUM OF DIGITS

Find all 3 digit numbers such that sum of their digits is a whole number less than 5.

- A. 18
- B. 20
- C. 19
- D. 17

Correct answer Explanatory Answer 3 Digit Number - Sum of Digits

Medium

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## 26 SUM OF REARRANGEMENTS

What is sum of all rearrangements of the 4-digit number 3214?

- A. 66660
- B. 55554
- C. 60048
- D. 65024

Correct answer Explanatory Answer Sum of Rearrangements

Medium

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## 27 SUM OF REARRANGEMENTS

What is sum of all rearrangements of the 4-digit number 3321?

- A. 29999
- B. 27777
- C. 28888
- D. 29997

Correct answer   Explanatory Answer   Sum of Rearrangements

Medium

## 28 FORMING TRIANGLES

Of 22 points on a plane, 8 are on a straight line, 7 are on another straight line and 10 are on a third straight line. How many triangles can be drawn by connecting some three points from these 22?

- A.  ${}^{22}C_3$
- B.  ${}^{22}C_3 - ({}^8C_3 + {}^7C_3 + {}^{10}C_3)$
- C.  ${}^{22}C_3 + ({}^8C_3 + {}^7C_3 + {}^{10}C_3)$
- D.  ${}^8C_3 + {}^7C_3 + {}^{10}C_3$

Correct answer   Explanatory Answer   Forming Triangles

Medium

## 29 SELECTION AND PROBABILITY

A bag contains 4 red and 3 black balls. A second bag contains 2 red and 3 black balls. One bag is selected at random. If from the selected bag one ball is drawn, then what is the probability that the ball drawn is red?

- A.  $\frac{39}{70}$
- B.  $\frac{41}{70}$
- C.  $\frac{29}{70}$
- D.  $\frac{17}{35}$

Correct answer   Explanatory Answer   Selection and Probability

Medium

## 30 MANANA REARRANGMENT

In how many ways can we rearrange the letters of the word MANANA such that no two A's are adjacent to each other?

- A.  $3! * {}^5C_3$
- B.  $4! * {}^4C_3$
- C.  $3! * {}^4C_3$
- D.  $5! * {}^4C_3$

Correct answer   Explanatory Answer   MANANA Rearrangement

Medium

## 31 I BETWEEN 2 A'S

How many ways are there for arranging letters of the word AMAZING such that the 'I' appears between the two 'A's?

- A. 5! ways
- B. 7! ways
- C. 8! ways
- D. 4! ways

Correct answer   Explanatory Answer   I between 2 A's

Medium

## 32 ROOM ALLOCATION

In how many ways can 6 boys be allotted into 5 rooms such that no room is empty and all 6 boys are accommodated?

- A.  $6 * 5!$  ways
- B.  $7 * 5!$  ways
- C.  $3 * 3!$  ways
- D.  $15 * 5!$  ways

Correct answer   Explanatory Answer   Room Allocation

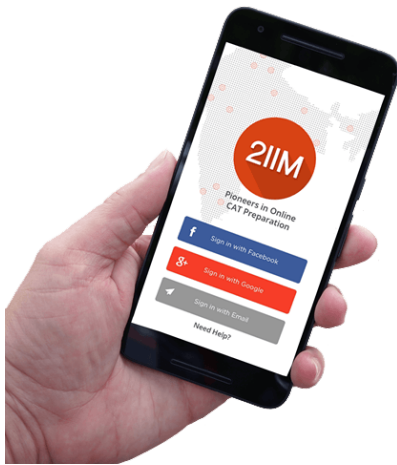
Medium

## 33 3 DIGIT NUMBERS > 500

How many 3-digit numbers greater than 500 contain the digit 9 appearing at least once?

- A. 191
- B. 176
- C. 153
- D. 189

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