**Answers and Explanations:**

**Probability**

Ans 1 : Option b

X can take 7 values. To get |X|<2 (i.e., −2 < X < +2) take X={−1,0,1}.

Thus required probability = 3 / 7

Ans 2 : Option b

P(Both are Red) = 6C2 / 13C2 = 5 / 26

Ans 3 : Option d

The probability that first ball is white: 12C1 / 30C1 = 2 / 5

Since, the ball is not replaced; hence the number of balls left in bag is 29.  
Hence the probability the second ball is black: 18C1 / 29C1 = 18 / 29

Thus, required probability = (2/5) \* (18/29) = 36/145

Ans 4 : Option a

A number divisible by 4 formed using the digits 1, 2, 3, 4 and 5 has to have the last two digits as 12 or 24 or 32 or 52. In each of these cases, the five digits number can be formed with the remaining 3 digits in 3! = 6 ways.

A number divisible by 4 can be formed in 6×4=24 ways.

Total number that can be formed using the digits 1, 2, 3, 4 and 5 without repetition = 5! = 120

Required probability = 24/120 = 1/5

Ans 5 : Option d

Let A be the event that ball selected from the first bag is red and ball selected from second bag is green. Let B be the event that ball selected from the first bag is green and ball selected from second bag is red.

P(A) = 5/8 \* 6/10 = 3 / 8

P(B) = 3/8 \* 4/10 = 3 / 20

Required Probability = P(A) + P(B) = 3/8 + 3/20 = 21/40

Ans 6 : Option c

Let probability of the first event taking place be A and probability of the second event taking place be B.

Then, P(A) = 3 / (5+3) = 3/8 and P(not A) = 5/8

P(B) = 7/(7+5) = 7/12 and P(not B) = 5/12

For calculating the probability of occurrence of atleast one event is = 1 – Probability of non-occurrence of both events.

Thus, required probability = 1 – (5/8 \* 5/12) = 1 – 25/96 = 71/96

Ans 7 : Option c

Total cases of checking in the hotels = 43 = 64 ways.

Total number of cases when three men are checking in different hotels = 4 \* 3 \* 2 = 24 ways.

Required probability = 24 / 64 = 3/8

Ans 8 : Option a

P(odd) = P(even) = 1/2

Sum or the three numbers can be odd only under the following 4 scenarios:

1. Odd + Odd + Odd = 1/2 \* 1/2 \* 1/2 = 1/8
2. Odd + Even + Even = 1/2 \* 1/2 \* 1/2 = 1/8
3. Even + Odd + Even = 1/2 \* 1/2 \* 1/2 = 1/8
4. Even + Even + Odd = 1/2 \* 1/2 \* 1/2 = 1/8

Required Probability = 1/8 + 1/8 + 1/8 + 1/8 = 1/2

Ans 9 : Option a

Required probability = 1 – P(both of the selected are boys) = 1 – (8/17 \* 7/16)

= 1 – (7/34) = 27/34

Ans 10 : Option d

The probability of selecting one bag = 1/2

Now, probability of getting a white ball from bag A = (1/2) \* (3/5) = 3/10

and probability of getting a white ball from bag B = (1/2) \* (2/6) = 1/6

Hence, Probability that white ball is drawn = 3/10 + 1/6 = 7/15

Ans 11 : Option b

There are 90 two digit numbers. There are 30 of those numbers that are divisible by '3'.

Of these 30 numbers, the numbers that are divisible by '5' are those that are multiples of '15'. i.e. numbers that are divisible by both '3' and '5'. There are 6 such numbers i.e. 15, 30, 45, 60, 75 and 90.

We need to find out numbers that are divisible by '3' and not by '5', which will be: 30−6=24.  
  
The required probability is therefore, 24/90 = 4/15.

Ans 12 : Option b

D and A will contradict each other when one speaks truth and other speaks lies.

Probability of D speak truth and A lies = 3/4 \* 1/5 = 3/20

Probability of A speak truth and D lies = 4/5 \* 1/4 = 1/5

The two probabilities are mutually exclusive. Hence, probabilities that D and A contradict each other = 3/20 + 1/5 = 7/20 = 35%.

Ans 13 : Option b

The sum of numbers can be 15 in the following three ways:

**Case I:** 15 = 3 + 6 + 6

The first, second and third throws can be (3,6,6),(6,3,6) and (6,6,3) respectively. Total number of ways in which 3, 6 and 6 can be obtained = 3

**Case II:** 15 = 4 + 5 + 6

The first, second and third throws can be 4, 5 and 6. Total number of ways in which 4, 5 and 6 can be obtained = 6

**Case III:** 15 = 5 + 5 + 5

The first, second and third throws can be 5, 5 and 5. Total number of ways in which 5, 5 and 5 can be obtained = 1.

Hence, the total number of ways=3+6+1=10

The total number of ways in which the first roll will be 4 is 2.

Thus, required probability = 2/10 = 1/5

Ans 14 : Option c

Let a particular number (say) number 2 occupies position 1. Then all possible arrangement are given as: (2,1,3,4), (2,1,4,3), (2,3,4,1), (2,3,1,4), (2,4,1,3), (2,4,3,1) = 6 in number.

Out of these six possible arrangements, three (2,1,3,4), (2,3,1,4), (2,4,3,1) are not acceptable because numbers 3 and 4 occupy the correct positions.

Required probability = 3/6 = 1/2

Ans 15 : Option c

From the question itself; P(A) = 3 / 11 and P(B)= 2 / 7

P(A) + P(B) + P(C) = 1

Thus, P(C) = 34 / 77

So, the odds against C = 43 : 34.

Ans 16 : Option a

Total number of possible arrangements for 4 boys and 3 girls in a queue = 7!

When they occupy alternate position the arrangement would be like:

B G B G B G B

Thus, total number of possible arrangements for boys = 4!

Total number of possible arrangements for girls = 3!

Required probability = (4! \* 3!) / 7! = 1/35

Ans 17 : Option b

2 balls can be drawn in the following ways: 1 red, 1 green or 2 red or 2 green

Required probability = (2C1 \* 3C1)/7C2 + 2C2/7C2 + 3C2/7C2

= 6/21 + 1/21 + 3/21 = 10/21.

Ans 18 : Option a

Total sample space will be total ways of selecting 2 squares out of available 64 squares. So, sample space =64C2

Now there are 7 unique adjacent square sets in each row and each column i.e. favorable cases will be 7 \* (8 rows + 8 columns) = 112.

Required probability = 112 / 64C2 = 1/18

Ans 19 : Option b

Clearly, Total number of cases = 6 \* 6 = 36.

Let E = Event that the sum is a prime number.

E = (1, 1), (1, 2), (1, 4), (1, 6), (2, 1), (2, 3), (2, 5), (3, 2), (3, 4), (4, 1), (4, 3), (5, 2), (5, 6), (6, 1), (6, 5)

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Total number of favorable cases = 15.

Thus, P(E) = 15/36 = 5/12.

Ans 20 : Option b

For the simultaneous throw of two dice, total cases = 6 \* 6 = 36

Required probability = 1 – P(odd number on both dices) = 1 – (3\*3) / 36

= 1 – 9/36 = 27/36 = 3/4

Ans 21 : Option a

Total number of ways of selecting 3 students out of 25 = 25C3 = 2300

Number of ways of selecting 1 girl and 2 boys = 10C1 \* 15C2 = 1050

Required probability = 1050/2300 = 21/46

Ans 22 : Option c

Required Probability = 2/52 = 1/26

Ans 23 : Option d

Required Probability = 4C2/52C2 = 1/221.

Ans 24 : Option b

P(atleast one defective) = 1 – P(none is defective) = 1 – (16C2/20C2)

= 1 – 12/19 = 7/19

Ans 25 : Option c

Required Probability = 1/7 \* 2/9 = 2/63.

Ans 26 : Option a

Total number of ways of sitting 12 persons at round table = (12−1)!=11!

Since two persons will be always together, then number of persons = 10 + 1 = 11

So, 11 persons will be seated in (11−1)! = 10! ways at round table and 2 particular persons will be seated in 2! ways.

Number of ways in which two persons always sit together=10! \* 2!

Required Probability = 10! \* 2! / 11! = 2/11

Ans 27 : Option b

Required Sample Space = {(2,3), (2,6), (4,3), (4,6), (6,3), (6,6), (3,2), (6,2), (3,4), (6,4), (3,6)}

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Required probability = 11/36

Ans 28 : Option d

Required Probability = (4C1 \* 4C1 \* 4C1) / 52C3 = 16/5525

Ans 29 : Option d

Required Probability = 36/52 = 9/13

Ans 30 : Option d

Required probability = 1/2 \* 1/6 = 1/12