

## BOOST UP PDFS | Quantitative Aptitude | Probability (Hard Level Part-1)

Recommend for Bank, SSC, UPSC & All other Competitive Exams

We Exam Pundit Team, has made this "BOOST UP PDFS" Series to provide The Best Free PDF Study Materials on All Topics of Reasoning, Quantitative Aptitude & English Section. This Boost Up PDFs brings you questions in different level, Easy, Moderate & Hard, and also in New Pattern Questions. Each PDFs contains 50 Questions along with Explanation. For More PDF Visit: [pdf.exampundit.in](https://pdf.exampundit.in)

1. There are three events X,Y and Z, one of which must and only can happen. If the odds are 7:4 against X, 5:3 against Y, the odds against Z must be:

- a. 65/23
- b. 47/51
- c. 27/65
- d. 37/53
- e. None of these

Directions (2-3) Study the following information carefully and answer the given questions:

Box	Red	Pink	Black
1	4	6	5
2	5	5	5

2. Three balls are taken from either of the box, what is the probability of getting at least two pink colour balls?

- a. 53/182
- b. 52/183
- c. 57/182
- d. 51/182
- e. None of these

3. Three balls are taken from either of the box, what is the probability of getting at most two balls black colour?

- a. 87/91
- b. 88/91
- c. 7/90
- d. 89/91
- e. None of these

Direction (4-5) Read the following carefully and Answer the Questions.

Bag A contains 3 different color tiles.i.e, Yellow, white and brown. In that, there are 12 yellow tiles, 8 white tiles and X brown tiles. The probability of choosing Brown tiles  $\frac{2}{7}$ . In Another Bag B, it contains, 12 blue tiles and number of red tiles was equal to five more tiles than brown tiles in Bag A.

4. What is the probability of not choosing white color tiles in Bag A?

- a.  $\frac{2}{7}$
- b.  $\frac{3}{7}$
- c.  $\frac{5}{7}$
- d.  $\frac{1}{7}$
- e. None of these

## BOOST UP PDFS | Quantitative Aptitude | Probability (Hard Level Part-1)

Recommend for Bank, SSC, UPSC & All other Competitive Exams

**5. What is probability choosing 2 tiles from bag B, if both are same in color?**

- a.  $12/25$
- b.  $13/25$
- c.  $1/2$
- d.  $14/25$
- e. None of these

**Direction (6-8): Study the information carefully and answer the question asked below.**

A Gems packet contains 5 Red, 4 Blue and 6 Yellow gem stones.

**6. If two are picked randomly, then what is the probability that either two balls are Red or Yellow?**

- a.  $6/21$
- b.  $10/21$
- c.  $12/21$
- d.  $5/21$
- e. none of these

**7. If 3 chocolates ate by Varun. What is the probability that all the gemstones are in same color?**

- a.  $36/455$
- b.  $34/455$
- c.  $421/455$
- d.  $419/455$
- e. none of these

**8. If three gem stones are taken out at random, what is the probability that at least one is blue?**

- a.  $33/91$
- b.  $58/91$

c.  $55/91$

d.  $36/91$

e. None of these

**9. A three-digit number is chosen at random. What is the probability that all the digits are distinct, the digits at odd places are odd and the digits at even places are even?**

a.  $1/99$

b.  $1/9$

c.  $3/100$

d.  $2/99$

e. None of these

**10. If two dice are thrown then what is the probability that the sum of the faces of dice are prime?**

a.  $5/12$

b.  $1/2$

c.  $1/3$

d.  $7/12$

e. None of these

**11. In a class 15 boys and 12 girls. For a committee ,we need 7 members. What is the probability that they should contain at least 2 boys and one girl?**

a.  $2919 /2990$

b.  $89945/98570$

c.  $96327/98570$

d.  $98554/98570$

e. none of these

**Question (12-13): Study the information carefully and answer the question asked below.**

## BOOST UP PDFS | Quantitative Aptitude | Probability (Hard Level Part-1)

Recommend for Bank, SSC, UPSC & All other Competitive Exams

Three letters are written to three different persons and addresses on three envelop are also written without looking at the addresses.

**12. What is the probability that all the letters go to right address?**

- a.  $1/3$
- b.  $2/3$
- c.  $1/6$
- d.  $1/9$
- e. None of these

**13. What is the probability that none of the letter goes to right address?**

- a.  $5/6$
- b.  $1/3$
- c.  $2/3$
- d.  $1/6$
- e. None of these

**14. Nikesh forms a code for locker of two distinct digits selected from 0, 1, 2... 9 such that the first digit of the code is nonzero. The code, handwritten on a slip, can however potentially create confusion, when read upside down-for example, the code 81 may appear as 18. How many codes are there for which no such confusion can arise?**

- a. 80
- b. 78
- c. 71
- d. 69
- e. None of these

**15. How many arrangements of the letters of the word 'BENGALI' can be made? I. If the vowels are never come together II. If the vowels are to occupy only odd places**

- a. I.620 II.576
- b. I.576 II.720
- c. I.720 II.620
- d. I.4320 II.576
- e. I.840 II.576

**16. A question paper consists of 10 questions divided into two parts I and II. Each part contains five questions. A candidate is required to attempt six questions in all of which at least 2 should be from part I and at least 2 from part II. In how many ways can the candidate select the questions if he can answer all questions equally well?**

- a. 240
- b. 200
- c. 300
- d. 250
- e. 100

**17. The Indian Cricket team consists of 16 players. It includes 2 wicket keepers and 5 bowlers. In how many ways can a cricket team of eleven be selected if we have to select 1 wicket keeper and at least 4 bowlers?**

- a. 1090
- b. 1290
- c. 1200

## BOOST UP PDFS | Quantitative Aptitude | Probability (Hard Level Part-1)

Recommend for Bank, SSC, UPSC & All other Competitive Exams

- d. 1920
- e. 1092

**18. In a box there are 10 apples and  $\frac{2}{5}$ th of the apples are rotten. If three apples are taken out from the box, what will be the probability that at least one apple is rotten.**

- a.  $\frac{3}{4}$
- b.  $\frac{5}{6}$
- c.  $\frac{9}{10}$
- d.  $\frac{8}{13}$
- e.  $\frac{4}{7}$

**19. Find the probability that at least two of the tube lights that he buys work.**

- a.  $\frac{29}{30}$
- b.  $\frac{34}{35}$
- c.  $\frac{14}{15}$
- d.  $\frac{24}{25}$
- e. None of these

**20. Find the probability that all of Salman's tube lights work.**

- a.  $\frac{1}{15}$
- b.  $\frac{1}{25}$
- c.  $\frac{1}{30}$
- d.  $\frac{1}{35}$
- e. None of these

**21. A box contains slips with numbers from 1 to 50 written on them. A slip is drawn and replaced. Then another slip is drawn and after replacing another slip is drawn. What is the probability that an even**

**number appears on the first draw, an odd number on the second draw and a number divisible by 3 on the third draw?**

- a.  $\frac{1}{25}$
- b.  $\frac{2}{25}$
- c.  $\frac{8}{25}$
- d.  $\frac{4}{25}$
- e. None of the above

**Question (22-33): Study the information carefully and answer the question asked below.**

Five students are to be arranged on five chairs for a photograph. Three of these are girls and the rest are boys.

**22. Find out the total number of ways in which three girls are together.**

- a. 36
- b. 84
- c. 100
- d. 120
- e. None of these

**23. Find out the number of ways in which all three girls do not occupy consecutive seats.**

- a. 120
- b. 36
- c. 84
- d. 136
- e. None of these

**Directions (24-25): Kindly study the following information carefully and answer the question that follows:**

## BOOST UP PDFS | Quantitative Aptitude | Probability (Hard Level Part-1)

Recommend for Bank, SSC, UPSC & All other Competitive Exams

Using all the letters of the word LINEAR.

**24. How many words start with a vowel but end with a consonant?**

- a. 224
- b. 316
- c. 212
- d. 216
- e. None of these

**25. How many different words can be formed that start and end with vowel?**

- a. 126
- b. 108
- c. 144
- d. 216
- e. None of these

**26. A six letter word is to be formed by using at least two vowels in it. How many such words can be formed (not necessarily meaningful) if all the letters in word are different?**

- a. 53349120
- b. 53439120
- c. 53431920
- d. 54339120
- e. 53493120

**Directions (27-29): Study the following information carefully and answer the question that follows:**

A joker have 10 balls, 10 ribbon and 10 plates of red, yellow and blue color in ratio 2 : 3 : 5, 5 : 2 : 3 and 3 : 5 :

2 respectively. He does his performance by using one item of each category.

**27. What is the probability that he performs with only red color?**

- a. 0.3
- b. 0.02
- c. 0.25
- d. 0.03
- e. 0.15

**28. What is the probability that he chooses yellow color for ribbons?**

- a. 0.0333
- b. 0.025
- c. 0.2
- d. 0.25
- e. 0.03

**29. If he chooses 3 balls, 5 ribbons and 1 plate then find the probability that all items are of same color.**

- a. 1
- b. 0
- c. 0.05
- d. 0.5
- e. 0.002

**30. A man has 5 identical chocolate and 5 different size boxes. If he ties a ribbon of different color on each chocolate, then find the probability of putting a particular colored ribbon on a chocolate put in a particular box.**

- a.  $1/625$

## BOOST UP PDFS | Quantitative Aptitude | Probability (Hard Level Part-1)

Recommend for Bank, SSC, UPSC & All other Competitive Exams

- b.  $1/5$
- c.  $2/25$
- d.  $1/25$
- e.  $1/125$

**31. A Bag contains some White and Black Balls. The probability of picking two white balls one after other without replacement from that bag is  $14/33$ . Then what will be the probability of picking two Black balls from that Bag if bag can hold maximum 15 balls only?**

- a.  $11/32$
- b.  $14/33$
- c.  $7/33$
- d.  $1/11$
- e. Cannot be determined

**Direction (32-34): Study the following information carefully and answer the question that follows:**

**There is three bags A, B and C. In each bag there are three types of colored balls Yellow, Green and Black.**

In bag A, no. of yellow colored balls are  $y$  and no. of green colored balls are  $g$ . Number of green colored balls are 4 more than the number of yellow colored balls.

When one ball is picked at random then the probability of getting black color ball is  $5/13$ . The value of  $y$  is 18  $2/11\%$  less than  $g$ .

In bag B, number of yellow colored balls is  $200/9\%$  more than that of bag A. If two balls are picked at random

from bag B then the probability of getting both green color ball is  $4/37$ . Total number of balls in bag B is 75.

In bag C, the ratio of number of green colored balls and number of black colored balls is  $7 : 5$ . Total number of green and black colored balls is 36. If one ball is picked at random then the probability of getting one yellow ball is  $7/13$ .

**32. If  $x$  number of yellow balls from bag B are taken and placed into bag A and 20% of black balls from bag A are taken and placed into in bag B. If we pick one ball from bag B then the probability that the ball is of black color is  $11/26$ . Then find the value of  $x$ ?**

- a. 5
- b. 6
- c. 3
- d. 2
- e. None of these

**33. If one ball picked at random from each of the bag A and bag B then find the probability that both of the balls are of the same color?**

- a.  $21 \times 47 / 65 \times 75$
- b.  $22 \times 43 / 65 \times 75$
- c.  $11 \times 17 / 65 \times 75$
- d. Can't be determined
- e. None of these

**34. Difference between the number of green balls in bag A and bag C is how much percent more/less than**

## BOOST UP PDFS | Quantitative Aptitude | Probability (Hard Level Part-1)

Recommend for Bank, SSC, UPSC & All other Competitive Exams

the sum of the number of black balls in bag A and bag C together?

- a. 100%
- b. 95%
- c. 97.5%
- d. 102.5%
- e. None of these

35. If  $P(5, 2) = P(n, 2)$ , find n.

- a. 5
- b. - 4
- c. 1
- d. 3
- e. 4

36. How many four digit numbers greater than 5000 can be formed with the digits 4, 5, 7, 8, and 9?

- a. 96
- b. 210
- c. 216
- d. 310
- e. None of these

37. How many numbers of five digits may be formed with the digits 5, 0, 9, 0, and 6?

- a. 44
- b. 36
- c. 30
- d. 42
- e. None of these

38. In how many ways can 2 girls and 8 boys be seated in a row so that girls are always together?

- a. 788000
- b. 740320
- c. 730240
- d. 725760
- e. None of these

39. If the letters of the word PLAYERS be arranged at random, what is the probability that there are exactly five letters between P and S?

- a.  $\frac{7}{55}$
- b.  $\frac{6}{49}$
- c.  $\frac{8}{51}$
- d.  $\frac{1}{42}$
- e. None of these

40. In a group of artists, there are 10 dancers and 8 singers. If four artists are to be selected at random, what is the probability that 2 dancers and 2 singers are selected?

- a.  $\frac{7}{17}$
- b.  $\frac{2}{19}$
- c.  $\frac{1}{17}$
- d.  $\frac{2}{17}$
- e. None of these

**Directions (41 – 43): Study the following information carefully and answer the question that follows:**

A bag contains 6 red balls and 8 green balls. Two balls are drawn at random one after one with replacement.

What is the probability that-

41. Both the balls are green

- a.  $\frac{13}{49}$

## BOOST UP PDFS | Quantitative Aptitude | Probability (Hard Level Part-1)

Recommend for Bank, SSC, UPSC & All other Competitive Exams

- b. 15/49
- c. 16/49
- d. 17/49
- e. None of these

**42. First one is green and second one is red**

- a. 16/49
- b. 14/49
- c. 11/49
- d. 12/49
- e. None of these

**43. Both the balls are red**

- a. 14/49
- b. 9/49
- c. 11/49
- d. 12/49
- e. None of these

**Directions (44 – 45): Study the following information carefully and answer the question that follows:**

**A box contains 6 red, 4 blue, 2 green and 4 yellow pens.**

**44. Two pens are picked at random, what is the probability that one is blue and one is yellow?**

- a. 3/19
- b. 2/11
- c. 4/15
- d. 2/15
- e. None of these

**45. If four pens are picked at random, what is the probability that one is green, two are blue and one is red?**

- a. 13/248
- b. 18/455
- c. 14/335
- d. 12/545
- e. None of these

**Directions (46 – 48): Study the following information carefully and answer the question that follows:**

A person has 140 colored cups in four colors. The number of red cup is eight times the number of green cups. For every blue cup there are three yellow cups. The number of green color cup is 4. The number of each of them is a positive integer number.

**46. How many Blue cups are there?**

- a. 18
- b. 26
- c. 31
- d. 29
- e. 15

**47. What will be the number of red cups if the number of blue cup replaced by green cup is one-third of the average of initial number of green cup and blue cup?**

- a. 58
- b. 66
- c. 70
- d. 72

## BOOST UP PDFS | Quantitative Aptitude | Probability (Hard Level Part-1)

Recommend for Bank, SSC, UPSC & All other Competitive Exams

e. 76

**48. By what percentage is the number of yellow cup more than number of red cup?**

- a. 118.66%
- b. 155.66%
- c. 162.89%
- d. 121.26%
- e. 143.75%

**49. If the digits of a 2 digit number are interchanged then original number is greater than four times the new number so obtained. How many such natural numbers are there? Assume that '0' cannot be at the unit place of the number.**

- a. 3
- b. 4

c. 5

d. 6

e. None of these

**50. In bag A, there are 2 Black balls, 3 Red balls & 5 green balls. In bag B, there are 6 red balls, 5 black balls & x green balls. Two balls are drawn from both bags. The probability of getting 2 green balls from bag A is  $\frac{52}{315}$  more than that from bag B. What is x?**

- a. 3
- b. 4
- c. 5
- d. 6
- e. None of these

### Answer Key with Detailed Solution

**1. A**

According to the question,

$$P(X')/P(X)=7/4$$

$$P(X')=7/11$$

$$P(X)=4/11$$

$$P(Y')/P(Y)=5/3$$

$$P(Y')=5/8, P(Y)=3/8$$

Now, out of X, Y and Z, one and only one can happen.

$$P(X)+P(Y)+P(Z)=1$$

$$4/11+3/8+P(Z)=1$$

$$P(Z)=1-4/11-3/8$$

$$=88-32-33/88$$

$$=23/88$$

$$P(Z')=1-P(Z)$$

$$=1-23/88$$

$$=65/88$$

So odd against z

$$P(z')/p(z)=65/23$$

**2. A**

## BOOST UP PDFS | Quantitative Aptitude | Probability (Hard Level Part-1)

Recommend for Bank, SSC, UPSC & All other Competitive Exams

$$\begin{aligned} \text{Required probability} &= \frac{1}{2} (6c^2 \cdot 9c + 6c^3) / 15c^3 + \frac{1}{2} \\ &= \frac{1}{2} \cdot \frac{1}{15c^3} (155 + 110) = \frac{53}{182} \end{aligned}$$

### 3. D

$$\begin{aligned} \text{Required probability} &= \frac{1}{2} \\ &= \frac{(5c^2 \cdot 10c + 5c \cdot 10c^2 + 10c^3) / 15c^3 + (5c^2 \cdot 10c + 5c \cdot 10c^2 + 10c^3) / 15c^3}{2} \\ &= \frac{445}{455} = \frac{89}{91} \end{aligned}$$

### 4. C

First we have to find the no. of brown tiles,

$$\frac{2}{7} = \frac{X}{12+8+X}$$

$$2 \cdot (20+X) = 7X$$

$$40+2X = 7X$$

$$5X = 40$$

$$X = 8$$

Probability of choosing white color tiles,

$$= \frac{8}{8+8+12}$$

$$= \frac{2}{7}$$

$$\text{Not Choosing} = 1 - \left(\frac{2}{7}\right) = \frac{5}{7}$$

### 5. A

$$\text{Red tiles} = X+5 = 8+5 = 13$$

$$\text{Blue tiles} = 12$$

$$\text{Total probability} = {}^{13}C_2 + {}^{12}C_2$$

$$= \frac{(13 \cdot 12)}{2} + \frac{(12 \cdot 11)}{2}$$

$$= [78 + 66] = 144$$

$$\text{No. of probability} = {}^{25}C_2$$

$$= \frac{(25 \cdot 24)}{2}$$

$$= 25 \cdot 12 = 300$$

$$\text{Probability} = \frac{144}{300} = \frac{12}{25}$$

### 6. D

$$\text{All are Red} = {}^5C_2 = \frac{(5 \cdot 4)}{2} = 10$$

$$\text{All are Yellow} = {}^6C_2 = \frac{(6 \cdot 5)}{2} = 15$$

$$\text{Total probability} = {}^{15}C_2 = \frac{(15 \cdot 14)}{2} = 105$$

$$\text{Either all are Red or all are yellow} = \frac{10}{105} + \frac{15}{105}$$

$$= \frac{25}{105} = \frac{5}{21}$$

### 7. B

$$\text{All are in blue} = {}^4C_3 = \frac{(4 \cdot 3 \cdot 2)}{2 \cdot 3} = 4$$

$$\text{All are in Red} = {}^5C_3 = \frac{(5 \cdot 4 \cdot 3)}{2 \cdot 3} = 10$$

$$\text{All are in Yellow} = {}^6C_3 = \frac{(6 \cdot 5 \cdot 4)}{2 \cdot 3} = 20$$

$$\text{Total probability} = {}^{15}C_3 = \frac{(15 \cdot 14 \cdot 13)}{3 \cdot 2 \cdot 1} = 455$$

$$\text{Possible probability} = \frac{4}{455} + \frac{10}{455} + \frac{20}{455}$$

$$= \frac{34}{455}$$

### 8. B

$$\begin{aligned} \text{Possible probability} &= ({}^4C_1 \cdot {}^{11}C_2) + ({}^4C_2 \cdot {}^{11}C_1) + \\ &+ ({}^4C_3 \cdot {}^{11}C_0) \end{aligned}$$

$$= 220 + 66 + 4$$

$$= 290$$

$$\text{Total probability} = {}^{15}C_3 = \frac{(15 \cdot 14 \cdot 13)}{3 \cdot 2 \cdot 1} = 455$$

$$\text{Possible probability} = \frac{290}{455} = \frac{58}{91}$$

Another Method:

Probability at least one is blue = 1 - Probability of None is blue

$$\text{Probability of None is blue} = \frac{{}^{11}C_3}{{}^{15}C_3}$$

$$\Rightarrow \frac{11 \cdot 10 \cdot 9}{15 \cdot 14 \cdot 13}$$

$$\Rightarrow \frac{33}{91}$$

Probability at least one is blue = 1 - Probability of None is blue

$$\Rightarrow 1 - \left(\frac{33}{91}\right)$$

## BOOST UP PDFS | Quantitative Aptitude | Probability (Hard Level Part-1)

Recommend for Bank, SSC, UPSC & All other Competitive Exams

=>58/91

### 9.B

Odd digits =1, 3,5,7,9

Even Digits =0, 2,4,6,8

Since,

Odd number= odd position; Even number = Even Position

Favorite ways =  $5P_2$  and  $5P_1 = 5 \times 4 \times 5 = 100$

Total three digit numbers that can be formed =  $9 \times 10 \times 10 = 900$

Total Probability =  $100/900 = 1/9$ .

### 10. A

The sum may be 2,3,5,7, 11

2 can be obtained in 1 way = (1, 1)

3 can be obtained in 2 ways = (1,2) , (2,1)

5 can be obtained in 4 ways= (1,4),(2,3),(3,2),(4,1)

7 can be obtained in 6 ways =

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

11 can be obtained in 2ways = (5,6),(6,5)

So total favorable ways =  $1+2+4+6+2=15$

Total outcomes ==  $6^2=36$

$P(E) = 15/36=5/12$

### 11. A

Probability of choosing 2 boys and 1 girl =  $(15C_2 * 12C_5) + (15C_3 * 12C_4) + (15C_4 * 12C_3) + (15C_5 * 12C_2) + (15C_6 * 12C_1)$

Total probability =  $27C_7$

Probability =  $83160 + 225225 + 300300 + 198198 + 60060 = 866943$

Total probability = 888030

### 12. C

	A	B	C
E1	1	2	3
E2	1	3	2
E3	2	1	3
E4	2	3	1
E5	3	1	2
E6	3	2	1

There are 6 combination of letters put into the envelop,  $n(s)= 6$

. Answer: c)

All the letters put into right envelop is only in E1.

Hence, required probability=  $1/6$

### 13. B

None of the letters put into right envelop is E4 and E5

Hence, required probability=  $2/6 = 1/3$

### 14. C

The available digits are 0, 1, 2 ...9

The first digit can be chosen in 9 ways (0 not acceptable); the second digit can be accepted in 9 ways (digits repetition not allowed)

Thus, the code can be made in  $9 \times 9 = 81$  ways

Now there are only 4 digits 1, 6, 8, 9 which can create confusion

Hence, the total number of codes which create confusion are =  $4 \times 3 = 12$

Out of these 12 codes 69 and 96 will not create confusion

## BOOST UP PDFS | Quantitative Aptitude | Probability (Hard Level Part-1)

Recommend for Bank, SSC, UPSC & All other Competitive Exams

Hence, in total  $12 - 2 = 10$  codes will create confusion

Hence, the total codes without confusion are  $81 - 10 = 71$

### 15.D

There are 7 letters in the word 'Bengali'; of these 3 are vowels and 4 consonants.

I. Considering vowels a, e, i as one letter, we can arrange letters in  $5!$  ways in each of which vowels are together.

These 3 vowels can be arranged among themselves in  $3!$  ways

Total number of words =  $5! \times 3! = 120 \times 6 = 720$

Vowels never together =  $7! - 720 = 4320$

II. There are 4 odd places and 3 even places. 3 vowels can occupy 4 odd places in  $4P3$  ways and 4 constants can be arranged in  $4P4$  ways

Number of words =  $4P3 \times 4P4 = 24 \times 24 = 576$

### 16.B

The candidate has to select six questions in all of which at least two should be from Part I and two should be from Part II. He can select questions in any of the following ways

	(i)	(ii)	(iii)
Part I	2	3	4
Part II	4	3	2

If the candidate follows choice (i), the number of ways in which he can do so is =  $5C2 \times 5C4$

=  $10 \times 5 = 50$

If the candidate follows choice (ii), the number of ways in which he can do so is =  $5C3 \times 5C3$

=  $10 \times 10 = 100$

Similarly, if the candidate follows choice (iii), then the number of ways in which he can do so is =  $5C4 \times 5C2 =$

50

Therefore, the candidate can select the question in  $50 + 100 + 50 = 200$  ways

### 17.E

We are to choose 11 players including 1 wicket keeper and 4 bowlers or 1 wicket keeper and 5 bowlers.

Number of ways of selecting 1 wicket keeper, 4 bowlers and 6 other players =  $2C1 \times 5C4 \times 9C6$

=  $2 \times 5 \times 84 = 840$

Number of ways of selecting 1 wicket keeper, 5 bowlers and 5 other players =  $2C1 \times 5C5 \times 9C5$

=  $2 \times 1 \times 126 = 252$

Total number of ways of selecting the team =  $840 + 252 = 1092$

### 18.B

Let rotten apples =  $10 \times \frac{2}{5} = 4$ , others = 6

If 1 apple is rotten + 2 apples are other

=  $4C1 \times 6C2 = 60$

If 2 apples are rotten + 1 apple is other

=  $4C2 \times 6C1 = 36$

If 3 apples are rotten

=  $4C3 = 4$

## BOOST UP PDFS | Quantitative Aptitude | Probability (Hard Level Part-1)

Recommend for Bank, SSC, UPSC & All other Competitive Exams

Total outcomes =  $10C3 = 120$

$$\text{Probability} = \frac{60 + 36 + 4}{120}$$

$$= \frac{100}{120} = \frac{5}{6}$$

### 19. A

Following the common explanation, we get

Probability that at least two of Salman's tube lights work

$$= \frac{29}{30}$$

Common Explanation:

$$n(S) = 10C4 = 210$$

7 of the 10 lamps are not defective.

∴ If T is the event that all of Salman's tube lights work,

$$n(T) = 7C4 = 35$$

∴ Probability that all of Salman's tube lights work

$$= \frac{35}{210} = \frac{1}{6}$$

We need the probability that at least two of his tube lights work.

The event that less than two of his tube lights work, and the event that at least two of his tube lights work, are exhaustive.

So, we calculate the probability that less than two of his tube lights work and subtract it from 1.

The probability that none of Salman's tube lights work = 0 as there are only 3 defective tube-lights and he buys 4.

If K is the probability that only one of Salman's tube lights works,

$$n(K) = 7C1 \times 3C3 = 7$$

∴ Probability that less than two of Salman's tube lights work

$$= \frac{7}{210} = \frac{1}{30}$$

∴ Probability that at least two of Salman's tube lights work

$$= 1 - \frac{1}{30} = \frac{29}{30}$$

### 20. E

Following the common explanation, we get

Probability that all of Salman's tube lights work

$$= \frac{1}{6}$$

### 21. B

The probability of an even number appearing on the first draw is  $1/2$  (since there are 25 even numbers in counting of 1 to 50).

The probability of an odd number appearing on the second draw is  $1/2$  (since there are 25 odd numbers in counting of 1 to 50).

## BOOST UP PDFS | Quantitative Aptitude | Probability (Hard Level Part-1)

Recommend for Bank, SSC, UPSC & All other Competitive Exams

The probability of a number divisible by 3 appearing on the third draw is  $\frac{16}{50}$  ( since there are 16 numbers that are divisible by 3 while counting from 1 to 50.)

Since all these events have no relation with each other and no dependence either, and the slips are replaced, we can directly multiply the individual probabilities to get the resultant probability.

So, the probability of all the events taking place is

$$\frac{1}{2} \times \frac{1}{2} \times \frac{16}{50} = \frac{2}{25}$$

### 22. A

**Common Explanation:** As per the question, three girls can't occupy consecutive seats but two can.

Therefore, if we find the number of ways in which all three girls occupy consecutive seats and subtract this number from the total number of ways in which the five people can be arranged among themselves, we will get the required answer.

5 students can be arranged among themselves in  $5P5$  ways = 120 ways.

Assume that the 3 girls are one entity. The total number of ways in which they can be arranged among themselves =  $3! = 6$

Also, the set of three girls and the other students can be arranged among themselves in  $3! = 6$  ways.

Thus, total number of ways in which three girls are together =  $6 \times 6 = 36$

Thus, number of ways in which all 3 girls will not occupy consecutive seats =  $120 - 36 = 84$

As per the common explanation, we get

Total number of ways in which three girls are together =  $6 \times 6 = 36$

Hence, option A is correct.

### 23. C

Following the common explanation, we get

Thus, number of ways in which all 3 girls will not occupy consecutive seats =  $120 - 36 = 84$

### 24.D

Following the common explanation, we get

The number of words that start with a vowel but end with a consonant =  $9 \times 24 = 216$ .

Hence, option D is correct.

**Common Explanation:**

The word LINEAR has three vowels - I, E and A. If a word starts and ends with a vowel, the two letters to occupy the first and the last positions can be selected and arranged in  $3P2 = 6$  ways.

The remaining 4 letters can be arranged among themselves in  $4P4 = 4! = 24$  ways.

$\therefore$  The number of words that start and end with a vowel =  $24 \times 6 = 144$ .

If a word starts with a vowel but ends with a consonant, its first letter can be selected from I, E and A in 3 ways.

Its last letter can be selected from L, N and R in 3 ways.

The remaining three letters can be arranged in  $4!$  ways.

## BOOST UP PDFS | Quantitative Aptitude | Probability (Hard Level Part-1)

Recommend for Bank, SSC, UPSC & All other Competitive Exams

∴ The number of words that start with a vowel but end with a consonant =  $3 \times 3 \times 4! = 9 \times 24 = 216$ .

Using all the letters of the word LINEAR.

### 25. C

Following the common explanation, we get

The number of words that start and end with a vowel = 144.

Hence, option C is correct.

Common Explanation:

The word LINEAR has three vowels - I, E and A. If a word starts and ends with a vowel, the two letters to occupy the first and the last positions can be selected and arranged in  $3P2 = 6$  ways.

The remaining 4 letters can be arranged among themselves in  $4P4 = 4! = 24$  ways.

∴ The number of words that start and end with a vowel =  $24 \times 6 = 144$ .

If a word starts with a vowel but ends with a consonant, its first letter can be selected from I, E and A in 3 ways.

Its last letter can be selected from L, N and R in 3 ways.

The remaining three letters can be arranged in 4! ways.

∴ The number of words that start with a vowel but end with a consonant =  $3 \times 3 \times 4! = 9 \times 24 = 216$ .

### 26. B

Six letter words with at least two vowels can have 2, 3, 4 or 5 vowels as no letters can be repeated.

There are 21 consonants and 5 vowels.

All possible cases:

2 vowels and 4 consonants

3 vowels and 3 consonants

4 vowels and 2 consonants

5 vowels and 1 consonant

∴ Number of ways in which this can be done =  $5C2 \times 21C4 + 5C3 \times 21C3 + 5C4 \times 21C2 + 5C5 \times 21C1$   
 $= 10 \times 5985 + 10 \times 1330 + 5 \times 210 + 1 \times 21 = 74221$

In each of these cases, chosen 6 letters can arrange themselves in 6! Ways.

∴ Total number of ways in which this can be done =  $6! \times 74221 = 720 \times 74221 = 53439120$

### 27. D

Balls = 10	Ribbon = 10	Plates = 10
Red = 2	Red = 5	Red = 3
Yellow = 3	Yellow = 2	Yellow = 5
Blue = 5	Blue = 3	Blue = 2

Performance with only red color

One ball of red color, one ribbon of red color and one plate of red color

Required Probability =  $\frac{2}{10} \times \frac{5}{10} \times \frac{3}{10} = \frac{3}{100} = 0.03$

### 28. C

Balls = 10	Ribbon = 10	Plates = 10
Red = 2	Red = 5	Red = 3
Yellow = 3	Yellow = 2	Yellow = 5
Blue = 5	Blue = 3	Blue = 2

Condition is yellow color for ribbon while plate and ball can be of any color so, probability of choosing ball and plate is 1 while probability of choosing one yellow color ribbon is

## BOOST UP PDFS | Quantitative Aptitude | Probability (Hard Level Part-1)

Recommend for Bank, SSC, UPSC & All other Competitive Exams

$$= \frac{2}{10} = 0.2$$

29. B

Balls = 10	Ribbon = 10	Plates = 10
Red = 2	Red = 5	Red = 3
Yellow = 3	Yellow = 2	Yellow = 5
Blue = 5	Blue = 3	Blue = 2

Now

Joker choose → 3 balls, 5 Ribbon and 1 plate  
Condition → all are of some color  
⇒ 5 ribbons of same color is only of red color  
But, 3 red ball cannot be possible so  
Required Probability = 0

30.D

As chocolate are identical so their no. does not affect the probability  
Now, probability of choosing a colored ribbon =  $\frac{1}{5}$   
Probability of choosing a box =  $\frac{1}{5}$   
Combined probability =  $\frac{1}{5} \times \frac{1}{5} = \frac{1}{25}$

31. D

$$Wc^2 / (B+W)c^2 = 14/33$$

$$W(W-1)/(W+B)*(B+W-1) = 14/33$$

Now expressing 14/33 in the above format by multiplying 4 in numerator and denominator

$$W(W-1)/(W+B)*(B+W-1) = 8*7/12*11 \text{ (note = balls <15)}$$

$$W = 8$$

$$W+B = 12 \quad B = 4$$

$$\text{Probability} = 4c^2/12c^2 = 1/11$$

32. D

After replacement →

$$\text{Yellow no of balls in beg B} = 22 - x$$

$$\text{Black no. of balls in beg B} = 28 + 5 = 33$$

$$\text{Green no. of balls in bag B} = 25$$

$$\text{Then, } \frac{33}{22-x+33+25} = \frac{11}{26}$$

$$\frac{33}{80-x} = \frac{11}{26}$$

$$78 = 80 - x$$

$$x = 2$$

33.E

$$\begin{aligned} \text{Required probability} &= \frac{18}{65} \times \frac{22}{75} + \frac{22}{65} \times \frac{25}{75} + \frac{25}{65} \times \frac{28}{75} \\ &= \frac{1646}{65 \times 75} \end{aligned}$$

34. C

$$\begin{aligned} \text{Required \%} &= \frac{40-1}{40} \times 100 \\ &= \frac{39}{40} \times 100 \\ &= 97.5\% \end{aligned}$$

35.A

Sol. Given that  $P(5, 2) = P(n, 2)$

$$\Rightarrow \frac{5!}{(5-2)!} = \frac{n!}{(n-2)!} \Rightarrow \frac{5!}{6!} = \frac{n(n-1)(n-2)!}{(n-2)!}$$

$$\Rightarrow 20 = n(n-1) \Rightarrow (n^2 - n - 20) = 0$$

$$(n-5)(n+4) = 0$$

$$n = 5$$

36.C

For 4 digit numbers greater than 5000, at thousands' place, only 5, 7, 8 & 9 can be placed and remaining 4 digits can be placed in at remaining three places.

$$4P_1 * 4P_3 = 4 \times 4 \times 3 \times 2 = 96$$

## BOOST UP PDFS | Quantitative Aptitude | Probability (Hard Level Part-1)

Recommend for Bank, SSC, UPSC & All other Competitive Exams

All 5 digit numbers would be greater than 5000,  
therefore, no. of ways =  $5! = 5 \times 4 \times 3 \times 2 = 120$

$\therefore$  Required number =  $96 + 120 = 216$

**37. B**

${}^3P_1$  ways and remaining 4 digits  $4!/2!$  (as 0 occurs twice)  
ways

${}^3P_1 \times 4!/2! = (3 \times 4 \times 3 \times 2!)/2! = 36$  ways

**38. D**

Required number of ways =  $2! \times 9! = 2 \times 362880 = 725760$

**39.D**

$S = 7! = 7 \times 5 \times 4 \times 3 \times 2 \times 1 = 5040$

Let E= event of getting exactly five letters between P and S

$n(E) = 5! = 120$

$\therefore P(E) = (n(E))/n(S) = (120)/5040 = 1/42$

**40. A**

Total number of artists =  $10 + 8 = 18$

Let S be the sample space. Then,

$n(S) =$  number of ways selecting 4 artists out of 18 =  
 ${}^{18}C_4 = (18 \times 17 \times 16 \times 15)/(3 \times 2 \times 1) = 3060$

Let E= event of selecting 2 dancers and 2 singers

$n(E) = {}^{10}C_2 \times {}^8C_2 = (10 \times 9)/(2 \times 1) \times (8 \times 7)/(2 \times 1) = 45 \times 28 = 1260$

$\therefore P(E) = n(E)/n(S) = 1260/3060 = 7/17$

**41.C**

**Sol.**

Required Probability =  $\frac{8}{14} \times \frac{8}{14} = \frac{64}{14 \times 14} = \frac{16}{49}$

**42.D**

**Sol.**

Required Probability =  $\frac{8}{14} \times \frac{6}{14} = \frac{12}{49}$

**43. B**

**Sol.**

Required Probability =  $\frac{6}{14} \times \frac{6}{14} = \frac{9}{49}$

**44.D**

Total number of pens =  $6 + 4 + 2 + 4 = 16$

Let S be the sample space. Then,

$n(S) =$  number of ways of drawing 2 pens out of 16 =  
 ${}^{16}C_2 = (16 \times 15)/(2 \times 1) = 120$

Let E= event of drawing two pens so that one is blue and one is yellow

$n(E) = {}^4C_1 \times {}^4C_1 = 4 \times 4 = 16$

$\therefore P(E) = (n(E))/n(S) = 16/120 = 2/15$

**45. B**

Total number of pens =  $6 + 4 + 2 + 4 = 16$

Let S be the sample space. Then,

$n(S) =$  number of ways of drawing 4 pens out of 16 =  
 ${}^{16}C_4 = (16 \times 15 \times 14 \times 13)/(4 \times 3 \times 2 \times 1) = 1820$

Let E= event of drawing 4 pens so that one is green, two are blue and one is red =  $n(E) = {}^2C_1 \times {}^4C_2 \times {}^6C_1 = 2 \times 6 \times 6 = 72$

$\therefore P(E) = (n(E))/n(S) = 72/1820 = 18/455$

**46.B**

Let number of Green cup = G and Number of Blue Cup = B

Red = 8G

## BOOST UP PDFS | Quantitative Aptitude | Probability (Hard Level Part-1)

Recommend for Bank, SSC, UPSC & All other Competitive Exams

Blue: Yellow = 1:3  $\Rightarrow$  Yellow = 3B

Also Red + Green + Blue + Yellow = 140

$$\Rightarrow 8G + G + 3B + B = 140$$

$$\Rightarrow B = (140 - 9G)/4 \text{ ----- (i)}$$

We have for  $G=4$

$$B = (140 - 9 \times 4)/4 = 26$$

**47. D**

$$\text{Average} = (4 + 26)/2 = 15$$

$$\text{Total green cup} = 4 + 15/3 = 9$$

$$R = 8G = 8 \times 9 = 72$$

**48. E**

Number of yellow cup = 3B

$$B = 26$$

$$\text{Hence number of yellow cup} = 3 \times 26 = 78$$

$$\text{Number of red cup} = 8 \times 4 = 32$$

$$\text{Required more \%} = (78 - 32) \times 100/32 = 143.75\%$$

**49. A**

Let original number be  $10a+b$

$$\text{So } 10a+b > 4(10b+a)$$

$$10a+b > 40b+4a$$

$$6a > 39b$$

If  $b = 1$  then  $6a > 39$  or  $a \geq 7$  so possible numbers are 71, 81 & 91.

If  $b = 2$  then  $6a > 78$  or  $a > 13$  which is not possible as  $a$  is a single digit number. Hence possible numbers are only 3.

**50. B**

Probability of getting 2 green balls from bag A =  $\frac{5c^2}{10c^2} = \frac{2}{9}$

Probability of getting 2 green balls from bag B =  $\frac{xc^2}{(x+11)c^2} = \frac{x(x-1)}{(x+11)(x+10)}$

Now ATQ,

$$\frac{x(x-1)}{(x+11)(x+10)} = \frac{2}{9} - \frac{52}{315}$$

$$\frac{x(x-1)}{(x+11)(x+10)} = \frac{18}{315} = \frac{2}{35} \text{ --- (1)}$$

Now putting all the options one by one in equation (1), we will check

When  $x = 4$ ,

$$\frac{4(4-1)}{(4+11)(4+10)} = \frac{12}{210} = \frac{2}{35} \text{ which satisfy the equation.}$$