

Aptitude Practice

Probability

Introduction

① formula

$$\text{Probability} = \frac{\text{Sum of observation}}{\text{Possibility}}$$

② Add / OR
 $\frac{x}{+}$

③ Balls ① ② ③ * Target to pick ② balls out of ③ balls

$$\left. \begin{matrix} 1-2 \\ 2-3 \\ 3-1 \end{matrix} \right\} 3 \text{ possible} \quad \textcircled{6} \quad 3C_2 = \frac{3 \times 2}{1 \times 2} = 3 \text{ possible}$$

$$\textcircled{4} \quad {}^1C_1 \Leftrightarrow {}^1C_2 \quad \quad \quad {}^6C_4 \Leftrightarrow {}^6C_2$$

Problem Based on Coins

① One coin: $\{H, T\} = 2 \quad \textcircled{6} \quad 2^1 = 2$

② Two coin: $\{HH, HT, TH, TT\} = 4 \quad \textcircled{6} \quad 2^2 = 4$

③ Three coin: $\{HHH, TTT, HHT, TTH, HTH, THT, THH, HTT\} = 8 \quad \textcircled{6} \quad 2^3 = 8$

④ In a simultaneous toss of 2 coins then find the probability of 2 tails?

→ Two coins: $2^2 = 4 \quad \textcircled{6} \quad \{HH, TH, HT, TT\}$

$$\text{Probability} = \frac{\text{Sum of observation}}{\text{possibility}}$$

$$= \frac{1}{4}$$

② In a simultaneous toss of 2 coins, then find the probability of exactly 1 tail.

→ Two coins: {HH, HT, TH, TT} $\Leftrightarrow 2^2 = 4$

$$\text{Probability} = \frac{2}{4} = \frac{1}{2}$$

③ In a simultaneous toss of 2 coins, then find the probability of no tail.

→ Two coins: {HH, TH, HT, TT} $\Leftrightarrow 2^2 = 4$

$$\text{Probability} = \frac{1}{4}$$

④ 3 coins are tossed. Find the probability of all one heads.

→ Three coins tossed = $2^3 = 8$

$$\text{Probability} = \frac{1}{8}$$

$$\{\text{HHH}, \text{TTT}, \text{HHT}, \text{THH}, \text{HTH}, \text{THT}, \text{THH}, \text{HTT}\} = 8$$

⑤ 3 coins are tossed. Find the probability of exactly 2 heads.

→ Three coins tossed = $2^3 = 8$

$$\text{Probability} = \frac{3}{8}$$

$$\{\text{HHH}, \text{TTT}, \text{HHT}, \text{THH}, \text{HTH}, \text{THT}, \text{THH}, \text{HTT}\} = 8$$

⑥ 3 coins are tossed. Find the probability of at least 2 heads.

→ Three coins tossed = $2^3 = 8$

$$\text{Probability} = \frac{4}{8} = \frac{1}{2}$$

$$\{\text{HHH}, \text{TTT}, \text{HHT}, \text{THH}, \text{HTH}, \text{THT}, \text{THH}, \text{HTT}\} = 8$$

⑦ 3 coins are tossed. Find the probability of no heads

$$\rightarrow \text{Three coins tossed} = 2^3 = 8$$

{HHH, TTT,
HHT, TTH,
HTH, THT,
THH, HTT} = 8

Probability = $\frac{1}{8}$

⑧ 3 coins are tossed. Find the probability of at least 1 head and 1 tail.

$$\rightarrow \text{Three coins tossed} = 2^3 = 8$$

{HHH, TTT,
HHT, TTH,
HTH, THT,
THH, HTT} = 8

Probability = $\frac{6}{8} = \frac{3}{4}$

⑨ 4 coins are tossed once. Find the Probability of exactly 3 tails

$$\rightarrow \text{Four coins tossed} = 2^4 = 16$$

{HHHH, TTTT
HHHT, TTTH
HHTH, TTHT
HTHH, THTT
THHH, HTTT
HHTT, THHT
HTTH, THTH
TTHH, HTHT} = 16

Probability = $\frac{4}{16} = \frac{1}{4}$

⑩ 4 coins are tossed once. Find the probability by of atleast 1 tail.

$$\rightarrow \text{Probability} = \frac{15}{16}$$

{HHHH, TTTT
HHHT, TTTH
HHTH, TTHT
HTHH, THTT
THHH, HTTT
HHTT, THHT
HTTH, THTH
TTHH, HTHT} = 16

* atleast.

↳ min - Max

1 tail ⊕ 2 tail ⊕

3 tail ⊕ 4 tail)

Problems Based on Dice



1 Dice : $\{(1, 2, 3, 4, 5, 6)\} = 6 \quad \text{⊗} \quad 6^1 = 6$

2 Dice : $\{(1,1) (1,2) (1,3) (1,4) (1,5) (1,6)$
 $(2,1) (2,2) (2,3) (2,4) (2,5) (2,6)$
 $(3,1) (3,2) (3,3) (3,4) (3,5) (3,6)$
 $(4,1) (4,2) (4,3) (4,4) (4,5) (4,6)$
 $(5,1) (5,2) (5,3) (5,4) (5,5) (5,6)$
 $(6,1) (6,2) (6,3) (6,4) (6,5) (6,6)\} \Rightarrow 36 \quad \text{⊗}$

$$6^2 = 36$$

① In a single throw of 2 dice, find the probability of getting a total of 3 ⊗ 5

$$\rightarrow \text{Probability} = \frac{6}{36} = \frac{1}{6}$$

$\{(1,1) (1,2) (1,3) (1,4) (1,5) (1,6)$
 $(2,1) (2,2) (2,3) (2,4) (2,5) (2,6)$
 $(3,1) (3,2) (3,3) (3,4) (3,5) (3,6)$
 $(4,1) (4,2) (4,3) (4,4) (4,5) (4,6)$
 $(5,1) (5,2) (5,3) (5,4) (5,5) (5,6)$
 $(6,1) (6,2) (6,3) (6,4) (6,5) (6,6)\}$

② In a single throw of 2 dice, find the probability of getting a total of 12

$$\rightarrow \text{Probability} = \frac{1}{36}$$

$\{(1,1) (1,2) (1,3) (1,4) (1,5) (1,6)$
 $(2,1) (2,2) (2,3) (2,4) (2,5) (2,6)$
 $(3,1) (3,2) (3,3) (3,4) (3,5) (3,6)$
 $(4,1) (4,2) (4,3) (4,4) (4,5) (4,6)$
 $(5,1) (5,2) (5,3) (5,4) (5,5) (5,6)$
 $(6,1) (6,2) (6,3) (6,4) (6,5) (6,6)\}$

③ In a single throw of 2 dice, find the probability of getting a total of 11

$$\rightarrow \text{Probability} = \frac{2}{36} = \frac{1}{18}$$

$\{(1,1) (1,2) (1,3) (1,4) (1,5) (1,6)$
 $(2,1) (2,2) (2,3) (2,4) (2,5) (2,6)$
 $(3,1) (3,2) (3,3) (3,4) (3,5) (3,6)$
 $(4,1) (4,2) (4,3) (4,4) (4,5) (4,6)$
 $(5,1) (5,2) (5,3) (5,4) (5,5) (5,6)$
 $(6,1) (6,2) (6,3) (6,4) (6,5) (6,6)\}$

④ In a single throw of 2 dice, what is the probability of a doublet?

→ both dice show same number

$$\text{Probability} = \frac{6}{36} = \frac{1}{6}$$

$\{(1,1) (1,2) (1,3) (1,4) (1,5) (1,6)$
 $(2,1) (2,2) (2,3) (2,4) (2,5) (2,6)$
 $(3,1) (3,2) (3,3) (3,4) (3,5) (3,6)$
 $(4,1) (4,2) (4,3) (4,4) (4,5) (4,6)$
 $(5,1) (5,2) (5,3) (5,4) (5,5) (5,6)$
 $(6,1) (6,2) (6,3) (6,4) (6,5) (6,6)\}$

⑤ In a single throw of 3 dice, then find the probability of getting a total of 5

$$\rightarrow 1 \text{ dice throw} \rightarrow 6^1 = 6$$

$$2 \text{ dice throw} \rightarrow 6^2 = 36$$

$$3 \text{ dice throw} \rightarrow 6^3 = 216$$

$$\text{Probability} = \frac{6}{216} = \frac{1}{36}$$

Problems Based on Cards

Pack of 52 cards

26 Black, 26 red

4 Shapes

① Diamond (13 cards)

② Heart (13 cards)

③ Club (13 cards)

④ Spade (13 cards)

Ace(A), Jack, Queen, King → face cards

16 face cards ← 4×4

① one card is drawn at random from the well shuffled pack of 52 cards. What is the probability of picking a black card?

$$\rightarrow \text{Probability} = \frac{26}{52}$$

$$= \frac{1}{2}$$

26 → Black

26 → red

② one card is drawn at random from the well shuffled pack of 52 cards. What is the probability of picking of Ace of spades or The Jack of Diamonds?

$$\rightarrow \text{Probability} = \frac{1+1}{52} = \frac{2}{52} = \frac{1}{26}$$

③ One card is drawn at random from the well shuffled pack of 52 cards. What is the probability that the card is either a red card or a king?

$$\rightarrow \text{Probability} = \frac{26+2}{52}$$
$$= \frac{28}{52}$$
$$= \frac{7}{13}$$

red \rightarrow 26
all King \rightarrow 4
Black King \rightarrow 2 \leftarrow bcz already we pick 2 King in red

④ One card is drawn at random from the well shuffled pack of 52 cards. What is the probability of picking an ace?

$$\rightarrow \text{Probability} = \frac{4}{52} = \frac{1}{13}$$

4 \rightarrow ace

⑤ One card is drawn at random from the well shuffled pack of 52 cards. What is the probability of picking a club?

$$\rightarrow \text{Probability} = \frac{13}{52} = \frac{1}{4}$$

⑥ One card is drawn at random from the well shuffled pack of 52 cards. What is the probability of picking a red Queen?

$$\rightarrow \text{Probability} = \frac{2}{52} = \frac{1}{26}$$

Diamond \rightarrow 1 Queen

Heart \rightarrow 1 Queen

⑦ One card is drawn at random from the well shuffled pack of 52 cards. What is the probability that the card is either a King or a Spade?

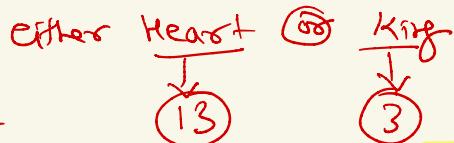
$$\rightarrow \text{Probability} = \frac{3+13}{52} = \frac{16}{52}$$
$$= \frac{4}{13}$$

either a King \otimes Spade
↓
③
↓
13
↳ bcz ① included in spade

⑧ One card is drawn at random from the well shuffled pack of 52 cards. What is the probability that the card is either a Heart or a King?

$$\rightarrow \text{Probability} = \frac{13+3}{52} = \frac{16}{52}$$

$$= \frac{4}{13}$$



bcz one in Heart

Two Color Balls

① A Bag contains 6 Red balls and 4 Yellow balls. Four balls are picked at random what is the probability that 3 are red and one is yellow?

$$\rightarrow (1 \text{ Bag}) \left. \begin{matrix} 6 \text{ Red} \\ 4 \text{ Yellow} \end{matrix} \right\} \text{Balls} \quad \text{Probability} = \frac{\text{Sum of observation}}{\text{Possibility}}$$

and → X
or → +

② A Bag contains 6 Red balls and 4 Yellow balls. Three balls are picked at random what is the probability that 1 is red?

$$\rightarrow (1 \text{ Bag}) \left. \begin{matrix} 6 \text{ Red}, 4 \text{ yellow} \end{matrix} \right.$$

$$\frac{6 C_1 \times 4 C_2}{10 C_3}$$

$$= \frac{6 \times \frac{4^2 \times 3}{1 \times 2}}{\frac{10 \times 9^3 \times 8}{1 \times 2 \times 3}} = \frac{3}{10}$$

$$= \frac{\frac{3}{10} \times 3}{10 \times 9 \times 8} = \frac{3}{10}$$

$$= \frac{6 C_3 \times 4 C_1}{10 C_4}$$

$$= \frac{\frac{6 \times 5 \times 4}{1 \times 2 \times 3} \times 4}{\frac{10 \times 9^3 \times 8}{1 \times 2 \times 3 \times 4}} = \frac{8}{21}$$

$$= \frac{6 \times 4^2 \times 4}{2 \times 1 \times 3 \times 7} = \frac{8}{21}$$

③ A Bag containing 6 Red balls and 4 Yellow balls. Two balls are picked at random what is the probability that either 2 are red or 2 are yellow?

→ (1 Bag) 6 Red, 4 Yellow
either two are red or 2 are yellow

$$= \frac{6C_2 + 4C_2}{10C_2}$$

$$= \frac{\frac{3}{1} \times \frac{5}{2} + \frac{4}{1} \times \frac{3}{2}}{\frac{5}{1} \times \frac{9}{2}} = \frac{15+6}{45} = \frac{21}{45} = \frac{7}{15}$$

④ A Bag containing 6 Red balls and 4 Yellow balls. Three balls are picked at random what is the probability that none is red?

→ (1 Bag) 6 Red, 4 Yellow

* none is red
↳ don't pick any red color balls

$$= \frac{4C_3}{10C_3} = \frac{4 \times 3 \times 2}{10 \times 9 \times 8} = \frac{1}{15}$$

$$= \frac{1}{\frac{10 \times 9 \times 8}{3}}$$

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

⑤ A Bag contains 6 Red balls and 4 yellow balls. Four balls are picked at random. What is the probability atleast one is red?

→ (1 Bag) 6 Red, 4 Yellow

atleast → min - max

$$\min \underset{\text{Red}}{1} + 2(\text{red}) + 3(\text{red}) + 4(\text{red})$$

$$\frac{(6C_1 \times 4C_3) + (6C_2 \times 4C_2) + (6C_3 \times 4C_1) + 6C_4}{10C_4}$$

$$\textcircled{2} \quad 6C_4 \Leftrightarrow 6C_2 = \frac{6 \times 5}{1 \times 2}$$

$$= (6 \times 4) + (15 \times 6) + \left(\frac{6 \times 5 \times 3}{1 \times 2 \times 3} \times 9 \right) + \frac{6 \times 5}{1 \times 2}$$

$$\frac{10 \times 9 \times 8 \times 7}{1 \times 2 \times 3 \times 4}$$

$$= \frac{24 + 90 + 80 + 15}{210} = \boxed{\frac{209}{210}}$$

⑥ A Bag contains 6 Red balls and 4 yellow balls. Three balls are picked at random. What is the probability atleast 2 are red?

→ (1 Bag) 6 Red, 4 Yellow

$$\frac{(6C_2 \times 4C_1) + (6C_1 \times 4C_2) + 6C_3}{10C_3}$$

atleast → min - max

atmost → Max - min + none
max (2) red + (1 red) + yellow

$$= \frac{(15 \times 4) + (6 \times 6) + 4}{10 \times 9 \times 8 \times 7} = \frac{60 + 36 + 4}{120}$$

$$= \frac{108}{120} = \boxed{\frac{5}{6}}$$

7 A bag contains 6 Red balls and 4 Yellow balls. Four balls are picked at random. What is the probability that 3 are red and 1 is yellow or 2 are red and two are yellow?

\rightarrow (1 Bag) 6 Red, 4 Yellow

$$(3 \text{ red} \times 1 \text{ yellow}) + (2 \text{ red} \times 2 \text{ yellow})$$

$$\frac{(6C_3 \times 4C_1) + (6C_2 \times 4C_2)}{10C_4}$$

$$= \frac{\left(\frac{6 \times 5 \times 4}{1 \times 2 \times 3} \times 4 \right) + \left(\frac{6 \times 5}{1 \times 2} \times \frac{4 \times 3}{1 \times 2} \right)}{\frac{10 \times 9 \times 8 \times 7}{1 \times 2 \times 3 \times 4}} = \frac{80 + 90}{210} = \frac{170}{210}$$

Three Color Balls

① A Bag containing 6 Red balls and 4 Yellow balls and 2 Green balls. Four balls are picked at random what is the probability that two are red, one is yellow and one is green?

\rightarrow (1 Bag) 6 Red, 4 Yellow, 2 Green

② A Bag containing 6 Red balls and 4 Yellow balls and 2 Green balls. Four balls are picked at random what is the probability that two are red?

\rightarrow (1 Bag) 6 Red, 4 Yellow, 2 Green

$$= \frac{6C_2 \times 4C_1 \times 2C_1}{12C_4}$$

$$= \frac{\frac{6 \times 5}{1 \times 2} \times 4 \times 2}{\frac{12 \times 11 \times 10 \times 9}{1 \times 2 \times 3 \times 4}} = \frac{120}{11 \times 10 \times 9} = \frac{8}{33}$$

$$= \frac{6C_2 \times 6C_2}{12C_4}$$

$$= \frac{\frac{6 \times 5}{1 \times 2} \times \frac{6 \times 5}{1 \times 2}}{\frac{12 \times 11 \times 10 \times 9}{1 \times 2 \times 3 \times 4}} = \frac{30 \times 30}{11 \times 10 \times 9} = \frac{5}{11}$$

③ A Bag contains 6 Red balls and 4 Yellow balls and 2 Green balls. Five balls are picked at random what is the probability none is yellow?

→ (1 Bag) 6 red, 4 yellow, 2 green

$$= \frac{8C_5}{12C_5} = \frac{\cancel{8} \times \cancel{7} \times \cancel{6} \times \cancel{5} \times \cancel{4}}{\cancel{12} \times \cancel{11} \times \cancel{10} \times \cancel{9} \times \cancel{8}} = \frac{7}{99}$$

④ A Bag contains 6 Red balls and 4 Yellow balls and 2 Green balls. Two balls are picked at random what is the probability

- (i) either both are red or both are green ← green ✓, red ✓
- (ii) neither red nor green ← red ✗, green ✗

$$(i) \frac{2C_2 + 6C_2}{12C_2}$$

$$= \frac{1+15}{\cancel{12} \times \cancel{11}} = \frac{16}{\cancel{12} \times \cancel{11}} = \frac{8}{33}$$

$$(ii) \frac{4C_2}{12C_2}$$

$$= \frac{\cancel{4} \times 3}{\cancel{12} \times \cancel{11}} = \frac{1}{11}$$

6 red ✓
4 yellow ✓
2 green ✗

⑤ A Bag contains 6 Red balls and 4 Yellow balls and 2 Green balls. Three balls are picked at random what is the probability that atleast one is red?

→ (1 Bag) 6 red, 4 yellow, 2 green

atleast = min - max

min 1 red or 2 red or 3 red

$$= \frac{(6C_1 \times 6C_2) + (6C_2 \times 6C_1) + 6C_3}{12C_3}$$

$$= \frac{(6 \times 15) + (15 \times 6) + \cancel{6 \times 5 \times 4}}{\cancel{2 \times 11 \times 10} \times \cancel{3 \times 2 \times 1}} = \frac{90 + 90 + 20}{220} = \frac{200}{220} = \frac{10}{11}$$

⑥ A Bag contains 6 Red balls and 4 yellow balls and 2 green balls. Three balls are picked at random what is the probability that **atmost** two are yellow?

→ (1 Bag)

$$\begin{aligned}
 & \hookrightarrow \text{max - min + None} \\
 & = \text{max } (2) \text{ or } 1(\text{yellow}) \text{ or } 0(\text{yellow}) \\
 & \text{Red } 1 \text{ yellow } 1, 2 \text{ green} = \frac{(4C_2 \times 8C_1) + (4C_1 \times 8C_2) + 8C_3}{12C_3} \\
 & = \frac{(48) + (4 \times 28) + \frac{8 \times 7 \times 6}{1 \times 2 \times 3}}{2 \frac{12 \times 11 \times 10}{1 \times 2 \times 3}} \\
 & = \frac{48 + 112 + 56}{220} = \frac{216}{220} = \frac{54}{55}
 \end{aligned}$$

⑦ A Bag contains 6 Red balls and 4 yellow balls and 2 green balls. Three balls are picked at random what is the probability 2 are red and 1 is green or 1 is yellow and 2 are green.

→ 1(Bag) 6 Red, 4 yellow, 2 green

2 red and 1 green or 1 yellow and 2 green

$$= \frac{(6C_2 \times 2C_1) + (4C_1 \times 2C_2)}{12C_3}$$

$$\begin{aligned}
 & = \frac{(15 \times 2) + (4)}{\frac{2 \cancel{12} \times 11 \times 10}{1 \times 2 \times 3}} = \frac{\frac{17}{34}}{\frac{220}{110}} = \frac{17}{110}
 \end{aligned}$$

Memory Bagged

① A bag containing 7 blue balls and 5 yellow balls. If two are selected at random, what is the probability that none is yellow?

$$\rightarrow \text{probability} = \frac{7C_2}{12C_2} = \frac{\frac{7 \times 6}{1 \times 2}}{\frac{12 \times 11}{1 \times 2}} = \frac{7 \times 6}{12 \times 11} = \frac{7}{22}$$

② There are 8 brown balls, 4 orange balls and 5 black balls in a bag. Five balls are chosen at random. What is the probability of there being 2 brown balls, 1 orange ball and 2 black balls?

$$\rightarrow \frac{8C_2 \times 4C_1 \times 5C_2}{17C_5} = \frac{\frac{8 \times 7}{1 \times 2} \times 4 \times \frac{5 \times 4}{1 \times 2}^2}{\frac{17 \times 16 \times 15 \times 14 \times 13}{1 \times 2 \times 3 \times 4 \times 5}} = \frac{4 \times \frac{7}{2} \times 4 \times \frac{5}{2} \times 2}{17 \times 16 \times 15 \times 13} = \frac{40}{221}$$

③ A bag contains 13 white and 7 black balls. Two balls are drawn at random. What is the probability that they are of the same colour?

\rightarrow either both are black or both are white

$$\frac{13C_2 + 7C_2}{20C_2} = \frac{\frac{13 \times 12}{1 \times 2} + \frac{7 \times 6}{1 \times 2}^3}{\frac{10 \times 9 \times 8 \times 7}{1 \times 2}} = \frac{78 + 21}{190} = \frac{99}{190}$$

④ A bag contains 3 red and 4 green marbles. If three marbles are picked at random, what is the probability that two are green and one is red?

$$\rightarrow \frac{4C_2 \times 3C_1}{7C_3} = \frac{\cancel{4 \times 3}^2 \times 3}{\cancel{7 \times 2} \cancel{8 \times 5}} = \frac{2 \times 3 \times 3}{7 \times 5} = \frac{18}{35}$$

⑤ A bag contains 9 red, 7 white and 4 black balls. If two balls are drawn at random, find the probability that both the balls are red.

$$\rightarrow \frac{9C_2}{20C_2} = \frac{\cancel{9 \times 8}^2}{\cancel{5 \times 20} \cancel{19}} = \frac{18}{95}$$

⑥ A bag contains 2 red, 3 green and 2 blue balls. 2 balls are to be drawn randomly, what is the probability that the balls drawn contain no blue ball?

$$\rightarrow \frac{5C_2}{7C_2} = \frac{\cancel{5 \times 4}^2}{\cancel{2 \times 5} \cancel{3}} = \frac{10}{21}$$

⑦ A box containing 4 black balls, 3 red balls and 5 green balls. 2 balls are drawn from the box at random. What is the probability that both the balls are of the same colour?

→ either both black or both red or both green

$$\frac{4C_2 + 3C_2 + 5C_2}{12C_2} = \frac{\cancel{4 \times 3}^2 + \cancel{3 \times 2} + \cancel{5 \times 4}^2}{\cancel{6 \times 2 \times 11}} = \frac{6+3+10}{66} = \frac{19}{66}$$

⑧ Out of 5 girls and 3 boys, 4 children are to be randomly selected for a quiz contest. What is the probability that all are girls?

$$\rightarrow \frac{5C_4}{8C_4} = \frac{5 \times 4 \times 3 \times 2}{\cancel{1 \times 2 \times 3 \times 4} \times \cancel{1 \times 8 \times 7 \times 6 \times 5}} = \frac{1}{14}$$

⑨ A Bag containing 3 Red balls and 6 Blue balls and 2 Green balls and 4 Yellow balls. If two balls are picked at random, what is the probability that both are green?

→ 3 Red, 6 Blue, 2 Green, 4 Yellow

$$\frac{2C_2}{15C_2} = \frac{1}{\cancel{15} \times \cancel{14} \times \cancel{13}} = \frac{1}{105}$$

⑩ A Bag containing 3 Red balls and 6 Blue balls and 2 Green balls and 4 Yellow balls. If three balls are picked at random, what is the probability that two are blue and one is yellow?

→ 3 Red, 6 Blue, 2 Green, 4 Yellow

$$\frac{6C_2 \times 4C_1}{15C_3} = \frac{\cancel{3} \times \cancel{5} \times 4}{\cancel{1} \times \cancel{2} \times \cancel{5} \times \cancel{4} \times \cancel{3}} = \frac{3 \times 5 \times 4}{\cancel{5} \times \cancel{4} \times \cancel{3} \times 13} = \frac{12}{91}$$

11) A Bag containing 3 Red balls and 6 Blue balls and 2 Green Balls and 4 Yellow Balls are picked at random, what is the probability that atleast one is yellow?

→ 3 Red, 6 Blue, 2 green, 4 yellow

atleast

\hookrightarrow min(1) yellow \textcircled{or} 2 yellow \textcircled{or} 3 yellow \textcircled{or} 4 yellow

$$\frac{(4C_1 \times 11C_3) + (4C_2 \times 11C_2) + (4C_3 \times 11C_1) + (4C_4)}{15C_4}$$

$$= \left(4 \times 11 \times \frac{15}{1} \times \frac{3}{2} \right) + (6 \times 55) + (4 \times 11) + 1$$

$$\frac{15 \times 7 \times 13 \times 12}{1 \times 2 \times 3 \times 4}$$

$$= \frac{660 + 330 + 45}{15 \times 7 \times 13} = \frac{\cancel{1035}}{\cancel{15} \times \cancel{7} \times \cancel{13}} = \frac{69}{91}$$

(12) A Bag contains 3 Red balls and 6 Blue balls and 2 Green balls and 4 Yellow balls. If two balls are picked at random, what is the probability that either both are red or both are green?

→ 3 Red, 6 Blue, 2 Green, 4 Yellow

either (2) red or 1 green

$$\frac{3C_2 + 2C_2}{15C_2} = \frac{4}{\frac{15 \times 14}{1 \times 2}} = \frac{4}{105}$$

(13) A Bag contains 3 Red balls and 6 Blue balls and 2 Green balls and 4 Yellow balls. If four balls are picked at random, what is the probability that one is green, two are blue and one is red?

→ 3 Red, 6 Blue, 2 Green, 4 Yellow

$$\frac{6C_2 \times 2C_1 \times 3C_1}{15C_4}$$

$$= \frac{\frac{15 \times 2 \times 3}{15 \times 14 \times 13 \times 12}}{1 \times 2 \times 3 \times 4} = \frac{6}{91}$$