

RD Sharma
Solutions
Class 11 Maths
Chapter 17
Ex 17.2

Combinations Ex 17.2 Q1

No of players = 15

No of players to be selected = 11

Number of combinations

$$= {}^{15}C_{11}$$

$$= \frac{15!}{11! 4!} = \frac{15 \times 14 \times 13 \times 12}{4 \times 3 \times 2}$$

$$= 1365 \text{ ways}$$

Combinations Ex 17.2 Q2

Total boy = 25

Total girls = 10

Party of 8 to be made from 25 boy and 10 girls, selecting 5 boy and 3 girls

$$\Rightarrow {}^{25}C_5 \text{ and } {}^{10}C_3$$

$$= {}^{25}C_5 \times {}^{10}C_3$$

$$\text{Now, } {}^{25}C_5 = \frac{n!}{r!(n-r)!}$$

$$\Rightarrow \frac{25!}{5! 20!} \times \frac{10!}{3! 7!} = \frac{25 \times 24 \times 23 \times 22 \times 21 \times 10 \times 9 \times 8}{5 \times 4 \times 3 \times 2 \times 3 \times 2}$$

$$= 6375600$$

Combinations Ex 17.2 Q3

Out of 9 courses 2 are compulsory. So students can choose from 7 courses only. Also out of 5 courses that students need to choose, 2 are compulsory.

So they have to choose 3 courses out of 7 courses. This can be done ${}^7C_3 = 35$ ways.

Combinations Ex 17.2 Q4

No of players = 16

No of players to be selected = 11

∴ No of combination = ${}^{16}C_{11}$

$$= \frac{16!}{11! 5!} = \frac{16 \times 15 \times 14 \times 13 \times 12}{5 \times 4 \times 3 \times 2} = 4368$$

(i) Include 2 particular players

→ Now we have to select 9 more out of remaining 14

∴ Required number of ways

$$= {}^{14}C_9$$

$$= \frac{14!}{9! 5!} = \frac{14 \times 13 \times 12 \times 11 \times 10}{5 \times 4 \times 3 \times 2}$$

$$= 2002$$

(ii) Exclude 2 particular players → now we have to select 11 players out of 14 players

$$= {}^{14}C_{11} = \frac{14!}{11! 3!} = \frac{14 \times 13 \times 12}{3 \times 2}$$

$$= 364$$

Total number of professor = 10

Total number of student = 20

Committee of 2 professor and 3 student can be selected in ${}^{10}C_2 \times {}^{20}C_3$ ways.

$$= \frac{10!}{2! 8!} \times \frac{20!}{3! 17!}$$

$$= \frac{10 \times 9}{2} \times \frac{20 \times 19 \times 18}{3 \times 2}$$

$$= 51300 \text{ ways}$$

(i) a particular professor is included

\therefore committee is ${}^9C_1 \times {}^{20}C_3$

$$= \frac{9!}{8!} \times \frac{20!}{3! \times 17!} = \frac{9 \times 20 \times 19 \times 18}{3 \times 2}$$

$$= 10260$$

(ii) a particular student is included

\therefore committee is ${}^{10}C_2 \times {}^{19}C_2$

$$= \frac{10!}{2 \times 8!} \times \frac{19!}{2! \times 17!} = \frac{10 \times 9 \times 19 \times 18}{2 \times 2 \times 1} = 7695$$

(iii) a particular student is excluded \rightarrow now total student are 19

\therefore committee is ${}^{10}C_2 \times {}^{19}C_3$

$$= \frac{10!}{2 \times 8!} \times \frac{19!}{3! \times 16!} = \frac{10 \times 9 \times 19 \times 18 \times 17}{2 \times 3 \times 2} = 43605$$

Combinations Ex 17.2 Q6

The we can multiplying 2 or 3 or 4 digits.

Then number of ways of multiplying 4 digits at a time

$$= {}^4C_4 \dots \dots \dots \text{(i)}$$

The number of ways of multiplying 3 digits at a time

$$= {}^4C_3 \dots \dots \dots \text{(ii)}$$

The number of ways of multiplying 2 digits at a time

$$= {}^4C_2 \dots \dots \dots \text{(iii)}$$

\therefore Total number of ways

$$= {}^4C_4 + {}^4C_2 + {}^4C_3$$

$$\Rightarrow = 1 + \frac{4 \times 3}{2} + 4$$

$$\Rightarrow = 11$$

= There are 11 ways

Combinations Ex 17.2 Q7

Total number of boys = 12
 Total number of girls = 10
 Total number of girls for the competition
 = $10 + 2 = 12$

Total students chosen for competition
 = $10 - 2$ (at least 4 boys and 4 girls)

∴ Selection can be made in

$$\begin{aligned}
 & {}^{12}C_4 \times {}^8C_4 + {}^{12}C_5 \times {}^8C_3 + {}^{12}C_6 \times {}^8C_2 \\
 &= \frac{12!}{4! 8!} \times \frac{8!}{4! 4!} + \frac{12!}{5! 7!} \times \frac{8!}{3! 5!} + \frac{12!}{6! 6!} \times \frac{8!}{2! 6!} \\
 &= \left(\frac{12 \times 11 \times 10 \times 9 \times 8 \times 7 \times 6 \times 5}{4 \times 3 \times 2 \times 4 \times 3 \times 2} \right) + \left(\frac{12 \times 11 \times 10 \times 9 \times 8 \times 8 \times 7 \times 6}{5 \times 4 \times 3 \times 2 \times 3 \times 2} \right) + \left(\frac{12 \times 11 \times 10 \times 9 \times 8 \times 7 \times 8 \times 7}{6 \times 5 \times 4 \times 3 \times 2 \times 2} \right) \\
 &= 55440 + 44352 + 181104 \\
 &= 280896
 \end{aligned}$$

∴ Total number of ways = $385770 - 280896 = 104874$
 (385770 = from 10 girls 4 are chosen)

Combinations Ex 17.2 Q8

Total number of books = 10
 total books to be selected = 4

(i) there is no restriction

$$\begin{aligned}
 &= {}^{10}C_4 = \frac{10!}{4! 6!} = \frac{10 \times 9 \times 8 \times 7}{4 \times 3 \times 2} \\
 &= 210
 \end{aligned}$$

(ii) two particular books are always selected

these the total books = $10 - 2 = 8$

So out of remaining 8 books selection of 2 books can be done in 8C_2 way

$$= \frac{8!}{2! 6!} = \frac{8 \times 7}{2 \times 1} = 28 \text{ ways}$$

(iii) two particular books are never selected

these the total number of books = $10 - 2 = 8$

so out of remaining 8 books, 4 books can be selected in 8C_4 way

$$\begin{aligned}
 &= \frac{8!}{4! 4!} = \frac{8 \times 7 \times 6 \times 5}{4 \times 3 \times 2} \\
 &= 14 \times 5 \\
 &= 70 \text{ ways}
 \end{aligned}$$

Combinations Ex 17.2 Q9

Total number of officer = 4
 Total number of jawans = 8
 Total number of selection to be made = 6

(i) to include exactly one officer

This can be done is ${}^4C_1 \times {}^8C_5$ ways

$$= \frac{4!}{1! 3!} \times \frac{8!}{5! 3!}$$

$$= \frac{4 \times 8 \times 7 \times 6}{3 \times 2} = 224 \text{ ways}$$

(ii) to include at least one officer

This can be done is following ways

$${}^4C_1 \times {}^8C_5 + {}^4C_2 \times {}^8C_4 + {}^4C_3 \times {}^8C_3 + {}^4C_4 \times {}^8C_2$$

$$= \frac{4 \times 8!}{5! 3!} + \frac{4!}{2! 2!} \times \frac{8!}{4! 4!} + \frac{4!}{3! 1!} \times \frac{8!}{3! 5!} + \frac{1 \times 8!}{2! 6!}$$

$$= \left(\frac{4 \times 8 \times 7 \times 6}{3 \times 2} \right) + \left(\frac{4 \times 3 \times 8 \times 7 \times 6 \times 5}{2 \times 4 \times 3 \times 2} \right) + \left(\frac{4 \times 8 \times 7 \times 6}{3 \times 2} \right) + \left(\frac{8 \times 7}{2 \times 1} \right)$$

$$= (4 \times 8 \times 7) + (4 \times 3 \times 7 \times 5) + (4 \times 8 \times 7) + (4 \times 7)$$

$$= 224 + 420 + 224 + 28$$

$$= 896 \text{ ways}$$

Combinations Ex 17.2 Q10

Total number of students is XI = 20
 Total number of students is XII = 20

Total number of students to be selected is c team = 11
 (at least 5 from XI and 5 from XII)
 this can be done is following ways

$${}^{20}C_5 \times {}^{20}C_6 + {}^{20}C_6 \times {}^{20}C_5$$

$$= 2 \left({}^{20}C_6 \times {}^{20}C_5 \right)$$

$$= 2 \left(\frac{20!}{6! 14!} \times \frac{20!}{5! 15!} \right)$$

or
$$= \frac{2 \times 20 \times 19 \times 18 \times 17 \times 16 \times 15 \times 20 \times 19 \times 18 \times 17 \times 16}{6 \times 5 \times 4 \times 3 \times 2 \times 5 \times 4 \times 3 \times 2 \times 1}$$

$$= 19 \times 17 \times 16 \times 15 \times 2 \times 19 \times 3 \times 17 \times 8$$

$$= 120 1870080 \text{ ways}$$

Combinations Ex 17.2 Q11

Total number of questions = 10

Question in part A = 6

Question in part B = 7

Selecting to questions with at least 4 from each part A and part B.
can from done in following way.

$$\begin{aligned} & {}^6C_4 \times {}^7C_6 + {}^6C_5 \times {}^7C_5 + {}^6C_6 \times {}^7C_4 \\ &= \left(\frac{6!}{4!2!} \times \frac{7!}{6!1!} \right) + \left(\frac{6!}{5!1!} \times \frac{7!}{5!2!} \right) + \left(\frac{1 \times 7!}{4!3!} \right) \quad \left(\because {}^nC_r = \frac{n!}{r!(n-r)!} \right) \\ &= \left(\frac{6 \times 5 \times 7}{2} \right) + \left(\frac{6 \times 7 \times 6}{2} \right) + \left(\frac{7 \times 6 \times 5}{3 \times 2} \right) \\ &= (105) + (126) + (35) \\ &= 266 \text{ ways} \end{aligned}$$

Combinations Ex 17.2 Q12

Total number of question = 5

Total number of question to be answered = 4

Given that 1 and 2 question are compulsory, the number of ways in which a student can choose the questions will follow the following way.

Total question = 5 - 2 = 3

Out of 3 remaining questions a student has to select any 2 for answering

$$\Rightarrow {}^3C_2 = 3 \text{ ways}$$

Combinations Ex 17.2 Q13

Total number of questions = 12

Total number of questions to be answered = 7

Each group has 6 questions (6 + 6) more than 5 question from either group is not permitted, therefore the number of ways a student can choose questions can be done in following ways.

$$\begin{aligned} & {}^6C_2 \times {}^6C_5 + {}^6C_4 \times {}^6C_4 + {}^6C_4 \times {}^6C_3 + {}^6C_5 \times {}^6C_2 \\ &= 2 \left({}^6C_2 \times {}^6C_5 + {}^6C_3 \times {}^6C_4 \right) \\ &= 2 \left(\frac{6!}{2!4!} \times \frac{6!}{5!1!} + \frac{6!}{3!3!} \times \frac{6!}{4!2!} \right) \\ &= 2 \left(\frac{6 \times 5 \times 6}{2} + \frac{6 \times 5 \times 4 \times 6 \times 5}{3 \times 2 \times 2} \right) \\ &= \frac{2 \times 6 \times 5 \times 6}{2} \left(1 + \frac{20}{6} \right) \\ &= 180 \left(\frac{26}{6} \right) \\ &= 30 \times 26 = 780 \\ &= 780 \text{ ways} \end{aligned}$$

Combinations Ex 17.2 Q14

Number of point = 10

Number of collinear points = 4

Since 4 out of 10 points are collinear, so the number of liner will be $({}^4C_2 - 1)$ lie from ${}^{10}C_2$
(one is subtracted from 4C_2 to count for the line on which 4 collinear points lie)

$$\therefore \text{ number of liner} = {}^{10}C_2 - ({}^4C_2 - 1)$$

$$= {}^{10}C_2 - {}^4C_2 + 1$$

$$= \frac{10!}{2! 8!} - \frac{4!}{2! 2!} + 1$$

$$= \frac{10 \times 9}{2} - \frac{4 \times 3}{2} + 1$$

$$= 45 - 6 + 1$$

$$= 40$$

Combinations Ex 17.2 Q15

(i) hexagon \rightarrow A hexagon has 6 angular points. By joining any two angular points we get a line which is either a side or a diagonal.

$$\therefore \text{ Number of lines} = {}^6C_2 = \frac{6!}{2! 4!}$$

$$= \frac{6 \times 5}{2} = 15$$

Number of sides = 6

$$\therefore \text{ Number of diagonals} = 15 - 6 = 9$$

(ii) Polygon of 16 sides will have 16 angular points. By joining any 2 points we get a line which is either a side or a diagonal.

$$\therefore \text{ number of lines} = {}^{16}C_2 = \frac{16!}{2! 14!}$$

$$= \frac{16 \times 15}{2} = 120$$

$$\Rightarrow \text{ number of sides} = 16$$

$$\therefore \text{ number of diagonals} = 120 - 16 = 104$$

Combinations Ex 17.2 Q16

Since 5 out of 12 points are collinear, so the number of triangles will be 5C_3 less from ${}^{12}C_3$

$$\begin{aligned} &= {}^{12}C_3 - {}^5C_3 \\ &= \frac{12!}{3!9!} - \frac{5!}{3!2!} \\ &= \frac{12 \times 11 \times 10}{3 \times 2} - \frac{5 \times 4}{2} \\ &= 220 - 10 \\ &= 210 \end{aligned}$$

Combinations Ex 17.2 Q17

Total men = 6

Total women = 4

Total persons in committee = 5

(where at least one woman has to be selected)

This can be done in

$$\begin{aligned} &{}^4C_1 \times {}^6C_4 + {}^4C_2 \times {}^6C_3 + {}^4C_3 \times {}^6C_2 + {}^4C_4 \times {}^6C_1 \\ &\left({}^nC_r = \frac{n!}{r!(n-r)!} \right) \left({}^nC_r = 1, {}^nC_1 = n \right) \\ &= \left(\frac{4 \times 6!}{4! \times 2!} \right) + \left(\frac{4!}{2!2!} \times \frac{6!}{3!3!} \right) + \left(\frac{4!}{3!1!} \times \frac{6!}{2!4!} \right) + (1 \times 6) \\ &= \left(\frac{4 \times 6 \times 5}{2} \right) + \left(\frac{4 \times 3}{2} \times \frac{6 \times 5 \times 4}{3 \times 2} \right) + \left(\frac{4 \times 6 \times 5}{2} \right) + (6) \\ &= (60) + (120) + 60 + 6 \\ &= 246 \text{ ways} \end{aligned}$$

Combinations Ex 17.2 Q18

52 families have at most 2 children, while 35 families have 2 children.

The selection of 20 families of which at least 18 families must have at most 2 children can be made as under

- 18 families out of 52 and 2 families out of 35
- 19 families out of 52 and 1 family out of 35
- 20 families out of 52

Therefore the number of ways are $= {}^{52}C_{18} \times {}^{35}C_2 + {}^{52}C_{19} \times {}^{35}C_1 + {}^{52}C_{20} \times {}^{35}C_0$

Combinations Ex 17.2 Q19

i) Since, the team does not include any girl therefore, only boys are to be selected.
5 boys out of 7 boys can be selected in 7C_5 ways.

$$= {}^7C_5 = \frac{7!}{5!2!} = \frac{6 \times 7}{2} = 21$$

ii) Since, at least one boy and one girl are to be there in every team. The team consist of

- a) 1 boy and 4 girls i.e. ${}^7C_1 \times {}^4C_4$
- b) 2 boys and 3 girls i.e. ${}^7C_2 \times {}^4C_3$
- c) 3 boys and 2 girls i.e. ${}^7C_3 \times {}^4C_2$
- d) 4 boys and 1 girls i.e. ${}^7C_4 \times {}^4C_1$

∴ The required number of ways

$$= {}^7C_1 \times {}^4C_4 + {}^7C_2 \times {}^4C_3 + {}^7C_3 \times {}^4C_2 + {}^7C_4 \times {}^4C_1$$

$$= 7 + 84 + 210 + 140$$

$$= 441$$

iii) Since, the team has to consist of at least 3 girls, the team can consist of

- a) 3 girls and 2 boys = ${}^7C_2 \times {}^4C_3$ ways
- b) 4 girls and 1 boy = ${}^4C_4 \times {}^7C_1$, ways

∴ The required number of ways

$$= {}^4C_3 \times {}^7C_2 + {}^4C_4 \times {}^7C_1$$

$$= 84 + 7$$

$$= 91$$

Combinations Ex 17.2 Q20

The number of ways selecting of 3 people out of 5

$$= {}^5C_3 = \frac{5!}{3!2!} = \frac{5 \times 4}{2} = 10.$$

1 man can be selected from 2 men in 2C_1 ways and 2 women can be selected from 3 women in 3C_2 ways.

∴ The required number of committees

$$= {}^2C_1 \times {}^3C_2$$

$$= \frac{2!}{1!1!} \times \frac{3!}{2!1!}$$

$$= 6$$

Combinations Ex 17.2 Q21

A decagon has 10 sides

By joining any two angular points

we get a line which is either a side or a diagonal

$$\therefore \text{number of lines} = {}^{10}C_2 = \frac{10!}{2! 8!} = \frac{10 \times 9}{2} = 45$$

$$\therefore \text{number of sides} = 10$$

$$\therefore \text{number of diagonals} = 45 - 10 = 35$$

Also, by joining 3 angular points a triangle is formed

$$= {}^{10}C_3$$

$$= \frac{10!}{3! 7!} = \frac{10 \times 9 \times 8}{3 \times 2} = \frac{720}{6} = 120$$

$$= 120$$

Combinations Ex 17.2 Q33

There are 18 points in a plane out of which 5 points are collinear.

Then number of straight lines joining these points are

$$\Rightarrow {}^nC_2 - ({}^pC_2 - 1)$$

$$\Rightarrow {}^nC_2 - {}^pC_2 + 1 \quad \left(\begin{array}{l} \text{where } n = 18 \\ p = 5 \end{array} \right)$$

$$\Rightarrow {}^{18}C_2 - {}^5C_2 + 1$$

$$\Rightarrow \frac{18 \times 17}{2} - \frac{5 \times 4}{2} + 1$$

$$\Rightarrow 144$$

number of triangle = ${}^{13}C_3$

$$= \frac{13!}{3! 10!} = \frac{13 \times 12 \times 11}{3 \times 2}$$

$$= 13 \times 2 \times 11$$

$$= 13 \times 22$$

$$= 806$$

Combinations Ex 17.2 Q22

Out of the 52 cards 4 are kings and 48 are Non-kings.

Five cards with at least one king

= (one king and 4 non-kings) or (two kings and 3 non kings) or
(3 kings and 2 non kings) or (4 kings and 1 non kings)

$$= ({}^4C_1 \times {}^{48}C_4) + ({}^4C_2 \times {}^{48}C_3) + ({}^4C_3 \times {}^{48}C_2) + ({}^4C_4 \times {}^{48}C_1)$$

$$= 4 \times \frac{48 \times 47 \times 46 \times 45}{4 \times 3 \times 2} + \frac{4 \times 3}{2} \times \frac{48 \times 47 \times 46}{3 \times 2} + 4 \times \frac{48 \times 47}{2} + 1 \times 48$$

$$= 778320 + 103776 + 4512 + 48$$

$$= 886656$$

Required Number of ways = 886656

Combinations Ex 17.2 Q23

Total persons = 8 Selection to be made = 6 person.

If A is chosen then B must be chosen.

$\Rightarrow A$ and B are chosen together

\therefore Selection can be made in

$${}^6C_4 = \frac{6!}{4!2!} = \frac{6 \times 5}{2} = 15 \text{ ways}$$

Also the number of selections in which A and B are not chosen are

$${}^7C_6 = \frac{7!}{6!1!} = 7 \text{ ways}$$

Total number of ways in which selection is made = $15 + 7$
= 22 ways

Combinations Ex 17.2 Q24

There are 5 boys and 4 girls.

The team consists of 3 boys and 3 girls.

Number of ways to form the team

$$= {}^5C_3 \times {}^4C_3$$

$$= \frac{5!}{3!2!} \times \frac{4!}{3!}$$

$$= \frac{5 \times 4}{2} \times 4$$

$$= 40$$

Number of ways = 40

Combinations Ex 17.2 Q25

There are 6 red balls, 5 white balls and 5 blue balls.

Number of ways to select 9 balls consisting of 3 balls of each colour.

$$= (3 \text{ red out of } 6 \text{ red}) \text{ and} \\ (3 \text{ white out of } 5 \text{ white}) \text{ and} \\ (3 \text{ blue out of } 5 \text{ blue balls})$$

$$= {}^6C_3 \times {}^5C_3 \times {}^5C_3$$

$$= \frac{6 \times 5 \times 4}{3 \times 2 \times 1} \times \frac{5 \times 4}{2} \times \frac{5 \times 4}{2}$$

$$= 2000$$

Required Number of ways = 2000

Combinations Ex 17.2 Q26

Out of 52 cards 4 are ace and
and 48 are Non-ace.

Number of ways to select 5 cards with exactly one ace.

$$= (\text{one ace out of } 4 \text{ ace}) \text{ and} \\ (4 \text{ non-ace out of } 48 \text{ Non-ace})$$

$$= {}^4C_1 \times {}^{48}C_4$$

$$= 4 \times \frac{48 \times 47 \times 46 \times 45}{4 \times 3 \times 2 \times 1}$$

$$= 778320$$

Required Number of ways = 778320

Combinations Ex 17.2 Q27

There are total 5 bowlers and 12 batsman are available to select from.

Number of ways to select a team of 11 that includes exactly 4 bowlers.

$$= (7 \text{ batsman out of } 12 \text{ batsman}) \text{ and} \\ (4 \text{ bowlers out of } 5 \text{ bowlers})$$

$$= {}^{12}C_7 \times {}^5C_4$$

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

$$= 3960$$

Required number of ways = 3960

Combinations Ex 17.2 Q28

Bag contains 5 black and 6 red balls.

Number of ways to select 2 black balls out of 5 black and 3 red balls out of 6 red balls.

$$= {}^5C_2 \times {}^6C_3$$

$$= \frac{5 \times 4}{2} \times \frac{6 \times 5 \times 4}{3 \times 2}$$

$$= 200$$

Required number of ways = 200

Combinations Ex 17.2 Q29

There are total 9 courses are available and out of these 2 subjects are compulsory. So,

Number of ways to select 2 compulsory and 3 option out of $9 - 2 = 7$ subjects

$$= {}^2C_2 \times {}^7C_3$$

$$= 1 \times \frac{7 \times 6 \times 5}{3 \times 2}$$

$$= 35$$

Required number of ways = 35

Combinations Ex 17.2 Q30

i) The committee consists of exactly 3 girls.

∴ We have to select 4 boys from 9 boys.

This can be done in 9C_4 ways and 3 girls out of 4 girls can be selected in 4C_3 ways.

∴ The required number ways = ${}^9C_4 \times {}^4C_3$

$$= \frac{9 \times 8 \times 7 \times 6}{4 \times 3 \times 2 \times 1} \times 4$$

$$= 504$$

ii) At least 3 girls are there.

∴ There are 3 or more than i.e. 3 or 4 girls

∴ a) 3 girls and 4 boys i.e. ${}^4C_3 \times {}^9C_3$ ways

b) 4 girls and 3 boys i.e. ${}^4C_4 \times {}^9C_3$ ways

∴ The required number of ways

$$= {}^4C_3 \times {}^9C_4 + {}^4C_4 \times {}^9C_3$$

$$= 504 + 84$$

$$= 588$$

iii) For at most 3 girls there are 3,2,1 or 0 girls

i.e. a) 0 girls and 7 boys = ${}^4C_0 \times {}^9C_7$

b) 1 girls and 6 boys = ${}^4C_1 \times {}^9C_6$

c) 2 girls and 5 boys = ${}^4C_2 \times {}^9C_5$.

d) 3 girls and 4 boys = ${}^4C_3 \times {}^9C_4$.

∴ Total number of required ways

$$\Rightarrow {}^4C_0 \times {}^9C_7 + {}^4C_1 \times {}^9C_6 + {}^9C_2 \times {}^9C_5 + {}^4C_3 \times {}^9C_4$$

$$\Rightarrow 0 \times \frac{9 \times 8}{2} + 4 \times \frac{9 \times 8 \times 7}{3 \times 2} + \frac{4 \times 3}{2} \times \frac{9 \times 8 \times 7 \times 6}{4 \times 3 \times 2} + 504$$

$$\Rightarrow 36 + 48 \times 7 + 18 \times 42 + 504$$

$$\Rightarrow 1632$$

Here, part I has 5 questions and part II has 7 questions.

Student has to attempt 8 questions selecting at least 3 from each section.

So,

Number of ways to select at least 3 from each section and a total of 8 questions.

$$= (3 \text{ from part I and } 5 \text{ from part II}) \text{ or}$$

$$(4 \text{ from part I and } 4 \text{ from part II}) \text{ or}$$

$$(5 \text{ from part I and } 3 \text{ from part II})$$

$$= ({}^5C_3 \times {}^7C_5) + ({}^5C_4 \times {}^7C_4) + ({}^5C_5 \times {}^7C_3)$$

$$= \left(\frac{5 \times 4}{2 \times 1} \times \frac{7 \times 6}{2 \times 1} \right) + \left(5 \times \frac{7 \times 6 \times 5}{3 \times 2} \right) + \left(1 \times 7 \times \frac{5 \times 6 \times 5}{3 \times 2} \right)$$

$$= 210 + 175 + 35$$

$$= 420$$

Required number of ways = 420

Combinations Ex 17.2 Q32

In a parallelogram, there are 2 sets of parallel lines. Each set of parallel lines consists of $(m+2)$ lines and, each parallelogram is formed by choosing two lines from the first set and two straight lines from the second set.

Hence, the total number of parallelogram = ${}^{m+2}C_2 \times {}^{m+2}C_2$

$$= ({}^{m+2}C_2)^2$$