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

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

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

$= 1365$ 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

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

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

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

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

$= 6375600$

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, 2are compulsory.
So they have to choose 3 courses out of 7 courses. This can be done ${}^{7}C_3 = 35$ ways.

Combinations Ex 17.2 Q4

No of players = 16

No of players to be selected = 11

$\therefore$ 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) *I*nclude 2 particular players

$\rightarrow$ Now we have to select 9 more out of remaining 14

$\therefore$ *R*equired 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) *E*xclude 2 particular players $\rightarrow$ now we have to select 11 players out of 14 players

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

$$= 364$$

Combinations Ex 17.2 Q5

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.

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

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

$= 51300$ ways

(i) a particular professor is included

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

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

$= 10260$

(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

$= {}^{4}C_4 \ldots\ldots\ldots$ (i)

The number of ways of multiplying 3 digits at a time

$= {}^{4}C_3 \ldots\ldots\ldots$ (ii)

The number of ways of multiplying 2 digits at a time

$= {}^{4}C_2 \ldots\ldots\ldots$ (iii)

$\therefore$ Total number of ways

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

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

$\Rightarrow \quad = 11$

= 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

$$^{12}C_4 \times ^8C_4 + ^{12}C_5 \times ^8C_3 + ^{12}C_6 \times ^8C_2$$

$$= \frac{12!}{4!\,8!} \times \frac{8!}{4!\,4!} + \frac{12!}{5!\,7!} \times \frac{8!}{3!\,5!} + \frac{12!}{6!\,6!} \times \frac{8!}{2!\,6!}$$

$$= \left(\frac{12 \times 11 \times 10 \times 9 \times 8 \times 7 \times 6 \times 5}{4 \times 3 \times 2 \times 4 \times 3 \times 2}\right) + \left(\frac{12 \times 11 \times 10 \times 9 \times 8 \times 8 \times 7 \times 6}{5 \times 4 \times 3 \times 2 \times 3 \times 2}\right) + \left(\frac{12 \times 11 \times 10 \times 9 \times 8 \times 7 \times 8 \times 7}{6 \times 5 \times 4 \times 3 \times 2 \times 2}\right)$$

$$= 55440 + 44352 + 181104$$
$$= 280896$$

∴ 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

$$= ^{10}C_4 = \frac{10!}{4!\,6!} = \frac{10 \times 9 \times 8 \times 7}{4 \times 3 \times 2}$$

$$= 210$$

(ii) two particular books are always selected
these the total books = 10 − 2 = 8

So out of remaining 8 books selection od 2 books canbe 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

$$= \frac{8!}{4!\,4!} = \frac{8 \times 7 \times 6 \times 5}{4 \times 3 \times 2}$$

$$= 14 \times 5$$

$$= 70 \text{ ways}$$

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.

$$^6C_4 \times ^7C_6 + ^6C_5 \times ^7C_5 + ^6C_6 \times ^7C_4$$

$$= \left(\frac{6!}{4!\ 2!} \times \frac{7!}{6!\ 1!}\right) + \left(\frac{6!}{5!\ 1!} \times \frac{7!}{5!\ 2!}\right) + \left(\frac{1 \times 7!}{4!\ 3!}\right) \qquad \left(\because {}^nC_r = \frac{n!}{r!(n-r)!}\right)$$

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

$$= (105) + (126) + (35)$$

$= 266$ ways

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

$\Rightarrow\ ^3C_2 = 3$ 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.

$$^6C_2 \times ^6C_5 + ^6C_4 \times ^6C_4 + ^6C_4 \times ^6C_3 + ^6C_5 \times ^6C_2$$

$$= 2\left(^6C_2 \times ^6C_5 + ^6C_3 \times ^6C_4\right)$$

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

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

$$= \frac{2 \times 6 \times 5 \times 6}{2}\left(1 + \frac{20}{6}\right)$$

$$= 180\left(\frac{26}{6}\right)$$

$$= 30 \times 26 = 780$$

$= 780$ ways

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 $\left({}^4C_2 - 1\right)$ lie from ${}^{10}C_2$ $\left(\text{one is subtracted from } {}^4C_2 \text{ to count for the line on which 4 collinear points lie}\right)$

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

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

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

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

$$= 45 - 6 + 1$$

$$= 40$$

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.

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

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

Number of sides = 6

$\therefore$ 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.

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

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

$\Rightarrow$ number of sides = 16

$\therefore$ 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 $^{12}C_3$

$$= {}^{12}C_3 - {}^5C_3$$

$$= \frac{12!}{3!\,9!} - \frac{5!}{3!\,2!}$$

$$= \frac{12\times11\times10}{3\times2} - \frac{5\times4}{2}$$

$$= 220 - 10$$

$$= 210$$

Combinations Ex 17.2 Q17

Total men = 6
Total women = 4

Total persons in committee = 5

(where at least are women has to be selected)
This can be done in

$$^4C_1 \times {}^6C_4 + {}^4C_2 \times {}^6C_3 + {}^4C_3 \times {}^6C_2 + {}^4C_4 \times {}^6C_1$$

$$\left({}^nC_r = \frac{n!}{r!(n-r)!}\right) \left({}^nC_r = 1,\ {}^nC_1 = n\right)$$

$$= \left(\frac{4\times6!}{4!\times2!}\right) + \left(\frac{4!}{2!\,2!} \times \frac{6!}{3!\,3!}\right) + \left(\frac{4!}{3!\,1!} \times \frac{6!}{2!\,4!}\right) + (1\times6)$$

$$= \left(\frac{4\times6\times5}{2}\right) + \left(\frac{4\times3}{2} \times \frac{6\times5\times4}{3\times2}\right) + \left(\frac{4\times6\times5}{2}\right) + (6)$$

$$= (60) + (120) + 60 + 6$$

$$= 246 \text{ ways}$$

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

i) 18 families out of 52 and 2 families out of 35

ii) 19 families out of 52 and 1 family out of 35

iii) 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 indude 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. $^7C_4 \times {}^4C_1$

$\therefore$ 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

$\therefore$ 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.

$\therefore$ 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

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

$\therefore$ number of sides = 10

$\therefore$ number of diagonals = 45 − 10 = 35

Also,by joining 3 angular points a triangle in 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 striaght lines joining these points are

$\Rightarrow \quad {}^{n}C_2 - \left({}^{p}C_2 - 1\right)$

$\Rightarrow \quad {}^{n}C_2 - {}^{p}C_2 + 1 \left(\begin{matrix}\text{where } n = 18 \\ p = 5\end{matrix}\right)$

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

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

$\Rightarrow \quad 144$

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

$$= (\text{one king and 4 non-kings}) \text{ or } (\text{two kings and 3 non kings}) \text{ or } (\text{3 kings and 2 non kings}) \text{ or } (\text{4 kings and 1 non kings})$$

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

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

$$= 778320 + 103776 + 4512 + 48$$
$$= 886656$$

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 from the leom

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

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

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

$$= 40$$

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 red out of 6 red) and

(3 white out of 5 white) and

(3 blue out of 5 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.

= (one ace out of 4 ace) and

(4 non-ace out of 48 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 batsman out of 12 batsman) and

(4 bowlers out of 5 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

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

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

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

$$\Rightarrow \quad 1632$$

Combinations Ex 17.2 Q31

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 from part I and 5 from part II) or
(4 from part I and 4 from part II) or
(5 from part I and 3 from part II)

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

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

$= 210 + 175 + 35$
$= 420$

Required number of ways = 420

Combinations Ex 17.2 Q32

In a parallelgram, 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 $= {}^{m+2}C_2 \times {}^{m+2}C_2$

$$= \left({}^{m+2}C_2\right)^2$$