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.

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

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

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

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

$$= \frac{2\times6\times5\times6}{2}\left(1+\frac{20}{6}\right)$$

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

$$= 30\times26 = 780$$

$$= 780 \text{ ways}$$

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 ${}^{10}C_2$ {one is subtracted from ${}^4C_2$ to count for the line on which 4 collinear points lie}

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

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

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

$$= \frac{10\times9}{2} - \frac{4\times3}{2} + 1$$

$$= 45 - 6 + 1$$

$$= 40$$

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 $= {}^6C_2 = \frac{6!}{2!\,4!}$

$$= \frac{6\times5}{2} = 15$$

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 $= {}^{16}C_2 = \frac{16!}{2!\ 14!}$

$$= \frac{16\times15}{2} = 120$$

$\Rightarrow$ 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 ${}^{5}C_{3}$ less from ${}^{12}C_{3}$

$= {}^{12}C_{3} - {}^{5}C_{3}$

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

$= \frac{12 \times 11 \times 10}{3 \times 2} - \frac{5 \times 4}{2}$

$= 220 - 10$

$= 210$

********** END **********