

Ex 1.2
Q1

$$(i) \binom{6}{2} = \frac{6 \times 5}{2 \times 1} = 15$$

$$(ii) \binom{7}{3} = \frac{7 \times 6 \times 5}{3 \times 2 \times 1} = 35$$

$$(iii) \binom{10}{2} = \frac{10 \times 9}{2 \times 1} = 45$$

$$(iv) \binom{12}{10} = \binom{12}{2} = \frac{12 \times 11}{2 \times 1} = 66$$

$$(v) \binom{18}{16} = \binom{18}{2} = \frac{18 \times 17}{2 \times 1} = 153$$

Q2 (i) $\binom{12}{9} + \binom{12}{8} = \binom{13}{9}$

$$220 + 495 = 715$$

$$715 = 715 \quad \checkmark \Rightarrow \text{True}$$

(ii) $8 \binom{10}{2} = 3 \binom{10}{3}$

$$8(45) = 3(120)$$

$$360 = 360 \quad \checkmark \Rightarrow \text{True}$$

Q3 $\binom{8}{5} = \binom{8}{3} = \frac{8 \times 7 \times 6}{3 \times 2 \times 1} = 56 \text{ ways}$

Q4 $\binom{14}{11} = \binom{14}{3} = \frac{14 \times 13 \times 12}{3 \times 2 \times 1} = 364 \text{ Teams}$

$$\binom{13}{10} = \binom{13}{3} = \frac{13 \times 12 \times 11}{3 \times 2 \times 1} = 286$$

Q5 $\binom{9}{5} = 126$

(i) $\binom{8}{4} = 70$

(ii) $\binom{7}{4} = 35$

Q6 $\binom{9}{5} = 126$

$\binom{8}{4} = 70$

Q7 $\binom{52}{3} = 22100$

$\binom{13}{3} = 286$

only 13 spades in a pack.

Q8 (i) $\binom{8}{3} = 56$

(ii) $\binom{9}{5} = 126$

(iii) $\binom{7}{3} = 35$

Q9 $\binom{5}{3} \times \binom{4}{3}$

$10 \times 4 = 40$ ways

Q10 (i) $\binom{10}{3} \overset{\text{and}}{*} \binom{12}{3} = 120 \times 220 = 26,400$

(ii) $\binom{10}{2} \times \binom{12}{4} = 45 \times 495 = 22,275$

Q11 $\binom{6}{3} = \frac{6 \times 5 \times 4}{3 \times 2 \times 1} = 20$ subsets

(i) $\binom{2}{1} \times \binom{4}{2} = 2 \times 6 = 12$

(ii) At least one vowel = Total - No vowels

No vowels $= \binom{4}{3} = 4$

\Rightarrow at least 1 vowel $= 20 - 4 = 16$

Q12 $\binom{8}{6} = \binom{8}{2} = \frac{8 \times 7}{2 \times 1} = 28$ ways

all Women \Rightarrow 4 women and 2 men

$\binom{4}{4} \times \binom{4}{2} = 1 \times 6 = 6$

Q13 (i) $\binom{5}{4} \times \binom{3}{2} = 5 \times 3 = 15$ ways

(ii) Majority of men \Rightarrow 4 men + 2 women
or 5 men + 1 woman

$\Rightarrow \left[\binom{5}{4} \times \binom{3}{2} \right] + \left[\binom{5}{5} \times \binom{3}{1} \right]$

$= 15 + 3 = 18$ ways

Q14 Goal Keeper Backs forwards
 $\binom{3}{1} \times \binom{6}{3} \times \binom{4}{2} = 3 \times 20 \times 6 = 360 \text{ Teams}$

Q15 (i) $\binom{8}{4} = 70$

(ii) $\binom{6}{2} = 15$

(iii) $\binom{6}{4} = 15$

Q16 $\binom{5}{3} = 10$ Triangles

$\binom{3}{1} = 3$

Q17 $\binom{6}{4} = 15$ quadrilaterals

$\binom{4}{2} = 6$

Q18 9 friends 5 tickets

(i) $\binom{7}{3} = 35$ ways

(ii) Anne + No Barry = $\binom{7}{4} = 35$

or
Barry + No Ann = $\binom{7}{4} = 35$ (+)

70 ways

(iii) At least 1 of the 3 included.
 \Rightarrow Total - None of 3.

$$\text{Total } \binom{9}{5} = 126$$

$$\text{None of the 3} = \binom{6}{5} = 6$$

$$\Rightarrow \text{at least 1 of the 3} = 126 - 6 = 120 \text{ ways}$$

Q19 2 from A and 3 from B = $\binom{5}{2} \times \binom{7}{3} = 350$
or
3 from A and 2 from B = $\binom{5}{3} \times \binom{7}{2} = 210$
Total = 560 ways.

Q20 $\boxed{4} \times \boxed{3} \times \boxed{4} \times \boxed{3} \times \boxed{2} = 288$

Q21 (i) $\binom{n}{2} = 10 \Rightarrow \frac{n(n-1)}{2 \times 1} = 10 \Rightarrow n^2 - n = 20$

$$n^2 - n - 20 = 0$$

$$(n+4)(n-5) = 0 \quad n = -4 \quad n = 5 \quad n \in \mathbb{N} \Rightarrow \underline{n=5}$$

(ii) $\binom{n}{2} = 45 \Rightarrow \frac{n(n-1)}{2 \times 1} = 45 \Rightarrow n^2 - n = 90$

$$n^2 - n - 90 = 0$$

$$(n-10)(n+9) = 0 \quad n = 10 \quad n = -9 \quad n \in \mathbb{N} \Rightarrow \underline{n=10}$$

(iii) $\binom{n+1}{2} = 28 \quad \frac{(n+1)n}{2 \times 1} = 28 \quad n^2 + n = 56$

$$n^2 + n - 56 = 0$$

$$(n-7)(n+8) = 0 \quad n = 7 \quad n = -8 \quad n \in \mathbb{N} \Rightarrow \underline{n=7}$$