

Assignment → (Part 1)

Group members :

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1. case 1 : 6 runners win gold
 $C(6, 6) = 1 \text{ way}$

case 2 : 5 runners win gold
 $C(6, 5) = 6 \text{ ways}$

case 3 : 4 runners win gold
 $C(6, 4) = 15 \text{ ways}$

case 4 : 3 runners win gold
 $C(6, 3) = 20 \text{ ways}$

case 5 : 2 runners win gold, 4 runners win bronze
 $C(6, 2) \times C(4, 4) = 15 \text{ ways}$

case 6 : 2 runners win gold, 3 runners win bronze
 $C(6, 2) \times C(4, 3) = 60 \text{ ways}$

case 7 : 2 runners win gold, 2 runners win bronze
 $C(6, 2) \times C(4, 2) = 90 \text{ ways}$

case 8 : 2 runners win gold, 1 runner wins bronze
 $C(6, 2) \times C(4, 1) = 60 \text{ ways}$

case 9 : 1 runner wins gold, 5 runners win silver
 $C(6, 1) \times C(5, 5) = 6 \text{ ways}$

case 10 : 1 runner wins gold, 4 runners win silver
 $C(6, 1) \times C(5, 4) = 30 \text{ ways}$

case 11 : 1 runner wins gold, 3 runners win silver
 $C(6, 1) \times C(5, 3) = 60 \text{ ways}$

case 12 : 1 runner wins gold, 2 runners win silver
 $C(6, 1) \times C(5, 2) = 60 \text{ ways}$

case 13 : 1 runner wins gold, 1 runner wins silver, 4 ^{runners} win bronze
 $C(6,1) \times C(5,1) \times C(4,4) = 30 \text{ ways}$

case 14 : 1 runner wins gold, 1 runner wins silver, 3 runners win bronze
 $C(6,1) \times C(5,1) \times C(4,3) = 120 \text{ ways}$

case 15 : 1 runner wins gold, 1 runner wins silver, 2 runners win bronze
 $C(6,1) \times C(5,1) \times C(4,2) = 180 \text{ ways}$

case 16 : 1 runner wins gold, 1 runner wins silver, 1 runner win bronze.
 $C(6,1) \times C(5,1) \times C(4,1) = 120 \text{ ways}$

Then we have;

$$= 1 + 6 + 15 + 20 + 15 + 60 + 90 + 60 + 6 + 30 + 60 + 60 + 30 + 120 + 180 + 120$$

$$= 873 \text{ ways} \#$$

a) $n = 20, r = 12$

$$C(20,12) = \frac{20!}{12! (20-12)!}$$

$$= \frac{20!}{12! 8!}$$

$$= 125970 \text{ ways} \#$$

b) $n = 20, r = 12$

$$C(20,12) = \frac{(20+12-1)!}{12! (20-1)!}$$

$$= \frac{31!}{12! 19!}$$

$$= 141120525 \text{ ways} \#$$

c) $C(20+6-1, 19) = C(25, 19)$

$$25! 19! 5! = 177100 \text{ ways} \#$$

$$3 \quad a) (5-1)! = 4! \\ = 24 \text{ ways} \#$$

$$b) 2[(4-1)!] = 2(3!) \\ = 2(6) \\ = 12 \text{ ways} \#$$

$$c) 2[(3-1)!] = 2(2!) \\ = 2(2) \\ = 4 \text{ ways}$$

$$4 \times 3 = 12 \text{ ways} \#$$

$$4 \quad a) n=13, r=10$$

$$C(13,10) = \frac{13!}{10!(13-10)!} \\ = \frac{13!}{10!3!} \\ = 286 \text{ ways} \#$$

$$b) n=13, r=10$$

$$P(13,10) = \frac{13!}{(13-10)!} \\ = \frac{13!}{3!} \\ = 1037836800 \text{ ways} \#$$

c) case 1: 1 woman and 9 men

$$1 \text{ woman: } C(3,1) = \frac{3!}{1!2!}$$

$$= 3$$

$$9 \text{ men: } C(10,9) = \frac{10!}{9!1!}$$

$$= 10$$

$$\therefore 3 \times 10 = 30 \text{ ways}$$

case (2) : 2 woman and 8 men

$$\begin{aligned} 2 \text{ women} : C(3,2) &= \frac{3!}{2!1!} \\ &= 3 \end{aligned}$$

$$\begin{aligned} 8 \text{ men} : C(10,8) &= \frac{10!}{8!2!} \\ &= 45 \end{aligned}$$

$$\therefore 3 \times 45 = 135 \text{ ways}$$

case (3) : 3 women and 7 men

$$\begin{aligned} 3 \text{ women} : C(3,3) &= \frac{3!}{3!0!} \\ &= 1 \end{aligned}$$

$$\begin{aligned} 7 \text{ men} : C(10,7) &= \frac{10!}{7!3!} \\ &= 120 \end{aligned}$$

$$\therefore 1 \times 120 = 120 \text{ ways}$$

$$\begin{aligned} \therefore \text{case (1)} + \text{case (2)} + \text{case (3)} \\ &= 30 + 135 + 120 \\ &= 285 \text{ ways} \# \end{aligned}$$

5 $n = 30$, $k = 26$

$$m = \left[\frac{30}{26} \right]$$

$$= 2 \# \text{ (shown)}$$

6 n : the number of students
 k : state

$$n = ? , m = 100 , k = 13$$

$$\begin{aligned} n &= k(m-1) + 1 \\ &= 13(100-1) + 1 \\ &= 13(99) + 1 \\ &= 1288 \text{ students} \# \end{aligned}$$

7 a) $n = 9$
 $k = 2$

$m = 5$ (students of one gender)

If the class has at least 5 male students, thus it has at most 4 female students as the total students in the class is 9 and same goes to, if the class has at least 5 female students, thus it has at most 4 male students as the total of students in the class is 9 students.

b) The least number of male students in the class is 3. Thus, it has the number of female students at most is 6. If 4 male student and 5 female students are acceptable. If 5 male students and 4 female students are unacceptable. If 2 male students and 7 female students are unacceptable. Therefore, the class must have at least 3 male students or 5 female students