Ratio

1. An equal numbers of males females and boys gets Rs. 225 in 10 days. If each male, female and boys get daily 42 p, 30 p and 18 p respectively, find the numbers of males.

⇒ 10 days in total Income = 225 Rs

1 days " " = 225 ÷ 10 = 22.50 Rs

male, female and boys income ratio = 42 : 30 : 18

∴ total Ratio = 90

∴ Total income in male = $\frac{22.50 \times 42}{90}$

= 10.50. Ans

Quartile deviation

2. Calculate the Quartile deviation and its Co-efficient of the following distributions of weight :-

Weight (pounds) :	10-12	12-14	14-16	16-18	18-20	20-22	22-24
No. of boxes :	2	9	20	25	24	15	5

C.I	f	c.f	
10 - 12	2	2	
12 - 14	9	11	
14 - 16	20	31	— Q_1
16 - 18	25	56	
18 - 20	24	80	— Q_3
20 - 22	15	95	
22 - 24	5	100	

Q_1 = Value of $\frac{N}{4}$ th term

$= \frac{100}{4} =$ 25 th item which lies in

$Q_1 = L_1 + \frac{\frac{N}{4} - C}{f} \times i$

$= 14 + \frac{25 - 11}{20} \times 2 = 14 + \frac{14}{20} \times 2 = 14 + \frac{28}{20}$

$= 14 + 1.40 = 15.40$

Q_3 = Value of $\frac{3N}{4}$ th item

$= 3 \times \frac{100}{4} = 75^{th}$ item which lies in C.I (18-20)

$Q_3 = L_1 + \frac{\frac{3N}{4} - C}{f} \times i = 18 + \frac{75 - 56}{24} \times 2$

$= 18 + \frac{19}{24} \times 2 = 18 + \frac{38}{24} = 18 + 1.58 = 19.58$

$Q.D = \frac{Q_3 - Q_1}{2} = \frac{19.58 - 15.40}{2} = \frac{4.18}{2} = 2.09$

Co-efficient of $Q.D = \frac{Q_3 - Q_1}{Q_3 + Q_1} = \frac{19.58 - 15.40}{19.58 - 15.40}$

$= \frac{4.18}{34.98} = 0.119$ Ans

Percentage

3. A mixture of 140 liters of wine and water contents 10% water. How much water must be Added to make the water $12\frac{1}{2}$% as the resulting mixture.

=) 140 litters quality in water = $140 \times \frac{10}{100} = 14$ L

∴ 140 liters Quality in wine = 140 - 14

= 126 L

Lets us x litters water ration $12\frac{1}{2}$%. and Wine ration $100 - 12\frac{1}{2}\% = 87.5\%$. Therefore, mintue of wine 126 litter quantity in new mixture quantity is 87.5%.

Let us, New mixture = y letter

∴ y 87.5% = 126

$y = \frac{126 \times 100}{875}$

= 144 L

∴ mixture resulting water Quantity

= 144 - 140

= 4 L Ans

Central Tendency

4. Calculate mean and mode form following data :-

Rs.	0-10	10-20	20-30	30-40	40-50	50-60	60-70
No. of person	10	15	25	30	10	5	5

mean

C.I	frequency	mid. value	fm
0-10	10	5	50
10-20	15	15	225
20-30	25	25	625
30-40	30	35	1,050
40-50	10	45	450
50-60	5	55	275
60-70	5	65	325
	N = 100		3,000

$$\text{mean } (\bar{x}) = \frac{\Sigma fm}{N}$$

$$= \frac{3,000}{100} = 30 \text{ Ans}$$

mode

$f_1 = 30$, $f_0 = 25$, $f_2 = 10$

$l_1 = 30$, $l_2 = 40$, $l_2 - l_1 = 10$

$$z = l_1 + \frac{f_1 - f_0}{2f_1 - f_0 - f_2} \times i$$

$$= 30 + \frac{30 - 25}{2 \times 30 - 25 - 10} \times 10$$

$$= 30 + \frac{5}{60 - 35} \times 10$$

$$= 30 + \frac{5}{25} \times 10^2$$

$$= 30 + 2$$

$$= 32 \text{ Ans}$$

mean $(\bar{x})$ is 30
Mode (z) is 32

Permutation & Combination

5. A. find the value of r if ${}^7P_r = 42$

${}^7P_r = 42$

given ${}^7P_r = 42$

To find value of $r = ?$

We know that, ${}^nP_r = \frac{n!}{(n-r)!}$

$$42 = \frac{7\times6\times5\times4\times3\times2}{(7-r)!}$$

$$(7-r)! = \frac{7\times6\times5\times4\times3\times2}{42}$$

$$(7-r)! = 5!$$

$$7-r = 5$$

$$r = 7-5 = 2 \quad \text{Ans}$$

b. The first term of G.P is 4 and 4th term is 108. find the common ratio and the sum of four terms.

→ first term $a = 4$

$a r^4 = 108$

$4r^3 = 108$

$r^3 = 27$

$r = 3$

1st four terms are

4, 12, 36, 108

$ar^3 = 108$

$r^3 = \frac{108}{4} = 27$

$r^3 = 27$

common ratio $r = 3$

of 4 terms

$4 = a(r^{4-1}/r-1)$

$= 4(3^{4-1}/3-1)$

$= 4(80/2)$

$= 54 = 160$ Ans

c. In a mile race x beats y 100 yards, x beats z by 176 yards by now yards can beat z?

x beat y 100 yards

y beat z 176 yards

By no. of yards z can beat

$100 + 176$

$= 276$

so, z can be beat by 276 yards.