Exam Paper

Test / Exam Name: Statistics **Standard: 10th** **Subject: Mathematics**

Instructions

1. RAVI TEST PAPERS & NOTES, WHATSAPP – 8056206308 JOIN MY PAID TEST GROUP WITH ANSWERS FEES RS.2500 FROM JULY TO TIL EXAM. OR PAY MONTHLY RS.500
2. CHECK GOOGLE FOR MORE FREE PAPERS BLOG www.ravitestpapers.in WEBSITE www.ravitestpapers.com

Q1. The following table gives the daily income of 50 workers of a factory: **5 Mark**

Daily income (in Rs.)	100 -120	120 - 140	140 - 160	160 - 180	180 - 200
Number of workers	12	14	8	6	10

Find the Mean, Mode and Median of the above data.

Ans:

Classes	**x_i**	**f_i**	**c.f_i**	**u_i**	**f_iu_i**
100 - 120	110	12	12	-2	-24
120 - 140	130	14	26	-1	-14
140 - 160	150	8	34	0	0
160 - 180	170	6	40	1	6
180 - 200	190	10	50	2	20

$\sum f_i u_i = -12$

$\text{Mean}(\overline{x}) = 150 - \frac{12}{50} \times 20 = 150 - 4.8$

$= 145.2$

$\text{Median Class} = 120 - 140, \text{Modal Class} = 120 - 140$

$\therefore \text{Median} = 120 + \frac{25-12}{14} \times 20$

$= 120 + 18.6 = 138.6$

$\text{Mode} = 120 + \left(\frac{14-12}{2\times14-12-8}\right) \times 20$

$= 120 + \frac{40}{8} = 125.0.$

Q2. Change the following distribution into 'less than' type distribution and draw its ogive. Hence find the median of the distribution. **5 Mark**

Marks	**Number of Students**
20-30	4
30-40	10
40-50	12
50-60	14
60-70	8
70-80	3
80-90	4
90-100	5

Ans:

Less than type distribution table is:

Marks	**fi**	**cf**
20-30	4	4
30-40	10	14
40-50	12	26
50-60	14	40
60-70	8	48

70-80	3	51
80-90	4	55
90-100	5	60

Median $= \mathrm{l} + \left(\frac{\frac{\mathrm{n}}{2} - \mathrm{cf}}{\mathrm{f}}\right) \times \mathrm{h}$

Where,
l = lower limit of median class,
n = number of observations,
cf = cumulative frequency of class preceding the median class,
f = frequency of median class, h = class size (assuming class size to be equal).
n = 60, cf = 26, f = 14, h = 10

Median $= \mathrm{l} + \left(\frac{\frac{\mathrm{n}}{2} - \mathrm{cf}}{\mathrm{f}}\right) \times \mathrm{h}$

$= 50 + \frac{30-26}{14} \times 10$

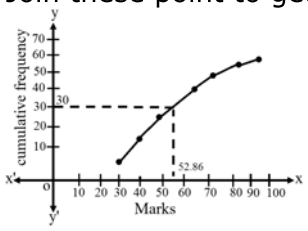
$= 50 + \frac{4}{14} \times 10$

$= 50 + \frac{40}{14} = 52.86$

Median = 52.86

Plot the point : (30, 4), (40, 14), (50, 26), (60, 40), (70, 48), (80, 51), (90, 55), (100, 60).

Join these point to get the required 'less than type give' which is as follows:



Q3. India meteorological department observes seasonal and annual rainfall every year in different sub-divisions of our country. **5 Mark**

It helps them to compare and analyse the results. The table given below shows sub-division wise seasonal (monsoon) rainfall (mm) in 2018:

Rainfall (mm)	**Number of Sub-divisions**
200-400	2
400-600	4
600-800	7
800-1000	4
1000-1200	2
1200-1400	3
1400 -1600	1
1600-1800	1

Based on the above information, answer the following questions:

1. Write the modal class.
2. Find the median of the given data.

OR

2. Find the mean rainfall in this season.

3. If sub-division having at least 1000 mm rainfall during monsoon season, is considered good rainfall sub-division, then how many sub-divisions had good rainfall?

Ans:

1. Modal Class is 600-800
2. $\frac{N}{2} = 12$, median class is 600-800

Rainfall	**x_i**	**f_i**	**c_f.**
200–400	300	2	2
400-600	500	4	6
600-800	700	7	13
800-1000	900	4	17
1000-1200	1100	2	19
1200-1400	1300	3	22
1400-1600	1500	1	23
1600-1800	1700	1	24
		24	

Median $= 600 + \frac{200}{7}(12 - 6)$

$= \frac{5400}{7}$ or 771.4

OR

2.

Rainfall	**x_i**	**f_i**	**$f_i x_i$**
200–400	300	2	600
400-600	500	4	2000
600-800	700	7	4900
800-1000	900	4	3600
1000-1200	1100	2	2200
1200-1400	1300	3	3900
1400-1600	1500	1	1500
1600-1800	1700	1	1700
		24	**20400**

Mean $= \frac{20400}{24} = 850$

3. Sub-divisions having good rainfall = 2 + 3 + 1 + 1 = 7.

Q4. The median of the following data is 525. Find the values of x and y, if total frequency is 100: **5 Mark**

Class:	0-100	100-200	200-300	300-400	500-600	700-800
Frequency	2	5	x	12	17	20

Ans:

Classes	Frequecy	Cumulative frequency	
0-100	2	2	
100 - 200	5	7	
200 - 300	x	7 + x	
300 - 400	12	19 + x	
400 - 500	17	36 + x	
500 - 600	20	56 + x	→ Median class
600 - 700	y	56 + x + y	
700 - 800	9	65 + x + y	
800 - 900	7	72 + x + y	
900 - 1000	4	76 + x + y	
Total	100		

76 + x + y = 100

⇒ x + y = 24 ...(i)

Since Mediam = 525

500-600 is median class

Median $= l + \frac{\frac{n}{2} - cf}{f} \times h$

Where l = lower limit of median class = 500

h = class-interval = 100 - 0 = 100

$n = \sum f_i = 100$

cf = cumulative frequency of the class before median class = 36 + x

f = frequency of the median class = 20

Median $= l + \frac{\frac{n}{2} - cf}{f} \times h$

$525 = 500 + \frac{\frac{100}{2} - (36+x)}{20} \times 100$

$525 = 500 + (50 - (36 + x)) \times 5$

$525 - 500 = (50 - 36 - x) \times 5$

$25 = (14 - x) \times 5$

$25 = 14(5) - 5x$

$25 = 70 - 5x$

$5x = 70 - 25$

$5x = 45$

$x = \frac{45}{5}$

$x = 9$

Substituting in equation (i),

$\Rightarrow 9 + y = 24$

$\Rightarrow y = 24–9$

$\Rightarrow y = 15$

Q5. Find the values of frequencies x and y in the following frequency distribution table, if N = 100 and median is 32. **5 Mark**

Marks:	0-10	10-20	20-30	30-40	40-50	50-60	**Total**
No. of Students:	10	x	25	30	y	10	100

Ans:

Marks	**fi**	**cf**
0-10	10	10
10-20	x	10 + x
20-30	25	35 + x
30-40	30	65 + x
40-50	y	65 + x + y
50-60	10	75 + x + y
Total	100	

Median class $= 30 - 40$

$75 + x + y = 100$

$x + y = 25$

$32 = 30 + \left(\frac{50-35-x}{30}\right) \times 10$

$2 = \frac{15-x}{3}$

$x = 9$

$y = 16$

Q6. If the median of the following frequency distribution is 32.5 Find the valuse of f_1 and f_2. **5 Mark**

Class:	0-10	10-20	20-30	30-40	40-50	50-60	60-70	Total
Frequency:	f_1	5	9	12	f_2	3	2	40

Ans:

Given: Median = 32.5

We prepare the cumulative frequency table, as given below.

Class interval:	**Frequency: (f_I)**	**Cumulative frequency (c.f.)**
0-10	f_1	f_1
10-20	5	5 + f_1
20-30	9	14 + f_1
30-40	12	26 + f_1

40-50	f_2	26 + f_1 + f_2
50-60	3	29 + f_1 + f_2
60-70	2	31 + f_1 + f_2
	N = 40 = 31 + f_1 + f_2	

Now, we have
N = 40
31 + f_1 + f_2 = 40
f_2 = 9 - f_1 ...(1)
Also, $\frac{N}{2} = 20$
Since median = 32.5 so the median class is 30-40.
Here, l = 30, f = 12, F = 14 + f_1 and h = 10
We know that

$$\text{Median} = l + \left\{ \frac{\frac{N}{2} - F}{f} \right\} \times h$$

$$32.5 = 30 + \left\{ \frac{20-(14+f_1)}{12} \right\} \times 10$$

$$2.5 = \frac{(6-f_1)\times 10}{12}$$

$$2.5 \times 12 = 60 - 10f_1$$

$$f_1 = \frac{30}{10}$$

$$= 3$$

Putting the value of f_1 in (1), we get
f_2 = 9 - 3
= 6
Hence, the missing frequencies are 3 and 6.

Q7. The mean of the following distribution is 18. Find the frequency f of the class 19-21. **5 Mark**

Class	11-13	13-15	15-17	17-19	19-21	21-23	23-15
Frequency	3	6	9	13	f	5	4

Ans:

Class	**Mid values x_i**	**Frequence f_i**	**$d_i = x_i$ - 18**	$\mu_i = \frac{x_i - 18}{2}$	$f_i\mu_i$
11-13	12	3	-6	-3	-9
13-15	14	6	-4	-2	-12
15-17	16	9	-2	-1	-9
17-19	18	13	0	0	0
19-21	20	f	2	1	f
21-23	22	5	4	2	10
23-25	24	4	6	3	12
		$\sum f_i = 40 + f$			

$$\sum f_i\mu_i = f - 8$$

we have
h = 2; A = 18, N = 40 + f, $\sum f_i\mu_i = f - 8 \bar{X} = 18$

$$\therefore \text{Mean} = A + h\left\{ \frac{1}{N} \sum f_i\mu_i \right\}$$

$$18 + 18 + 2\left\{ \frac{1}{40+f}(f-8) \right\}$$

$$\frac{2(f-8)}{40+f} = 0$$

$$f - 8 = 0$$

$$f = 8.$$

Q8. The mean of the following frequency distribution is 18. The frequency f in the class interval 19–21 is missing. Determine f. **5 Mark**

Class interval	11–13	13–15	15–17	17–19	19–21	21–23	23–25
Frequency	3	6	9	13	f	5	4

Ans:

Class	Frequency (f)	Class mark (x)	$d = \frac{X-A}{h}$	f × d
11-13	3	12	-3	-9
13-15	6	14	-2	-12
15-17	9	16	-1	-9
17-19	13	18 = A	0	0
19-21	f	20	1	f
21-23	5	22	2	10
23-25	4	24	3	12
	40-f			-8 + f

$$\bar{x} = A + \frac{\Sigma fd}{\Sigma f} \times h$$
$$18 = 18 + \frac{-8+f}{40+f} \times 2$$
$$18 - 18 = \frac{(f-8)\times 2}{40+f}$$
$$0 = f - 8$$
$$f = 8$$

Q9. The following distribution gives the daily income of 50 workers of a factory: **5 Mark**

Daily Income (In)	100-120	120-140	140-160	160-180	180-200
Number of workers	12	14	8	6	10

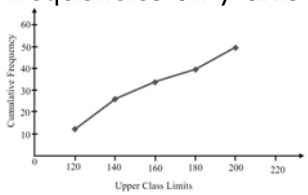
Convert the distribution above to a less than type cumulative frequency distribution and draw its ogive.

Ans:

Frequency distribution table of less than type is as follows:

Daily income (in Rs)(upper class limits)	Cumulative frequency
Less than 120	12
Less than 140	12 + 14 = 26
Less than 160	26 + 8 = 34
Less than 180	34 + 6 = 40
Less than 200	40 + 10 = 50

Now taking upper class limits of class intervals on x-axis and their respective frequencies on y-axis we can draw its ogive as follows:



Q10. Find the mean, mode and median of the following frequency distribution: **6 Mark**

Class	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	60 - 70
Frequency	4	4	7	10	12	8	5

Ans:

Classes	0 – 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	60 - 70
class marks (x_i)	5	15	25	35	45	55	65
$d_i = \frac{x_i-35}{10}$	-3	-2	-1	0	1	2	3
f_i	4	4	7	10	12	8	5
$f_i d_i$	-12	-8	-7	0	12	16	15
C.F	4	8	15	25	37	45	50

$$\sum f_i = 50, \sum f_i d_i = 16$$
$$\overline{X} = A + \frac{\sum F.d}{\sum f} \times i$$

1. $\overline{\mathrm{x}} = 35 + \frac{16}{50} \times 10 = 38.2$

2. Modal Class = 40 – 50

$$\mathrm{Mode} = \mathrm{L}_{+} \frac{\mathrm{f_i} - \mathrm{f_0}}{2\mathrm{f_i} - \mathrm{f_0} - \mathrm{f_2}} \times \mathrm{i}$$

$$\mathrm{Mode} = 40 + \frac{12 - 10}{24 - 18} \times 10 = 43.33$$

3. Median Class = 30 – 40

$$\mathrm{Median} = \mathrm{L} + \left(\frac{\frac{\mathrm{N}}{2} - \mathrm{C}}{\mathrm{f}} \right) \times \mathrm{i}$$

$$\mathrm{Median} = 30 + \frac{\frac{50}{2} - 15}{10} \times 10 = 40.00$$