$$Q_3 = 50 + \left(\frac{75-60}{20}\right) \times 10$$

$$= 50 + \frac{15}{20} \times 10$$

$$= 50 + 7.5$$

$$\therefore Q_3 = 57.5 \text{ Ans}$$

3. 6th decile $= D_6$

(iv) D_6 th decile $=$ Size of $6N/10$ th item

$$D_6 = \frac{6 \times 100}{10} = 60 \text{ th item}$$

C.I - 40-50	$D_6 = L_1 + \left(\frac{3N/10 - C}{f}\right) \times h$
L = 40	$= 40 + \left(\frac{6 \times 100/10 - 32}{28}\right) \times 10$
F = 28	$= 40 + \left(\frac{60 - 32}{28}\right) \times 10$
CF = 32	$= 40 + \frac{28}{28} \times 10$
h = 10	$= 40 + 10 = 50$

$$\therefore D_6 = 50 \text{ Ans}$$

75 th percentile $= P_{75}$

(v) 75 th percentile $=$ Size of $3N/100$ th item

$N = 100$, $\frac{75 \times 100}{100} = 75$ th item

$$P_{75} = L_1 + \left(\frac{3N/100 - C}{f}\right) \times h$$

C.I = 50-60	$= 50 + \left(\frac{75 \times 100/100 - 60}{20}\right) \times 10$
L - 50	$= 50 + \left(\frac{75 - 60}{20}\right) \times 10$
F - 20	$= 50 + \frac{15}{20} \times 10$
C - 60	$= 50 + 7.5$
h - 10	$= 57.5$ Ans

$$\therefore P_{75}$$

(ii) first quartile $= Q_1 =$ size of $\left(\frac{N}{4}\right)^{th}$ item

$N = 100$

$Q_1 = \frac{100}{4} = 25$ th item

C.I = 30-40
L = 20
F = 12
C = 20
H = 10

$Q_1 = L_1 + \left(\frac{N/4 - C}{f}\right) \times h$

$= 30 + \left(\frac{100/4 - 20}{12}\right) \times 10$

$= 30 + \left(\frac{25-20}{12}\right) \times 10$

$= 30 + \frac{5}{12} \times \frac{10}{6}^{5}$

$= 30 + \frac{25}{6} = 30 + 4.16$

$(Q_1) = 34.16$ Ans

(iii) third quartile $Q_3 =$ size of $\left(\frac{3N}{4}\right)$ th item

$Q_3 = \frac{3 \times 100}{4} = \frac{300}{4} = 75$ th item

C.I = 50-60
F = 20
L = 50
C = 60
h = 10

$Q_3 = L_1 + \left(\frac{3N/4 - C}{f}\right) \times h$

$= 50 + \left(\frac{3 \times 100/4 - 60}{20}\right) 10$

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③ Calculate the median of the following figures
11, 12, 8, 5, 9, 14, 20, 15, 13.

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5, 8, 9, 11, 12, 13, 14, 15, 20

$n = 9$

विषम संख्या है।

माध्यिका $= \left(\frac{n+1}{2}\right) = \left(\frac{9+1}{2}\right) = \frac{10}{2} = 5$

∴ 5 वाँ पद

$= 12$ Ans

Marks C.I	No. of students f	C.F
0-10	5	5
10-20	10	15
20-30	15	30
30-40	10	40
40-50	6	46
50-60	4	50
	$n = 50$	

माध्यिका $= L_1 + \left(\frac{n/2 - C}{f}\right) \times h$

$\frac{n}{2} = \frac{50}{2} = 25$

C.I - 20-30
$L = 20$
$f = 15$
C.F = 15
$h = 10$

$(M) = L_1 + \left(\frac{n/2 - C}{f}\right) \times h$

$= 20 + \left(\frac{25 - 15}{15}\right) \times 10$

$= 20 + \frac{10}{3} \times 10^{2}$

$= 20 + \frac{20}{3} = \frac{60+20}{3}$

(Median) $= \frac{80}{3} = 26.67$ Ans

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(ii) first quartile $= Q_1 =$ Size of $\left(\frac{N}{4}\right)$th item

$N = 100$

$Q_1 = \frac{100}{4} = 25$ th item

C.I = 30-40
L = 20
F = 12
C = 20
H = 10

$Q_1 = L_1 + \left(\frac{N/4 - C}{f}\right) \times h$

$= 30 + \left(\frac{100/4 - 20}{12}\right) \times 10$

$= 30 + \left(\frac{25-20}{12}\right) \times 10$

$= 30 + \frac{5}{12} \times 10^{5}$

$= 30 + \frac{25}{6} = 30 + 4.16$

$(Q_1) = 34.16$ Ans

(iii) third quartile $Q_3 =$ Size of $\left(\frac{3N}{4}\right)$ th item

$Q_3 = \frac{3 \times 100}{4} = \frac{300}{4} = 75$ th item

C.I = 50-60
F = 20
L = 50
C = 60
h = 10

$Q_3 = L_1 + \left(\frac{3N/4 - C}{f}\right) \times h$

$= 50 + \left(\frac{3 \times 100/4 - 60}{20}\right) 10$

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$= 5 + \left(\frac{10-6}{7}\right) \times 5 = 5 + \left(\frac{4}{7}\right) \times 5$

$= 5 + \frac{4}{7} \times 5$

$= 5 + \frac{20}{7} = \frac{35+20}{7} = \frac{55}{7}$

$= 7.86$

$\therefore D_1 = 7.86$ Ans

68 percentile (P_{68}) = Size of $68N/100$ item

= Size of $\frac{68 \times 100}{100}$

= 68 item

C.I = 25-30	C.I = 25-30
L = 25	
h = 5	
C.F = 65	
f = 15	

$P_{68} = L + \left[\frac{\frac{68N}{100} - C}{f}\right] \times h$

$= 25 + \left(\frac{68-65}{15}\right) \times 5$

$= 25 + \left(\frac{3}{15}\right) \times 5$

$= 25 + \frac{3}{15} \times 5$

$= 25 + 1$

$\therefore P_{68} = 26$ Ans

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(3) Calculate the median of the following figures
11, 12, 8, 5, 9, 14, 20, 15, 13.

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1 5, 8, 9, 11, 12, 13, 14, 15, 20

$n = 9$

विषम संख्या है,

मध्यिका $= \left(\frac{n+1}{2}\right) = \left(\frac{9+1}{2}\right) = \frac{10}{2} = 5$

$\therefore$ 5 वाँ पद

= 12 Ans

(5) Calcute the median from the following table

marks	0-10	10-20	20-30	30-40	40-50
No. of. students	5	10	15	10	6

50 - 60
4

Ans

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$= 20 + \left(\frac{100/2 - 40}{25}\right) \times 5$

$= 20 + \left(\frac{50-40}{25}\right) \times 5$

$= 20 + \frac{10}{25} \times 5$

$= 20 + \frac{10^2}{5} = 20 + 2 = 22$

$\therefore (M) = 22$ Ans.

(ii) lower quartile (Q_1) = size of $\left(\frac{N}{4}\right)$

$= \frac{100}{4} = 25$ th item

(class interval) (CI) = 15-20

$Q_1 = L_1 + \left(\frac{N/4 - C}{f}\right) \times h$

C.F = 22	$= 15 + \left(\frac{100/4 - 22}{f}\right) \times 5$
f = 18	$= 15 + \left(\frac{25-22}{18}\right) \times 5$
L = 15	$= 15 + \frac{3}{6} \times 5$
H = 5	$= 15 + \frac{5}{6} = \frac{90+5}{6}$

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$(M) = (Q_1) = \frac{95}{6} = 15.83$ Ans

(iii) upper quartile (Q_3) = size of $\left(\frac{3N}{4}\right)$

$= \frac{3 \times 100}{4} = \frac{300}{4} = 75$ th item

C.I = 25-30	$= 25 - 30$
C.F = 65	$Q_3 = L_1 + \left(\frac{3N/4 - C}{f}\right) \times h$
f = 15	$= 25 + \left(\frac{75 - 65}{15}\right) \times 5$
L_1 = 25	$= 25 + \left(\frac{10}{15}\right) \times 5$
H = 5	$= 25 + \frac{10}{3} \times 5$
	$= 25 + \frac{10}{3} = \frac{75+10}{3}$

$(Q_3) = \frac{85}{3} = 28.33$

(iv) first decile (D_1) = size of $\frac{N}{10}$ th item

$= \frac{100}{10} = 10$ th item

$(D_1) = L_1 + \left(\frac{N/10 - C}{f}\right) \times h$

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Ex- Calculate the median lower quartile, upper quartile, first decile and 68 th percentile from the following data.

Marks obtained (C.I)	No. of students (f)	(C.f)
0-5	6	6
5-10	7	13
10-15	9	22
15-20	18	40
20-25	25	65
25-30	15	80
30-35	12	92
35-40	8	100
	$n = 100$	

Ans (i) Median (M) = size of $\frac{N}{2}$ item

$= \frac{100}{2} = 50$ th

(C.I) = 20-25

$M = L_1 + \left(\frac{N/2 - C}{f}\right) \times h$

C.f = 40
f = 25
L = 20
h = 5

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Marks C.I	No. of Students f	C.F
0-10	5	5
10-20	10	15
20-30	15	30
30-40	10	40
40-50	6	46
50-60	4	50
	n = 50	

माध्यिका $= L_1 + \left(\frac{n/2 - C}{f}\right) \times h$

$\frac{n}{2} = \frac{50}{2} = 25$

C.I - 20-30
L = 20
F = 15
C.F = 15
h = 10

$(M) = L_1 + \left(\frac{n/2 - C}{f}\right) \times h$

$= 20 + \left(\frac{25 - 15}{15}\right) \times 10$

$= 20 + \frac{10}{3} \times 10^2$

$= 20 + \frac{20}{3} = \frac{60+20}{3}$

$(\text{Median}) = \frac{80}{3} = 26.67$ Ans

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(6) Calculate the median, first quartile, third quartile, 6th decile and 75th percentile from the following data:

Marks Obtained M. C.I	No. of Student F	C.F
0-10	5	5
10-20	8	13
20-30	7	20
30-40	12	32
40-50	28	60
50-60	20	80
60-70	10	90
70-80	10	100
	n = 100	

$n = 100$

~~(i) first quartile~~ $(Q_1) = \text{Size of } \left(\frac{N}{4}\right)$

$= \text{Size of } = \left(\frac{100}{4}\right) = 25$

Median $= L_1 + \left(\frac{N/2 - C}{f}\right) \times h$

$n = \frac{100}{2} = 50$, C.I = 40-50, F = 28, h = 10

L = 40, C.F = 32

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