3. A life insurance agent found the following data for distribution of ages of 100 policy holders. Calculate the median age, if policies are only given to persons having age 18 years onwards but less than 60 years.

Ages (in years)	Number of policy holders
Below 20	2
Below 25	6
Below 30	24
Below 35	45
Below 40	78
Below 45	89
Below 50	92
Below 55	98
Below 60	100

Ans.

Ages (in years)	Cumulative Frequency	Number of consumers (f_i)
Below 20	2	2
20 – 25	6	6 – 2 = 4
25 – 30	24	24 – 6 = 18
30 – 35	45	45 – 24 = 21
35 – 40	78	78 – 45 = 33
40 – 45	89	89 – 78 = 11
45 – 50	92	92 – 89 = 3
50 – 55	98	98 – 92 = 6
55 – 60	100	100 – 98 = 2
Total		$\sum f_i = n = 100$

Here, $\sum f_i = n = 100$, then $\dfrac{n}{2} = \dfrac{100}{2} = 50$, which lies in interval 35 – 40.

∴ Median class = 35 − 40

So, $l = 35$, $n = 100$, $f = 33$, $cf = 45$ and $h = 5$

Now, Median $= l + \left[\dfrac{\dfrac{n}{2} - cf}{f} \right] \times h$

$= 35 + \left[\dfrac{\dfrac{100}{2} - 45}{33} \right] \times 5$

$= 35 + \dfrac{50 - 45}{33} \times 5$

$= 35 + \dfrac{25}{33}$

$= 35 + 0.7575$

$= 35 + 0.76$ (approx.)

$= 35.76$

Hence median age of given data is 35.76 years.

Q4. The lengths of 40 leaves of a plant are measured correct to the nearest millimeter and data obtained is represented in the following table. Find the median length of the leaves.

Length (in mm)	Number of leaves
118 – 126	3
127 – 135	5
136 – 144	9
145 – 153	12
154 – 162	5
163 – 171	4
172 – 180	2

Ans. Since the frequency distribution is not continuous, so firstly we shall make it continuous.

Length (in mm)	Number of leaves (f_i)	Cumulative Frequency
117.5 - 126.5	3	3
126.5 - 135.5	5	8
135.5 - 144.5	9	17
144.5 - 153.5	12	29
153.5 - 162.5	5	34
162.5 - 171.5	4	38
171.5 - 180.5	2	40
Total	$\sum f_i = n = 40$	

Here, $\sum f_i = n = 40$, then $\dfrac{n}{2} = \dfrac{40}{2} = 20$, which lies in interval $144.5 - 153.5$.

$\therefore$ Median class $= 144.5 - 153.5$

So, $l = 144.5$, $n = 40$, $f = 12$, $cf = 17$ and $h = 9$

Now, Median $= l + \left[\dfrac{\dfrac{n}{2} - cf}{f}\right] \times h$

$= 144.5 + \left[\dfrac{20 - 17}{12}\right] \times 9$

$= 144.5 + \dfrac{3 \times 9}{12}$

$= 144.5 + 2.25$

$= 146.75$

Hence median length of the leaves is 146.75 mm.

Q5. The following table gives the distribution of the life time of 400 neon lamps. Find the median life time of the lamps.

Life time (in hours)	Number of lamps
1500 – 2000	14
2000 – 2500	56
2500 – 3000	60
3000 – 3500	85
3500 – 4000	74
4000 – 4500	62
4500 – 5000	48

Ans.

Life time (in hours)	Number of lamps (f_i)	Cumulative Frequency
1500 – 2000	14	14
2000 – 2500	56	70
2500 – 3000	60	130
3000 – 3500	86	216
3500 – 4000	74	290
4000 – 4500	62	352
4500 – 5000	48	400
Total	$\sum f_i = n = 400$	

Here, $\sum f_i = n = 400$, then $\dfrac{n}{2} = \dfrac{400}{2} = 200$, which lies in interval $3000 - 3500$.

$\therefore$ Median class = $3000 - 3500$

So, $l = 3000$, $n = 400$, $f = 86$, $cf = 130$ and $h = 500$

Now, Median $= l + \left[\dfrac{\dfrac{n}{2} - cf}{f}\right] \times h$

$= 3000 + \left[\dfrac{200 - 130}{86}\right] \times 500$

$= 3000 + \dfrac{70 \times 500}{86}$

$= 3000 + 406.9767441$

$= 3000 + 406.98$ (approx.)

$= 3406.98$

Hence median life time of a lamp is 3406.98 hours.

********** END **********