



Statistics Ex 7.4 Q17

Answer :

Calculation for mean.

Length (in mm)	Mid-Values(x_i)	Number of Leaves(f_i)	$f_i x_i$
117.5–126.5	122	3	366
126.5–135.5	131	5	655
135.5–144.5	140	9	1260
144.5–153.5	149	12	1788
153.5–162.5	158	5	790
162.5–171.5	167	4	668
171.5–180.5	176	2	353
		$N = 40$	$\sum f_i x_i = 5880$

$$\text{Mean length of the leaf} = \frac{1}{N} \sum f_i x_i = \frac{1}{40} \times 5880 = 147$$

Calculation for median.

The given series is in inclusive form. Converting it to exclusive form and preparing the cumulative frequency table, we have

Length (in mm)	Number of Leaves(f_i)	Cumulative Frequency (c.f.)
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
	$N = 40$	

Now, we have

$$N = 40$$

$$\text{So, } \frac{N}{2} = 20$$

Now, the cumulative frequency just greater than 20 is 29 and the corresponding class is 144.5–153.5.

Therefore, 144.5–153.5 is the median class.

Here, $l = 145$, $f = 12$, $F = 17$ and $h = 7$

We know that

$$\begin{aligned}
 \text{Median} &= l + \left\{ \frac{\frac{N}{2} - F}{f} \right\} \times h \\
 &= 144.5 + \left(\frac{20 - 17}{12} \right) \times 9 \\
 &= 144.5 + \frac{27}{12} \\
 &= 144.5 + 2.25 \\
 &= 146.75
 \end{aligned}$$

Hence, the median length of leaf is 146.75 mm.

Disclaimer: If the question asks for the mean length of the leaf, then the answer is 147 mm whereas if the question asks for the median length of the leaf, then the answer is 146.75 mm, which is same as the answer given in the book.

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