

# Final Solution for Mean, Median, and Mode

We are given the following inclusive class intervals and their corresponding frequencies:

Weight (Kgs) (Inclusive)	No. of Students (f)
93 - 97	3
98 - 102	5
103 - 107	12
108 - 112	17
113 - 117	14
118 - 122	6
123 - 127	3
128 - 132	1

## Step 1: Convert to Exclusive Class Intervals

Since the given intervals are inclusive, we convert them to exclusive by adjusting the boundaries:

Weight (Kgs) (Exclusive)	Class Mark (x)	No. of Students (f)
92.5 - 97.5	95	3
97.5 - 102.5	100	5
102.5 - 107.5	105	12
107.5 - 112.5	110	17
112.5 - 117.5	115	14
117.5 - 122.5	120	6
122.5 - 127.5	125	3
127.5 - 132.5	130	1

## Step 2: Calculate Mean using Step Deviation Method

The formula for the **mean** is:

$$\text{Mean} = A + \left( \frac{\sum fu}{\sum f} \right) \times h$$

Where:

- $A$  = Assumed mean (Choose **110** for simplicity)
- $u$  = Step deviation, calculated as  $u = \frac{x-A}{h}$
- $h$  = Class width = 5

Class Mark (x)	f	u = (x - 110) / 5	fu
95	3	-3	-9
100	5	-2	-10
105	12	-1	-12
110	17	0	0
115	14	1	14
120	6	2	12
125	3	3	9
130	1	4	4

- **Total Frequency ( $\sum f$ ):**

$$3 + 5 + 12 + 17 + 14 + 6 + 3 + 1 = 61$$

- **Total  $fu$  ( $\sum fu$ ):**

$$-9 + (-10) + (-12) + 0 + 14 + 12 + 9 + 4 = 8$$

Now, calculate **Mean**:

$$\text{Mean} = 110 + \left( \frac{8}{61} \right) \times 5$$

$$= 110 + (0.131 \times 5)$$

$$= 110 + 0.655$$

$$= 110.66$$

---

## Step 3: Calculate Median

The formula for **Median** is:

$$\text{Median} = L + \left( \frac{\frac{N}{2} - CF}{f} \right) \times h$$

Where:

- $N = 61$ , so  $\frac{N}{2} = 30.5$
- Find the **Median Class** (Cumulative Frequency just before 30.5)

Class Interval	f	Cumulative Frequency (CF)
92.5 - 97.5	3	3
97.5 - 102.5	5	8
102.5 - 107.5	12	20
107.5 - 112.5	17	37 ( <b>Median Class</b> )
112.5 - 117.5	14	51
117.5 - 122.5	6	57
122.5 - 127.5	3	60
127.5 - 132.5	1	61

The **Median Class** is 107.5 - 112.5.

Now, apply the formula:

- $L = 107.5$
- $CF = 20$
- $f = 17$
- $h = 5$

$$\text{Median} = 107.5 + \left( \frac{30.5 - 20}{17} \right) \times 5$$

$$= 107.5 + \left( \frac{10.5}{17} \right) \times 5$$

$$= 107.5 + (3.1) = 110.6$$

---

## Step 4: Calculate Mode

The **modal class** is the class with the highest frequency, which is **107.5 - 112.5** (since it has the highest frequency of 17).

The formula for **Mode**:

$$\text{Mode} = L + \left( \frac{f_1 - f_0}{2f_1 - f_0 - f_2} \right) \times h$$

Where:

- $L = 107.5$  (Lower boundary of modal class)
- $f_1 = 17$  (Frequency of modal class)
- $f_0 = 12$  (Preceding class frequency)
- $f_2 = 14$  (Succeeding class frequency)
- $h = 5$  (Class width)

$$\begin{aligned}\text{Mode} &= 107.5 + \left( \frac{17 - 12}{2(17) - 12 - 14} \right) \times 5 \\ &= 107.5 + \left( \frac{5}{34 - 26} \right) \times 5 \\ &= 107.5 + \left( \frac{5}{8} \right) \times 5 \\ &= 107.5 + (3.13) = 110.63\end{aligned}$$

---

## Final Answers

- Mean = 110.66
- Median = 110.6
- Mode = 110.63