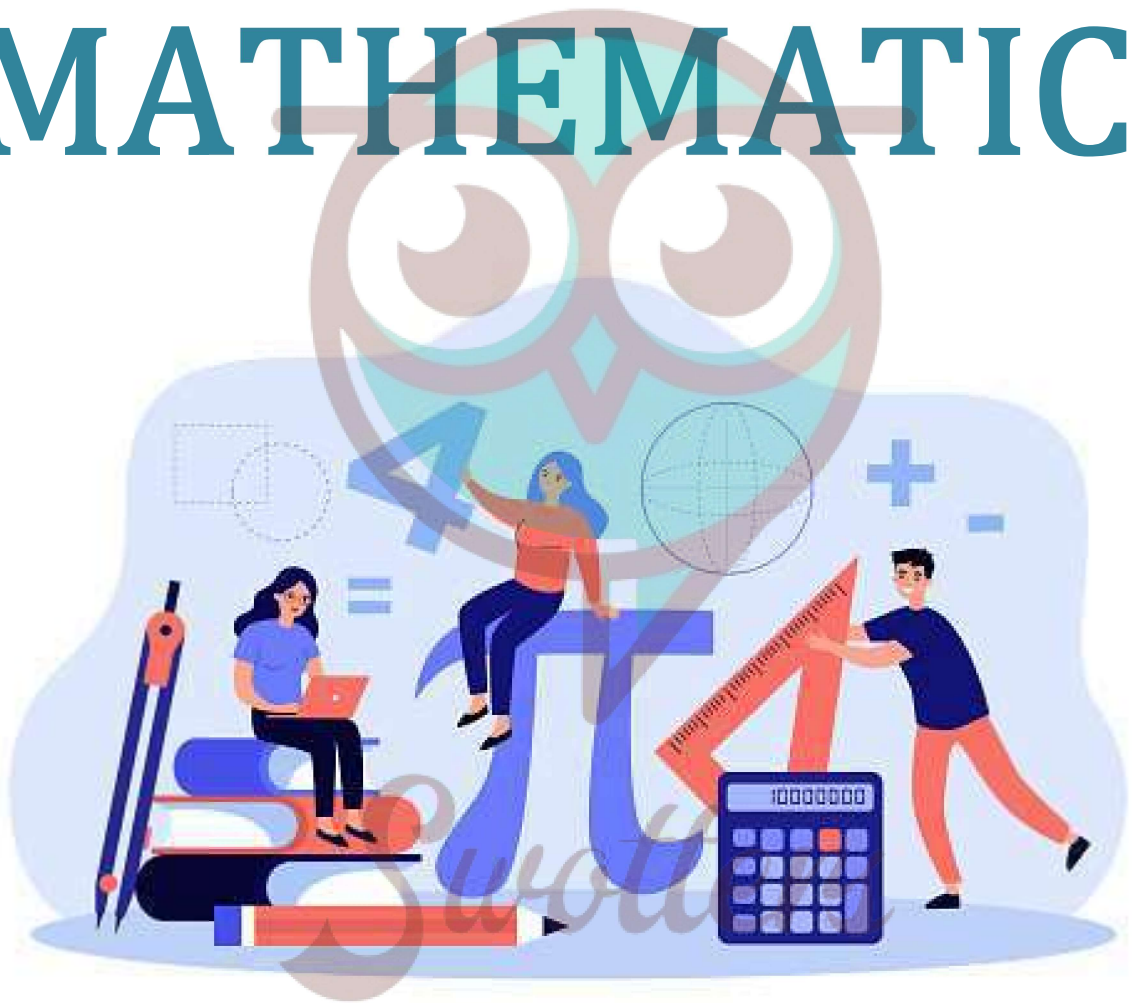# MATHEMATICS

Important Questions

Multiple Choice questions-

Question 1. The class mark of the class 90-130 is:

(a) 90

(b) 105

(c) 115

(d) 110

Question 2. The range of the data:

25, 81, 20, 22, 16, 6, 17,15,12, 30, 32, 10, 91, 8, 11, 20 is

(a) 10

(b) 75

(c) 85

(d) 26

Question 3. In a frequency distribution, the mid value of a class is 10 and the width of the class is 6. The upper limit of the class is:

(a) 6

(b) 7

(c) 10

(d) 13

Question 4. The width of each of five continuous classes in a frequency distribution is 5 and the lower class-limit of the lowest class is 10. The lower class-limit of the highest class is:

(a) 15

(b) 30

(c) 35

(d) 40

Question 5. Let m be the mid-point and 1 be the lower-class limit of a class in a continuous frequency distribution. The upper-class limit of the class is:

(a) $2m + l$

(b) $2m - l$

(c) $m - l$

(d) $m - 2l$

Question 6. The class marks of a frequency distribution are given as follows:

15, 20, 25, …

The class corresponding to the class mark 15 is:

(a) 12.5 – 17.5

(b) 17.5 – 22.5

(c) 18.5 – 21.5

(d) 19.5 – 20.5

Question 7. In the class intervals 10-20, 20-30, the number 20 is included in:

(a) 10-20

(b) 20-30

(c) Both the intervals

(d) None of these intervals

Question 8. A grouped frequency table with class intervals of equal sizes using 250-270 (270 not included in this interval) as one of the class interval is constructed for the following data:

268, 220, 368, 258, 242, 310, 272, 342, 310, 290, 300, 320, 319, 304,402, 318, 406, 292, 354, 278, 210, 240, 330, 316, 406, 215, 258, 236.

The frequency of the class 370-390 is:

(a) 0

(b) 1

(c) 3

(d) 5

Question 9. A grouped frequency distribution table with classes of equal sizes using 63-72 (72 included) as one of the class is constructed for the following data:

30, 32, 45, 54, 74, 78, 108, 112, 66, 76, 88, 40, 14, 20, 15, 35, 44, 66, 75, 84, 95, 96, 102, 110, 88, 74, 112, 14, 34, 44.

The number of classes in the distribution will be:

(a) 9

(b) 10

(c) 11

(d) 12

Question 10. To draw a histogram to represent the following frequency distribution:

Class interval	5–10	10–15	15–25	25–45	45–75
Frequency	6	12	10	8	15

the adjusted frequency for the class 25-45 is:

(a) 6

(b) 5

(c) 3

(d) 2

Very Short:

1. The points scored by a basketball team in a series of matches are follows:

   17, 7, 10, 25, 5, 10, 18, 10 and 24. Find the range.

2. The points scored by a basketball team in a series of matches are as follows:

   17, 2, 7, 27, 25, 5, 14, 18, 10. Find the median.

3. The scores of an English test (out of 100) of 20 students are given below:

   75, 69, 88, 55, 95, 88, 73, 64, 75, 98, 88, 95, 90, 95, 88, 44, 59, 67, 88, 99. .:: Find the median and mode of the data.

4. Mean of 20 observations is 17. If in the observations, observation 40 is replaced by 12, find the new mean.

5. Mean of 36 observations is 12. One observation 47 was misread as 74. Find the correct mean.

6. The median of the data 26, 56, 32, 33, 60, 17, 34, 29, 45 is 33. If 26 is replaced by 62, then find the new median.

7. There are 50 numbers. Each number is subtracted from 53 and the mean of the numbers so obtained is found to be - 3.5. Find the mean of the given numbers

8. To draw a histogram to represent the following frequency distribution

Class interval	5-10	10-15	15-25	25-45	45-75
Frequency	6	12	10	8	15

Find the adjusted frequency for the class 25-45

Short Questions:

1. For a particular year, following is the distribution of ages (in years) of primary school teachers in district:

Age (in years)	15 - 20	20 - 25	25 - 30	30 - 35	35 - 40	40 - 45	45 - 50
No. of Teachers	10	30	50	50	30	6	4

(i) Write the lower limit of first-class interval.

(ii) Determine the class limits of the fourth-class interval.

(iii) Find the class mark of the class 45 – 50.

(iv) Determine the class size.

2. Find the mean of the following distribution:

x	5	10	15	20	25
f	4	12	20	28	36

3. In figure, there is a histogram depicting daily wages of workers in a factory. Construct the frequency distribution table.
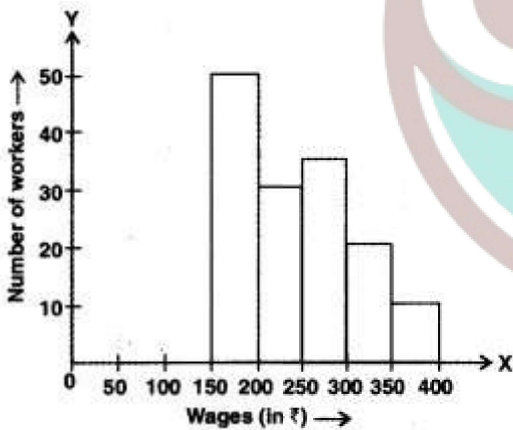
4. Ten observations 6, 14, 15, 17, x + 1, 2x – 13, 30, 32, 34, 43 are written in ascending order. The median of the data is 24. Find the value of x.

5. Draw a histogram for the given data:

Class Interval	Frequency
20 – 25	21
25 – 30	22
30 – 35	50
35 – 40	75
40 – 45	67
45 – 50	51
50 – 55	18

6. Given are the scores (out of 25) of 9 students in a Monday test:

14, 25, 17, 22, 20, 19, 10, 8 and 23

Find the mean score and median score of the data.

Long Questions:

1. Find the mean salary of 60 workers of a factory from the following table:

Salary (in ₹)	Number of Workers
3000	16
4000	12
5000	10
6000	8
7000	6
8000	4
9000	3
10000	1
Total	60

2. In a school marks obtained by 80 students are given in the table. Draw a histogram. Also, make frequency polygon

Marks obtained (Mid Value)	Number of students
305	12
315	18
325	28
335	15
345	5
355	2

3. The following two tables gives the distribution of students of two sections according to the marks obtained by them:

Section-A		Section-B	
Marks	Frequency	Marks	Frequency
0 – 10	3	0 – 10	5
10 – 20	9	10 – 20	19
20 – 30	17	20 – 30	15
30 – 40	12	30 – 40	10
40 – 50	9	40 – 50	1

Represent the marks of the students of both the sections on the same graph by two frequency polygons. From the two polygons compare the performance of the two sections.

4. The mean weight of 60 students of a class is 52.75 kg. If mean weight of 25 students of this class is 51 kg, find the mean weight of remaining 35 students of the class.

5. Find the missing frequencies in the following frequency distribution. If it is known that the

mean of the distribution is 50.16 and the total number of items is 125

x	10	30	50	70	90
f	17	f_1	32	f_2	19

Assertion and Reason Questions-

1. In these questions, a statement of assertion followed by a statement of reason is given. Choose the correct answer out of the following choices.

   a) Assertion and reason both are correct statements and reason is correct explanation for assertion.

   b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.

   c) Assertion is correct statement but reason is wrong statement.

   d) Assertion is wrong statement but reason is correct statement.

Assertion: The range of the first 6 multiples of 6 is 9.

Reason: Range = Maximum value – Minimum value

2. In these questions, a statement of assertion followed by a statement of reason is given. Choose the correct answer out of the following choices.

   a) Assertion and reason both are correct statements and reason is correct explanation for assertion.

   b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.

   c) Assertion is correct statement but reason is wrong statement.

   d) Assertion is wrong statement but reason is correct statement.

Assertion: The median of the following observation 0, 1, 2, 3, x , x + 2, 8, 9, 11, 12 arranged in ascending order is 63, then the value of x is 62.

Reason: Median of n even observations is $\dfrac{\left(\frac{n}{2}\right)^{th} \text{ term} + \left(\frac{n}{2}+1\right)^{th} \text{ term}}{2}$

Answer Key:

MCQ:

1. (d) 110

2. (c) 85

3. (d) 13

4. (b) 30

5. (b) 2m – I

6. (a) 12.5 – 17.5

7. (b) 20-30

8. (a) 0

9. (b) 10

10. (d) 2

Very Short Answer:

1. Here, maximum points = 25 and

   minimum points = 5

   Range = Maximum value - Minimum value

   = 25 - 5 = 20

2. Here, points scored in ascending order are 2, 5, 7, 10, 14, 17, 18, 25, 27, we have n = 9 terms

   $$\therefore \text{Median} = \left(\frac{n+1}{2}\right)^{th} \text{term} = \left(\frac{9+1}{2}\right)^{th} \text{term} = 5^{th} \text{term} = 14$$

3. The scores of an English test (out of 100) in ascending order are

   44, 55, 59, 64, 67, 69, 73, 75, 75, 88, 88, 88, 88, 88, 90, 95, 95, 95, 98, 99

   Here, n = 20

   $$\therefore \text{Median} = \text{Mean of } \left(\frac{n}{2}\right)^{th} \text{term and } \left(\frac{n}{2}+1\right)^{th} \text{term}$$

   = Mean of 10th and 11th term Median

   = Mean of 88 and 88 = 88

   Mode = 88 [∵ 88 occured max. no. of times i.e., 5 times]

4. Since mean of 20 observations is 17

   ∴ Sum of the 20 observations = 17 × 20 = 340

   New sum of 20 observations = 340 - 40 + 12 = 312

   New mean = $\frac{312}{20}$ = 15.6

5. Mean of 36 observations = 12

   Total of 36 observations = 36 × 12 = 432

Correct sum of 36 observations = 432 - 74 + 47 = 405

Correct mean of 36 observations = $\frac{405}{36}$ = 11.25

6. Here, the given data in ascending order is 17, 29, 32, 33, 34, 45, 56, 60, 62

Now, median is $\left(\frac{9+1}{2}\right)^{th}$ term i.e., 5th term.

Hence, new median is 34.

7. There are 50 numbers. Each number is subtracted from 53 and the mean of the numbers so obtained is found to be – 3.5. Find the mean of the given numbers.

Solution:

Let x be the mean of 50 numbers.

i. Sum of 50 numbers = 50x

Since each number is subtracted from 53.

According to question, we have

$$\frac{53 \times 50 - 50x}{50} = -3.5$$

$$\Rightarrow \quad 2650 - 50x = -175 \Rightarrow 50x = 2825$$

$$\Rightarrow \quad x = \frac{2825}{50} = 56.5$$

8. Adjusted frequency of a class

$$= \frac{\text{Minimum class size of frequency distribution} \times \text{Frequency of given class}}{\text{Class size of given class}}$$

$\therefore$ Adjusted frequency for the class 25-45 = $\frac{5 \times 8}{20}$ = 2

Short Answer:

Ans: 1. (i) First class interval is 15 – 20 and its lower limit is 15.

(ii) Fourth class interval is 30 – 35

Lower limit is 30 and upper limit is 35.

(iii) Class mark of the class 45 – 50 = $\frac{45 + 502}{2} = \frac{95}{2}$ = 47.5

(iv) Class size = Upper limit of each class interval – Lower limit of each class interval

$\therefore$ Here, class size = 20 – 15 = 5

Ans: 2.

x	f	fx
5	4	20
10	12	120
15	20	300
20	28	560
25	36	900
Total	Σf = 100	Σfx = 1900

Now,   mean $(\bar{x})$ = $\dfrac{\Sigma fx}{\Sigma f}$ = $\dfrac{1900}{100}$ = 19

Ans: 3.

Class interval	Frequency
150-200	50
200-250	30
250-300	35
300-350	20
350-400	10
Total	**145**

Ans: 4. Here, the arranged data is 6, 14, 15, 17, x + 1, 2x − 13, 30, 32, 34, 43

Total number of observations = 10

Here, 10 is an even number, therefore, median will be the mean of $\left(\dfrac{10}{2}\right)$th and $\left(\dfrac{10}{2}+1\right)$th observation.

∴   Median = $\dfrac{5\,\text{th observation} + 6\,\text{th observation}}{2}$

$= \dfrac{x+1+2x-13}{2} = \dfrac{3x-12}{2}$
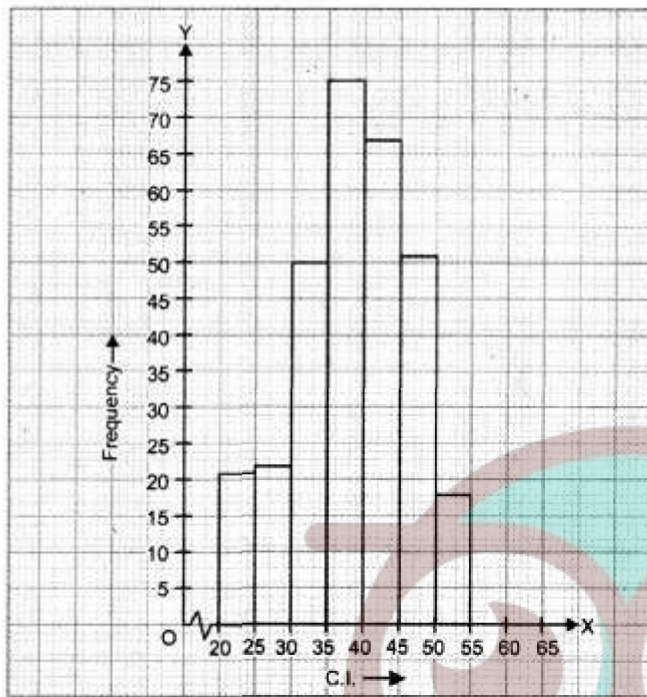
But median of data is 24 (given)

$\Rightarrow \dfrac{3x-122}{2}$ = 24

$\Rightarrow$ 3x - 12 = 48

$\Rightarrow$ 3x = 60

$\Rightarrow$ x = 20

∴ The value of x = 20

Ans: 5. Let us represent class-intervals along x-axis and corresponding frequencies along y-axis on a suitable scale, the required histogram is as under:

Ans: 6. Ascending order of scores is:

8, 10, 14, 17, 19, 20, 22, 23, 25

$$\text{Now, mean score} = \frac{8+10+14+17+19+20+22+23+25}{9} = \frac{158}{9} = 17.5 \text{ marks}$$

$$\text{Median} = \left(\frac{n+1}{2}\right)^{th} \text{ observation because } n \text{ is odd}$$

$$= \left(\frac{9+1}{2}\right)^{th} \text{ observation} = 5^{th} \text{ observation} = 19 \text{ marks}$$

Long Answer:

Ans: 1.

Salary (in ₹) (x_i)	Number of Workers (f_i)	$f_i x_i$
3000	16	48000
4000	12	48000
5000	10	50000
6000	8	48000
7000	6	42000
8000	4	32000
9000	3	27000
10000	1	10000
Total	$\Sigma f_i = N = 60$	$\Sigma f_i x_i = 305000$

$$\therefore \quad \text{Mean} = \bar{x} = \frac{\sum_{i=1}^{n} f_i x_i}{\sum_{i=1}^{n} f_i}$$

$$\Rightarrow \quad \bar{x} = \frac{305000}{60} \quad \Rightarrow \quad \bar{x} = 5083.33$$
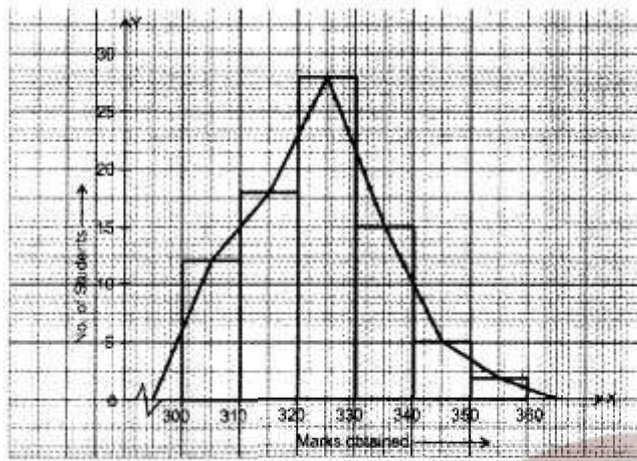
Hence, mean salary of 60 workers is ₹ 5083.33

Ans: 2. $\therefore$ Lower limit of first-class interval is 305 - 102 = 300

Upper limit of first-class interval is 305 + 102 = 310

Thus, first class interval is 300 – 310

| Marks obtained	Number of students
300 – 310	12
310 – 320	18
320 – 330	28
330 – 340	15
340 – 350	5
350 – 360	2

Required histogram and frequency polygon is given on the graph paper

Ans: 3. The class marks are as under:

Marks	Class Marks	Section-A Frequency	Section-B Frequency
0 – 10	5	3	5
10 – 20	15	9	19
20 – 30	25	17	15
30 – 40	35	12	10
40 – 50	45	9	1

Let us take class marks on X-axis and frequencies on Y-axis. To plot frequency polygon of Section-A, we plot the points (5, 3), (15, 9), (25,17), (35,12), (45, 9) and join these points by (15,19). line segments. To plot frequency polygon of Section-B, we plot the points (5, 5), (15, 19), (25, 15), (35, 10), (45, 1) on the same scale and join these points by dotted line segments.
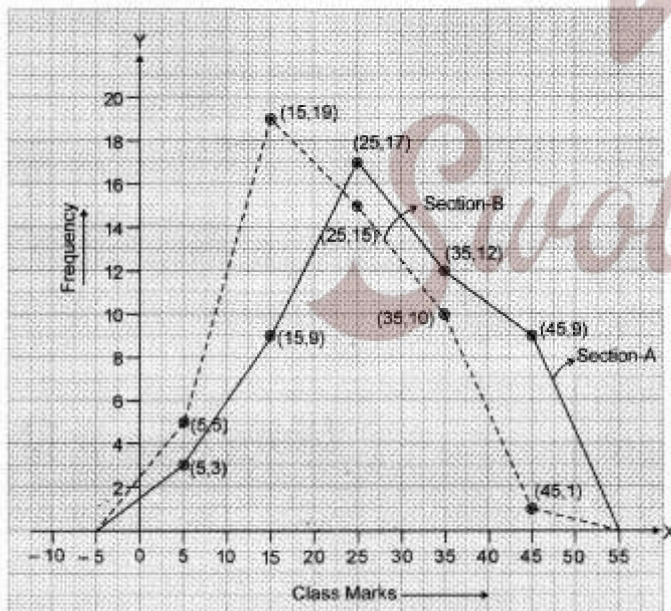
From the above two polygons, clearly the performance of Section A is better.

Ans: 4. Total weight of 60 students = 60 × 52.75kg = 3165kg

Total weight of 25 students = 25 × 51kg = 1275kg

∴ Total weight of 35 students = (3165 − 1275) kg = 1890kg

∴ Mean weight of 35 students = 189035 = 54kg

Ans: 5. Since total number of items = 125

∴ 17 + f_1 + 32 + f_1 + 19 = 125

f_1 + f_2 = 125 - 17 - 32 - 19

f_1 + f_2 = 57 …..(i)

Now, mean of data = 50.16

We know that

$$\frac{\Sigma f_i x_i}{\Sigma f_i} = 50.16$$

$$\Rightarrow \quad \frac{10 \times 17 + 30 \times f_1 + 50 \times 32 + 70 \times f_2 + 90 \times 19}{125} = 50.16$$

$$\Rightarrow \quad 170 + 30f_1 + 1600 + 70f_2 + 1710 = 125 \times 50.16$$

$$\Rightarrow \quad 3480 + 30f_1 + 70f_2 = 6270$$

$$\Rightarrow \quad 30f_1 + 70f_2 = 6270 - 3480$$

$$\Rightarrow \quad 30f_1 + 70f_2 = 2790$$

$$\Rightarrow \quad 3f_1 + 7f_2 = 279 \qquad \ldots (ii)$$

Multiplying (i) by 3, we have

$$3f_1 + 3f_2 = 171 \qquad \ldots (iii)$$

Subtracting (iii) from (ii) we have

$$7f_2 - 3f_2 = 279 - 171$$

$$\Rightarrow \quad 4f_2 = 108 \quad \Rightarrow f_2 = \frac{108}{4} = 27$$

Now, put $f_2 = 27$ in (i), we have

$$f_1 + 27 = 57$$

$$f_1 = 57 - 27 = 30$$

Hence, $\quad f_1 = 30$ and $f_2 = 27$

Assertion and Reason Answers-

1. d)   Assertion is wrong statement but reason is correct statement.

Explanation:

Know that the first 5 multiples of 4 are

$$\Rightarrow 4, 8, 12, 16, 20$$

The range is given as the difference between the maximum value and the minimum value.

Therefore, the range of multiples of 4 is

$$\Rightarrow 20 - 4$$
$$\Rightarrow 16$$

Hence, (A) is wrong but (R) is true.

2. a)   Assertion and reason both are correct statements and reason is correct explanation for assertion.
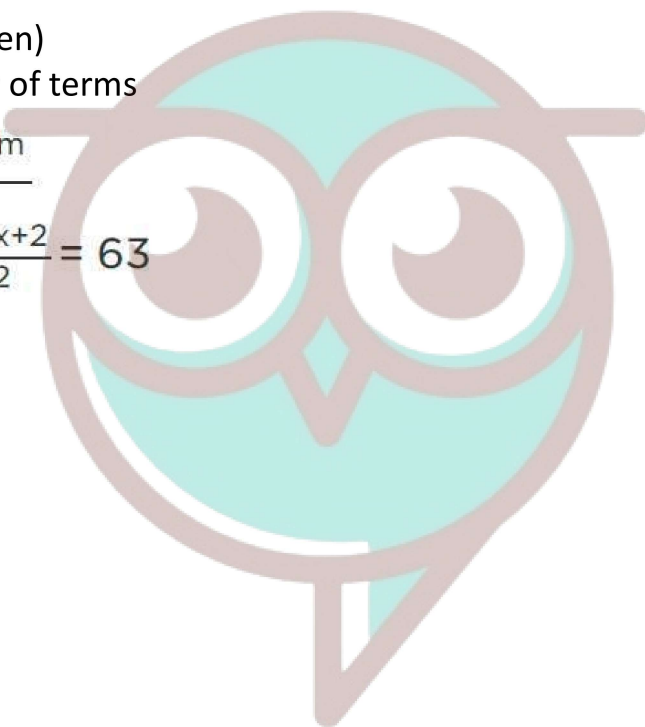
Explanation:

Number of terms = 10 (even)
Median of n even number of terms

$$= \frac{(\frac{n}{2})^{th} \text{ term} + (\frac{n}{2}+1)^{th} \text{ term}}{2}$$

$$= \frac{5^{th} \text{ term} + 6^{th} \text{ term}}{2} = \frac{x+x+2}{2} = 63$$

$$\Rightarrow 2x+2=126$$
$$\Rightarrow x=62$$