PRACTICE SET 6.1 PAGE NO: 138

1. The following table shows the number of students and the time they utilized daily for their studies. Find the mean time spent by students for their studies by direct method.

Time (hrs.)	0–2	2–4	4–6	6–8	8–10
No. of students	7	18	12	10	3

Solution:

Using given data, we can construct a table.

Time	Class mark (x_i)	Number of students (f_i)	$x_i f_i$
0 – 2	1	7	7
2 – 4	3	18	54
4 – 6	5	1	60
6 – 8	7	10	70
8 – 10	9	3	27
Total		$\sum f_i = 50$	$\sum x_i \times f_i = 218$

we know that,

$\Rightarrow$ Mean $= \bar{x} = \frac{\sum x_i \times f_i}{\sum f_i} = \frac{218}{50} = 4.36$

$\Rightarrow$ Mean $\bar{x} = 4.36$

2. In the following table, the toll paid by drivers and the number of vehicles is shown. Find the mean of the toll by 'assumed mean' method.

Toll (Rupees)	300–400	400–500	500–600	600–700	700–800
No. of vehicles	80	110	120	70	40

Solution:

Using given data, we can construct a table.

Time	Class mark(x_i)	$p_i = x_i - A$ $p_i = x_i - 550$	$p_i = \frac{d_i}{100}$	No of Drivers (f_i)	$p_i \times f_i$
300-400	350	-200	-2	80	-160
400-500	450	-100	-1	110	-110
500-600	550 = A	0	0	120	0
600-700	650	100	1	70	70
700-800	750	200	2	40	80
Total				$\sum f_i = 420$	$\sum p_i \times f_i = -120$

We know that

$\Rightarrow$ Mean $= \bar{p} = \frac{\sum p_i \times f_i}{\sum f_i} = \frac{-120}{420} = -0.2857$

$\Rightarrow \bar{p} \times 100 = -28.57$

$\Rightarrow$ Mean $\bar{x} = A + 100\,\bar{p}$

$\Rightarrow \bar{x} = 550 + (-28.57)$

$\Rightarrow$ Mean $\bar{x} = 521.43$

Mean toll is Rs 521.43

3. A milk centre sold milk to 50 customers. The table below gives the number of customers and the milk they purchased. Find the mean of the milk sold by direct method.

Milk Sold (Litre)	1–2	2–3	3–4	4–5	5–6
No. of Customers	17	13	10	7	3

Solution:

Using given data, we can construct a table.

Milk sold	Class mark(x_i)	No of customers(f_i)	$x_i \times f_i$
1-2	1.5	17	25.5
2-3	2.5	13	32.5
3-4	3.5	10	35
4-5	4.5	7	31.5
5-6	5.5	3	16.5
Total		$\sum f_i = 50$	$\sum x_i \times f_i = 141$

We know that

$\Rightarrow$ Mean $= \bar{x} = \frac{\sum x_i \times f_i}{\sum f_i} = \frac{141}{50} = 2.82$ litre

$\Rightarrow$ Mean $\bar{x} = 2.82$ litre

Mean of the milk sold is 2.82 litre

PRACTICE SET 6.2 PAGE NO: 145

1. The following table shows classification of number of workers and the number of hours they work in a software company. Find the median of the number of hours they work.

Daily No. of hours	8–10	10–12	12–14	14–16
Number of workers	150	500	300	50

Solution:

Using given data, we can construct a table.

Daily hours Class	No of workers (f_i)	Cumulative frequency less than(cf)
8-10	150	150
10-12	500	650
12-14	300	950
14-16	50	1000

Here,

N = 1000

$\frac{N}{2} = 500$

⇒ 500 Lies in class 10-12

⇒ Median class 10-12

L = lower limit of median class = 10

N = sum of frequencies = 1000

h = class interval of median class = 2

f = frequency of median class = 500

c f = cumulative frequency of class preceding median class = 150

we know that,

$$\Rightarrow \text{Median} = L + \left[\frac{\frac{N}{2}-cf}{f}\right] \times h$$

$$\Rightarrow \text{Median} = 10 + \left[\frac{500-150}{500}\right] \times 2$$

⇒ Median = 11.4

2. The frequency distribution table shows the number of mango trees in a grove and

their yield of mangoes. Find the median of data.

No. of Mangoes	50–100	100–150	150–200	200–250	250–300
No. of trees	33	30	90	80	17

Solution:

Using given data, we can construct a table.

No of mangoes Class	No of trees (f_i)	Cumulative frequency less than(cf)
50-100	33	33
100-150	30	63
150-200	90	153
200-250	80	233
250-300	17	250

Here N = 250

$\frac{N}{2} = 125$

⇒ 125 Lies in class 100-150

⇒ Median class 100-150

L = lower limit of median class = 100

N = sum of frequencies = 250

h = class interval of median class = 50

f = frequency of median class = 30

cf = cumulative frequency of class preceding median class = 33

⇒ Median $= L + \left[\frac{\frac{N}{2}-cf}{f}\right] \times h$

Substituting the values, we get

$100 + [\frac{\frac{250}{2} - 33}{30}] \times 50$

$\Rightarrow 100 + [\frac{125 - 33}{30}] \times 50$

⇒ Median = 253.33

PRACTICE SET 6.3 PAGE NO: 149

1. The following table shows the information regarding the milk collected from farmers on a milk collection centre and the content of fat in the milk, measured by a lactometer. Find the mode of fat content.

Content of fat (%)	2–3	3–4	4–5	5–6	6–7
Milk collected (Litre)	30	70	80	60	20

Solution:

Using given data, we can construct a table.

Content of fat (%)	Milk collected (Litre)
2-3	30
3-4	70-f_0
4-5	80-f_1
5-6	60-f_2
6-7	20

Here maximum amount of milk collected in class 4-5

⇒ 4-5 is modal class

L = lower limit of modal class = 4

h = class interval of modal class = 1

f_1 = frequency of modal class = 80

f_2 = frequency of class succeeding modal class = 60

f_0 = frequency of class preceding modal class = 70

we know that,

$$\Rightarrow \text{Mode} = L + \left[\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right] \times h$$

Substituting the values, we get

$$\Rightarrow \text{Mode} = 4 + \left[\frac{80-70}{2\times80-70-60}\right] \times 1$$

$$\Rightarrow \text{Mode} = 4 + \left[\frac{10}{30}\right] \times 1$$

⇒ Mode = 4.33 litre

2. Electricity used by some families is shown in the following table. Find the mode for

use of electricity.

Use of electricity (Unit)	0–20	20–40	40–60	60–80	80–100	100–120
No. of families	13	50	70	100	80	17

Solution:

Using given data, we can construct a table.

Use of electricity (Unit)	No. of families
0-20	13
20-40	50
40-60	$70-f_0$
60-80	$100-f_1$
80-100	$80-f_2$
100-120	17

Here maximum amount of Electricity in class 60-80

$\Rightarrow$ 60-80 is modal class

L = lower limit of modal class = 60

h = class interval of modal class = 20

f_1 = frequency of modal class = 100

f_2 = frequency of class succeeding modal class = 80

f_0 = frequency of class preceding modal class = 70

we know that,

$$\Rightarrow \text{Mode} = L + \left[\frac{f_1-f_0}{2f_1-f_0-f_2}\right] \times h$$

Substituting the values, we get

$$\Rightarrow \text{Mode} = 60 + \left[\frac{100-70}{2\times100-70-80}\right] \times 20$$

$$\Rightarrow \text{Mode} = 60 + \left[\frac{30}{50}\right] \times 20$$

$\Rightarrow$ Mode = 72 families

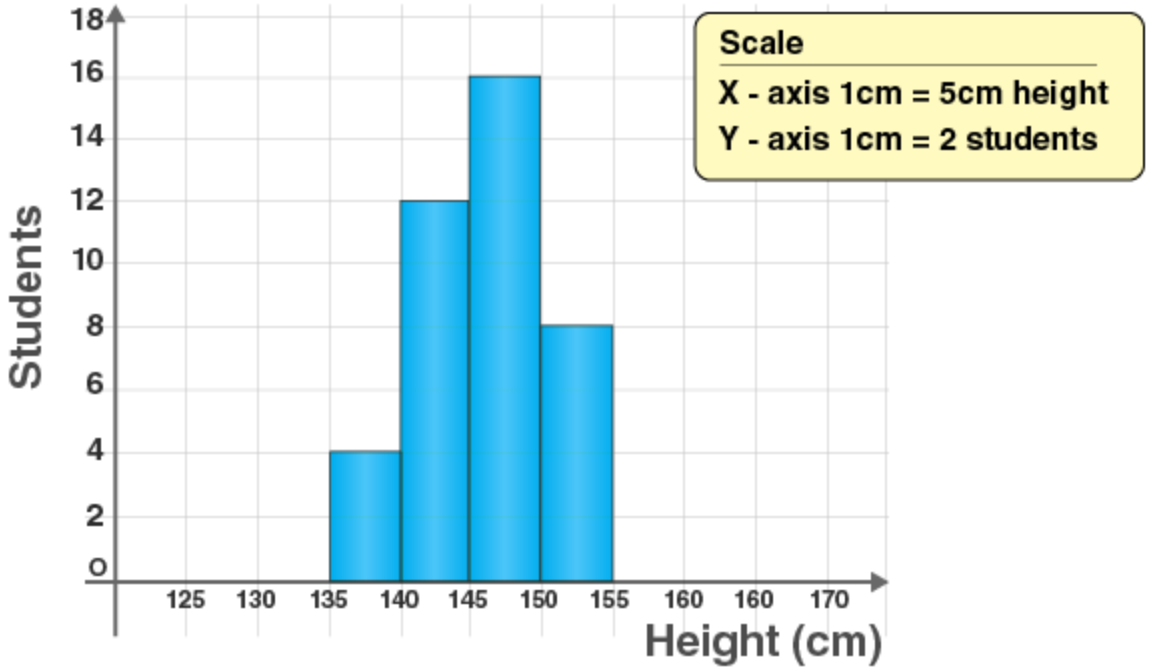
PRACTICE SET 6.4 PAGE NO: 153

1. Draw a histogram of the following data.

Height of student (cm)	135–140	140–145	145–150	150–155
No. of students	4	12	16	8

Solution:

For the given data we can construct histogram which is given below.



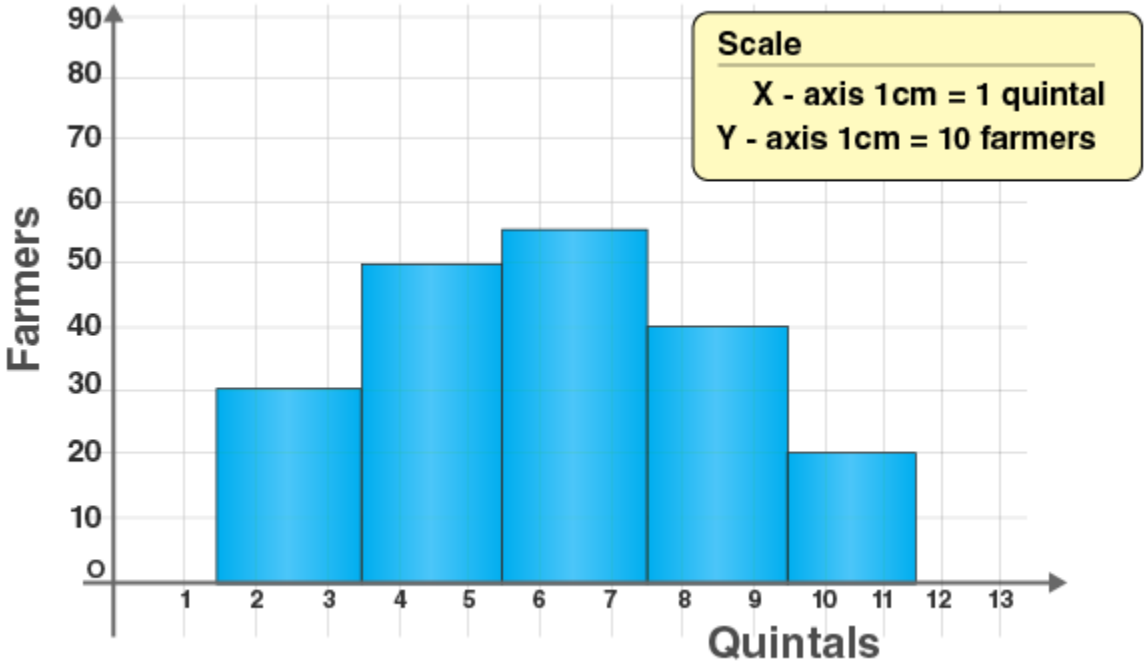
2. The table below shows the yield of jowar per acre. Show the data by histogram.

Yield per acre (quintal)	2–3	4–5	6–7	8–9	10–11
No. of farmers	30	50	55	40	20

Solution:

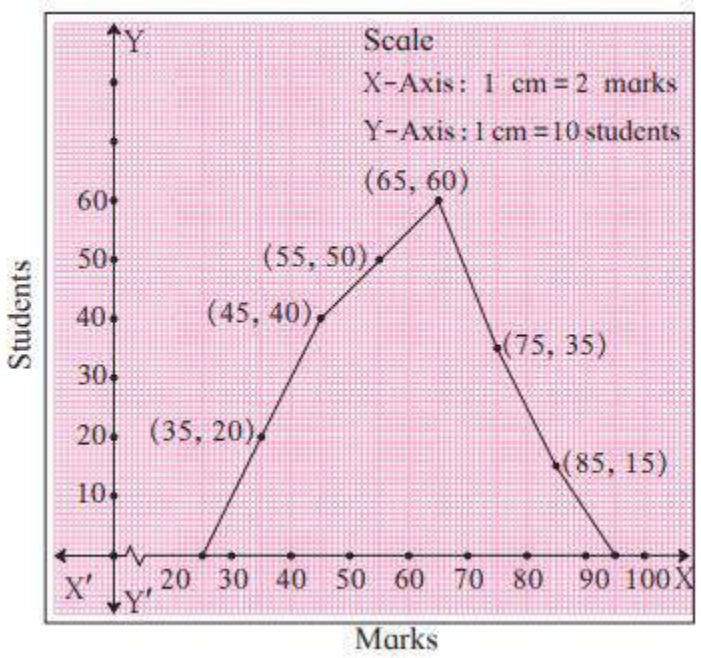
Given classes are not continuous, so let us construct a continuous class.

Continuous class	1.5-3.5	3.5-5.5	5.5-7.5	7.5-9.5	9.5-11.5
frequency	30	50	55	40	20


Scale
X - axis 1cm = 1 quintal
Y - axis 1cm = 10 farmers
Farmers
90
80
70
60
50
40
30
20
10
O
1
2
3
4
5
6
7
8
9
10
11
12
13
Quintals

PRACTICE SET 6.5 PAGE NO: 156

1. Observe the following frequency polygon and write the answers of the questions below it.



(1) Which class has the maximum number of students?

Solution:
Class 60-70 has maximum number of students

(2) Write the classes having zero frequency.

Solution:
Class 20-30 and class 90-100 have zero frequency

(3) What is the class-mark of the class, having frequency of 50 students?

Solution:
Frequency 50 students is for class 50-60
Class mark for this class is 55

(4) Write the lower and upper-class limits of the class whose class mark is 85.

Solution:
Class mark is 85 for class 80-90
Lower limit = 80
Upper limit = 90

(5) How many students are in the class 80-90?

Solution:
There are 15 students in class 80-90

PRACTICE SET 6.6 PAGE NO: 163

1. The age group and number of persons, who donated blood in a blood donation camp is given below. Draw a pie diagram from it.

Age group (Yrs)	20–25	25–30	30–35	35–40
No. of persons	80	60	35	25

Solution:

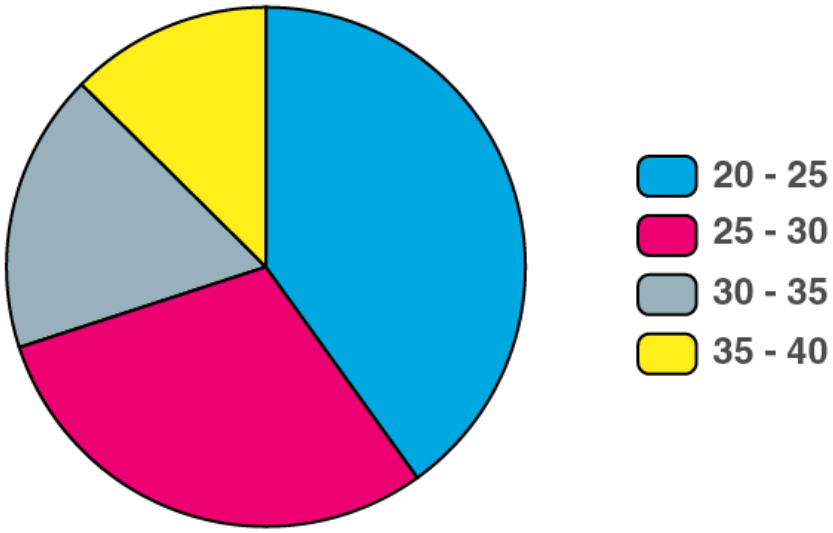
Let us find the measures of central angles and show them in a table.

We Know that,

$$\text{Measures of central angles} = \frac{\text{No. of persons}}{\text{Total number of persons}} \times 360°$$

Age group (yrs)	No. of persons	Measure of central angles
20-25	80	$\frac{80}{200} \times 360° = 144°$
25-30	60	$\frac{60}{200} \times 360° = 108°$
30-35	35	$\frac{35}{200} \times 360° = 63°$
35-40	25	$\frac{25}{200} \times 360° = 45°$
Total	200	360°

Now we shall show the table into a pie chart.



2. The marks obtained by a student in different subjects are shown. Draw a pie diagram showing the information.

Subject	English	Marathi	Science	Mathematics	Social science	Hindi
Marks	50	70	80	90	60	50

Solution:

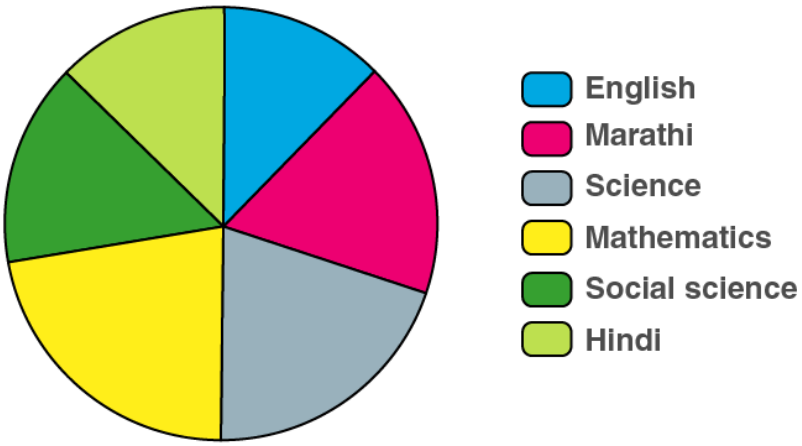
Let us find the measures of central angles and show them in a table.

We Know that,

$$\text{Measures of central angles} = \frac{\text{Marks}}{\text{Total Marks}} \times 360°$$

Subject	Marks	Measure of central angles
English	50	$\frac{50}{400} \times 360° = 45°$
Marathi	70	$\frac{70}{400} \times 360° = 63°$
Science	80	$\frac{80}{400} \times 360° = 72°$
Mathematics	90	$\frac{90}{400} \times 360° = 81°$
Social Science	60	$\frac{60}{400} \times 360° = 54°$
Hindi	50	$\frac{50}{400} \times 360° = 45°$
Total	400	360°

Now we shall show the table into a pie chart.



3. In a tree plantation programme, the number of trees planted by students of different classes is given in the following table. Draw a pie diagram showing the information.

Standard	5 th	6 th	7 th	8 th	9 th	10 th
No. of trees	40	50	75	50	70	75

Solution:

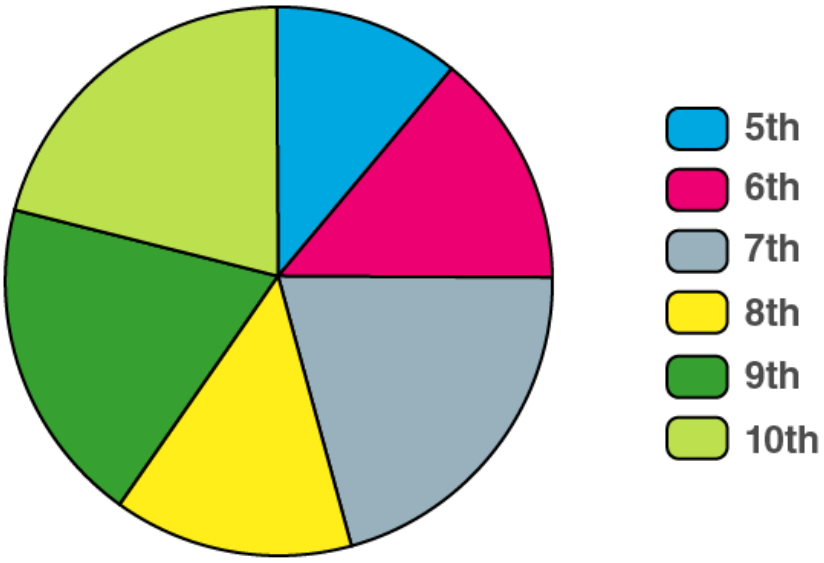
Let us find the measures of central angles and show them in a table.

We Know that,

$$\text{Measures of central angles} = \frac{\text{No. of trees}}{\text{Total number of trees}} \times 360°$$

Standard	No. of trees	Measure of central angles
5^{th}	40	$\frac{40}{360} \times 360° = 40°$
6^{th}	50	$\frac{50}{360} \times 360° = 50°$
7^{th}	75	$\frac{75}{360} \times 360° = 75°$
8^{th}	50	$\frac{50}{360} \times 360° = 50°$
9^{th}	70	$\frac{70}{360} \times 360° = 70°$
10^{th}	75	$\frac{75}{360} \times 360° = 75°$
Total	360	360°

Now we shall show the table into a pie chart.


5th
6th
7th
8th
9th
10th

MISCELLANEOUS PROBLEMS - 6 PAGE NO: 164

1. Find the correct answer from the alternatives given.

(1) The persons of O- blood group are 40%. The classification of persons based on blood groups is to be shown by a pie diagram. What should be the measures of angle for the persons of O- blood group?

A. 114°

B. 140°

C. 104°

D. 144°

Solution:

D. 144°

Explanation:

Given is, percentage of persons of O - blood group = 40%

⇒ Sample of persons of O - blood group = 40

& Total sample of persons = 100

(∵ 40/100 implies that out of 100 samples, 40 are persons of O- blood group)

And we know,

$$\text{Central angle for persons of O} - \text{blood group} = \frac{\text{Sample of persons of O} - \text{blood group}}{\text{Total sample of persons}} \times 360°$$

$$\Rightarrow \text{Central angle for persons of O} - \text{blood group} = \frac{40}{100} \times 360°$$

⇒ Central angle for persons of O- blood group = 144

Thus, the correct option is (D).

(2) Different expenditures incurred on the construction of a building were shown by a pie diagram. The expenditure

Rs 45,000 on cement was shown by a sector of central angle of 75°. What was the total expenditure of the construction?

A. 2,16,000

B. 3,60,000

C. 4,50,000

D. 7,50,000

Solution:
A. 2,16,000

Explanation:
The pie diagram shows, the central angle for expenditure on cement = 75°
Also, expenditure on cement = Rs. 45,000
We know that,
Central angle for expenditure on cement

$$= \frac{\text{Expenditure on cement}}{\text{Total expenditure on the contruction}} \times 360°$$

$$\text{Total expenditure on the construction} = \frac{\text{Expenditure on cement}}{\text{Central angle for expenditure on cement}} \times 360°$$

$$\Rightarrow \text{Total expenditure on the construction} = \frac{45000}{75°} \times 360°$$

$\Rightarrow$ Total expenditure on the construction = 216000
Thus, the correct option is (A).

(3) Cumulative frequencies in a grouped frequency table are useful to find . . .
A. Mean
B. Median
C. Mode
D. All of these

Solution:
B. Median

Explanation:
Median is the middle value of the set of ordered data. The position of the median is given by $\{(n + 1)/2\}^{th}$ value, where n is the number of values in a set of data.

(4) The formula to find mean from a grouped frequency table is $\overline{X} = A + \frac{\sum f_i u_i}{\sum f_i} \times h$ ℐ
In the formula u_i = . . .

(A) $\frac{x_i + A}{\text{ℐ}}$ (B) $(x_i - A)$ (C) $\frac{x_i - A}{\text{ℐ}}$ (D) $\frac{A - x_i}{\text{ℐ}}$

Solution:

(C) $\frac{x_i - A}{g}$

Explanation:

Among the given option, $(X_i – A)/g$ is the correct option.

Where X_i = values in the given data corresponding to i^{th} position.

A = Assumed mean

g = class size

Thus, (C) is the correct option.

(5)

Distance Covered per litre (km)	12–14	14–16	16–18	18–20
No. of cars	11	12	20	7

The median of the distances covered per litre shown in the above data is in the group . . .. .

A. 12-14

B. 14-16

C. 16-18

D. 18-20

Solution:

C. 16-18

Explanation:

Here, $(n/2)^{th} = (50/2)^{th} = 25^{th}$ term

cf = 23 < 25 ⇒ Median class = 16-18

Median class is the next class of interval of cumulative frequency.

Thus, option (C) is correct.

(6)

No. of trees planted by each student	1–3	4–6	7–9	10–12
No. of students	7	8	6	4

The above data is to be shown by a frequency polygon. The coordinates of the points to show number of students in the class 4-6 are . . . .

A. (4, 8)

B. (3, 5)
C. (5, 8)
D. (8, 4)

Solution:
C. (5, 8)

Explanation:

Class	Continuous Class	Class mark	Frequency	Coordinate
1-3	0.5-3.5	2	7	(2,7)
4-6	3.5-6.5	5	8	(5,8)
7-9	6.5-9.5	8	6	(8,6)
10-12	9.5-12.5	11	4	(11,4)

So, the coordinates of the points to show number of students in the class 4-6 are (5,8).
Thus, option (C) is correct.

2. The following table shows the income of farmers in a grape season. Find the mean of their income.

Income (Thousand Rupees)	20–30	30–40	40–50	50–60	60–70	70–80
Farmers	10	11	15	16	18	14

Solution:
Using given data, we can construct a table which is mentioned below.

Class (Income in Rs. 1000)	Class Mark x_i	Frequency (farmers) f_i	Class Mark × Frequency x_if_i
20-30	25	10	250
30-40	35	11	385
40-50	45	15	675
50-60	55	16	880
60-70	65	18	1170
70-80	75	14	1050
TOTAL		$\Sigma f_i = 84$	$\Sigma x_if_i = 4410$

Mean is given by

$$\text{Mean} = \frac{\sum x_i f_i}{\sum f_i}$$

⇒ Mean = 4410/84

⇒ Mean = 52.5

Now, since the income is given in thousand rupees.

Then, Mean = 52.5 × 1000

⇒ Mean = 52500

Thus, mean income is Rs. 52,500.

3. The loans sanctioned by a bank for construction of farm ponds are shown in the following table. Find the mean of the loans.

Loan (Thousand rupees)	40–50	50–60	60–70	70–80	80–90
No. of farm ponds	13	20	24	36	7

Solution:

Using given data, we can construct a table which is mentioned below.

Class (Loan in Rs. 1000)	Class Mark x_i	Frequency (No. of farm pounds) f_i	Class Mark × Frequency $x_i f_i$
40-50	45	13	585
50-60	55	20	1100
60-70	65	24	1560
70-80	75	36	2700
80-90	85	7	595
TOTAL		$\Sigma f_i = 100$	$\Sigma x_i f_i = 6540$

Mean is given by

$$\text{Mean} = \frac{\sum x_i f_i}{\sum f_i}$$

⇒ Mean = 6540/100

⇒ Mean = 65.4

Now, since the loan is given in thousand rupees.

Then, Mean = 65.4 × 1000

⇒ Mean = 65400

Thus, mean loan is Rs. 65,400.

4. The weekly wages of 120 workers in a factory are shown in the following frequency

distribution table. Find the mean of the weekly wages.

Weekly wages (Rupees)	0–2000	2000–4000	4000–6000	6000–8000
No. of workers	15	35	50	20

Solution:

Using given data, we can construct a table which is mentioned below.

Class (Weekly wages in Rs.)	Class Mark x_i	Frequency (No. of workers) f_i	Class Mark × Frequency x_if_i
0-2000	1000	15	15000
2000-4000	3000	35	105000
4000-6000	5000	50	250000
6000-8000	7000	20	140000
TOTAL		$\Sigma f_i = 120$	$\Sigma x_if_i = 510000$

Mean is given by

$$\text{Mean} = \frac{\sum x_i f_i}{\sum f_i}$$

⇒ Mean = 510000/120

⇒ Mean = 4250

Thus, mean weekly wages is Rs. 4250.

5. The following frequency distribution table shows the amount of aid given to 50 flood affected families. Find the mean of the amount of aid.

Amount of aid (Thosand rupees)	50–60	60–70	70–80	80–90	90–100
No. of families	7	13	20	6	4

Solution:

Using given data, we can construct a table which is mentioned below.

Class (Amount of aid in Rs. 1000)	Class Mark x_i	Frequency (No. of families) f_i	Class Mark × Frequency x_if_i
50-60	55	7	385
60-70	65	13	845
70-80	75	20	1500
80-90	85	6	510
90-100	95	4	380
TOTAL		$\Sigma f_i = 50$	$\Sigma x_if_i = 3620$

Mean is given by

$$\text{Mean} = \frac{\sum x_i f_i}{\sum f_i}$$

⇒ Mean = 3620/50

⇒ Mean = 72.4

Now, since the amount of aid is given in thousand rupees.

Then, Mean = 72.4 × 1000

⇒ Mean = 72400

Thus, mean amount of aid is Rs. 72,400.

6. The distances covered by 250 public transport buses in a day is shown in the following frequency distribution table. Find the median of the distances.

Distance (km)	200–210	210–220	220–230	230–240	240–250
No. of buses	40	60	80	50	20

Solution:

Let us prepare cumulative frequency table:

Class (Distance in km)	Frequency (No. of buses) F	Cumulative frequency cf
200-210	40	40
210-220	60	100
220-230	80	180
230-240	50	230
240-250	20	250

Here, N = 250

N/2 = 250/2 = 125

Since, cumulative frequency 180 is just greater than 125. ⇒ median class = 220-230

Median is given by

$$\text{Median} = L + \left[\frac{\frac{N}{2} - cf}{f}\right] \times h$$

Where l = lower limit of the median class
N = Sum of frequencies
h = class interval of the median class
cf = Cumulative frequency of the class preceding the median class
f = Frequency of the median class
Here, Median class = 220-230
L = 220
N/2 = 125
h = 10
cf = 100
f = 80
Putting all these values in the median formula, we get

$$\text{Median} = 220 + \left[\frac{125 - 100}{80}\right] \times 10$$

⇒ Median = 220 + 250/80
⇒ Median = 220 + 3.125 = 223.125
Or Median is approximately 223.13 km
Thus, median of the distances is 223.13 km.