Statistics

CHAPTER 14

NCERT FOCUS

SOLUTIONS

EXERCISE - 14.1

1. Following are five examples of data which are related to day-to-day life :
(i) Heights of girl students in our class.
(ii) Number of computer sets in our computer lab.
(iii) Telephone bills of our house of last three years.
(iv) Number of students appeared in an examination obtained from newspapers.
(v) Number of female teachers in all the schools in a state obtained from the education department.

2. We have, Primary data : (i), (ii) and (iii);
Secondary data : (iv) and (v)

EXERCISE - 14.2

1. The frequency distribution table is :

Blood groups	Tally marks	Number of Students
A	𝍸 ||||	9
B	𝍸 |	6
O	𝍸 𝍸 ||	12
AB	|||	3

The most common blood group is O.
The rarest blood group is AB.

2. Here, the observations with minimum and maximum values are 2 and 32 respectively.
∴ The class intervals are as follows :
0 - 5, 5 - 10, 10 - 15, 15 - 20, 20 - 25, 25 - 30, 30 - 35
The frequency distribution table is

Distance (in km)	Tally marks	Frequency
0-5	𝍸	5
5-10	𝍸 𝍸 |	11
10-15	𝍸 𝍸 |	11
15-20	𝍸 ||||	9
20-25	|	1
25-30	|	1
30-35	||	2

From the table we observe that :
(i) Frequencies of class interval 5 - 10 and 10 - 15 are equal, *i.e.*, 11 each. It shows that maximum number of engineers have their residences at 5 to 15 km away from their work place.
(ii) Frequencies of class intervals 20 - 25 and 25 - 30 are also equal, *i.e.*, 1 each. It shows that minimum number of engineers have their residences at 20 to 30 km away from their work place.

3. (i) The required frequency distribution table is :

Relative humidity (in %)	Tally marks	Frequency
84-86	|	1
86-88	|	1
88-90	||	2
90-92	||	2
92-94	𝍸 ||	7
94-96	𝍸 |	6
96-98	𝍸 ||	7
98-100	||||	4

(ii) Since, the relative humidity is high during the rainy season, so, the data appears to be taken in the rainy season.

(iii) Range = Highest value – Lowest value
= 99.2 – 84.9 = 14.3

4. (i) The frequency distribution table is :

Heights (in cm)	Tally marks	Number of Students
150 - 155	𝍸 𝍸 ||	12
155 - 160	𝍸 ||||	9
160 - 165	𝍸 𝍸 ||||	14
165 - 170	𝍸 𝍸	10
170 - 175	𝍸	5

(ii) More than 50% of the students are shorter than 165 cm.

5. (i) The frequency distribution table is :

Concentration of sulphur dioxide (in ppm)	Tally marks	Frequency
0.00 - 0.04	||||	4
0.04 - 0.08	𝍸 ||||	9

0.08 - 0.12	𝍸 IIII	9
0.12 - 0.16	II	2
0.16 - 0.20	IIII	4
0.20 - 0.24	II	2

(ii) The concentration of sulphur dioxide was more than 0.11 ppm for (2 + 4 + 2) = 8 days.

6. The frequency distribution table is :

Number of heads	Tally marks	Frequency
0	𝍸 I	6
1	𝍸 𝍸	10
2	𝍸 IIII	9
3	𝍸	5

7. (i) The frequency distribution table is,

Digits	Tally marks	Frequency
0	II	2
1	𝍸	5
2	𝍸	5
3	𝍸 III	8
4	IIII	4
5	𝍸	5
6	IIII	4
7	IIII	4
8	𝍸	5
9	𝍸 III	8

(ii) The most frequently occurring digits are 3 and 9 and the least frequently occurring digit is 0.

8. (i) The required frequency distribution is :

Number of hours	Tally marks	Frequency
0 - 5	𝍸 𝍸	10
5 - 10	𝍸 𝍸 III	13
10 - 15	𝍸	5
15 - 20	II	2

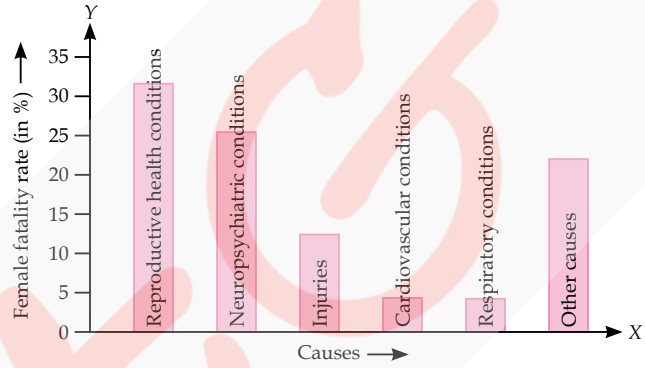
(ii) Number of children who watched TV for 15 or more hours a week = 2.

9. The frequency distribution table is :

Life of batteries (in years)	Tally marks	Frequency
2.0 - 2.5	II	2
2.5 - 3.0	𝍸 I	6
3.0 - 3.5	𝍸 𝍸 IIII	14
3.5 - 4.0	𝍸 𝍸 I	11
4.0 - 4.5	IIII	4
4.5 - 5.0	III	3

EXERCISE - 14.3

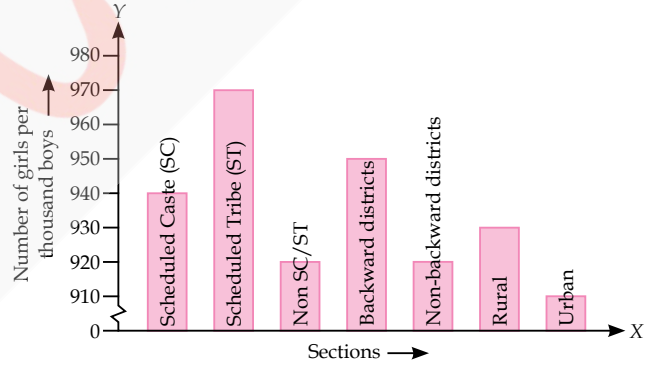
1. (i) The required graphical representation is given below :



(ii) The major cause of women's ill health and death worldwide is 'reproductive health conditions'.

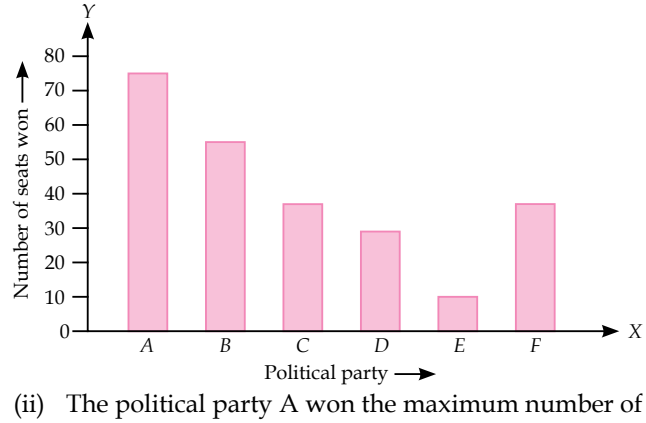
(iii) Two factors may be uneducation and poor background.

2. (i) : The required bar graph is :



(ii) Number of girls (per thousand boys) are maximum in scheduled tribes whereas minimum in urban section.

3. (i) The required bar graph is given below :

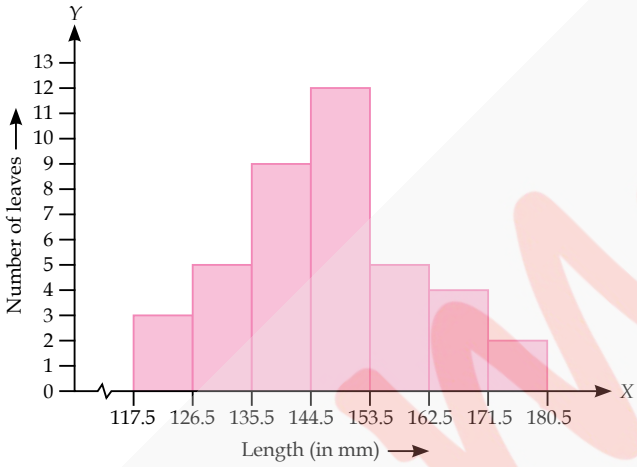


(ii) The political party A won the maximum number of seats.

4. (i) The given frequency distribution is not continuous. Therefore, first we have to modify it to be continuous distribution.
Thus, the modified frequency distribution is :

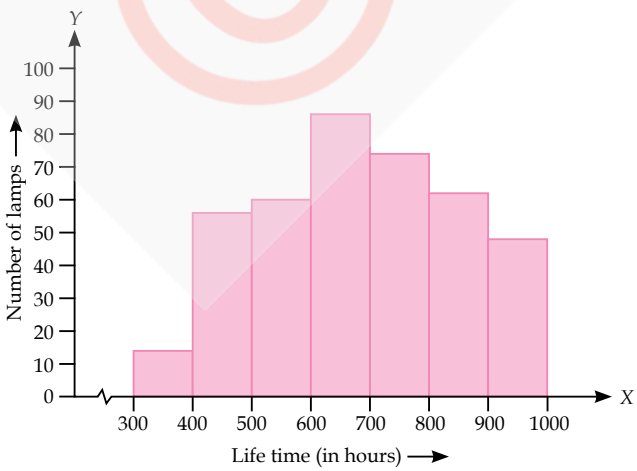
Length (in mm)	Number of leaves
117.5 - 126.5	3
126.5 - 135.5	5
135.5 - 144.5	9
144.5 - 153.5	12
153.5 - 162.5	5
162.5 - 171.5	4
171.5 - 180.5	2

Now, the required histogram of the above frequency distribution is :



(ii) Yes, other suitable graphical representation is a 'frequency polygon'.
(iii) No, it is not a correct statement. The maximum number of leaves are not 153 mm long rather they are from 145 mm to 153 mm long.

5. (i) The required histogram is shown as:

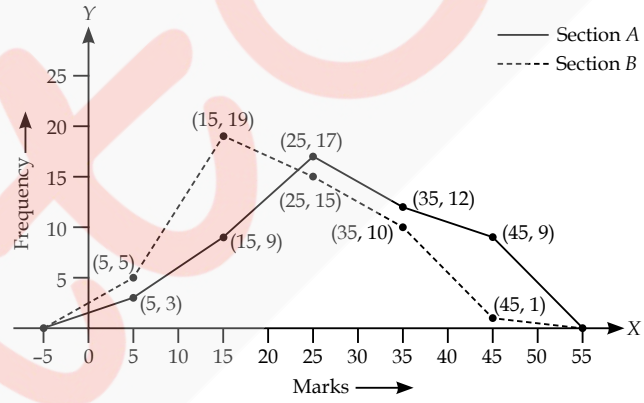


(ii) Number of lamps having life time more than 700 hours = 74 + 62 + 48 = 184.

6. To draw a frequency polygon we mark the class marks along x-axis. Therefore, the modified table is :

Marks	Class marks	Frequency Section *A*	Frequency Section *B*
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

So, the two frequency polygons are as shown below :

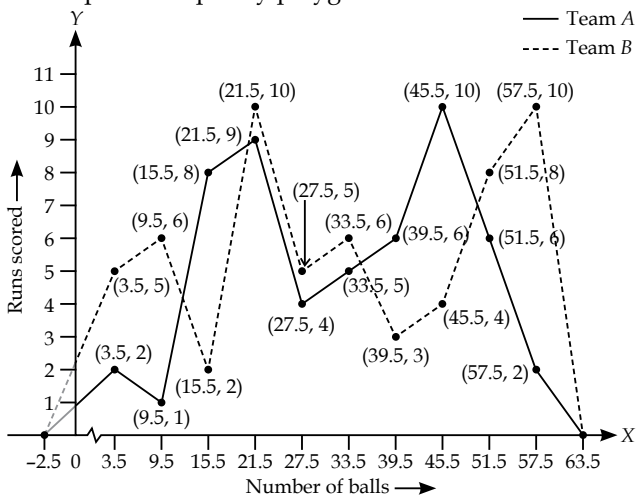


More students of section A have secured good marks than students of section B.

7. The given class intervals are not continuous. Therefore, we first modify the distribution as continuous.

Number of balls	Class Marks	Frequency Team *A*	Frequency Team *B*
0.5 - 6.5	3.5	2	5
6.5 - 12.5	9.5	1	6
12.5 - 18.5	15.5	8	2
18.5 - 24.5	21.5	9	10
24.5 - 30.5	27.5	4	5
30.5 - 36.5	33.5	5	6
36.5 - 42.5	39.5	6	3
42.5 - 48.5	45.5	10	4
48.5 - 54.5	51.5	6	8
54.5 - 60.5	57.5	2	10

The required frequency polygons are as follows :



8. Here, the class sizes are different therefore, we calculate the adjusted frequencies so that area of rectangles become proportional to the frequencies :

Adjusted frequency

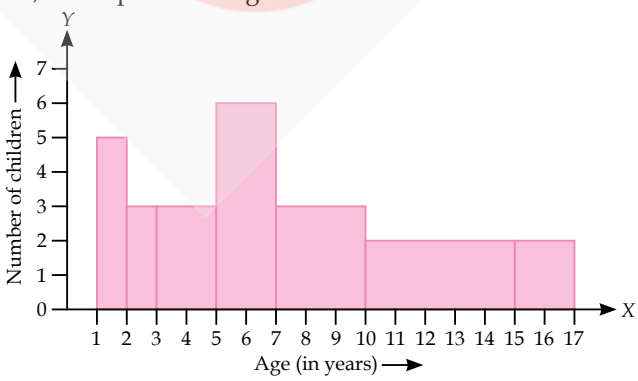
$$= \left[\frac{\text{Minimum class size}}{\text{Class size of corresponding class}}\right] \times \text{Frequency of corresponding class}$$

Here, the minimum class size = 2 – 1 = 1

Thus, we have :

Age (in years)	Frequency	Width of class	Adjusted Frequency
1 - 2	5	1	$\frac{1}{1}\times 5 = 5$
2 - 3	3	1	$\frac{1}{1}\times 3 = 3$
3 - 5	6	2	$\frac{1}{2}\times 6 = 3$
5 - 7	12	2	$\frac{1}{2}\times 12 = 6$
7 - 10	9	3	$\frac{1}{3}\times 9 = 3$
10 - 15	10	5	$\frac{1}{5}\times 10 = 2$
15 - 17	4	2	$\frac{1}{2}\times 4 = 2$

So, the required histogram is :

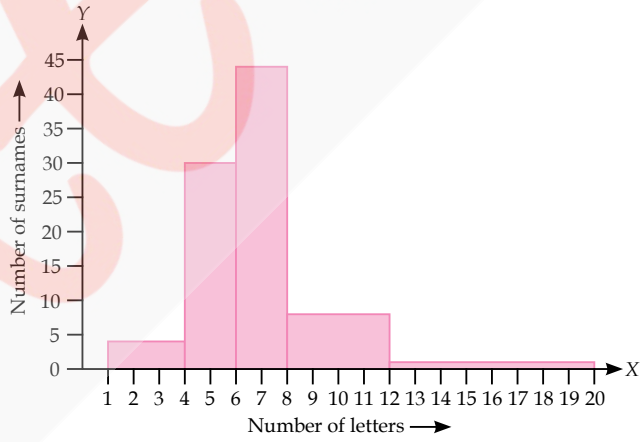


9. (i) Since, class sizes of the given frequency distribution are unequal and the minimum class-size = 6 – 4 = 2.

Thus, we have

Number of letters	Frequency	Width of class	Adjusted Frequency
1 - 4	6	3	$\frac{2}{3}\times 6 = 4$
4 - 6	30	2	$\frac{2}{2}\times 30 = 30$
6 - 8	44	2	$\frac{2}{2}\times 44 = 44$
8 - 12	16	4	$\frac{2}{4}\times 16 = 8$
12 - 20	4	8	$\frac{2}{8}\times 4 = 1$

The required histogram is:



(ii) The maximum frequency is 44, which is corresponding to the class interval 6 - 8.

∴ Maximum surnames lie in the class interval 6 - 8.

EXERCISE - 14.4

1. Mean, $\bar{x} = \frac{\sum_{i=1}^{10} x_i}{n} = \frac{2+3+4+5+0+1+3+3+4+3}{10}$

$= \frac{28}{10} = 2.8$

Now arranging the given data in ascending order, we get

0, 1, 2, 3, 3, 3, 3, 4, 4, 5

No. of observations (n) = 10 (even)

∴ Median

$$= \frac{\text{Value of } \left(\frac{10}{2}\right)^{\text{th}} \text{ observation} + \text{Value of } \left(\frac{10}{2}+1\right)^{\text{th}} \text{ observation}}{2}$$

$$= \frac{\text{Value of } 5^{th} \text{ observation} + \text{Value of } 6^{th} \text{ observation}}{2}$$

$$= \frac{3+3}{2} = \frac{6}{2} = 3$$

Thus, the median of the data = 3

Here, 3 occurs most frequently *i.e.*, 4 times. So, mode = 3.

2. Here, $n = 15$ (odd)

$$\text{Mean, } \bar{x} = \frac{\sum_{i=1}^{n} x_i}{n} = \frac{[41+39+48+52+46+62+54+40+96+52+98+40+42+52+60]}{15}$$

$$= \frac{822}{15} = 54.8$$

Now, arranging the given data in ascending order, we get

39, 40, 40, 41, 42, 46, 48, 52, 52, 52, 54, 60, 62, 96, 98

$\therefore$ Median = Value of $\left(\frac{15+1}{2}\right)^{th}$ observation

= Value of 8^{th} observation = 52

Here, 52 occurs 3 times *i.e.*, the maximum number of times.

$\therefore$ Mode = 52

3. The given observations are arranged in ascending order.

Here, $n = 10$ (even)

$\therefore$ Median

$$= \frac{\text{Value of } \left(\frac{10}{2}\right)^{th} \text{ observation} + \text{Value of } \left(\frac{10}{2}+1\right)^{th} \text{ observation}}{2}$$

$$= \frac{\text{Value of } 5^{th} \text{ observation} + \text{Value of } 6^{th} \text{ observation}}{2}$$

$$\Rightarrow \quad 63 = \frac{x + (x+2)}{2} \quad \Rightarrow \quad 126 = 2x + 2$$

$$\Rightarrow \quad 2x = 124 \quad \Rightarrow \quad x = 62$$

4. Arranging the given data in ascending order, we have 14, 14, 14, 14, 17, 18, 18, 18, 22, 23, 25, 28.

Since the observation 14 is occurring the maximum number of times *i.e.*, 4 times.

$\therefore$ Mode of the given data = 14

5. We have,

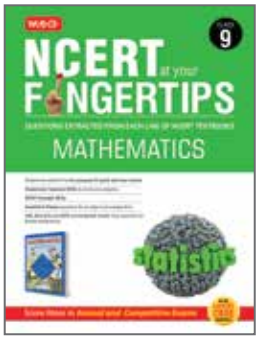
Salary (in ₹) x_i	**No. of workers** f_i	$x_i f_i$
3000	16	48000
4000	12	48000
5000	10	50000
6000	8	48000
7000	6	42000
8000	4	32000
9000	3	27000
10000	1	10000
Total	$\Sigma f_i = 60$	$\Sigma x_i f_i = 305000$

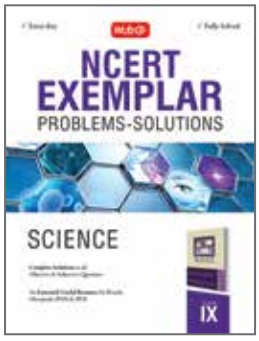
$\therefore$ Mean, $\bar{x} = \frac{\sum x_i f_i}{\sum f_i} = \frac{305000}{60}$ = ₹ 5083.33

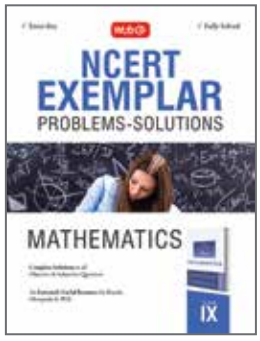
6. (i) Mean height of the students of a class.

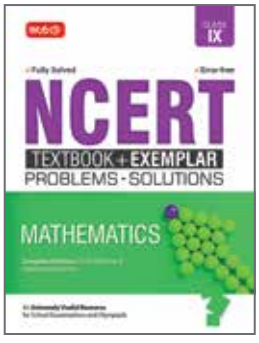
(ii) Median weight of a pen, a book, a rubber band a match box and a chair.

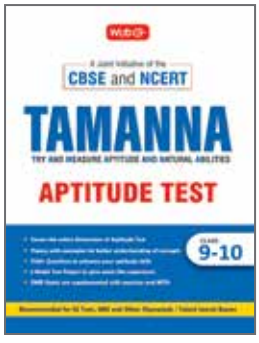
mtG BEST SELLING BOOKS FOR CLASS 9

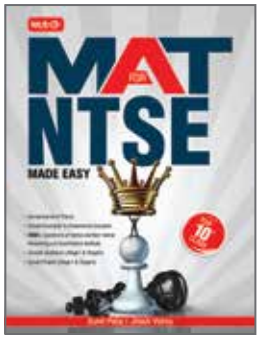


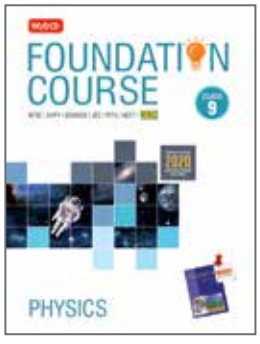


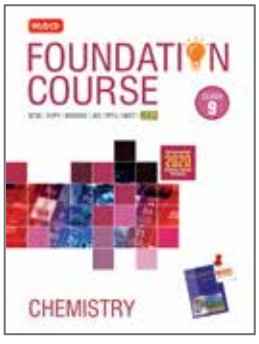


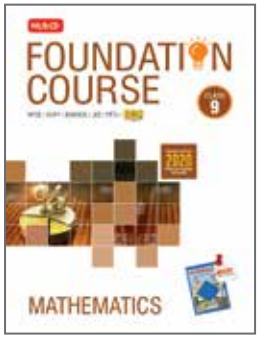


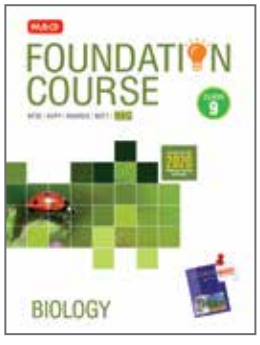


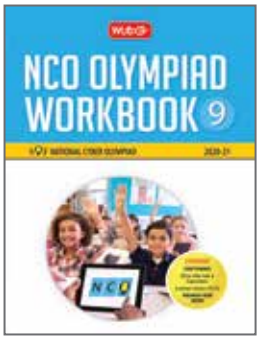


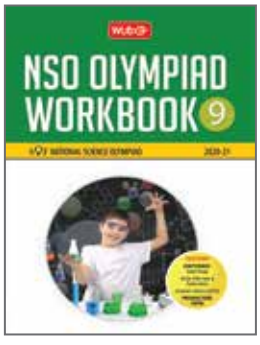


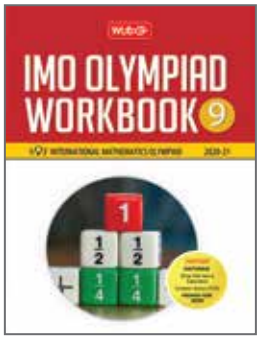


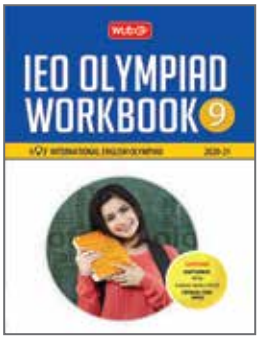


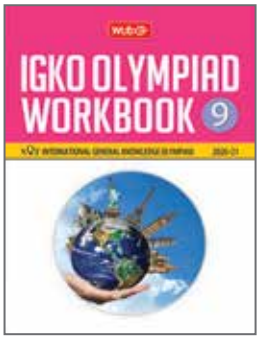


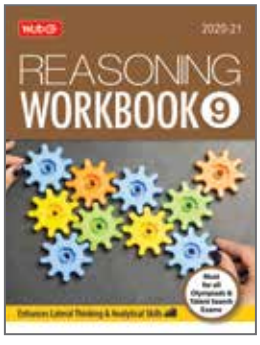












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