

NCERT Solutions - Statistics Chapter 12

Exercise 12.1

Question 1

A survey conducted by an organisation for the cause of illness and death among the women between the ages 15-44 (in years) worldwide, found the following figures (in %):

S.No.	Causes	Female fatality rate (%)
1	Reproductive health conditions	31.8
2	Neuropsychiatric conditions	25.4
3	Injuries	12.4
4	Cardiovascular conditions	4.3
5	Respiratory conditions	4.1
6	Other causes	22.0

(i) Represent the information given above graphically.

Solution: Draw a bar graph with:

- X-axis: Different causes (Reproductive health, Neuropsychiatric, Injuries, Cardiovascular, Respiratory, Other causes)
- Y-axis: Female fatality rate (%) with scale 1 unit = 5%
- Draw bars of equal width with heights proportional to the percentages

(ii) Which condition is the major cause of women's ill health and death worldwide?

Solution: Reproductive health conditions is the major cause of women's ill health and death worldwide with 31.8% fatality rate.

(iii) Try to find out, with the help of your teacher, any two factors which play a major role in the cause in (ii) above being the major cause.

Solution: Two major factors contributing to reproductive health conditions being the major cause are:

1. Lack of proper medical facilities and healthcare during pregnancy and childbirth
 2. Inadequate nutrition and anemia among women of reproductive age
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Question 2

The following data on the number of girls (to the nearest ten) per thousand boys in different sections of Indian society is given below.

Section	Number of girls per thousand boys
Scheduled Caste (SC)	940
Scheduled Tribe (ST)	970
Non SC/ST	920
Backward districts	950
Non-backward districts	920
Rural	930
Urban	910

(i) Represent the information above by a bar graph.

Solution: Draw a bar graph with:

- X-axis: Different sections (SC, ST, Non SC/ST, Backward districts, Non-backward districts, Rural, Urban)
- Y-axis: Number of girls per thousand boys with scale starting from 900 (1 unit = 10 girls)
- Draw bars of equal width with heights according to the values

(ii) In the classroom discuss what conclusions can be arrived at from the graph.

Solution: Conclusions from the graph:

1. Scheduled Tribes (ST) have the highest number of girls per thousand boys (970)
2. Urban areas have the lowest number of girls per thousand boys (910)
3. All sections show less than 1000 girls per thousand boys, indicating gender imbalance
4. Tribal areas show better sex ratio compared to urban and non-tribal areas
5. Backward districts have better ratio than non-backward districts

Question 3

Given below are the seats won by different political parties in the polling outcome of a state assembly elections:

Political Party	A	B	C	D	E	F
Seats Won	75	55	37	29	10	37

(i) Draw a bar graph to represent the polling results.

Solution: Draw a bar graph with:

- X-axis: Political parties (A, B, C, D, E, F)
- Y-axis: Number of seats won with scale 1 unit = 10 seats

- Draw bars of equal width with heights: 7.5, 5.5, 3.7, 2.9, 1, and 3.7 units respectively

(ii) Which political party won the maximum number of seats?

Solution: Political Party A won the maximum number of seats with 75 seats.

Question 4

The length of 40 leaves of a plant are measured correct to one millimetre, and the obtained data is represented in the following table:

Length (in mm)	Number of leaves
118 - 126	3
127 - 135	5
136 - 144	9
145 - 153	12
154 - 162	5
163 - 171	4
172 - 180	2

(i) Draw a histogram to represent the given data.

Solution: First, make the class intervals continuous by subtracting 0.5 from lower limits and adding 0.5 to upper limits:

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

Draw a histogram with:

- X-axis: Length (in mm) starting from 117.5 with scale 1 cm = 9 mm
- Y-axis: Number of leaves with scale 1 cm = 2 leaves
- Draw rectangles with no gaps between them

(ii) Is there any other suitable graphical representation for the same data?

Solution: Yes, a frequency polygon can also be used to represent this data.

(iii) Is it correct to conclude that the maximum number of leaves are 153 mm long? Why?

Solution: No, it is not correct to conclude that the maximum number of leaves are 153 mm long. The class interval 145-153 has the maximum frequency (12 leaves), which means that 12 leaves have lengths between 145 mm and 153 mm, not exactly 153 mm long.

Question 5

The following table gives the life times of 400 neon lamps:

Life time (in hours)	Number of lamps
300 - 400	14
400 - 500	56
500 - 600	60
600 - 700	86
700 - 800	74
800 - 900	62
900 - 1000	48

(i) Represent the given information with the help of a histogram.

Solution: Draw a histogram with:

- X-axis: Life time (in hours) with scale 1 cm = 100 hours
- Y-axis: Number of lamps with scale 1 cm = 10 lamps
- Draw rectangles for each class interval with heights proportional to frequencies
- All class intervals have equal width (100 hours)

(ii) How many lamps have a life time of more than 700 hours?

Solution: Number of lamps with lifetime more than 700 hours = $74 + 62 + 48 = 184$ lamps

Question 6

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

Marks	Section A Frequency	Marks	Section B 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.

Solution:

First, find class marks:

Marks	Class Mark	Section A	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

Draw two frequency polygons on the same graph with:

- X-axis: Marks (use class marks: -5, 5, 15, 25, 35, 45, 55)
- Y-axis: Number of students
- Plot points for both sections and join them with line segments

Comparison:

1. Section A has more students scoring between 20-50 marks
 2. Section B has more students in the 10-20 marks range
 3. Section A has better overall performance with more students in higher mark ranges
 4. Section B has most students concentrated in lower marks (10-20)
 5. Section A shows better distribution across all ranges
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Question 7

The runs scored by two teams A and B on the first 60 balls in a cricket match are given below:

Number of balls	Team A	Team B
1 - 6	2	5
7 - 12	1	6
13 - 18	8	2
19 - 24	9	10
25 - 30	4	5
31 - 36	5	6
37 - 42	6	3
43 - 48	10	4
49 - 54	6	8
55 - 60	2	10

Represent the data of both the teams on the same graph by frequency polygons.

Solution:

First, make class intervals continuous by subtracting 0.5 from lower limits and adding 0.5 to upper limits:

Number of balls	Class Mark	Team A	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

Draw two frequency polygons on the same graph:

- X-axis: Number of balls (use class marks with additional points at -2.5 and 63.5)
- Y-axis: Runs scored
- Plot and join points for both teams

Question 8

A random survey of the number of children of various age groups playing in a park was found as follows:

Age (in years)	Number of children
1 - 2	5
2 - 3	3
3 - 5	6
5 - 7	12
7 - 10	9
10 - 15	10
15 - 17	4

Draw a histogram to represent the data above.

Solution:

Since class intervals have varying widths, we need to calculate adjusted frequencies:

Minimum class size = 1 year

Age (years)	Frequency	Class Width	Adjusted Frequency = (Frequency/Width) $\times$ 1
1 - 2	5	1	$5/1 \times 1 = 5$
2 - 3	3	1	$3/1 \times 1 = 3$
3 - 5	6	2	$6/2 \times 1 = 3$
5 - 7	12	2	$12/2 \times 1 = 6$
7 - 10	9	3	$9/3 \times 1 = 3$
10 - 15	10	5	$10/5 \times 1 = 2$
15 - 17	4	2	$4/2 \times 1 = 2$

Draw a histogram with:

- X-axis: Age (in years)

- Y-axis: Adjusted frequency (proportion of children per 1 year interval)
 - Draw rectangles with varying widths and adjusted heights
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Question 9

100 surnames were randomly picked up from a local telephone directory and a frequency distribution of the number of letters in the English alphabet in the surnames was found as follows:

Number of letters	Number of surnames
1 - 4	6
4 - 6	30
6 - 8	44
8 - 12	16
12 - 20	4

(i) Draw a histogram to depict the given information.

Solution:

Since class intervals have varying widths, calculate adjusted frequencies:

Minimum class size = 2

Number of letters	Frequency	Class Width	Adjusted Frequency = (Frequency/Width) × 2
1 - 4	6	3	$6/3 \times 2 = 4$
4 - 6	30	2	$30/2 \times 2 = 30$
6 - 8	44	2	$44/2 \times 2 = 44$
8 - 12	16	4	$16/4 \times 2 = 8$
12 - 20	4	8	$4/8 \times 2 = 1$

Draw a histogram with:

- X-axis: Number of letters
- Y-axis: Adjusted frequency (proportion of surnames per 2 letter interval)
- Draw rectangles with varying widths and adjusted heights

(ii) Write the class interval in which the maximum number of surnames lie.

Solution: The class interval **6 - 8** has the maximum number of surnames with 44 surnames.