27

Data Representation and Interpretation

By studying this lesson you will be able to,

- represent data in a stem and leaf diagram,
- find the maximum value, minimum value and the range of a collection of data using a stem and leaf diagram, and
- find the mode, median, mean and range of a collection of raw data.

27.1 Stem and leaf diagram

In Grades 6 and 7, you learnt to represent and interpret data using picture graphs, bar graphs and multi bar graphs. Now we will consider what a stem and leaf diagram is and how data is represented in a stem and leaf diagram.

A stem and leaf diagram is a standard method of organizing numerical data to enable us to interpret the data easily.

When data is organized according to this method,

- if the values of the data are from 0 to 99, the value in the units place of a datum is indicated as the leaf and the value in the tens place is indicated as the stem.
- if the values of the data are from 100 to 999, the value in the units place is indicated as the leaf and the values in the tens and hundreds places considered together is indicated as the stem.

- Only the digit in the units place is indicated as the leaf.
- For values from 0 to 9, the stem takes the value 0.
- If a row has more than one leaf value, the values are written leaving a gap between the digits.

Example 1

(i) Write the stem and leaf of each of the numbers 2, 43 and 225.
(ii) Write the datum of which the stem is 3 and the leaf is 0.

(i)

Data	Stem	Leaf
2	0	2
43	4	3
225	22	5

(ii) 30

The marks obtained by 25 students in a certain class for a mathematics test paper marked out of 50 are given below.

5	7	9	11	13
16	19	20	21	22
24	25	26	26	29
31	33	35	36	38
40	43	45	48	49

Let us represent this data in a stem and leaf diagram.

In a stem and leaf diagram, the first column is called the stem and the second column is called the leaf.

Stem	Leaf
0	5 7 9
1	1 3 6 9
2	0 1 2 4 5 6 6 9
3	1 3 5 6 8
4	0 3 5 8 9

Key: 3|1 means 31.

- All the numbers are written in ascending order such that the stems of the numbers are in the first column (stem column) and the leaves of the numbers are in the second column, and with the numbers from 0 to 9 in the first row, the numbers from 10 to 19 in the second row and the numbers from 20 to 29 in the third row etc.
- The numbers in the fourth row of the above stem and leaf diagram have 3 as the stem and 1, 3, 5, 6, 8 respectively as the leaves. Their corresponding values are 31, 33, 35, 36, and 38.

  The numbers represented in the other rows can also be written as shown above.
- It is easier to understand information related to the above 25 data when they are represented in a stem and leaf diagram than when they are written in a row.

- If the students who obtained less than 20 marks failed the test, then we can easily say that the number of students who failed is 3 + 4 = 7.
- If an "A" pass is given to those who have obtained 40 or more marks, then we can easily say by considering the stem and leaf diagram that there are 5 such students.

Therefore, a stem and leaf diagram can be considered as a simple method of representing and understanding data.

Now let us consider through an example how data is organized in ascending order.

Example 2

The heights of some students in a class are given below in centimetres.

141	148	142	130	152	135	157	146	140	160
151	173	139	135	144	134	151	138	137	137
169	136	143	154	146	166	131	150	145	143

(i) Represent this data in a stem and leaf diagram.

(ii) What is the least value of this collection of data?

(iii) What is the greatest value of this collection of data?

Stem	Leaf
13	0 5 9 5 4 8 7 7 6 1
14	1 8 2 6 0 4 3 6 5 3
15	2 7 1 1 4 0
16	0 9 6
17	3

Key : 14|1 means 141.

The stem and leaf diagram prepared with the data values in ascending order is given below.

Stem	Leaf
13	0 1 4 5 5 6 7 7 8 9
14	0 1 2 3 3 4 5 6 6 8
15	0 1 1 2 4 7
16	0 6 9
17	3

(ii) 130 (iii) 173

Now let us consider through the following examples how a collection of data consisting of decimal numbers is represented in a stem and leaf diagram.

Example 3

The birth weights of 25 animals of a certain species are given below in kilogrammes.

6.1	9.8	6.7	8.1	5.6	6.4	7.5	8.6
8.5	7.2	9.5	6.8	8.9	7.3	6.8	7.7
9.3	9.0	8.4	7.6	8.2	8.5	7.9	8.3
9.5							

(i) Represent this data in a stem and leaf diagram.
(ii) What is the minimum birth weight?
(iii) What is the maximum birth weight?

(i) In these decimal numbers, the whole number parts take values from 5 to 9. These are taken as the stems and the decimal parts are taken as the leaves.

Stem	Leaf
5	6
6	1 4 7 8 8
7	2 3 5 6 7 9
8	1 2 3 4 5 5 6 9
9	0 3 5 5 8

Key : 7|3 means 7.3

(ii) 5.6 kg
(iii) 9.8 kg

Exercise 27.1

(1) The period of service of a group of employees of a certain company are given below in months. Represent this data in a stem and leaf diagram.

120 145 164 156 134 129 132 145 158 162

(2) The mass in kilogrammes of the bags of 30 pilgrims who flew to their destination in Dambadiva are given below. Represent this data in a stem and leaf diagram.

30	29	27	28	19	22	18	21	20	24
28	12	23	30	09	21	17	25	27	26
26	10	29	25	24	20	15	29	29	28

(3) The masses of the water melons for sale in a certain shop on a particular day are given below in kilogrammes.

6.5	7.8	5.7	4.3	5.8	6.2	4.3	6.9	7.8	7.2
6.9	5.5	7.7	7.8	5.2	6.7	5.7	6.1	6.0	7.3
7.1	6.7	7.7	4.3	6.5	7.3	6.7	5.8	6.8	5.4

(i) Represent this data in a stem and leaf diagram.

(ii) How many water melons are there for sale in this shop on this day?

(iii) What is the mass of the heaviest water melon for sale in this shop?

(iv) What is the mass of the water melon with the least mass?

27.2 Distribution of data represented in a stem and leaf diagram

The number of customers who bought gift items from a certain shop on each day of a period of 30 days is given below.

Stem	Leaf
0	8 9
1	2 8 9
2	3 2 6 6 9
3	0 5 6 8
4	0 1 1 4
5	3 4 6 7
6	2 5 8
7	2 4 6
8	0 1

Key :4|0 means 40.

- The minimum value of this collection of data is 8.

  This is the minimum number of customers who bought items from the shop on a day in that period of 30 days.
- The maximum value of this collection of data is 81.

  This is the maximum number of customers who bought items from the shop on a day in that period of 30 days.
- Accordingly, this data is distributed from 8 to 81. To find the range of this data, we use;

  Range = Maximum value − Minimum value
  = 81 − 8
  = 73

- When the groups of ten from 0 to 90 are considered, the maximum number of data, that is 5 data, is in the group 20 – 29. The minimum number of data, that is 2 data, is in the groups 0 – 9 and 80 – 89.

Exercise 27.2

(1) A cyclist had a training schedule for a month. The distance he cycled each day is given below in kilometres.

Stem	Leaf
1	5 5 8
2	0 1 3 4 6 7
3	2 4 5 6 6 8 8
4	0 2 4 4 5 6 8 8
5	1 2 4 6
6	3 5

Key : 5|1 means 51.

(i) What is the minimum value of this data?
(ii) What is the maximum distance he cycled in a day during this period?
(iii) Find the range of this data.

(2) 30 students in Grade 8 were given 40 English words to read and then write down. The number of incorrect words written by each student is given below.

16	24	12	15	10	23
23	15	13	19	14	25
26	21	31	24	19	27
35	12	17	29	18	29
32	18	27	31	21	31

(i) Represent this data in a stem and leaf diagram.
(ii) How many incorrect words were written by the student who wrote the least number of incorrect words?
(iii) How many incorrect words were written by the student who wrote the most number of incorrect words?
(iv) Find the range of the incorrect words written by this group of students.
(v) Write the groups of ten to which the greatest and least values belong.

(3) The number of fish buns and bottles of fruit juice sold by a mobile food truck during a period of 30 days are given in the following two stem and leaf diagrams.

Fish buns sold

Stem	Leaf
5	4 5 6 8 8 9
6	0 3 3 5 8 8
7	2 3 3 5 9 9
8	0 0 3 4 5 7
9	0 1 3 4 4 5

Key :6|3 means 63.

Bottles of fruit juice sold

Stem	Leaf
0	8 9
1	0 2 5
2	0 1 3 5 8 9
3	5 6
4	3 4 5
5	0 2 6 8
6	1
7	0 2 5
8	1 4
9	0 2 4 6

Key :8|1 means 81.

(i) What is the minimum number of fish buns sold in a day?
(ii) What is the maximum number of fish buns sold in a day?
(iii) Find the range of the sales of fish buns.
(iv) What is the minimum number of bottles of fruit juice sold in a day?
(v) What is the maximum number of bottles of fruit juice sold in a day?
(vi) Find the range of the sales of bottles of fruit juice.
(vii) Compare the sales of fish buns with the sales of fruit juice and write your conclusions.

(4) The marks obtained for a mathematics test paper marked from 100, by the students of two parallel classes *A* and *B* are given below.

Class *A*

Stem	Leaf
5	0 2 6
6	0 1 3 5 6 6 8
7	2 2 3 5
8	0 2

Key :7|2 means 72.

Class *B*

Stem	Leaf
0	5 9
1	0 2 5 6
2	1
3	2 3
4	4 5 8
5	1 3
6	0 8

Key :5|1 means 51.