*the adjoining classes meet. In spite of this logical difficulty,, when the discrete data are sufficiently large, they are treated for convenience of calculations as continuous and hence are grouped in the same way as the continuous data.*

**Example 2.2** Make a grouped frequency distribution from the following data, relating to the weight recorded to the nearest grams of 60 apples picked out at random from a consignment.

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 106 | 107 | 76 | 82 | 109 | 107 | 115 | 93 | 187 | 95 | 123 | 125 |
| 111 | 92 | 86 | 70 | 126 | 68 | 130 | 129 | 139 | 119 | 115 | 128 |
| 100 | 186 | 84 | 99 | 113 | 204 | 111 | 141 | 136 | 123 | 90 | 115 |
| 98 | 110 | 78 | 185 | 162 | 178 | 140 | 152 | 173 | 146 | 158 | 194 |
| 148 | 90 | 107 | 181 | 131 | 75 | 184 | 104 | 110 | 80 | 118 | 82. |

By scanning the data, we find that the largest weight is 204 grams and the smallest weight is 68 grams so that the range is 204−68=136 grams.

Suppose we decide to take 7 classes of equal size. Then size or width of the equal class interval would be $\frac{136}{7} = 19.47$. But we take $h=20$, the next integral value higher than 19.47 to facilitate the numerical work.

Let us decide to locate the lower limit of the lowest class at 65. With this choice, the class limits will be 65–84, 85–104, 105–124, ..., the class boundaries become 64.5–84.5, 84.5–104.5, 104.5–124.5, ..., and the class-marks are 74.5, 94.5, 114.5.... The grouped frequency distribution is then constructed as follows:

(i) **By listing the actual values:**

**FREQUENCY DISTRIBUTION OF WEIGHTS OF 60 APPLES**

| Weight | Entries | Frequency |
|---|---|---|
| 65 – 84 | 76, 82, 70, 68, 84, 78, 75, 80, 82 | 9 |
| 85 – 104 | 93, 95, 92, 86, 100, 99, 90, 98, 90, 104 | 10 |
| 105 – 124 | 106, 107, 109, 107, 115, 123, 111, 119, 115, 113, 111, 123, 115, 110, 107, 110, 118 | 17 |
| 125 – 144 | 125, 126, 130, 129, 139, 128, 141, 136, 140, 131 | 10 |
| 145 – 164 | 162, 152, 146, 158, 148 | 5 |
| 165 – 184 | 178, 173, 181, 184 | 4 |
| 185 – 204 | 187, 186, 204, 185, 194 | 5 |
| **Total** | | **60** |

This table is sometimes known as an *entry table.* The values against each class may be arranged in an array.

(ii) By using a Tally-Column:

**FREQUENCY DISTRIBUTION OF WEIGHTS OF 60 APPLES**

| Classes (weight) | Class-boundaries | Mid-points or Class-Marks | Tally | Frequency |
|---|---|---|---|---|
| 65 – 84 | 64.5–84.5 | 74.5 | 卌 \|\|\|\| | 9 |
| 85 – 104 | 84.5–104.5 | 94.5 | 卌 卌 | 10 |
| 105 – 124 | 104.5–124.5 | 114.5 | 卌 卌 卌 \|\| | 17 |
| 125 – 144 | 124.5–144.5 | 134.5 | 卌 卌 | 10 |
| 145 – 164 | 144.5–164.5 | 154.5 | 卌 | 5 |
| 165 – 184 | 164.5–184.5 | 174.5 | \|\|\|\| | 4 |
| 185 – 204 | 184.5–204.5 | 194.5 | 卌 | 5 |
| Total | .... | .... | .... | 60 |

**Example 2.3** Given below are the mean annual death rates per 1,000 at ages 20–65 in each of 88 occupational groups. Construct a grouped frequency distribution.

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 7.5 | 8.2 | 6.2 | 8.9 | 7.8 | 5.4 | 9.4 | 9.9 | 10.9 | 10.8 | 7.4 |
| 9.7 | 11.6 | 12.6 | 5.0 | 10.2 | 9.2 | 12.0 | 9.9 | 7.3 | 7.3 | 8.4 |
| 10.3 | 10.1 | 10.0 | 11.1 | 6.5 | 12.5 | 7.8 | 6.5 | 8.7 | 9.3 | 12.4 |
| 10.6 | 9.1 | 9.7 | 9.3 | 6.2 | 10.3 | 6.6 | 7.4 | 8.6 | 7.7 | 9.4 |
| 7.7 | 12.8 | 8.7 | 5.5 | 8.6 | 9.6 | 11.9 | 10.4 | 7.8 | 7.6 | 12.1 |
| 4.6 | 14.0 | 8.1 | 11.4 | 10.6 | 11.6 | 10.4 | 8.1 | 4.6 | 6.6 | 12.8 |
| 6.8 | 7.1 | 6.6 | 8.8 | 8.8 | 10.7 | 10.8 | 6.0 | 7.9 | 7.3 | 9.3 |
| 9.3 | 8.9 | 10.1 | 3.9 | 6.0 | 6.9 | 9.0 | 8.8 | 9.4 | 11.4 | 10.9. |

(B.I.S.E. Lahore, 1971)

A scan of the data shows that the largest value is 14.0 and the smallest value is 3.9 so that the range is 14.0–3.9 = 10.1.

As the data are recorded to one decimal place, we may therefore locate the lower limit of the first group at 3.5. Let us choose a class interval of 1.0. Then the class limits are specified as 3.5–4.4, 4.5–5.4, 5.5–6.4,... With this choice, the class-boundaries are 3.45–4.45, 4.45–5.45, 5.45–6.45,..., which do not coincide with the given values.

The following table shows the required frequency

**FREQUENCY DISTRIBUTION OF MEAN DEATH RATES**

| Death Rates | Class-boundaries | Tally | Frequency |
|---|---|---|---|
| 3.5–4.4 | 3.45–4.45 | \| | 1 |
| 4.5–5.4 | 4.45–5.45 | \|\|\|\| | 4 |
| 5.5–6.4 | 5.45–6.45 | 𝍸 | 5 |
| 6.5–7.4 | 6.45–7.45 | 𝍸 𝍸 \|\|\| | 13 |
| 7.5–8.4 | 7.45–8.45 | 𝍸 𝍸 \|\| | 12 |
| 8.5–9.4 | 8.45–9.45 | 𝍸 𝍸 𝍸 \|\|\|\| | 19 |
| 9.5–10.4 | 9.45–10.45 | 𝍸 𝍸 \|\|\| | 13 |
| 10.5–11.4 | 10.45–11.45 | 𝍸 𝍸 | 10 |
| 11.5–12.4 | 11.45–12.45 | 𝍸 \| | 6 |
| 12.5–13.4 | 12.45–13.45 | \|\|\|\| | 4 |
| 13.5–14.4 | 13.45–14.45 | \| | 1 |
| Total | | | 88 |

**Example 2.4** A survey of 50 retail establishments had assistants,, excluding proprietors, as follows:

2, 3, 9, 0, 4, 4, 1, 5, 4, 8, 5, 3, 6, 6, 0, 2,
2, 7, 6, 4, 8, 4, 3, 3, 1, 0, 8, 7, 5, 1, 3, 4, 7, 2, 4, 7,
5, 2, 6, 3, 1, 7, 5, 4, 6, 4, 2, 5, 3, 4.

Arrange the values as a frequency distribution.

By scanning the data, we find that the number of assistants is a *discrete variable* and the range is small, so the data can be conveniently sorted by taking the values of classes as 0, 1, 2, etc. The frequency distribution is then constructed as shown below:

**FREQUENCY DISTRIBUTION OF ASSISTANTS IN 50 RETAIL ESTABLISHMENTS**

| Number of Assistants ($x$) | Tally | Number of Establishments ($f$) |
|---|---|---|
| 0 | \|\|\| | 3 |
| 1 | \|\|\|\| | 4 |
| 2 | 𝍸 \| | 6 |
| 3 | 𝍸 \|\| | 7 |
| 4 | 𝍸 𝍸 | 10 |
| 5 | 𝍸 \| | 6 |
| 6 | 𝍸 | 5 |
| 7 | 𝍸 | 5 |
| 8 | \|\|\| | 3 |
| 9 | \| | 1 |
| Total | .... | 50 |

Such a frequency distribution in which each class consists of a single value is sometimes called a discrete or ungrouped frequency distribution.