



## Frequency Distributions

Frequency tables are used to organize a large set of quantitative data into something easier to understand. Frequency tables can be constructed to show individual data values ( $x$ ) and the number of times each value occurs or frequency,  $f(x)$ . This is an **ungrouped frequency distribution**. Frequency tables can also be constructed by breaking data into smaller classes (intervals) and showing how many data values are in each class. This is called a **grouped frequency distribution**.

*Example:* Set up a grouped frequency distribution for the data shown below.

15	42	9	4	16	21	18	39	5	1
10	26	20	15	14	2	18	17	6	12
11	45	3	19	5	15	22	24	35	30
40	41	33	25	21	11	13	2	3	32

- Determine the number of classes and class width. If you are told to create a table with 7 classes, use the formula (largest data value – smallest data value)/desired number of classes and round up your answer. If you are not told how many classes to create, use this formula for class width:

$$\text{Class width} = \frac{\text{largest data value} - \text{smallest data value}}{\sqrt{(\text{number of data values})}} = \frac{45 - 1}{\sqrt{40}} = 6.96 \approx 7$$

Always round up to the next whole number for class width.

- Construct the classes for your table. The **lower class limit** is the lowest data value counted in that class. Find the smallest data value in the set; this will be the lower limit of the first class. For the data above, the lower class limit of the first class is 1. To find the next lower class limit, add the class width (ex.  $1 + 7 = 8$ , the second lower class limit). Continue for all the following classes.
- Then fill in the upper class limits which will be the same as the lower class limit of the next class. Note that for the class 1–8, this includes all values UP TO 8 (e.g. 7.7) EXCEPT for 8 itself. So the data value 8, would not be counted in the class: 1–8, but in the class 8–15.
- Count how many data values occur within the created class intervals and enter this information into the “frequency” column.
- To find the **midpoint** of a class in a grouped frequency distribution, take the average of the upper and lower limits of a class.
- To find the **relative frequency** of a particular class, divide the class frequency  $f$  by the total of all the frequencies (which equals the sample size,  $n$ ).

See next page for completed frequency table