

# Chapter 15

## 15-1 Presenting Statistical Data

**Frequency distribution:** a table that shows how many times each data item occurs.

**Histogram:** a bar graph displaying a frequency distribution

**Stem and leaf plot:** A way of displaying the data in a frequency distribution.

**Statistics:** the methods used to describe a set of data.

**Mode:** the number that occurs most frequently

**Median:** the middle number in a distribution (which must be sorted in order) or the mean of the two middle numbers

**Mean:** the arithmetic average of the numbers in a deviation of a distribution. The sum of all the data items divided by the number of data items.

## 15-2 Analyzing statistical Data Part 1

**First quartile:** the median of the lower half of the data

**Third quartile:** the median of the upper half of the data

$Q_1$  = The median between the minimum and the median

$Q_3$  = The median between the median and the maximum

**Range** = Maximum – Minimum

**Box and whisker plot:** is used to show the median, the first and third quartiles, and the range of a distribution.

## 15-2 Analyzing Statistical Data part 2

**Variance:** one of the statistics used to measure the dispersion or “spread” of the data.

**Standard deviation:** the other statistic used to measure the dispersion or “spread” of the data. (The square root of the variance.)

$$\text{Mean} = \bar{x} = \frac{\sum_{i=1}^n x_i}{n}$$

$$\text{Variance} = \frac{(x_1 - \bar{x})^2 + (x_2 - \bar{x})^2 + \dots + (x_n - \bar{x})^2}{n}$$

$$\text{Variance} = \sigma^2 = \frac{\sum_{i=1}^n (\bar{x} - x_i)^2}{n}$$

$$\text{Standard deviation} = \sigma = \sqrt{\frac{\sum_{i=1}^n (\bar{x} - x_i)^2}{n}}$$

$$\sigma = \sqrt{\frac{\text{sum of the squares of the deviations from the mean}}{\text{number of elements in the distribution}}} = \sqrt{\text{variance}}$$

### Statistical Symbols and Variables:

$\bar{x}$  = The mean of the x values

$\sum_{i=1}^n x$  = The sum of the x values

$\sigma^2$  = The variance of the x values

$n$  = The number of elements in the distribution

## 15-5 Fundamental Counting Principles

**Outcome:** the result

**Event:** a subset of outcomes

**Compound event:** several events which occur together

### The Fundamental Counting Principle

In a compound event in which the first event may occur in  $n_1$  ways, the second event may occur in  $n_2$  ways, etc. The  $k^{\text{th}}$  event may occur in the  $n_k$  different ways, so the total number of ways the compound event may occur is:

$$n_1 \cdot n_2 \cdot n_3 \cdot \dots \cdot n_k$$

**Mutually exclusive choices:** you can do one or the other but not both at the same time.  
The outcome of mutually exclusive choices is the **SUM** of each outcome.

## 15-6 Permutations (order, arrange)

**Permutation:** An arrangement of the elements of a set of definite order.

**Ordered Arrangement:** A permutation of a set of objects

$${}_n P_n = n!$$

$$n! = n \cdot (n-1) \cdot (n-2) \cdot \dots \cdot 3 \cdot 2 \cdot 1$$

$${}_n P_r = \frac{n!}{(n-r)!}$$

$$P = \frac{n!}{n_1! n_2! \dots} \quad \text{Where objects. } n_1, n_2, \text{ etc., are repeated objects.}$$

## 15-7 Combinations (choose, select)

The number of combinations of a set of **n** objects taken **r** at a time is:

$$\binom{n}{r} = {}_n C_r = \frac{n!}{r!(n-r)!}$$