

CHAPTER II

VARIABLES AND FUNCTIONS

6. Variables and constants. A *variable* is a quantity to which an unlimited number of values can be assigned. Variables are denoted by the later letters of the alphabet. Thus, in the equation of a straight line,

$$\frac{x}{a} + \frac{y}{a} = 1,$$

x and y may be considered as the variable coördinates of a point moving along the line.

A quantity whose value remains unchanged is called a *constant*.

Numerical or *absolute constants* retain the same values in all problems, as 2, 5, $\sqrt{7}$, π , etc.

Arbitrary constants, or *parameters*, are constants to which any one of an unlimited set of numerical values may be assigned, and they are supposed to have these assigned values throughout the investigation. They are usually denoted by the earlier letters of the alphabet. Thus, for every pair of values arbitrarily assigned to a and b , the equation

$$\frac{x}{a} + \frac{y}{b} = 1$$

represents some particular straight line.

7. Interval of a variable. Very often we confine ourselves to a portion only of the number system. For example, we may restrict our variable so that it shall take on only such values as lie between a and b , where a and b may be included, or either or both excluded. We shall employ the symbol $[a, b]$, a being less than b , to represent the numbers a , b , and all the numbers between them, unless otherwise stated. This symbol $[a, b]$ is read *the interval from a to b* .

8. Continuous variation. A variable x is said to vary continuously through an interval $[a, b]$, when x starts with the value a and increases until it takes on the value b in such a manner as to assume the value