

CHAPTER I

MEASUREMENTS

1. Science in Daily Life. During the last fifty years science in all its branches has developed very rapidly, and at the present time its applications have become of the utmost importance in our every-day life. Some of the most prominent of these applications are to be seen in our means of transportation over the land and the water and through the air: and also in the methods of generating, distributing, and utilizing electric energy. Many of to-day's achievements were not even dreamt of by our grandfathers.

Now it may seem strange, but it is none the less true, that this great development came about through our learning to make accurate measurements of the various quantities which enter in our experiments.

2. Fundamental Units. Let us measure a piece of rope. We do so, and find that its length is (say) 52 feet. Here our unit is a *foot*, and it is contained 52 times in the given length. A loaf of bread is said to contain 3 pounds. In this case the unit of *mass* is a *pound*. Again the strength of an electric current is stated as 25 amperes. The unit in this instance is called an *ampere*.

It is evident that there will be as many kinds of units as there are kinds of quantities to be measured; and the magnitude of the units may be just what we choose. But there are three units which we speak of as *fundamental*, namely, the units of *length*, *mass* and *time*. Each is independent of the others and cannot be derived from them. It can also be shown that the measurement of any quantity (for instance,