weights and measures is constructed. This is the system adopted, with some modifications of minor importance, by all English-speaking people. It is necessary therefore for us to ascertain accurately what constitutes this unit, and to give heed to some of the circumstances more intimately associated with it. The unit of time is a day. This seems sufficiently accurate and definite until we come to ask ourselves what is a *day?* This is commonly said to be the time in which the earth makes one complete revolution on its axis, and this is true enough for one sort of day, namely, the sidereal day, which is the time which elapses between the successive transits of the same fixed star over the meridian of any place as already mentioned, and which being an invariable quantity would have served as an admirable unit for the measurement of time. But the transit of a star over the meridian of any place was not a phenomenon sufficiently striking to be generally or readily observed, and as the complete alternation of light and darkness could escape the observation of no one, this period has been fixed upon as the most convenient unit to which to refer other periods of time for measurement. And just here let me say a word or two as to the meaning and accurate use of the words *unit* and *measure.* If we wish to estimate a given magnitude, such as a length, a weight, a sum of money, &c., we must take some well defined magnitude of the same kind which we call the *unit*, and the number of times this unit has to be repeated in order to make up the given magnitude is called the *measure* of that given magnitude. The measure of a magnitude is therefore the quotient obtained by dividing a quantity by its unit, or as it is sometimes expressed, by dividing one concrete number by another concrete number of the same denomination. The measure of a magnitude is thus an *abstract* number. Again, since the measure of a quantity is the number of times that quantity contains its unit it is evident that this measure will be different for different units, although the quantity itself may remain the same. Thus, suppose we wish to ascertain the length between two objects, we first fix upon a definite length as the unit—a foot, say—and we find that the required length contains this unit 12 times; we then say the measure of the required length is 12, But suppose we had fixed upon a much smaller unit—say an inch—we should then have found that the required length contains the unit 144 times, and therefore its measure would be 144, &c. We thus find that the measure of a quantity varies inversely as the unit of measurement.

The unit fixed upon for the measurement of time is the solar day, that is the time which elapses between two successive transits of the sun across the meridian of any place. This would seem to be a sufficiently well defined unit, for the time when the sun crosses the meridian can be observed within a fraction of a second, and the time which elapses until he again crosses this same meridian can be accurately measured. Unfortunately this length of time is not a constant quantity, but as will appear presently, is continually changing from day to day throughout the year. In consequence of this irregularity in the length of the solar day the unit of time is defined to be the *mean solar day*, that is the mean or average of all the solar days which elapse during one complete revolution of the earth round the sun.

The want of uniformity in the length of the solar day is owing to two causes:

1. The earth's variable motion in its orbit round the sun.

2. The inclination of the earth's axis to the plane of its orbit.

The cause of the earth's variable motion and its effect on the length of