

bined with its rotation, the researches of dynamical science have enabled us, through the medium of the pendulum, to obtain another invariable standard, more refined and less obvious, it is true, in its origin, but possessing a great advantage in its capability of ready verification, and therefore easily made to serve as a check on the other. The former, viz. direct measurement of the dimensions of the earth, is the origin of the *mètre*, the French unit of linear measure; the latter, of the British yard. Theoretically speaking, they are equally eligible; but when we consider that the *quantity directly measured*, in the case of the *mètre*, is a length a great many thousand times the final unit, and in the pendulum or yard very nearly the unit itself, there can be no hesitation in giving the preference, as an original measure, to the former, because any error committed in the process by which that is determined becomes subdivided in the final result; while, on the other hand, any minute error committed in determining the length of the pendulum becomes multiplied by the repetition of the unit in all measurements of considerable lengths performed in yards.

(121.) The same admirable invention of the pendulum affords a means of subdividing time to an almost unlimited nicety. A clock is nothing more than a piece of mechanism for counting the oscillations of a pendulum; and by that peculiar property of the pendulum, that one vibration commences exactly where the last terminates, no part of time is lost or gained in the *juxta-position* of the units so counted, so that the precise fractional part of a day can be ascertained which each such unit measures.

(122.) It is owing to this peculiar property by which the *juxta-position* of units of time and weight can be performed *without error*, that the whole of the accuracy with which time and weight can be multiplied and subdivided is owing.* The same thing cannot be accom-

* The abstract principle of repetition in matters of measurement (*viz.* *juxta-position* of units without error) is applicable to a great variety of cases in which quantities are required to be determined to minute nicety.