the volume; but it would be preferable to employ the coefficient $c$ which we have just defined; magnitudes measured by the unit of weight would not then enter into the analytical expressions: we should have to consider only, 1st, the linear dimension $x$, the temperature $v$, and the time $t$; 2nd, the coefficients $c$, $h$, and $K$. The three first quantities are undetermined, and the three others are, for each substance, constant elements which experiment determines. As to the unit of surface and the unit of volume, they are not absolute, but depend on the unit of length.

160. It must now be remarked that every undetermined magnitude or constant has one *dimension* proper to itself, and that the terms of one and the same equation could not be compared, if they had not the same *exponent of dimension*. We have introduced this consideration into the theory of heat, in order to make our definitions more exact, and to serve to verify the analysis; it is derived from primary notions on quantities; for which reason, in geometry and mechanics, it is the equivalent of the fundamental lemmas which the Greeks have left us without proof.

161. In the analytical theory of heat, every equation $(E)$ expresses a necessary relation between the existing magnitudes $x, t, v, c, h, K$. This relation depends in no respect on the choice of the unit of length, which from its very nature is contingent, that is to say, if we took a different unit to measure the linear dimensions, the equation $(E)$ would still be the same. Suppose then the unit of length to be changed, and its second value to be equal to the first divided by $m$. Any quantity whatever $x$ which in the equation $(E)$ represents a certain line $ab$, and which, consequently, denotes a certain number of times the unit of length, becomes $mx$, corresponding to the same length $ab$; the value $t$ of the time, and the value $v$ of the temperature will not be changed; the same is not the case with the specific elements $h, K, c$: the first, $h$, becomes $\frac{h}{m^2}$; for it expresses the quantity of heat which escapes, during the unit of time, from the unit of surface at the temperature 1. If we examine attentively the nature of the coefficient $K$, as we have defined it in Articles 68 and 135,