Third, the formula is a mathematical expression, and, as such, can be subjected to purely mathematical analysis: this analysis may refer to purely algebraical processes of

land; the former country having supplied the means and organised many expeditions (under Richer, Picard, Cassini, La Condamine, Maupertuis, and others), the latter having invented and furnished the greater portion of the delicate instruments, through Newton, Gregory, Ramsden, Dollond, Harrison, and others. The latter was a matter of personal, the former one of organised, talent. England did not take any great part in the repeated measurements of the arc of the meridian till, towards the end of the eighteenth century (1785-87), the French astronomer Cassini de Thury presented to the Royal Society a memorial on the uncertainty in the difference of longitude of Greenwich and Paris, and proposed that the English and French mathematicians in concert should determine, by geodetic operations, the distance measured along an arc of parallel. This was assented to, and the late Astronomer Royal (G. B. Airy) claims that it "may be said that in this as in other grand experiments, though we began later than our Continental neighbours, we conducted our operations with a degree of accuracy of which, till that time, no one had dared to form an idea." Since the beginning of this century Germany has, through the accurate measurements of Gauss and Bessel, and through the famous establishments of Fraunhofer, Steinheil, Repsold, and others, taken a leading position both in the theory and practice of measuring. So far as gravitational astronomy is concerned, the United States of America seem at the end of this century to eclipse all previous performances. But if we owe to English genius the invention of logarithms, the sextant, the reflecting and the achromatic telescope, the theodolite, and the chronometer, we owe to France the idea of an absolute system of measurements and the first approximation to it in the metrical system, which England has been tardy to adopt. A really absolute unit of measurement, as the ten-millionth part of the earth quadrant was intended to be—one which would be recoverable, if every actually existing pattern was destroyed—does not yet indeed exist; but the Government of the Revolution laid the foundation in 1790 of our present international decimal centigrade system. It does not appear that the idea of extending this system to all other forces and quantities in nature was then contemplated. A valuable contribution towards this desirable object was made by Fourier, who in his celebrated 'Théorie de la Chaleur' (1822, p. 152, &c.) laid down the doctrine of the "dimensions" of physical quantities which had to be measured and compared with each other. The first who reduced the measurement of other than purely mechanical phenomena to the standard of mechanical forces was Gauss (1832). In his investigations referring to the intensity of magnetic force at different points of the earth, he found it necessary to abandon the unit of weight, the gramme, and to adopt the unit of mass, inasmuch as the weight of the unit of mass varied at different points of the globe. He introduced the name "absolute" to signify that this standard is independent of local or relative influences (see