quarters—the one purely theoretical, the other practical. Accordingly the doctrine of forms and arrangements has during the last century been developed by mathematicians in two distinct interests, which only quite lately seem to approach and assist each other.

38. Theory of numbers.

The purely abstract or theoretical interest came from the side of the theory of numbers, a branch of research which was revived by Legendre in France and by the youthful genius of Gauss in Germany; the more practical one came from the theory of equations, notably in its application to problems of geometry. The methods by which these subjects were treated had in the early part of the nineteenth century undergone a great change. The older inductive method in both branches—namely, in the solution of equations and in the investigation of the properties of numbers—relied mainly on ingenious devices which were mostly of special, not of general, value. Theorems were found by induction, and had afterwards to be proved by rigorous logical deduction. Success depended on the degree of care with which the mind operated with mathematical symbols, and rested frequently on the intuition, if not the inspiration, of genius. Two of the greatest mathematical minds—Fermat[1] in France and Newton[2] in England—stood

[1] Pierre Fermat (1601-65) prepared an edition of the Treatise of Diophantus, and his marginal notes contain many theorems referring to the properties of numbers which have been the subject of much comment and examination by mathematicians of the first rank down to the present day. In letters to contemporaries he referred to many of these discoveries, and to his proofs, which he did not communicate. Some of these proofs seem not to have satisfied him, being deficient in rigour. In spite of the labours of Euler, Lagrange, Cauchy, Dirichlet, Kummer, and others, one of these theorems still awaits proof. A full account of Fermat's theorems is given in Cantor's 'Geschichte der Mathematik,' vol. ii. 2nd ed., p. 773 *sqq.* Also in W. Rouse Ball's 'History of Mathematics,' p. 260 *sqq.*

[2] Newton, in his 'Universal