Activity 40. Read the article to differentiate between pure mathematics and applied mathematics, conceptually and historically.

The study of abstract mathematical systems and structures, without necessarily having practical applications in mind, is called pure mathematics. It has various branches, including abstract algebra, geometry, number theory, calculus, topology, and the topics derived from them. The study and use of the mathematical techniques to solve practical problems is called applied mathematics. The field has various branches including statistics, probability, mechanics, mathematical physics.

The distinction between pure mathematics and applied mathematics might not be sharp. For example, Euclidean geometry could be analyzed as an abstract study of the relationships between lines, points, and geometric shapes based on the foundations of Euclid’s postulates, or could, at the same time, be viewed as a study of results that could potentially (and, in fact, has proved to be) useful to architects, surveyors, engineers, and scientists. Or, the general study of vectors and vector spaces can be viewed as either an abstract study or a practical one if one later has in mind to use this theory to analyze force diagrams in mechanics.

Although much of the mathematics developed in the time of antiquity was clearly motivated by practical concerns, the development of mathematics for its own sake was nonetheless of interest to early scholars. For instance, Babylonian tablets from ca. 1600 B.C.E. list large Pythagorean triples that could have no practical use. Greek mathematicians of around 400 B.C.E. began to seek rigour, proof, and justification in their mathematical thinking, and ca. 300 B.C.E. Euclid produced his logically rigorous treatise “The Elements”, summarizing all mathematical knowledge known at his time. The unique organization of ideas presented in his work became the key feature of the piece. That, in itself, was seen as an analysis of logical thinking, one that became the paradigm of all mathematical and scientific thinking for the two millennia that followed.

During the 19th century, mathematicians began to search for unifying ideas between distinct branches of algebra and geometry. The general study of structures and operations on them led to the development of abstract algebra, for instance. The development of paradoxes in set theory and in the foundations of calculus forced scholars to seek greater levels of rigour and abstraction. Even the nature of logical reasoning itself was examined as an attempt to understand and resolve fundamental paradoxes. The need for abstract analysis and synthesis was recognized as important, and dichotomy between applied and pure mathematics became more apparent.

(from Encyclopaedia Britannica)