What is Mathematics?

What is mathematics? A reasonable answer is: the study of numbers and shapes. The particular word in this definition we would like to clarify is *study*. How do mathematicians approach their work?

Every field has its own criteria for success. In medicine, success is healing and the relief of suffering. In science, the success of a theory is determined through experimentation. Success in art is the creation of beauty. Lawyers are successful when they argue cases before juries and convince jurors of their clients’ cases. Players in professional sports are judged by whether they win or lose. And success in business is profit.

What is successful mathematics? Many people lump mathematics together with science. This is plausible, as mathematics is incredibly useful for science. But of the various fields just described, mathematics has less to do with science than it does with law and art!

Mathematical success is measured by *proof*. A *proof* is an essay in which an assertion, such as “there are infinitely many prime numbers,” is incontrovertibly shown to be correct. Mathematical statements and proofs are, first and foremost, judged by their correctness. Other, secondary criteria are also important. Mathematicians are concerned with creating beautiful mathematics. And mathematics is often judged on its utility; mathematical concepts and techniques are enormously useful in solving real-world problems.

Edward R. Scheinerman, *Mathematics, A Discrete Introduction*
Brooks/Cole, Pacific Grove, CA, 2000, p. xviii