The Queen of the Sciences: A History of Mathematics: David Bressoud; Great Courses

Math and the natural world

is mathematics discovered or created?

Lecturer considers math as an attempt to recognize pattern in the natural world

Eugene Wigner 1902-1995: The Unreasonable Effectiveness of Mathematics in the Natural Sciences (1960)
Wigner remarked that amazingly, most of the time when physicists see a pattern in the natural world, and they pick up a pattern from mathematics, the pattern from mathematics usually fits what is going on in the natural world with amazing accuracy. Not only that, but the mathematical model often suggests ways to go deeper into the physical reality.

Wigner asks why is this?

Math that was developed for one particular application; say trig for astronomy, turn out to be applicable to other applications; for example a vibrating spring; mechanics, heat flow and electromagnetism. (simple harmonic motion)

Response to Wigner's paper by Richard Hamming: The Unreasonable Effectiveness of Mathematics. 1980.
Was applied mathematics. Was also intrigued by why math works so well. Clarifies mathematics into four "faces":
Number, geometry, close reasoning, and artistic taste (aesthetics).

Close reasoning: not just logic.

Pivotal point for history of math is in 17th century; five threads come together: algebra, geometry, astronomy, mechanics, and motion. Culminates in Newton.

In 2000 BC, many people conversant with Pythagorean theorem, so it was around long before Pythagoras, who lived in the 5th century BC

Plimpton 322: Babylonian Pythagorean triples: include 4601 sq + 4800 sq = 6649 sq
Base 60 system rather than base 10. units place, 60s place, 60 60s place (3600)
Our hour/min/sec from Babylonia

Quote that Plato ascribes to Pythagoras of Samos: "At its deepest level, reality is mathematical in nature."