# Mathematics
and the Cosmos

Simulation of colliding black holes and the resulting gravitational wave emission. Image courtesy of Max Planck Institute for Gravitational Physics (Albert Einstein Institute). Visualization by W. Benger (Zuse Institute Berlin/AEI).

Mathematics is at the core of our attempts to understand the cosmos at every level: Riemannian geometry and topology furnish models of the universe, numerical simulations help us to understand large-scale dynamics, celestial mechanics provides a key to comprehending the solar system, and a wide variety of mathematical tools are needed for actual exploration of the space around us.
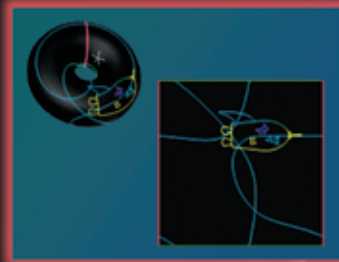
A model of a two-dimensional finite universe without edges. Image courtesy of Key Curriculum Press. www.keypress.com

Artist's conception of the Interplanetary Superhighway. Courtesy of Dr. Martin Lo, NASA/JPL, Caltech. The artist is Cic Koenig.

Artist's rendition of the Cassini spacecraft approaching Saturn. Courtesy of NASA/JPL, Caltech.

LIGO gravitational wave detector. Photo courtesy of LIGO Laboratory.

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