NASA Resources
for 6th Grade Math classes

For NC 6th Grade Math Obj. 6RP - Understand ratio concepts and use ratio reasoning to solve problems.

- **Lesson Plan: Exploring Planetary Moons -** This is a collection of mathematics problems relating to the moons of the solar system. Learners will use simple proportional relationships and work with fractions to study the relative sizes of the larger moons in our solar system, and explore how temperatures change from place to place using the Celsius and Kelvin scales. https://www.nasa.gov/pdf/752224main_Exploring_Planetary_Moons.pdf

- **Lesson Plan: Proportional Relationships -** Students use simple proportions and fractions to explore the number of stars in the Milky Way, and the relative sizes of some famous stars compared to our own sun. https://spacemath.gsfc.nasa.gov/Modules/6Module7.html

- **Lesson Plan: Diameter of the Moon -** The diameter of the Moon is proportional to the diameter of a cardboard disk, given that you know the distance to the Moon and the distance to the cardboard disk. https://www.nasa.gov/pdf/180562main_ETM.Diameter.Moon.pdf and follow up with calculating distance. In this activity students will use simple sports balls as scale models of Earth and the Moon. https://www.nasa.gov/pdf/180561main_ETM.Distance.Moon.pdf

- **Lesson Plan: Signal-to-Noise Ratio -** Apply appropriate techniques, tools, and formulas to determine measurements solve problems involving scale factors, using ratio and proportion. https://www.nasa.gov/pdf/579711main_Signals_and_Noise_6-8.pdf

For NC 6th Grade Math Obj. 6.NS - Apply and extend previous understanding of multiplication and division to divide fractions by fractions.

- **Lesson Plan: Understanding Decimals -** Students will learn about the Cassini mission and its exploration of Saturn's moons through reading a NASA press release. By viewing a NASA eClips video segment, students will learn more about these and other moons in our solar system. Then students will use decimals to compare the sizes and distances of Saturn's moons to the center of Saturn. https://spacemath.gsfc.nasa.gov/Modules/6Module3.html

- **Lesson Plan: Number Theory and Fractions -** Students will visualize Jupiter and the other 88 largest objects in our solar system. Then students will use fractions to compare Jupiter's moons and movements. https://spacemath.gsfc.nasa.gov/Modules/6Module4.html

For NC 6th Grade Math Obj. 6.EE - Apply and extend previous understanding of arithmetic to algebraic expressions. Write and evaluate numerical expressions involving whole-number exponents. Reason about and solve one-variable equations and inequalities.

- **Lesson Plan: Translating Between Tables and Expressions -** Students will use tables and mathematical expressions to compare black holes' sizes and temperatures. https://spacemath.gsfc.nasa.gov/Modules/6Module2.html

- **Lesson Plan: Graphing Functions -** Students then explore global climate change by studying the properties of functions that have been derived from actual data describing ocean level rise, temperature and carbon dioxide increases, and arctic ice declines, among other climate data. https://spacemath.gsfc.nasa.gov/Modules/6Module10.html

For NC 6th Grade Math Obj. 6.G. - Solve real-world and mathematical problems involving area, surface area, and volume.

- **Lesson Plan: Measurement and Geometry** - Students learn how solar panels can be used to generate electrical power and how the size and area of the panels affects energy production. https://spacemath.gsfc.nasa.gov/Modules/6Module8.html

- **Lesson Plan: Integers and the Coordinate Plane -** As astronomers study stars, planets and galaxies, they keep track of their positions in space. For flat systems like our solar system, or traveling over the surface of planets like Mars, a 2-dimensional coordinate plane is useful to identify positions. https://spacemath.gsfc.nasa.gov/Modules/6Module9.html

- **Lesson Plan: Areas of Polygons -** Students explore the geometric shapes of snowflakes by viewing them as polygons and calculating their areas using the area properties of right triangles. https://spacemath.gsfc.nasa.gov/Modules/6Module11.html

For NC 6th Grade Math Obj. 6.SP. - Develop understanding of statistical variability.

- **Lesson Plan: Data Collection and Analysis -** During the last sunspot cycle between 1996-2008, over 21,000 flares and 13,000 clouds of plasma exploded from the sun's magnetically active surface. Students will explore the statistics of various types of space weather storms by determining the mean, median and mode of a sample of storm events. https://spacemath.gsfc.nasa.gov/Modules/6Module6.html

- **Lesson Plan: The White Glove Test -** Learners will use data from the Student Dust Counter (SDC) Data Viewer to establish any trends in the distribution of dust in the solar system. http://lasp.colorado.edu/media/projects/sdc/pdf/whiteglove_student.pdf

Videos:

- **NASA Connect Math Simulations** - 7 video segments with math simulations from the NASA Connect program https://www.knowitall.org/series/nasa-connect-math-simulations

- **Our World: What Is a Ratio? -** This NASA video segment explains how ratios are used to compare two numbers. Fractions and ratios are used in example problems. https://nasaeclips.arc.nasa.gov/video/ourworld/our-world-what-is-a-ratio
- **Real World: Scale Models and Ratios** -This NASA video segment explains scale models, ratios, proportions and how to calculate problems with different units of measurement. Color animations clarify the use of ratios. https://nasaeclips.arc.nasa.gov/video/realworld/real-world-scale-models-and-ratios

Other Resources:

Space Math - This website contains collections of activities with authentic glimpses of modern science and engineering issues, often involving actual research data. The problems were designed to be 'one-pagers' with a Teacher's Guide and Answer Key as a second page and are organized based on grade level, CCSS-M, and STEM Modules around a single topic.
https://spacemath.gsfc.nasa.gov/SpaceMath.html

Year of the Solar System - This math guide offers educators and students insight into the behind-the-scenes role that mathematics plays in solar system exploration through engaging real-world problems.
https://spacemath.gsfc.nasa.gov/YOSS/YOSS.pdf

Image Scale Math - This is designed to be used as a supplement for teaching mathematical topics. The problems can be used to enhance understanding of the mathematical concept, or as a good assessment of student mastery. This set of math problems can be used as an application for students to gain mastery of scale of an image using a variety of images.
https://www.nasa.gov/sites/default/files/atoms/files/image_scale_math.pdf

NASA CONNECT™ is an inquiry-based and standards-based, Emmy® award-winning series of mathematics-focused, instructional programs for students in grades 6 -8.
https://www.knowitall.org/series/nasa-connect