NASA Resources for Math 2 classes

Algebra based - Creating Equations that describe numbers or relationships.

- **Space Math -** Since 2004, Space Math@ NASA has developed math problems for grades 3-12 designed to showcase how NASA discoveries in earth and space science are connected to a variety of math topics and skills. By 2010, over 400 of these problems are available online, or can be found in a series of special-topic books https://spacemath.gsfc.nasa.gov/algebra2.html

- **Why Tailgating on Freeways is Unsafe -** We discuss how to compute the stopping distance of a car traveling at a given speed-- a real life application of a math topic, quadratic equations https://pumas.nasa.gov/examples/index.php?id=145

Geometry based

- **Astronomy and Space Science Applications Featuring Geometry** - These problems cover: Properties of Angles and Angular Measure; Properties of Triangles; Areas and Volumes; Similar Triangles and Scales and Trigonometry https://spacemath.gsfc.nasa.gov/geometry.html

- **Technology Through Time: Ancient Astronomical Alignments -** At the bottom of the website, there are are 4-page problem sets that introduce you to the very simple geometry that goes along with designing monuments to favor certain orientations and alignments. It really isn't 'rocket science' but it did take thousands of years for humans to get it right! The problems require a basic understanding of angular measure, the use of compasses and protractors, and creating and using scaled images and models. https://sunearthday.nasa.gov/2011/articles/ttt_72.php

Trigonometry based

- **Pilots, Airplanes, and the Tangent of Three (3) Degrees** - This exercise shows a practical application of trigonometry in the aviation environment, where student pilots consider the relationship between altitude and distance to complete a landing. It requires a scientific calculator. https://pumas.nasa.gov/files/10_13_99_1.pdf

- **Designing a Spectroscopy Mission -** In this lesson, students will find and calculate the angle that light is transmitted through a holographic diffraction grating using trigonometry. After finding this angle, the students will build their own spectrographs in groups and research and design a ground or space-based mission using their creation. http://lasp.colorado.edu/home/wp-content/uploads/2011/08/Designing_Spectroscopy_Mission.pdf

Statistics based

- **Matching Birthdays -** This problem falls in the category of problems called counter-intuitive -- meaning that you may be surprised at the answer.
  https://pumas.nasa.gov/examples/index.php?id=60

- **Probability -** Three example problems that determine probabilities using counting procedures, tables, trees, area models, and formulas for permutations and combinations.
  https://pumas.nasa.gov/benchmarks/index.php?benchmark=273

Other Resources:

- **ARCHIVE: Real World: Shuttle Safety -** Computer modeling and simulation was used to help engineers evaluate the probability of malfunctions in everything from shuttle valves to the thermal protection system.
  https://nasaeclips.arc.nasa.gov/video/realworld/archive-real-world-shuttle-safety

- **Solar Math -** Teachers continue to look for ways to make math meaningful by providing students with problems and examples demonstrating its applications in everyday life. Examples appropriate for high school include: judging the reasonableness of numerical computations and their results; generalizing patterns using explicitly defined and recursively defined functions; analyzing functions of one variable by investigating rates of change, intercepts, zeros, asymptotes, and local and global behavior; understanding and comparing the properties of classes of functions, including exponential, polynomial, rational, logarithmic, and periodic functions; and drawing reasonable conclusions about a situation being modeled.

  https://www.nasa.gov/sites/default/files/files/Solar_Math.pdf

  This is just one of many Math Educator Guides which are all listed here:
  https://www.nasa.gov/audience/foreducators/topnav/materials/listbytype/Solar_Math.html

- **Project Spectra!** - This is a science and engineering program for 6th – 12th grade students, focusing on how light is used to explore the Solar System using data stories. A data story is an inquiry driven, standards-based lesson using real data from actual spacecraft! Each data story is a cogent, well-bounded story of solar system exploration that is accessible to students.
  http://lasp.colorado.edu/home/education/k-12/project-spectra/