

# NASA Resources for Math 3 classes

## Equations based

- **Can an Astronaut on Mars distinguish Earth from its Moon?** - An observer on Earth needs a powerful telescope to see the tiny moons of Mars, Phobos and Deimos, but our own moon is much larger, and orbits at a greater distance. Could the unaided eye of an observer on Mars tell apart the Earth and its moon, at their greatest separation? This problem guides students through the steps to answer this question. [https://pumas.jpl.nasa.gov/files/06\\_19\\_01\\_1.pdf](https://pumas.jpl.nasa.gov/files/06_19_01_1.pdf)

## Functions based

- **Dream Job** - This math problem demonstrates the concept of geometric progression, through an example of a million dollar contract between an employee and an employer. Application of the concept of geometric progression to social cause activism is addressed. [https://pumas.nasa.gov/files/01\\_30\\_00\\_1.pdf](https://pumas.nasa.gov/files/01_30_00_1.pdf)

## Trigonometry based

- **How Far Can You See?** - This math example shows how to calculate the distance one can see from different heights using trigonometry. [https://pumas.nasa.gov/files/03\\_25\\_96\\_1.pdf](https://pumas.nasa.gov/files/03_25_96_1.pdf)
- **Fitting Periodic Functions** - Students work with data from a newly-discovered extra-solar planet to determine its orbit period and other parameters of a mathematical model. <https://spacemath.gsfc.nasa.gov/Geometry/5Page51.pdf>

## Geometry based

- **IT ALL COMES FULL CIRCLE** - When the space shuttle launches from Kennedy Space Center, it must launch within a certain time frame called a launch window in order to successfully dock with the International Space Station. When the space shuttle reaches orbit both vehicles are traveling in circular orbits around the Earth. Students will use circle properties to predict and monitor the vehicles positions. [https://www.nasa.gov/audience/foreducators/exploringmath/geometry/Prob\\_FullCircle\\_detail.html](https://www.nasa.gov/audience/foreducators/exploringmath/geometry/Prob_FullCircle_detail.html)

## Statistics based

- **A Dusty Dilemma** - In this lesson, students learn the concepts of averages, standard deviation from the mean, and error analysis. Students explore the concept of standard deviation from the

mean before using the Student Dust Counter data to determine the issues associated with taking data, including error and noise. Questions are deliberately open-ended to encourage exploration. [https://www.nasa.gov/audience/foreducators/topnav/materials/listbytype/Dusty\\_Dilemma.html](https://www.nasa.gov/audience/foreducators/topnav/materials/listbytype/Dusty_Dilemma.html)

### Other Resources:

- **Exploring Space Through Math** - The focus of this is to promote inquiry through real world applications. Doing so will place students in the role of NASA scientists, engineers and researchers who work in teams to accomplish tasks. This project will promote cooperative learning, problem-solving and the use of technology and follows the 5-E instructional model. <https://www.nasa.gov/audience/foreducators/exploringmath/home/index.html>
- **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](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](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/>
- **PUMAS** (*poo' • mas*) --This is a collection of brief examples (several are listed above) showing how math and science topics taught in K-12 classes can be used in interesting settings, including everyday life. Each PUMAS example is tagged with one or more Benchmarks, which are referred to by their Benchmark Labels. This link lets you search by math skill. <https://pumas.jpl.nasa.gov/benchmarks/results.php>