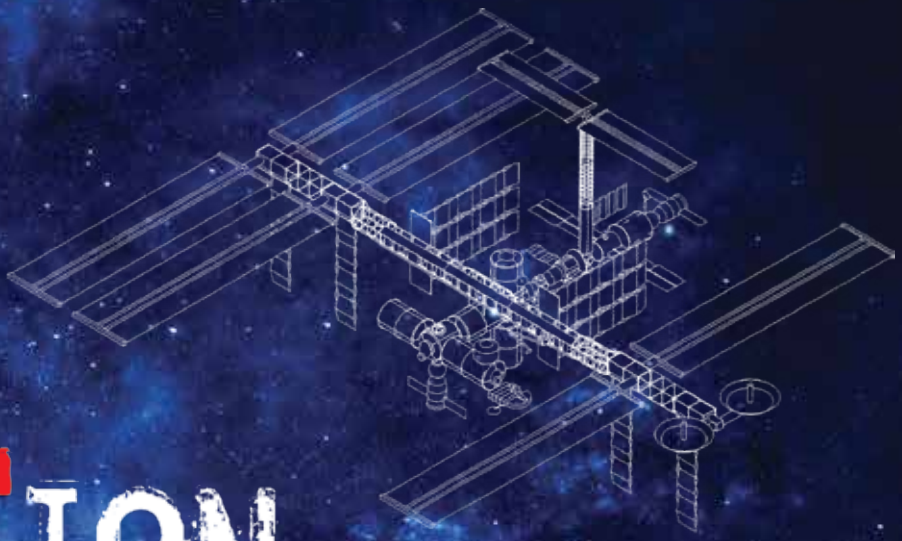
Adult Sponsor / Educator Guide



MISSION IMAGINATION

inspire. explore. engage.

INTERNATIONAL SPACE STATION

OFF THE EARTH, FOR THE EARTH

...and in the classroom!

TEXAS INSTRUMENTS

Welcome to mISSion imaginaTIon!

NASA and Texas Instruments are collaborating to bring a series of STEM-focused design challenges to students in grades 6-12. The challenges will give students the opportunity to develop STEM skills and use their imagination as they learn more about the International Space Station, the One-Year Mission and future space exploration.

The challenges are a great fit for classrooms, after-school programs, home school settings, museums, science centers...anywhere there are students! As an adult sponsor for a team or individual, you will help ***inspire*** students to study and pursue careers in STEM, ***explore*** future possibilities and ***engage*** them in real-world, hands-on STEM problems. Keep reading to learn more about the challenges, the International Space Station and the One-Year Mission.

The International Space Station and the One-Year Mission

The International Space Station is a unique place – a one-of-a-kind microgravity laboratory where science, technology and human innovation come together to do things not possible here on Earth. One primary focus of the space station is to learn how the microgravity environment affects humans.

During the One-Year Mission, NASA astronaut Scott Kelly and Russian cosmonaut Mikhail Kornienko are spending a year in space to help us learn what happens to their body systems during a long-duration spaceflight. The knowledge gained from their year-long mission is critical as NASA looks toward human journeys deeper into the solar system. This could include a journey to and from Mars, which could last 500 days or longer. The One-Year Mission is the latest step in the International Space Station's role as a proving ground for technologies and knowledge we will need to venture further away from Earth.

The information we will learn from this mission will help determine how we prepare for missions that will leave low Earth orbit. During this challenge, students will have to come up with solutions for a long-duration, deep space mission to Mars based on what we have learned on the space station.

Be sure to check out the video of NASA astronaut Ricky Arnold welcoming students to **mISSion imaginaTIon**!

Getting Started

mISSion imaginaTIon is a series of four challenges. One challenge will be made available each month beginning in January and ending in April on the mISSion imaginaTIon website. Additional resources, including a video, will also be available for each challenge to help students along. Using the provided Design Notebook, students will develop and submit four solutions and a short video.

Who Can Participate?
Any student in grades 6-12 is eligible to participate in **mISSion imaginaTIon**. Students can participate as individuals or as a team (maximum of five members). Each individual or team will need to designate an adult sponsor such as an educator or parent. An adult may sponsor more than one team. The adult sponsor does not count toward the team total.

What is the Design Notebook?
The Design Notebook can be downloaded at the **mISSion imaginaTIon** website. It is a fillable PDF form that guides students through the design process for each of the four challenges. Students can include text and links in the Design Notebook.

Design Notebooks can be submitted to the **mISSion imaginaTIon** website at any time by the adult sponsor to save student progress. However, only complete Design Notebooks will be eligible for the **mISSion imaginaTIon** final prize.

What About the Video?
Students will create a video that explains the processes used in designing the solutions and answers the following questions:

- How did I/the team collaborate?
- How did I/the team evaluate the work of others?
- Why did I/the team approach the problems the way I/we did?
- How did I/the team share our ideas and solutions?

The video will need to be posted to Vimeo at http://vimeo.com and should be between one and three minutes in length. There is space at the end of the Design Notebook to provide a link to the video as well as a password if the adult sponsor chooses to keep the video private.

What is the Prize?
The **mISSion imaginaTIon** winner (individual or team) will be selected from all complete Design Packet submissions. To be considered complete, a submission must include four solutions and a video link. The winner will receive a personalized chat from a NASA scientist or engineer, a TI calculator for every team member and an assortment of really cool space stuff!

What Determines the Winner?
Each complete submission will be evaluated using the rubric found on **page 6** of this guide. In the case of a tie, the review committee (made of Texas Instruments and NASA personnel) will determine the final winner.

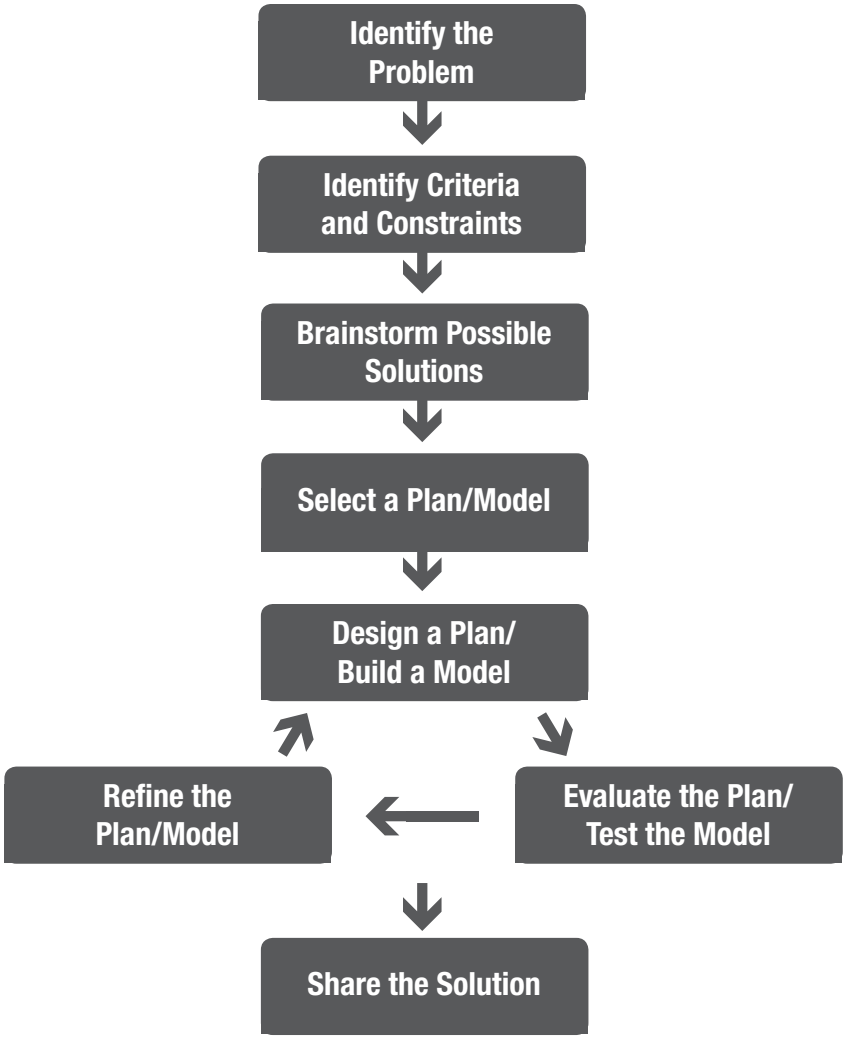
What Else Do I Need to Know?
Each Design Notebook submission will be associated with the given email address and team name. You can submit multiple times to keep track of progress, but each submission will overwrite previous submissions. Be sure you also keep a saved copy of the Design Notebook.

All submissions must be 10MB or less. Submissions larger than 10MB will not be accepted.

What If I Have Questions?
We are here to help! Send an email to **JSC-STEMonStation@mail.nasa.gov**, and someone will be able to assist you.

Design Process

Scientists and engineers use a series of steps to guide them as they solve problems. The process is cyclical, meaning the steps are repeated as many times as necessary to find the optimal solution. Students will be using the following design process in their Design Notebook for each of the STEM-focused challenges:



Evaluation Rubric

Design Notebook submissions will be evaluated based on the following rubric:

4 EXCELLENT	All criteria (procedures, steps and details) are met or followed
3 GOOD	Most criteria are met with only a few errors
2 FAIR	Many criteria are not met, and/or work has many errors
1 POOR	Most criteria are not met
0 NO EFFORT	No effort was made to meet criteria

Design Notebook **SCORE:**	Challenge 1	Challenge 2	Challenge 3	Challenge 4
Explains the problem in detail				
Lists and/or discusses all criteria and constraints				
Conducts background research				
Identifies viable solutions during brainstorming				
Selects one solution and provides explanation for choice				
Constructs a detailed plan or model of the selected solution				
Evaluates the effectiveness of the solution				
Refines the solution				
TOTAL **(Challenge 1 + Challenge 2 + Challenge 3 + Challenge 4)**				
Video				
Is between one and three minutes in length				
Explains the overall collaboration that took place				
Explains the evaluation process				
Explains the approach to finding solutions				
Explains how solutions and ideas were shared				
TOTAL **(Challenge Scores + Video Score)**	_____ / 148			

Standards Alignment

Each of the four STEM-focused challenges have been aligned with national science and mathematics standards.

Next Generation Science Standards	Challenge 1	Challenge 2	Challenge 3	Challenge 4
Middle School				
MS-LS1-7	X			
MS-LS2-1			X	
MS-LS2-3		X		
MS-LS2-5		X		
MS-PS2-1				X
MS-PS2-2				X
MS-PS2-4				X
MS-PS3-2				X
MS-ESS1-2				X
MS-ETS1-1	X	X	X	X
MS-ETS1-2	X	X	X	X
MS-ETS1-3	X	X	X	X
MS-ETS1-4	X	X	X	X
High School				
HS-LS1-5	X			
HS-LS1-7	X			
HS-PS2-4				X
HS-PS4-2	X			X
HS-PS4-5				X
HS-ESS1-4				X
HS-ETS1-1	X	X	X	X
HS-ETS1-2	X	X	X	X
HS-ETS1-3	X	X	X	X
HS-ETS1-4	X	X	X	X

Common Core Math Standards	Challenge 1	Challenge 2	Challenge 3	Challenge 4		Challenge 1	Challenge 2	Challenge 3	Challenge 4		Challenge 1	Challenge 2	Challenge 3	Challenge 4
6th					**7th**					**8th**				
6.RP	X	X	X	X	7.RP	X	X	X	X	8.EE.7	X	X	X	X
6.NS.1	X	X	X	X	7.NS	X	X	X		8.G.7	X	X	X	X
6.NS.2	X	X	X	X	7.EE.3	X	X	X		8.G.9	X	X	X	X
6.NS.3	X	X	X	X	7.EE.4	X	X	X		8.SP.1	X	X		
6.NS.5	X	X	X	X	7.G.1			X						
6.EE.2	X	X	X	X	7.G.2			X						
6.EE.6	X	X	X	X	7.G.6			X						
6.EE.9	X	X	X	X	7.SP.5				X					
6.G.1	X	X	X	X	7.SP.6	X	X		X					
6.G.4	X	X	X	X	7.SP.7	X	x		X					
6.SP.1		X		X										
6.SP.4				X										
6.SP.5				X										
High School														
Modeling	X	X	X	X										
A-CED.1	X													
A-CED.3	X													
A-REI.1	X													
G-MG.1		X												
G-MG.2		X												
G-MG.3		X												
Statistics and Probability				X										