

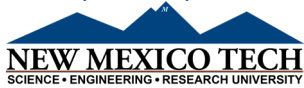


The Rocket Report

In This Issue...

The Rocket Report	1
VIRTUAL Mission to Mars	2
STEM 101	3
Slice of Py	3
STEM Bytes	4
Masthead and Important Terms and Acronyms	4

In partnership with:

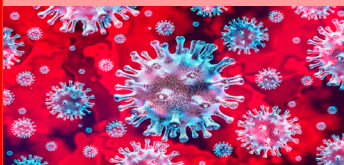


Collaborator:



Don't need school buses during the coronavirus lockdown, huh?!

STOP the SPREAD



Happy Last Day of
VIRTUAL SCHOOL!



Due to precautionary measures related to the coronavirus, we are developing and delivering virtual STEM activities that will be available to you through our website and social media pages (Facebook, Instagram, and Twitter).

As the situation evolves, we will provide updates.

Mission (Virtually) Accomplished

May 2020 is turning out to be an unusual month.

During the mother of all pandemics, we wished all mothers *except* the pandemic a Happy Mother's Day. From at least six feet away, of course.

For the first time, we celebrated *Star Wars Day* (May the Fourth be With You) under *total pandemic lockdown*.



Actually, Darth Vader has this pandemic thing *down*—

- He wears a mask,
- Doesn't go visit his son or daughter,
- Follows orders, and
- Teleworks by force-choking people over Zoom meetings.

We should all try to be more like Darth Vader.



And *last* month, we accomplished *another* first... we *virtually* went to Mars, pandemic and all!

Virtually Successful METS Mission

When we say the Mars Exoplanet Transient Satellite (METS) Mission 2020 was “virtually accomplished,” we don't mean it was *almost* accomplished... it was *completely* accomplished...just *virtually*.

From 15-24 April 2020, more than 125 fourth to sixth-grade students, from 22 schools in 9 cities and 3 states, participated virtually, over the internet, in our Mission to Mars to colonize the Red Planet.

The first eight days, students participated in various virtual Base Operations tasks, preparing for their online trip to Mars.

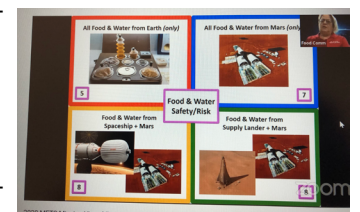
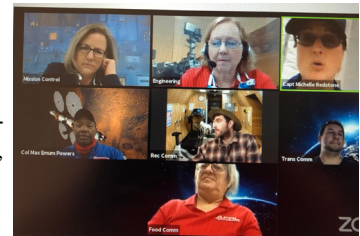
They found the location of a “lost” supply lander; researched Mars Facts, and used them to create a Mars Facts Riddle; designed a life sup-



port system, mission patch, and habitat; and planned a nutritious and efficient Lunch on Mars, submitting their work online.

Then, on 24 April 2020, from 11:00 am to 12:30 pm MDT, the students participated in a Virtual Link-Up Day event!

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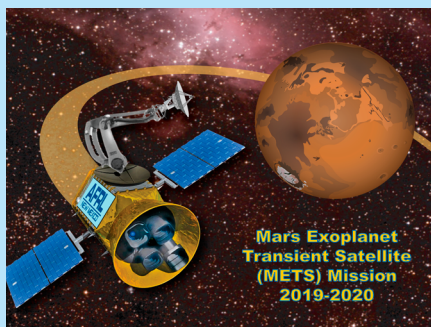




VIRTUAL Mission to Mars

For Fourth-Sixth Graders

Mars Exoplanet Transient Satellite (METS) Mission 2019-2020



Due to precautionary measures related to the coronavirus, the 2020 Mission to Mars was restructured into a **Virtual Mission to Mars**, and a **Virtual Link-Up Day**, which was held, successfully, **15-24 April 2020**.

Mission (Virtually) Accomplished

Continued from page 1

During the Link-Up Day event, students became members of an advance technical team sent to Mars. Their goal: Set up a colony to house the 2020 METS Mission scientists and engineers, allowing them to carry out their exoplanet research.

This year's 90-minute event was conducted in a very social-distancing-friendly manner, with students and adult support staff scattered in remote locations, all connected electronically via Zoom or YouTube live teleconferencing.

As students logged in, they were greeted with a slideshow of some of the mission patches and life support system designs, such as the ones on this page, students had submitted.

Then, the students conducted an initial assessment to determine their Mars readiness status. To do this, they took an online Kahoot! quiz to test their Mars knowledge.

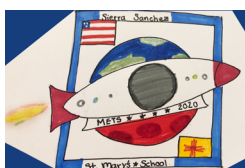


A big *Kahoot!* to winners *Roman*, with 5,163 points; *CaliforniaCaleb*, with 4,486 points; and *Brainiac B*, with 4,413 points!



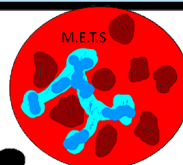
Next, we went into the Life Support System stage.

As project engineers tasked with establishing a colony on Mars, the students had to make some decisions about what kind of life support systems their colony would employ. Each decision came with trade-offs in the areas of *safety, reliability, and suitability*.



Colony Commanders manning various stations would present four color-coded options in a "quad chart" for a given life support system, and explain the advantages and disadvantages of each option.

For example, Dr. Jake Grosek displayed four options for Air Supply on the screen:



- 1) Bringing air supply from Earth in tanks;
- 2) A machine that converts carbon dioxide into oxygen;
- 3) A machine that separates water into hydrogen and oxygen, or
- 4) *Both* machines.

He would then discuss the advantages and disadvantages of each option in terms of safety, reliability, and suitability.

For example, there's plenty of carbon dioxide available on Mars, but the machine requires frequent filter changes and maintenance, and consumes a lot of power.

Students weighed the options and voted in Kahoot! for the color-coded option they thought best, and were informed of the results.

Periodically, "Capt Michelle Redstone" (Ms. Carri Carothers) would give a "HAB-COM" status report from inside her Mars habitat describing such things as current weather and temperature conditions on Mars.



Colony Commanders also presented voting options for additional life support systems such as Power, Transportation, Food and Water, Communication, and Recreation.

Later, students submitted a Lunch on Mars plan and took a Kahoot! post-assessment based on their Mars Riddles. The results of the final Kahoot! game were: *Crusader*, with 26,074 points; *TACOS IS GOOD*, with 22,451 points; and *domcatboy*, with 20,751 points.

Your commitment to this mission was crucial to its success

Thanks, Everyone!

Thanks to all who pitched in remotely to help us:

- Dr. Imelda Atencio (Food and Water)
- Lt Col Alex Carothers (Col Max Emum Powers, Power, Communications)
- Ms. Carri Carothers (Capt Michelle Redstone) (HABCOM)
- Jaden Carothers (Lt. Anderson, exterior maintenance specialist)

- Dr. Jacob Grosek (Air)
- Lt Jason Kirkendall (Recreation)
- Dr. Theodore Ortiz (Transportation)

Not to mention all the parents, teachers, students, and staff who made this such a phenomenal event. A *virtual* trip to Mars wasn't our original plan when we started the school year, but with all of your help, it was a huge virtual *success!*

Ingenius 'Copter Name

The newly-named *Perseverance* rover's traveling companion is no longer just called "Mars Helicopter."

The helicopter, which will be the first craft to attempt powered flight on Mars, has been designated "*Ingenuity*" by



Alabama High School student Vaneeza Rupani.

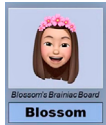
Her 'copter name was chosen as part of NASA's "Name the Rover" contest.

Chemistry 101 is Here!

We've launched a whole new series of virtual STEM activities students can do from home on our new **STEM 101** page at www.afnlm.com/stem! Check out the videos on our AFRLNM STEM Academy **YouTube channel**.

First, there was *Engineering 101* and *Physics 101*. But that wasn't enough STEM for us, so we added **Chemistry 101!**

- **Blossom's Brainiac Board:** Daily STEM challenges and adventures.



Blossom explores activities and adventures in chemistry, including making rock candy, making simple den-



sity jars, "What will freeze first," how fireworks work, and how to use chemistry to turn a penny green.

Now if she can just figure out how to turn a penny into a million dollars, we can have some *real* fireworks!

- **Bruja's Magical Storytime:** Scientific STEM storytelling highlighting STEM concepts, experts, and advancements.



Bruja introduces us to George Washington Carver

and how chemistry is used in everyday life.

Due to precautionary measures related to the coronavirus, including school closures, the scheduled 2020 DoD STARBASE NM, STARBASE 2.0, TECH, Robotics Challenge, and STEM Challenge Mission classes and events have been cancelled for the remainder of the school year.

Instead, in the interim we're transitioning to developing and delivering new virtual activities for students, including **STEM 101** and **Slice of Py**.



- **Pebbles' Pantry Project:**

Use common materials to design and execute STEM experiments!

Pebbles encourages us to observe phase changes and then shows us how to create a tasty mixture of either ice-cream or slushee.

We just put up all this chemistry stuff because we wanted to get a *reaction* out of people. Share the projects you create on social media, and tag us!

#DoDSTARBASENM,
#AFRLNMSTEM101
#AFRLNMchemistry101

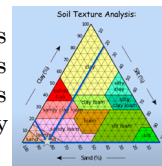


- **Spike's Science Spot:**

Develops the natural scientist by making real-world connections to STEM.



Spike introduces us to the atoms and explores the chemistry of clay.



Slice of Py

For Sixth through Eighth grade students, and beyond

Py in the Sky

I spy Py, with my little eye, in the cybersky! My, my, my.

Have you heard? Our good friend Larry Heard has put together a great page for our



www.afnlm.com/stem website called "Slice of Py," for engaging students in virtual Python programming activities!



Python is a programming language widely used in science, engineering and education. Our TECH Mission and Robotics Challenge Missions have both provided a taste of programming with Python.

The activities found here are intended for students in 6th through 8th grade, or *to infinity and beyond*.



The videos and activities will get you started programming with Python, and challenge you to create and share original projects as you learn new skills.

Getting Started



The Mu editor is a free and widely-used Python code editor for beginning programmers. The first step is to download and install the Mu editor.

On the website, there's a video in which Mr. Heard explains how to download the Mu editor, and a link to where it can be downloaded from.

If it doesn't work with your computer for some reason, there's also links to other Python editors you can download.

Using Modes in Mu Editor

When you first open Mu, you'll see a row of round buttons

across the top.

In the video for this section, Mr. Heard explains that the first button in the upper left corner is called a "Mode" button.



There are several Modes you can select from when you start using the Mu editor. Mu will behave differently, and have different buttons across the top, depending on the Mode selected.

Make sure you read the instructions carefully so you select the required Mode for each activity.

Mr. Heard suggests trying the Mode called "Python 3," which takes us to the first program.

Your First Program

For each programming skill introduced in Slice of Py, there will be one or more sample programs for you to copy and paste

into the Mu Editor. Explore editing the code in that program to make it your own.

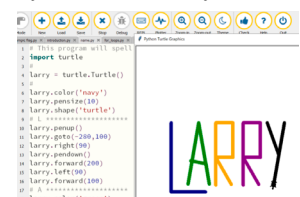
The first Slice of Py program is the common "Hello World" program. This program will introduce you to the "print" function and some of the rules you must use to create a correct sequence of symbols in Python, to print the words, "Hello, World!"

Mr. Heard also discusses using **variables** in Python, and the **Turtle Graphics** module.



Python Challenge #1

Your first Python Challenge is to draw your name using Python code. Good luck, and may the Mu be with you.



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Mr. Steve Burke, Technical Writer.

Important Terms and Acronyms

AF: Air Force

AFB: Air Force Base

AFRL: Air Force Research Laboratory

AFRL NM: AFRL New Mexico (AFRL/RD and AFRL/RV), on KAFB

AFRL/RD: The Directed Energy Directorate of the AFRL

AFRL/RV: The Space Vehicles Directorate of the AFRL

DoD: Department of Defense

KAFB: Kirtland Air Force Base, Albuquerque, NM

METS: Mars Exoplanet Transient Satellite (METS) Mission 2019-2020

MM: Mission to Mars

PRS: Phillips Research Site

S&Es: Scientists and Engineers

STEM: Science, Technology, Engineering, and Math

TECH: Technology and Engineering Challenges

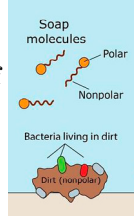
USAF: United States Air Force

Remember, Teachers:
Get those EPA
Modification forms in!

STEM Bytes

Coronavirus vs. Soap...and STEM

Palli Thordarson, a professor at the School of Chemistry at the University of New South Wales, Sydney, thinks that the coronavirus is no match for ordinary soap...and STEM.



In fact, it's even better, he says, than plain water, or even alcohol-based wipes or disinfectants.

The virus, he says, is a "self-assembled nanoparticle in which the weakest link is the lipid (fatty) bilayer."

Soap makes viruses, grease-like nanoparticles, detach from the skin and fall apart "like a house of cards."

"Supramolecular chemistry and nanoscience tell us not only a lot about how the virus self-assembles into a functional, active menace, but also how we can beat viruses with something as simple as soap," he says.

See www.marketwatch.com.

Virtually Summer

Summer is virtually here, and we're going to be virtually there!



Like everything educational in The Age of Coronavirus, we'll be holding our summer camps, traditionally aimed at children of Kirtland AFB base personnel, virtually, over the internet.

But STEM will be in the air!

Virtual NM CS PD Week



In consideration for these unprecedented times, all strands for NM Computer Science Professional Development Week will be delivered online this year, 1-5 June 2020.

They plan to hold five days of online, synchronous morning sessions, followed by on-your-own-time activities.

Scholarships from support-

ing partners such as Code.org, NMSU's Computer Science department, APS, and NM MESA are available.

Two strands they're highlighting this year include Counselors for Computing (C4C) and Botball.

For more info, see www.computersciencealliance.org.

3-D Masks



Technology to the rescue! Companies such as Raise-3D are making 3-D printed masks, which when combined with a small HEPA-compatible filter, makes a reusable face mask for coronavirus, when N-95 or similar masks are unavailable.

See www.raise3d.com.

Coronavirus STEM/Ed Resources, Grants, Activities



The US Department of Education website has a page with links to coronavirus-related grants, funding, and other resources and information for Elementary and Secondary schools. See www.ed.gov/coronavirus.

They also have a number of links to stay-at-home STEM activities, such as:

- Learning about careers in DoD STEM fields,
- Virtual field trips to national energy labs, and
- Free Smithsonian STEM Games and Simulations.

The NEA Foundation (www.neafoundation.org) has three

MakeCode at Home

With many schools closed due to the coronavirus, Microsoft's MakeCode.com knows that parents and educators are looking for online learning resources for students.

They've compiled a list of helpful resources that students can access to continue their computing education outside the classroom.

There's video playlists and online tutorials available for

Daily Streams (Monday - Friday)		Weekly Streams	
TIME	STREAM	DAY	TIME
9 AM PT 6 PM ET	MakeCode for the Micro:bit	TUESDAY	12 PM PT 3 PM ET
10 AM PT 7 PM ET	MakeCode with Minecraft	WEDNESDAY	12 PM PT 3 PM ET
11 AM PT 7 PM ET	MakeCode Arcade (Beginner)	FRIDAY	2 PM PT 5 PM ET
1 PM PT 4 PM ET	MakeCode Arcade (Advanced)		

MakeCode micro:bit and MakeCode Arcade, and daily and weekly live-streaming events for stay-at-home-during-coronavirus times.

There's also online curriculum resources for educators.

See www.makecode.com/online-learning.

Coming Next Issue...

- Another great year of less pandemics (hopefully), more STEM, and summer fun!

Watch for it!

