



The Rocket Report

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In partnership with:



Collaborator:



Remember, Teachers:
It's never too early to make
bussing arrangements for
our classes and events!



A new year of STEM in
3...2...1...



Mars LUD Accomplished

BUCKLEY SPACE FORCE BASE, CO—Fifth grade students from the Cherry Creek and Aurora, Colorado school districts participated in a Mission to Mars Link-Up Day event on 13 December 2023 at Buckley Space Force Base in Colorado—and AFRL NM STEM Academy staff members were there to assist!

During the preparation for Link Up Day, students completed projects needed for the mission, and talked to a Space Force Guardian about the Space Force mission and how Mission to Mars correlates to it.

At the Colorado event, our staff assisted as students simulated go-



Space Force photo by Senior Airman Madelyn Yezep

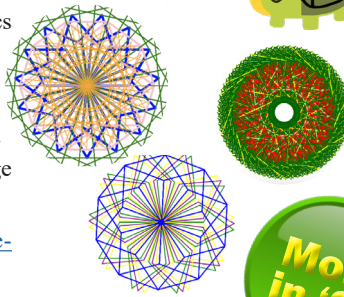
ing on a manned mission to Mars. Students built and linked habitats, gave life support briefings, and performed other Link-Up Day activities. Good job, gang! See www.buckley.spaceforce.mil/News.

Meanwhile, New Mexico Mission to Mars students are preparing for our own Link-Up Day event on 25 April 2024!

More Mosaics in 2024

2024 is Turtle Time! Robotics Challenge students are making more mosaics, and many of them are already on display in a Mosaics Gallery on our website, in the Robotics Challenge menu:

<https://afrlnm.com/stem/turtle-mosaics-gallery/>.



More Kahooting in 2024

The Mars Facts Challenge Kahoot! games have started! (<https://afrlnm.com/stem/mis-sions/mission-to-mars/mars-kahoot-games/>).

Challenge #1 is already up and available to play through **Friday, 26 January 2024**, and games will rotate about every two weeks.



More STEM in 2024

Hey, L..Remember when “AI” meant Adobe Illustrator? Ay, ay, ay. Artificial Intelligence had a big year in 2023, but 2024 promises to be an even *bigger* year for AI. Even Adobe Illustrator has an AI helper now, called *Firefly*. AI AI!

AI was all over the [Consumer Electronics Show 2024](#), too—AI’s being woven into pretty much everything: Robots, TVs, cars, laptops, “crying baby” translators...Microsoft even wants to add a dedicated AI “[Copilot](#)” key to its computer keyboards.

2024 promises to be a big year for [space travel](#), too.

Missions to our moon, Jupiter’s moon Europa, Mars’ moons Phobos and Deimos, and a return visit to the asteroid the DART mission hit are all scheduled to launch this year.

A joint [report](#) from Japanese T2K and American [NOVA](#) researchers, on how the masses of neutrino particles—*electron*, *muon*, and *tau*—compare, is coming out in 2024.

Fortunately, we’ve got more STEM planned in 2024 as well!

There’s a new semester of **DoD STARBASE NM** and **Spring TECH Mission** classes in 2024.

The **STEM Challenge Symposium** is scheduled for 4 April, **STARBASE Advanced’s** ARC qualifying rocket launch deadline is 8 April, **Mars Missions Link-Up Day** is 25 April, and the **Robotics Expo** is 10 May 2024.

Nothing artificial about our *students’* STEM intelligence!





Your **commitment** to this mission is crucial to its success



Mission to Mars

For Fifth Graders

Mars Safeguarding Through Asteroid Redirection Spacecraft (STARS) Mission 2023-2024

Look For the Volcano, Mon

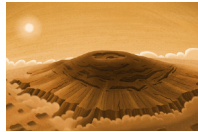
Where on Mars will students be setting up their colony? Just look for the big volcano, Mon.

Mission to Mars students can go to the Mars STARS Mission website and click on the Mars Colony Location task on the Base Operations Control Panel to obtain three clues to their colony location (<https://afrlnm.com/stem/mars-colony-location/>).

The three clues involve solving

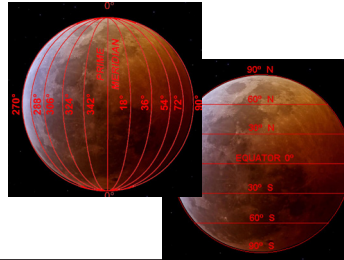
a Latitude and Longitude Math problem, and decoding a Latitude ASCII Code. Answers can be written in their Student Journals.

With clue answers, and the Mars topographical map, students can fill out the *Mars Colony Location Form* using the link on the webpage.



First clue is, it's near the largest volcano in the Solar System, *Olympus Mons*.

Second clue is, it's not near the site of the next Olympic Games.



Divide/Conquer

When Mission to Mars students complete Kahoot Mars Facts Challenges (see page 1), their Student Mission Journal asks them to calculate the "Correct Answer Percent."



In other words, the *fraction* of the total number of questions in the game that were correct: The top number is the number of correctly answered questions, the bottom number is the total number of questions in the challenge.

Dividing those two numbers results in a decimal number. Multiply the decimal by 100 and add a "percent" symbol, and that's the "Correct Answer Percent!"

A Little Help, Please

To survive on the Red Planet, Mission to Mars students will need a little help.

Students research Mars Facts and sketch a design they would create of one of eight helpful *life support systems* in their Mission Journal.



Food Supply

They also build a model of their life support system using materials found around the house (www.afrlnm.com/stem/life-support-system/).

Note: The model does not have to actually *function*.



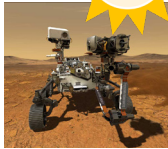
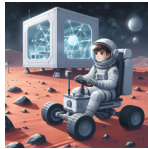
A Thousand Points of Light



Mars rover *Curiosity* recently passed 4,000 sols (Martian days) on Mars, and now *Perseverance* has passed the 1,000 sols mark.

Percy's been exploring Jezero Crater, which appears to have been a water-filled lake once upon a time.

It's also been collecting soil samples,



which NASA hopes to retrieve on a future Mars mission.

See www.mars.nasa.gov/news.

Mark Your Mobile

It's not too early to Mark Your Mobile, specifically the calendar app in it, for the mandatory Mission to Mars Mid-Year Meeting coming up on 22 February 2024 12:30-3:30 pm.

Make your arrangements now!



TECH Mission

For Middle Schoolers

Technology and Engineering Challenges—Rocketry and Satellites Missions

Rocketry Wraps, Satellites Start

Fall Rocketry semester TECH Mission Day 3 has wrapped, and it rocked!

Participants, like these Peralta students, analyzed and graphed real-world launch data collected from the Day 2 Rocket Launch, comparing it to the Rocksim simulation made on Day 1.

Students used an object's *center of gravity* to make a little eagle figurine balance on the tip of its beak, and figured out how to balance a bunch of nails on just one nail.

Students explored forces and Newton's Laws by jumping on Vernier Force Plates and riding on Human Dynamics Carts, before engineering anti-gravity forces into the payload protection device for an Egg Drop activity.



The TECH Mission Spring semester is starting soon, and we're shifting gears from Rocketry to Satellites and Satellite Technology. It promises to be a *shockingly swell* STEM session!

By the Tuesday of the week before the first class in the series, session, or semester, we will ask you for the name, driver's license number/ state of issue, date of birth, and the FULL Social Security Number, of every adult coming through the base gate for that series of classes.





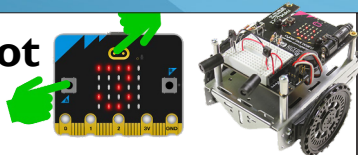
Robotics Challenge For Middle Schoolers

Build a Bit of 'Bot

Robotics Challenge teams: As a reminder, **Module 3, Building and Controlling a Robot**, opens up on Tuesday, 16 January. Follow the directions carefully, center those servos, and remember to have fun!

Don't worry if you're still working on Modules 1 and 2, they will continue to stay open.

If your team is hoping to qualify for the Robotics Expo this year, keep in mind that you will need to be completely done with Modules 1 and 2 by the end of February in order to receive the materials you need.



Keep on plugging away at those challenges, and don't be afraid to ask for help if you need it!

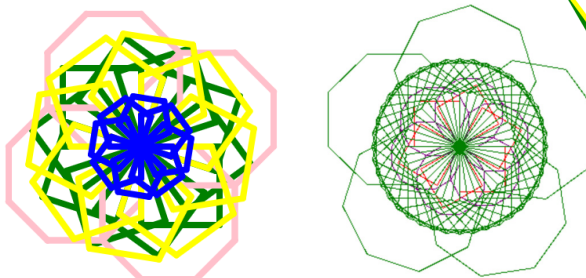
Finally, you can check out a sampling of the Module 1 Challenge 8 mosaic designs from this year by visiting our webpage [here](#).

We have really beautiful and creative designs online; keep them coming! Questions? Suggestions? Contact:

caitlin.everhart@afrlnmexico.com!

More in '24

More Module 1 turtle mosaics! We've updated the [Turtle Mosaics](#) page in the Robotics Challenge section of our website with additional images.



STEM Challenge For High Schoolers

"Phun" With Projectiles

Suggested Timeline: Jan/Feb
STEM Challenge teams build and test their launching and payload protection devices.

Then they take the Module 3 Projectile Challenge at https://phet.colorado.edu/sims/html/projectile-motion/latest/projectile-motion_all.html! It's "phun!"

In this simulation, students have "phun" with "physics" to make three projectile objects "phly" through the air at different angles:



1. A pumpkin,
2. A car, and
3. A piano.

They also test their knowledge in a Canvas quiz. Let the chunking begin, and may the best chunk dunk!

More Logos Hatching

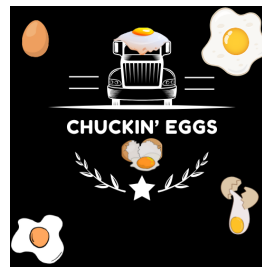
In STEM Challenge Module 1, student teams are asked to choose a team name and design a team logo that represents the team and the mission.

More logos are hatching, and they're still cuter than baby chicks!

THE SPRINGALD SQUAD



Team 19—
The Springfield Squad



Team 4—
Chuckin' Eggs



DoD STARBASE NM For Fifth Graders



Nonstop Flights

Inclement weather and other issues sometimes result in holiday travelers finding themselves cooling their jets in an airport for a while.

But not our DoD STARBASE Day 5 students! One of the best things about flying on a flight simulator is...

Nonstop flights, available all year 'round! No long TSA lines, and no lost luggage, either. You can't beat that, not even with an online

Mission	Day	Activity	STATUS
SB-NM	5	BERNOULLI BAGS	ON TIME
SB-NM	5	TORNADO TUBES	ON TIME
SB-NM	5	FLIGHT ENTHUSIAST	ON TIME
SB-NM	5	FLIGHT SIMULATION	ON TIME
SB-NM	5	STEM AND FUN	ON TIME

boarding pass on your phone!

Students in Day 5 learn about air pressure...which leads to a Tornado Tube activity. Ever try to fly through a tornado? It's not fun.

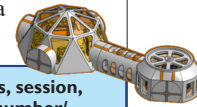
They learn about how air pressure and fluid motion relates to Bernoulli's Principle...which leads to inflating Bernoulli Bags from a distance.

AFRL Flight Enthusiasts get all enthusiastic talking about their real-world flying experiences, made possible by air pressure, fluid motion, and Bernoulli's Principle holding up the wings of the aircraft.

Students earn their wings flying an X-Plane 11 Flight Simulator Cessna. Louder and slower than an X-59, though...not even supersonic!



Students also use Onshape CAD software to design a new science outpost on Mars, in case they feel like catching a connecting flight.



By the Tuesday of the week before the first class in the series, session, or semester, we will ask you for the name, driver's license number/ state of issue, date of birth, and the FULL Social Security Number, of every adult coming through the base gate for that series of classes.



AFRL NM STEM Academy
PO Box 9556
Albuquerque, NM 87119
(505) 846-8042

AFRL.RDOX.NMSTEMOutreach@us.af.mil

Website:
www.afrlnm.com/stem

YouTube Channel:
<https://www.youtube.com/channel/UC-QuOSdIXTKYuXPONZwIAIHQ/videos>

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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

MM: Mission to Mars

S&Es: Scientists and Engineers

STARS: Mars Safeguarding Through Asteroid Redirection Spacecraft Mission 2023-2024

STEM: Science, Technology, Engineering, and Math

TECH: Technology and Engineering Challenges

USAF: United States Air Force

USSF: United States Space Force

Remember, Teachers:
Get those EPA
Modification forms in!

STEM Bytes

A-door-able Update

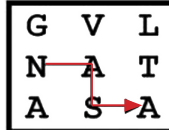
Our Cochiti Room Door won third place in the AFRL door decorating contest! Woo-hoo!

Zuni's door got an honorable mention, but for some reason there was a bit of concern that planet-destroying Death Stars *might* not send the most cheerful holiday message.



Aerospace Word Turn

Directions: The 15 **red** words from the paragraph below can be found in the large letter grid. They're not in a straight line; they turn corners—and no diagonals! See example at right. Find all 15 words, the remaining letters will spell out a word or phrase. Enjoy!



L E N N S N T N A T A
G L E F A E A L I S S
E L S I C I N P R A E
W E F F Q A E S E Q U
X A M I U R E L E C T
S M R E L A O A R N R
T A A T U N R E C H I
R O N G Y G E S T E C
S E R S E L I A B L I
E P U O C O L P X S S
M A S N I R E L A N E

NASA Aeronautics conducts **research** to help make **airplanes** more **safe**, **efficient**, **quiet**, and **reliable**. The work is completed at different NASA facilities around the country, including **Ames**, **Armstrong**, **Glenn**, and **Langley**. Part of this work includes designing **X-planes** like the X-57 (**Maxwell**), an **electric** powered plane, and the X-59 (**QueSST**), a **supersonic** plane that doesn't produce a loud sonic boom.

For more cool STEM activities, visit
www.nasa.gov/directorates/armd/quesst-supersonic-stem-toolkit/.

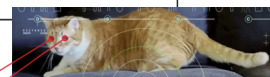
\$Scholarship Open\$



The 2024 Advancing Young Women in STEM [scholarship application](#) (\$500, \$750, and \$1,000) is open now through 18 March 2024.

Women remain underrepresented in STEM professions and there is a need to inspire the next generation of female innovators and leaders. This scholarship is designed to assist and encourage young women pursuing a STEM career most.org/young-women-stem/.

Laser Cats



On 11 December 2023, NASA's Deep Space Optical Communications (DSOC) experiment beamed the first ultra-high-definition streaming [cat video](#), of a cat named Taters, from nearly **19 million miles away**, over a laser beam.

Tech Trekkin'



NEW MEXICO TECH
SCIENCE • ENGINEERING • RESEARCH UNIVERSITY

Tech Trek is a week-long residential summer camp for girls passionate about STEM.

Nominations for 2024 by 7th grade math or science teachers **are due 28 January 2024**.

Nominated girls are invited to submit a Tech Trek NM **application**; deadline is **29 February 2024**.

Email: techtreknm@gmail.com.

How do you get 100 math teachers in a room that fits 99? Carry the one.

SURPRISINGLY STEM
Space Tire Engineer



<https://www.nasa.gov/careers/>

Explore unique and exciting careers at NASA!



DISCOVER STEAM DAY

FEBRUARY 10, 2024



SciGirls



A series of half-hour SciGirls videos on PBS LearningMedia is changing how millions of K-12 girls think about STEM. Check it out here:

<https://nm.pbslearningmedia.org/collection/scigirls/>

Teachers: Need help with the **Mission to Mars**, **Robotics Challenge**, or **STEM Challenge missions**?

There's Zoom "office hours" with our staff every Thursday (excluding holidays) from 4:00 – 5:00 pm.

Email caitlin.everhart@afrlnewmexico.com.

Coming Next Issue...

- Uniforms and Mid-Year Meetings on Mars
- Building Robots
- Satellite TECH
- Sugary hearts and lots of chocolate

Watch for it!

