



AFRL LA LUZ ACADEMY

“CREATING THE POSSIBILITIES”



INSPIRING FUTURE SCIENTISTS AND ENGINEERS

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In This Issue...

The Rocket Report	1
Impressive Turnout at Kickoff	1
Important Change to Base Entry Requirements	1
Mars Missions Flight	2
In Point of Fact	2
Gaga Over Sagas	2
Patch Things Up	2
DoD STARBASE Flight	2
Use the Force, Luke	2
PETES PRS Flight	3
Roses are Red, UV is Ultraviolet	3
Intro to SE Flight	3
Resistance Is Neither Futile Nor Useless	3
STEM Challenge Flight	3
Critical Thinking	3
Teacher Institute	4
Materials Orders!	4
Here Comes the Deputy	4
Ah, Memories...	4
The Next Step...	4
STEM Bytes	4
Expanding Your Horizons 2011	4
Anyone Feel Like a Deer in Headlights Yet?	4
Masthead and Important Terms and Acronyms	4
Coming Next Issue...	4



The Rocket Report

Impressive Turnout at Kickoff

The numbers are in for the STEM Challenge Flight Kickoff Briefing held 28 October 2010.

A very impressive 107 high-school students, representing 11 high schools, participated in the Kickoff Briefing, thus getting the STEM Challenge Flight off to a great start.

Six scientists and engineers (S&Es) assisted these students as they worked in teams to identify the goals, constraints, and requirements for their science, technology, engineering, and math (STEM) projects.

Four of these S&Es were from the Air Force Research Laboratory (AFRL): Capt Paul Frisinger, AFRL/RVSS;

Lt Robert Lake, AFRL/RVSE; Mr. Mayer Landau, AFRL/RVSS; and Lt Rich Shepherd, AFRL/RVES. The others were Maj James Clegern and Mr. Trevor Kennedy.

A heartfelt thanks goes out to all the S&Es, and everyone who helped make the 2010 Kickoff Briefing turn out so impressively!



Important Change to Base Entry Requirements

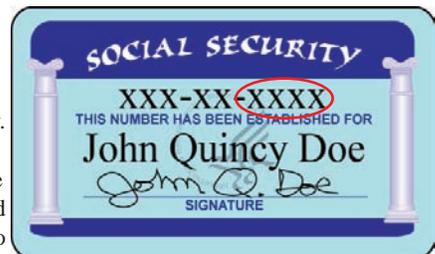
There has been a change in base entry requirements for all visitors coming to Kirtland Air Force Base.

Now, in addition to the first name, last name, and middle initial of every person 16 years of age and over, we are required to submit the last four digits of their Social Security Number. In the interest of the security of your personal information, please *do not* submit your *entire* social security number, only the last four digits.

We are required to submit

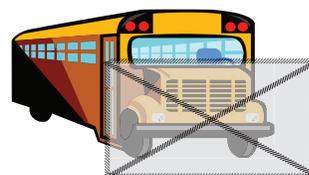
this information to Base Law Enforcement at least three working days before the date of entry. For example, if you are planning to come to base on a Monday, we would need the information no later than the end of the day Tuesday of the week before. In the past, we were given some laxity in the enforcement of this deadline, but that is no longer the case.

A sample form that you can use to submit the information to our office is enclosed with this newsletter.



You can also email the information to Ms. Diana Lee, responding to her e-mail reminder about your scheduled visit.

As always, when sending this info, please also include your full name as it appears on your driver's license, the date that you are intending to visit, and an estimate of how many students you expect to bring.





Mars Missions Flight

Mars Cave Skylight Investigation (CSI) Mission 2010-11

In Point of Fact

The trouble with facts is that there are so many of them.

--Samuel McChord Crothers

Fact: If you tried to hike to the top of Mount Everest without first studying what conditions



to expect on the mountaintop, you likely would not bring adequate clothing and provisions for the trip. This would result, *ipso facto*, in your having a miserable time.

Now imagine taking a trip to Mars. How much do your students know about the Red Planet, really? Is the air breathable? Is it cold or hot there? Is there any water available to drink? These

are the kinds of facts that would be good to know before leaving Earth, so your students can plan and pack appropriately.

But here's a little factoid for you: Your students can find out the answers to questions like these by studying their "Mars Facts" (*Teacher's Resource Guide* manual, pp. 57-60).

For example: According to the "Mars Facts" chart, the atmosphere on Earth consists of 78% nitrogen and 21% oxygen. On Mars, however, the atmosphere is 95% carbon dioxide. The fact of the matter is, it might be just a tad harder to breathe on Mars.

So, unless you can hold your breath a really, really long time,

some sort of preparations must be made ahead of time to account for this fact. Good thing you studied your Mars Facts before you went, huh?

There are learning tips built right into the chart, and games like "Mars Facts Bingo" and the "Mars Facts Card Game" in Chapter 6 of the manual, to help your students get their facts straight.

AFRL La Luz Academy
Mars Missions Flight
Mars Facts Bingo

The US satellite	From Mars	From Earth	121°F to 134°F	140°F to 157°F
Mars' moons, Phobos and Deimos	Red	Earth's oceans freeze	Mars' surface freezes	Climate on Earth
Climate on Mars	95% CO ₂	95% CO ₂	95% CO ₂	Earth's atmosphere
Mars' atmosphere	95% CO ₂	95% CO ₂	95% CO ₂	Earth's atmosphere
21% O ₂	21% O ₂	21% O ₂	21% O ₂	Earth's atmosphere



Gaga Over Sagas

A saga is a story, sung or spoken, about historical events. The Mars Missions Flight sagas describe the epic journey to Mars our heroic student TEAMS are undertaking. The sagas can be set to music, choreographed, sung, or simply spoken.

Performance opportunities at Link-Up Day include when the student TEAMS arrive at their habitat site, during Lunch on Mars inside the habitats, and for visitors passing through their habitat.

While it's true that you may go gaga over your saga, you can't hire Lady Gaga to perform it for you on Link-Up Day. Each student TEAM must perform their own. Sorry.

See pp. 37-38 in your *Teacher's Resource Guide* for more information.



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

Patch Things Up

The mission patch symbolizes the unique qualities of each TEAM and its mission, so tell your students to put some thought into the design, and work hard to make them look nice.

Components of the mission patch include: Name of the mission (Cave Skylight Investigation), mission objective (colonize Mars), names of TEAM members, experiments scheduled



for the mission (such as the life support system the TEAM will build), flags or colors representing mission participants, shape and size.

Each TEAM (5-7 students) makes two patches:

- A small one that can be used to make nametags for each student on the TEAM; and
- A large (poster-sized) one that can be displayed on the outside of the habitat on Link-Up Day.

Refer to pp. 39-56 in your *Teacher's Resource Guide* for more information.

DoD STARBASE Flight

Use the Force, Luke

Yes, Luke, you do want to use the force during DoD STARBASE Flight Day 4. Sixth graders attending Day 4 use plenty of forces in their hands-on STEM activities.

Actually, they get more help from Issac than Luke, though. Sir Isaac Newton, that is. He's the one that figured out some laws of physics like the Law of Inertia (objects don't move unless acted on by an outside force), the notion that every action has an equal and opposite reaction, and the

equation $F=ma$ (Force = mass x acceleration).

Students explore forces with hands-on activities like Newton's Cradle, a row of silvery balls hanging from strings. By making one or more balls swing down and collide with the other ones in the chain, students can observe first-hand how the force of impact gets transferred over to the same number of balls on the opposite side.



To make an omelet, sometimes you have to break a few eggs—but don't tell that to Eggbert, the small but brave pilot of a shuttle attempting a crash-landing. Students use engineering and design skills to test various methods of protecting our brave pilot from the violent force of the shuttle's crash landing.

Students also explore pushing and pulling forces with a Vernier® dual-force sensor to control the shape of the force as it's

graphed on the computer screen.

Other Day 4 activities students participate in include designing a space station using PTC Pro/ENGINEER® 3-D modeling software, and investigating air pressure with Tornado Tubes.

And speaking of eggs, don't forget the sage advice Luke's aunt gave him when he tried to eat an omelet with his fingers:

"Use the fork, Luke!"

At least one week in advance, please give us the name of each adult per driver's license, the last four digits of their Social Security Number, and the estimated number of students you're bringing.

Don't forget to turn in your Media Release Forms!



PETES PRS Flight

Providing Engineering and Technology Experiences for Students Phillips Research Site Flight

Roses are Red, UV is Ultraviolet

OK, class, pop quiz. Get out your clickers, please, and no talking.

Question 1. What is the major source of ultraviolet (UV) radiation?

- A. The Sun
- B. The Moon
- C. Volcanoes
- D. Smoking cigarettes

Question 2. If you shine a red laser beam through a green lens, what color light will come out?

- A. Blue
- B. Yellow
- C. Red
- D. Green

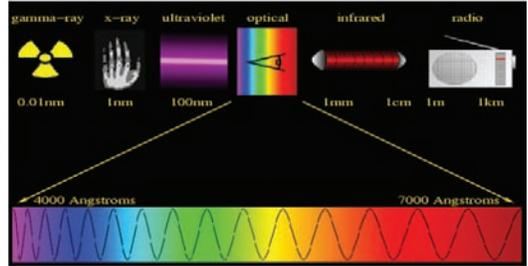
Don't forget to turn in your Media Release Forms!

Seventh grade students attending their Phillips Research Site Flight Day 1 explored the electromagnetic spectrum and UV radiation with hands-on activities in-

cluding working with blacklights indoors, and UV frisbees and beads outdoors.

The students explored light by cutting various lens shapes out of red and green JELL-O and shining red and green lasers through them.

They also experimented with lightboxes, combining different colors to see which ones make white light.



At least one week in advance, please give us the name of each adult per driver's license, the last four digits of their Social Security Number, and the estimated number of students you're bringing.



Intro to Systems Engineering Flight

Resistance Is Neither Futile Nor Useless

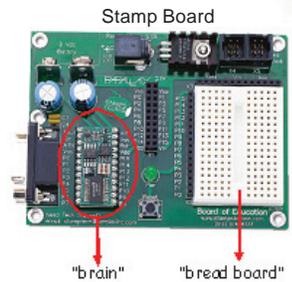
In science fiction, alien races who want to conquer us humans never have anything nice to say about resistance. "Resistance is futile," say the Borg. "Resistance is useless," say the Vogons and the Daleks.

But to eighth grade students participating in the Intro to Systems Engineering Flight, resistance is merely the ratio of the degree to which an object opposes an electric current running through it, measured in units called *Ohms*.

Don't forget to turn in your Media Release Forms!

Far from futile, the students actually find resistance quite useful when building a test circuit on their *stamp board*.

In the Intro to Systems Engineering Flight, students build and program small robots called "Boe-Bots®." Along the way, they learn hands-on how to build test circuits on a stamp board, using electronic components such as resistors and light-emitting diodes. They even learn how to decode what the different colored bands on a resistor mean.



Resistor



Resisting the Vogons may be useless, but hands-on, minds-on STEM never is!

At least one week in advance, please give us the name of each adult per driver's license, the last four digits of their Social Security Number, and the estimated number of students you're bringing.



STEM Challenge Flight

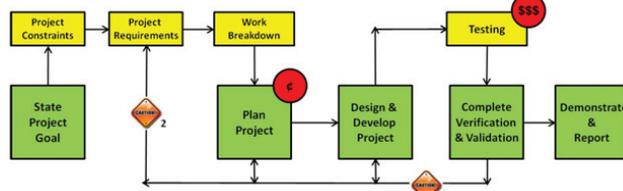
(formerly the SPACE Flight)

A Systems Engineering Approach to STEM Projects

Critical Thinking

OK, STEM Challenge Flight teams, time to prepare your Annotated Briefing in PowerPoint (see Appendix B in your handbook), and schedule your Critical Design Review (CDR). Some things to think about as you prepare your briefing:

Is the scope of your STEM project reasonable, or can you scale it back somehow? How much technical expertise will you need? Are there problems or issues that may impact your project?



What materials will you need, where can you buy them, and how much do they cost? Will you need hazardous materials that require special procedures?

Does your timeline in Gantt format (you did make one, right?) show who is responsible for tasks, and when?

Print out a hard copy of your briefing materials which includes project goals, constraints, and requirements; work breakdown, and timeline in Gantt format. These are all mandatory deliverables at the CDR.

Also, don't forget to have your project record book available with your current project documentation in it.

The Next Step...



- Continue working on your STEM project
- Let us know the name of your project once you choose it
- Prepare a CDR briefing with your project goals, constraints and requirements; work breakdown; materials needed and for which components; and timeline in Gantt format
- Schedule and perform your CDR briefing



Teacher Institute

Materials Orders!

Teacher Institute Fellows, don't forget to fill out and submit your materials orders by 10 December!

Here Comes the Deputy

Fellows, did you attend the Fellows meeting on 19 October? No? Then have you had a visit yet at your school from Deputy Director Diane MacAlpine? No?

She will visit you soon to discuss how your STEM project is going with your students.

Ah, Memories...

Memories...light the corners of my mind...misty water-colored memories...of the way we were...

OK, Teacher Institute Fellows, you mean to tell me you can't remember how much *fun* we had at the Teacher Institute workshop this summer?

Well, no matter, because the Teacher Institute Memory Book will refresh your memory. You should receive yours soon if you haven't already.

Scattered pictures...



The Next Step...

- During the first semester, **identify what the goals of your STEM project are.**
- **Fill out and submit your materials orders by 10 December 2010.** This should give you plenty of time to complete your project with your students during the second semester of the school year. Remember, the materials request form is on the flash drive you received this summer.
- **Let us know** if you would like a scientist or engineer to help you and your class complete your STEM project.

AFRL LA LUZ ACADEMY

AFRL La Luz Academy
PO Box 9556
Albuquerque, NM 87119



(505) 846-8042

AFRLLaLuzAcademy@Kirtland.af.mil

Website: www.vs.afrl.af.mil/LaLuz/

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Mr. Steve Burke, Technical Writer, or
Ms. Ronda Cole, Director.

Important Terms and Acronyms

AF: Air Force

AFB: Air Force Base

AFRL: Air Force Research Laboratory

AFRL/RD: The Directed Energy Directorate of the AFRL (formerly AFRL/DE)

AFRL/RV: The Space Vehicles Directorate of the AFRL (formerly AFRL/VS)

CSI: The Mars Cave Skylight Investigation mission

DoD: Department of Defense

KAFB: Kirtland Air Force Base, Albuquerque, N.M.

LF: Leadership Flight

PETES: Providing Engineering and Technology Experiences for Students

PRS: Phillips Research Site

R&D: Research and Development

STEM: Science, Technology, Engineering, and Math

TI: Teacher Institute

T²: Technology Transfer

TTE: Technology Transfer for Education

USAF: United States Air Force

STEM Bytes

Expanding Your Horizons 2011

The annual Expanding Your Horizons event, for girls in grades five through nine, is scheduled a bit earlier this year. Registration

deadline is 14 January 2011, so make your plans now.

Admit it...science really IS fun!

2011 Albuquerque Conference
Saturday, January 29, 2011
8 am – 1 pm
Central New Mexico Community College

Enjoy hands-on workshops

ADMIT IT – Science is Fun!

We'll show you how a career in science, technology, engineering or math is a lot of fun.

Girls grades 5-9 are invited to attend hands-on workshops and learn about different careers from women professionals.



For more information and to register for this **free event** by January 14, 2011:

www.expandingyourhorizons.org/conferences/Albuquerque/
centraleyh@gmail.com

505-750-8131 (google voicemail)

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Twitter: <http://twitter.com/CentralEYH>



Presented by the NM Network
for Women in Science and Engineering
www.nmnwse.org



Anyone Feel Like a Deer in Headlights Yet?



Teachers who have never participated in one of our Flights before sometimes report that they feel glassy-eyed, like a deer in headlights. There's so much information to learn!

Not to worry, though—veteran teachers report that the feeling goes away about the time you start your second year. Our staff is always ready to answer your questions, too.

So just hang in there—you'll be a pro in no time!

Coming Next Issue...

- Uniforms and Life Support Systems
- A new year for us
- A new semester for DoD STARBASE



Watch for it!