



AFRL LA LUZ ACADEMY

“CREATING THE POSSIBILITIES”



INSPIRING FUTURE SCIENTISTS
AND ENGINEERS

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Happy Thanks- giving!



The Rocket Report

Hey, It's Not Rocket Science... Oh, Wait, Yes It Is

On 12 and 13 October 2010, hundreds of sixth grade DoD STARBASE Flight students, representing over twenty schools, made their way to an empty field on the outskirts of Rio Rancho for the eighth annual AFRL La Luz Academy Rocket Launch event.

Student teams came ready to launch the six-foot rockets they built and decorated themselves during the first day of the DoD STARBASE Flight; rockets with inspirational names like *Apollo*, *Atlas*, *Gemini*, *Mercury*, *Opportunity*, *Phoenix*, *Saturn*, and *Spirit*.

The students already had an idea of how high their rocket would fly; they simulated the flight back in the classroom using a computer program called *Rock-Sim*.

As students arrived at the launch site, they stood in line in the warm New Mexico sun at the Registration table, and received their assignments for the day, as identified by a color-coded magnetic badge they affixed to their bright yellow AFRL La Luz Academy T-shirts.

Next, they headed to the Launch Gear Checkout table and received their team's rocket and specific equipment they would be using, such as binoculars, GPS units, and clipboards and forms to record data on.

After taking a group photo with

their rocket, the students moved on to their assigned duty areas and went to work.

With the help of volunteer adult mentors, Assembly and Inspection Teams packed the parachute, inserted an *altimeter* into the rocket for measuring the flights' altitude, and weighed the rocket.

Meteorologists, using a Pinpoint WeatherNet weather station set up on site, checked that weather and wind conditions were acceptable for launch.

Spotter Teams, using binoculars, checked that the skies were clear of aircraft.

The Assembly Team installed the rocket's motor.

The Pad Manager helped load the rocket onto the launch tower and arm the altimeter.

The sixth grade Range Safety Officer (RSO), speaking into a microphone, gave the school name and the rocket name, and verified with the Meteorologist and Spotter Team that everything was a "go." Then the RSO



began the countdown: "Five... four...three...two...one... *launch!*"

The Launch Control Officer, a fellow team member, flipped the switch on the launch control box.

Whoosh! The six-foot long rocket shot off the launch tower and zoomed about 2,000 feet into the air. Shortly after *apogee*, the highest point of the rocket's flight, the parachute came out and gently slowed the rocket's descent back to Earth. Students and spectators cheered. Then the Recovery Teams, guided by the Spotter Teams, set out to find the rocket and bring it back.

By the end of the event, the students had successfully launched 59 rockets into the air over the course of two days.

Hey, it doesn't take a rocket scientist to figure out that these students all did a great job at the Rocket Launch event...and had a blast doing it!





Mars Missions Flight

Mars Cave Skylight Investigation (CSI) Mission 2010-11

New Mars Missions Flight Teachers Gain Confidence

The thought of participating in an activity like the Mars Missions Flight might make some teachers new to this activity a bit weak in the knees.

Hey, it's understandable. We all get a little nervous when we start something new.

Well, by now, most of those teachers are probably starting to feel a bit more confident.

First of all, they attended the Mars Missions Flight New Teacher Training, held 21 October 2010.

Director Ronda Cole led the full-

day training session, which was jam-packed with hands-on activities and useful information.

Ms. Cole explained the Mars Missions process in detail, with help from PowerPoint slides and videos. Teachers got first-hand experience doing some of the things they will teach their own fifth grade students to do, such as designing mission patches, studying Mars Facts, building life support system models, composing and performing sagas (musical renditions of their journey to Mars), and building a scale-model version of a habitat.



Secondly, at the same meeting, the teachers received a revised version of the *Teacher's Resource Guide* manual. It, too, is jam-packed with hands-on activities and useful information. The teachers can refer to it all year to help guide them through the process of preparing their students for a successful manned mission to Mars.

If teachers have questions, they can contact Ms. Cole or Deputy Director Diane MacAlpine whenever they need to. At the grand finale Link-Up Day event, there will also be fellow teachers, Colony Commanders, and others available to assist or answer questions. As the little alien the teachers received at the Teacher Training reminds us, We Are Not Alone!

And last, but *certainly* not least, there's always *this very Mars Missions Flight section of the monthly newsletter*, for additional tips and information!

Now, if *that* doesn't inspire confidence, I don't know *what* will! :-)

Investigate the Mars Manual Thoroughly

Teachers, while you're busy implementing the Cave Skylight Investigation (CSI) mission at your school, don't forget to also investigate your Mars Missions manual thoroughly.

For example, need a form? Chapter 5 supplies you with some valuable forms, including the Flight Director and Team Mission Logs. These logs, by the way, give an excellent step-by-step checklist of

the entire Link-Up Day event.

Chapter 6 has a wealth of supplemental resources, like a page outlining roles students can be assigned for group activities, and a Mars Facts Bingo game to help students get their facts straight.

Chapter 9 has a glossary of useful terms.

Check out what else the *Teacher's Resource Guide* has to offer, too!



The Next Step...

November/December is a good time to:

- Look at the timeline on pages 12-13 of your Mars Missions manual, and adjust it to fit your curriculum and scheduling needs. Items on the timeline should be completed prior to the Link-Up Day event
- Divide students into TEAMS (5-7 students per TEAM)
- Have students research Mars

and learn "Mars Facts," work on their sagas and mission patches, and begin planning their life support system

- Do your holiday shopping and baking, visit friends and family, eat, drink, and be merry, and then eat some more
- Be thankful that you're still on Earth for now, because a year is almost twice as long on Mars, and hence, so is the Martian holiday shopping season...aaaaaaaaaaaaah!
- Did we mention eat?



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



DoD STARBASE Flight

Oh, Cool! Cryo Mike is Here!

During DoD STARBASE Flight Day 3, Mr. "Cryo" Mike Martin holds up a snake.

Well, okay, a *rubber* snake, one he calls "Reggie" in honor of the snake in the movie *Raiders of the Lost Ark*.

"Why," he asks the sixth grade students, "don't people have heat sensors on their nose like Reggie here does?" The answer, it turns out, is because to be effective, heat sensors need to be

colder than the things they sense. They work well on snakes because snakes are *cold-blooded* animals. Humans are not. Well, most of us, anyway!

Mr. Martin, a warm-blooded cryogenics field engineer who works for the Air Force Research Laboratory (AFRL)'s Space Vehicles Directorate, uses liquid nitrogen to help keep heat sensors cool on satellites for the same reason; to be colder than the things



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

they're sensing.

Mr. Martin has been volunteering his time to come

by and do an interactive cryogenics presentation with the students during Day 3. He flash-freezes marshmallows, flowers, and other objects with the students, teaching them about the *states of matter* and *thermal dynamics* along the way.

During Day 3, students also compare their actual rocket launch data collected on Day 2 to their computer-simulated launch from Day 1, and explore 3-D modeling using PTC Pro/ENGINEER® software.

Coolness!



Please let us know, at least one week in advance, the name of each adult that will accompany your students, exactly as written on the adult's driver's license.

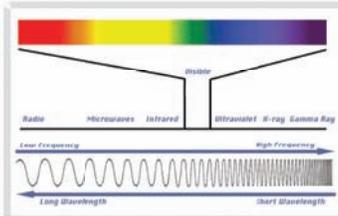


PETES PRS Flight

Providing Engineering and Technology Experiences for Students Phillips Research Site Flight

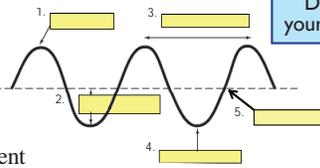
Studying STEM in Waves

The current wave of activities for seventh grade students attending Phillips Research Site (PRS) Flight Day 1 involves waves and the electromagnetic spectrum. Some of these waves, however, are invisible.



That's because electromagnetic waves come in different frequencies. The human eye can only see the ones that fall between red and violet. But there are other frequencies that we can't see with our human eyes, like radio waves and ultraviolet light.

The seventh graders use metal springs to create different types of waves.



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

Then the students go outside to discover the effects of invisible ultraviolet (UV) radiation from the sun on UV frisbees and beads, including what happens when the UV rays are blocked with sunscreen.

Students also explore with laser light, lightboxes, and lenses.



Please let us know, at least one week in advance, the name of each adult that will accompany your students, exactly as written on the adult's driver's license.



Intro to Systems Engineering Flight

Computers Are Our Friends

Students attending Day 1 of the Intro to Systems Engineering Flight, for eighth graders, are getting to be quite good friends with computers. They're even learning to speak the same languages computers do.

First, students connect electronic components like resistors and light-emitting diodes (LEDs) to a stamp board.

Then they hook the stamp board up to a computer and write BASIC programs like this one:

```
{ $STAMP BS2 }
{ $PBASIC 2.5 }
DEBUG "Program Running!"
Counter VAR Byte
FOR counter = 1 TO 10
    HIGH 14
    PAUSE 500
    LOW 14
    PAUSE 500
NEXT
DEBUG "All done!"
END
```

This program, the students learn, makes the LED connected to



Pin 14 blink. They can tell how many times it will blink from the line:

FOR counter = 1 TO 10
In this case, the students learn, "counter" is a variable (a word that represents a number). Here, it determines how many times the LED will blink, which, in this

$$\begin{array}{r} 10101 \\ + 1111 \\ \hline \end{array}$$

case, is ten times.

The eighth graders will use their new programming and binary math skills later when they program their Boe-Bot® to maneuver around an obstacle course.

So you see, computers really are our friends...until they crash before we've had a chance to save our work!

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

Please let us know, at least one week in advance, the name of each adult that will accompany your students, exactly as written on the adult's driver's license.



STEM Challenge Flight (formerly the SPACE Flight)

A Systems Engineering Approach to STEM Projects

Here's the Opening Kickoff

A milestone is a scheduled event signifying the completion of a major deliverable (objects or products that must be delivered) or a set of related deliverables. Usually a milestone is used as a project checkpoint to validate how a project is progressing.

The Kickoff Briefing is the first of four major milestones in the high

school STEM Challenge (formerly SPACE) Flight. It provides a format for student teams to meet and develop a strategy for working on their science, technology, engineering, and math (STEM) project. Like the opening kickoff in a football game, it signifies the start of the formal activities involved in the Flight.



On 28 October 2010, high school STEM Challenge Flight teams assembled at the Kickoff Briefing.

After listening to a presentation on the Flight by Director Ronda Cole, they met with their fellow team members and discussed what sort of STEM project they would like to do for the year.

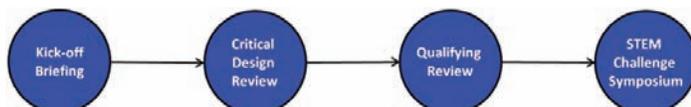
The students also interacted with scientists and engineers as they identified their project goals and requirements. Looks like it's gonna be a good year for STEM!

What About Next Year, Seniors?



The school year is just beginning, but it's not too early for high school students, especially seniors, to start thinking about what they will do after they've graduated from high school.

One option they might consider is a STEM degree from an accredited institution of higher learning, such as New Mexico State University, New Mexico Tech, or the University of New Mexico.





Teacher Institute

For It Was a Jolly Good Fellow Meeting

On 19 October 2010, teachers convened at AFRL La Luz Academy for a Teacher Institute Fellows Meeting, and what a swell bunch of Fellows they were!

Deputy Director Diane MacAlpine discussed project requirements, materials, and timelines with the Fellows who attended.

The Teacher Institute Fellows also brainstormed possible STEM projects they could work on with their students, while munching on some pizza and salad for brain fuel.

They also received a copy of the book *On Intelligence* by Jeff Hawkins. Keynote Speaker Mr. Rick Dove mentioned this book during his presentation on the first day of the week-long Teacher Institute workshop during the summer.

For those teachers who were unable to attend, Ms. MacAlpine will go out and visit with them at their school.

For it was a jolly good Fellow meeting...which nobody can deny!



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.

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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

Former AFRL La Luz Academy Participants Meet the President

Former AFRL La Luz Academy participants Jack Hanson, Haley Hanson, and Erika DeBenedictis were among those receiving awards from President Barack Obama at the White House on 18 October 2010 for their winning STEM projects.

The occasion was the White House Science Fair. As part of the President's *Educate to Innovate* program, winners from a broad range of STEM competitions received awards from the President in the east wing of the White House.

Jack and his older sister Haley were winners in the Digital Media and Learning Corporation (DML)'s Game Changers Kids Competition. Jack scored the highest marks in the competition for creating the Live or Die adventure for the educational STEM game Spore™ while Haley won for her Reflections V7.5 entry for the STEM game LittleBigPlanet™.



Jack and Haley Hanson pose in front of the White House during their trip to Washington, D.C. on 18 October 2010. (Photo courtesy DML/the Hansons)



President Barack Obama talks with award winner Erika DeBenedictis. (Official White House Photo by Pete Souza)

Erika won the top award in the Intel Science Talent Search for developing a software navigation system to improve spacecraft travel through the solar system.

Turn In Those Forms!

OK, teachers, form up! Have you turned in your Flight Application forms yet? How about your Adult and Student Media Release forms? No? What are you waiting for? The line forms over here!

If you need blank copies of any of these forms, just contact us. There isn't any special form to fill out to request more forms—but if there was, you'd have to turn that form in, too!



Coming Next Issue...

- Patches, Facts, and Sagas
- Sensing Forces
- Critical Design Reviews



Watch for it!