AFRL La Luz Academy

"Creating the Possibilities"

Inspiring Future Scientists and Engineers

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The Rocket Report

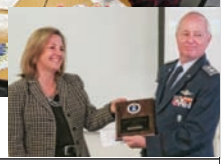
DVs and S&Es Tour Facility at Volunteer Open House

On 20 January 2011, distinguished visitors from the Air Force Research Laboratory Directed Energy and Space Vehicles Directorates (AFRL/RD and AFRL/RV), including Col William T. "Bill" Cooley, Commander, Phillips Research Site, and Materiel Wing Director, AFRL/RV; Dr. David A. Hardy, Director, AFRL/RD; Col Eddie L. Richardson, Deputy Director, AFRL/RD; Dr. Greg Spanjers, Senior Scientist, Space Experiments, AFRL/RV; and Mark E. Roverse, Division Chief, AFRL/RVO, toured AFRL La Luz Academy as part of our Volunteer Open House event.

Visiting scientists and engineers (S&Es) saw demonstrations of some of our hands-on science, technology, engineering, and math (STEM) volunteer-opportunity activities, such as bottle rockets and Boe-Bots®, and got to tour our facility to see students in action in our classrooms.

Civil Air Patrol Col Roland Dewing attended the event and presented Director Ronda Cole with the 2010 Southwest Region Brewer Award for outstanding contributions to the advancement of youth in aerospace.

If you know an S&E who would like to know more about our STEM volunteer opportunities, contact us for more information.



Robotics Tournament Held

The New Mexico For Inspiration and Recognition of Science and Technology (FIRST)® LEGO® League (FLL), for 9-14 year-old students, held their New Mexico State Championship Tournament at the Albuquerque Convention Center on 15 January 2011.

Student teams were judged on teamwork, design, programming, and performance of their LEGO® MINDSTORMS™ robot, and their presentation on this year's Body Forward Challenge research topic, "Engineering Meets Medicine."

AFRL La Luz Academy and Girl Scouts of New Mexico Trails helped sponsor the event, which motivates students to participate in robotics and STEM, brick by brick.

For more information, see www.nmfll.org.

Base Operations Performed On Base

In the fifth grade Mars Missions Flight, students typically perform the *Base Operations* segment in their classrooms. The resourceful Radloff home school students, however, are using a classroom inside our classroom/office facility on Kirtland Air Force Base.

The students have been preparing *telecommunications* messages to send to the other two teams in their habitat CREW, and rehearsing their *saga*, a choreographed musical story of their upcoming simulated journey to Mars—in this case, to the "*Addams Family*" TV show theme.

Mars Missions Flight

Mars Cave Skylight Investigation (CSI) Mission 2010-11

Don't Wait, Telecommunicate

Big projects are often split up among several teams, to make them more manageable.

For example, say your company wanted to build a rocket. One team of people might work on building the engine, while another team built the fins, and another designed the nose cone.

These teams might be far away from each other, perhaps in different buildings, different cities, or even different countries!

So they would *telecommunicate* with each other to ensure that the individual components of the rocket would all fit and work together properly.

It's the same way with the Mars Missions Flight. The habitat CREW is made up of three TEAMS, each of which is responsible for only a portion of the habitat pieces. But each TEAM goes to a different school, and they only meet each other at the very end, at the Link-Up Day event!

So, to make sure your habitat fits together properly and everyone is on the same page, your TEAM will have to *telecommunicate* with the other two TEAMS (via email, text, fax, phone, videoconference, whatever—see pp. **81-86** in your handbook).

For starters, everyone needs to make sure they can find the colony when they arrive. Yes, Mars is

smaller than Earth, but it's still a pretty big planet.

Each TEAM receives a math problem sent by AFRL La Luz Academy. (Let us know if you didn't get yours.) The three TEAMS in each CREW telecommunicate to introduce themselves and share their math problems with each other.

Once the answers to the three math problems are calculated, the TEAMS can locate their colony's position on the Mars map you received from us.

Have students fill out their Telecommunications Log (handbook, pp. **85-86**). Remember, real communication involves a *response* from the other party!

Now that the telecommunication lines are flowing, the TEAMS can also contact each other to verify each TEAM's habitat pieces and decide on a habitat decoration theme together.

Don't Forget:

- The Albuquerque Mid-Year Meeting on 17 Feb. 2011
- The Las Cruces Mid-Year Meeting on 25 Feb. 2011
- Fill out and send us your TEAM Registration Forms

Launch Lunch

If you're going to take a trip to Mars, you'd better make sure you pack a *lunch* before you *launch*. There's nothing worse than being cooped up in a space shuttle with a bunch of hungry astronauts, and no food. Talk about going into orbit!

That's why each Mars Missions Flight TEAM plans and brings a lunch with them to the Link-Up Day event (see pp. **97-98** in your handbook).

TEAMS will use teamwork, problem-solving, and—gulp!—actual *math* to plan and pack their Link-Up Day lunch.

Balanced diets help one get through the rigors of space travel. The meal must be nutritionally complete and include at least 8 oz. of fluid per TEAM member. Each Flight Director (teacher) brings the same type of lunch as the students. There are no fast-food joints on Mars.

Fuel is expensive. To keep the weight of the spacecraft down, the total weight of food and liquid must not exceed 20 ounces per TEAM member (plus a couple extra for the container).

Space is limited on board, too—so the entire TEAM lunch (all food, liquid, and individual packaging) should be carried in, at most, 5 (five) one-gallon plastic zip-lock food storage bags.

Albuquerque MYM Moved Up a Week!

Please note: The date for the Albuquerque Mars Missions Mid-Year Meeting (MYM) has been changed. It is now Thursday, **17 February 2011**, from 12:30 pm to 3:00 pm.

Habitat plastic will be distributed at the meeting. **See the enclosed memo** for more information.

Your commitment to this mission is crucial to its success.

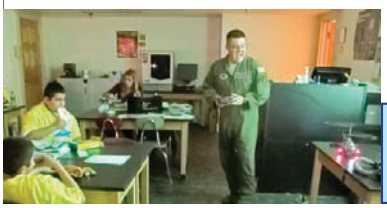
DoD STARBASE Flight

New Semester In Full Gear

Day 1 of the second semester of the DoD STARBASE Flight is underway, and the participating sixth grade students are getting in gear.

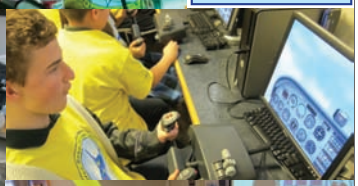
Flight gear, that is.

In Day 1, which this semester focuses on properties of air and principles of flight, visiting pilots and flight enthusiasts often discuss their real-life flying experiences with the students, and show models and videos of the airplanes and helicopters they have flown. Meanwhile, the students check out any flight gear the pilots brought, such as flight helmets, G-suits, and night-vision goggles.



The students learn about principles of flight and flight control surfaces like rudders and ailerons, fly computer-simulated airplanes, and explore principles of air with hands-on activities such as swirling up whirlpools in a *Tornado Tube*.

Don't forget to turn in yourMedia Release Forms!



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.

PETES PRS Flight

Providing Engineering and Technology Experiences for Students Phillips Research Site Flight

What is Space Weather, and Why Do We Care?

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

You've probably heard meteorologists on TV talk about the weather in your area. The ones on KOB-TV4 in Albuquerque, NM will even report current weather conditions from middle schools that have one of our *Pinpoint WeatherNet* stations installed!

But did you know there's weather in space, too, and it impacts our lives on Earth?

The sun is constantly emitting a stream of charged particles called the *solar wind* into the solar system. Plus, about every eleven years, the sun's surface has a wave of *solar storms* like sunspots, solar flares, and coronal mass ejections (CMEs).

These events send massive amounts of electromagnetic particles and radiation across space, colliding with Earth's *magnetosphere*, a protective magnetic field around Earth. This can expose astronauts to dangerous radiation, disrupt communications, and knock out power grids.

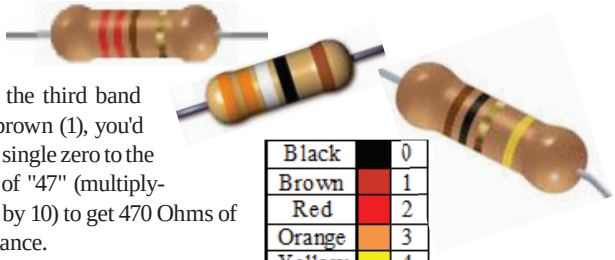
It can also cause billions of dollars of damage to the many hundreds of satellites now orbiting Earth.

That's why space weather is such an important topic to scientists and engineers like the ones in the Air Force Research Laboratory's Space Vehicles Directorate, who work with satellite technology.

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

How to Read Resistor Codes



When eighth grade Intro to Systems Engineering Flight students make a test circuit with their stamp board, one of the electronic components they use is *resistors*.

See the resistors pictured on the right? Those colorful bands around them aren't decorations—they are acually *resistor codes* that tell how much resistance in Ohms the resistor produces.

So how do you read a resistor code?

First, the band on one end is usually gold or silver in color. Orient your resistor so that end is on the right.

Reading left to right, the first two bands tell you the first and second digits of the resistance number, as shown on the chart on the right.

So if the first band is yellow (4), and the second band is violet (7), the first two digits are "47."

The third band is the multiplier. It tells you how many zeros to add to the right of these numbers.

So if the third band was brown (1), you'd add a single zero to the right of "47" (multiplying it by 10) to get 470 Ohms of resistance.

The gold or silver (or blank) band on the end tells you the percentage, or *tolerance*, of error the resistor has above or below that resistance.

Gold is 5% tolerance, silver is 10% tolerance, and blank is 20%.

Black		0
Brown		1
Red		2
Orange		3
Yellow		4
Green		5
Blue		6
Violet		7
Grey		8
White		9

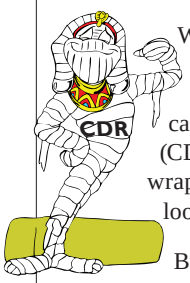
Don't forget to turn in your Media Release Forms!

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

CDRs All Wrapped Up



Well done, STEM Challenge Flight teams! The Critical Design Reviews (CDRs) are all wrapped up, and they looked great!

But don't relax just yet...Now it's time to start getting your Qualifying Review (QR) presentation ready.

Prepare to Qualify

STEM Challenge Flight teams, you're going to want to prepare a good QR presentation.

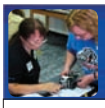
That's because this time the Review Team will evaluate your presentation to see if your project *qualifies* to move on to the STEM Challenge Symposium. And you don't want to miss that!

Here are some things the Review Team will be looking for:

- Have you shown an increase in understanding or progress since the last review?
- Do you have realistic goals?
- Are you working together as a team?
- Have you done enough research?
- Do you have an updated hard copy of your *deliverables*, such as the Project Goals, Constraints, and Requirements; Work Breakdown; and Gantt Timeline?

The Next Step...

1. Continue working on, and let us know the name of, your STEM Challenge project
2. Let us know if you have questions or need assistance implementing the STEM Challenge Flight at your school
3. Prepare your QR. These will be scheduled between 28 February and 8 April 2011
4. Have fun with your STEM project!



Teacher Institute

Prepare Your Presentations, TI Symposium Coming Soon

Hello, Fellows!

The Teacher Institute (TI) Symposium is approaching rapidly, so mark your calendars.

There are actually *two* of them: The first TI Symposium is scheduled for Tuesday, 26 April 2011 from 5:00 pm to 7:00 pm.

Can't make that one? That's okay, the second TI Symposium is scheduled for Saturday, 30 April 2011 from 10:00 am to 12:00 pm.

Start thinking now about putting together your presentation for the TI Symposium. April will be here before you know it!

Slides you'll want to include:

- A *Cover Sheet* slide with your team and project name, and the presentation date,
- An *Introduction* slide with your name and school,
- A *Project Goals* slide,
- An *A Spec* slide,

- A *B Spec* slide,
- A *Work Breakdown* slide,
- A *Timeline in Gantt Format* slide,
- An *Accomplishments* slide,
- A *Lessons Learned* slide, and
- A *Conclusion* slide.

The Next Step...

- **Continue implementing your STEM lesson plan** in your classroom
- Start **planning and preparing your presentation** for the TI Symposium
- **Mark your calendars** for the date of your TI Symposium: 26 April from 5-7 pm, or 30 April from 10 am to noon
- **Let us know** if you would like a scientist or engineer to help you and your class complete your STEM project, or if there's anything else we can do to help you implement it

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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

MMudoku Math

Below are nine tiles with icons representing the eight Mars Missions Flight life support systems, plus the AFRL La Luz Academy logo.

Each tile also has a corresponding math equation representing 1 through 9. For example, a tile containing the equation "4+2" represents the number "6."

First: Match the correct name to each tile. Second: Fill in the grid by drawing in the correct icons or numbers (1-9). Each row, column, *and* 3x3 red square should have exactly *one* of each icon/number; no duplicates allowed. Good luck!

3×2					3+1		√4	4-3
		3×3			9-7	9-3		
	1+1	4+3		2×3		7-3		
			√9				7÷1	
9-2		8-5				8÷8		3×2
	4×2				9-3			
		√4		5+4		4+3	1+0	
		2×3	9-7			5+3		
6+3	7÷1		6+2					8÷2

Temperature Control

Food Production/Delivery

Water Supply

AFRL La Luz Academy

Recreation

Air Supply

Communications

Waste Management

Transportation

Interested in being a judge for the "Central NM Regional Science and Engineering Research Challenge" science fair, 18 March 2011? Contact Mr. Jerry Cross at (505) 228-6768 or jeraldcross@comcast.net.

Coming Next Issue...

- Link-Up Day Survival Guide
- Math, Technology, and Navigation
- Listening to Light
- Building Boe-Bots®
- Qualifying Reviews

Watch for it!