AFRL La Luz Academy

"Creating the Possibilities"

Inspiring Future Scientists and Engineers

Star Date: March 2012
Volume IX, Issue 7

In This Issue...

The Rocket Report

Students Design Racecars, Program Robots in STARBASE 2.0

It's only been going on for a few weeks, but already students are doing some exciting things, with the help of volunteer mentors, in STARBASE 2.0.

Each Tuesday, students meet after school at Van Buren Middle School to design Scalextric racecars with PTC Pro/ENGINEER® 3-D modeling software. Students have learned how to design the basic car shape, "round" the edges, carve out wheel wells, "mirror" the second half of the car to look like the first, hollow out the car to form a "shell," and fit the shell over the chassis.

Students have also begun racing pre-made "commercial" racecars on the oval-shaped racecar track, to get a feel for the tricky controls. Too slow and you lose the race, but too fast (easy to do) and the car flies off the track.

On Thursdays, students meet to learn about building small robots called BoeBots®. Already, the students have studied the history of computers, learned some computer programming, worked with binary math, and learned how to control light-emitting diodes plugged into the stamp board.

Look, Ma! I'm On The Internet

Haven't checked out our new updated AFRL La Luz Academy website at http://prs.afrl.kirtland.af.mil/LaLuz/ yet? Well, now you have another reason.

A link has been added to the home page that lets you access all of our newsletters, including the one you are now reading, since the beginning of the previous (2010-11) school year.

AFNWC Winners Announced

For one month, from 13 January to 14 February 2012, AFRL La Luz Academy tracked mentors' hours volunteering for us and other outreach programs. The Air Force Nuclear Weapons Center (AWNWC) Engineering and Technical Management Directorate used this data to recently announce the winners of their Volunteer Hour competition.

Many of the winners volunteered for us as STARBASE 2.0 or other AFRL La Luz Academy mentors. Congratulations, and thanks!

- 1st place: Lt Matthew Leines (20 hours)
- 2nd place: Ms. Catherine Pierce (8.5 hours)
- Third place: Lt Alexander Stevenson (8 hours)

Other award winners:

- Lt Eric Bailey
- Lt Nathan Haluska
- Lt Benjamin Struebing

STEM Expedition Teachers Fly

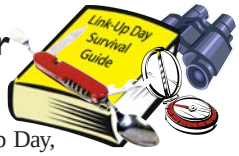
On 25 February 2012, we hosted a STEM Expedition for Civil Air Patrol Teacher Orientation Program (formerly the "Fly a Teacher" program) workshop participants.

Mars Missions Flight

for fifth grade students

Microprobe Evaluation of Lava and Titanium (MELT) Mission 2011-12

The Flight Director Log: Your Link-Up Day Survival Guide

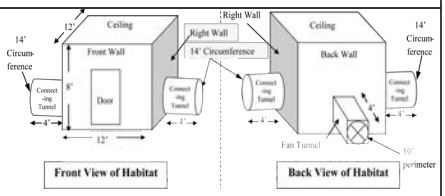


On Link-Up Day, you, as habitat Flight Director, keep the three TEAMS in the habitat CREW on task and on schedule. Students are expected to follow the Flight Director's instructions and treat you with courtesy and respect, whether or not you're their regular classroom teacher.

- ☑ On Link-Up Day, refer to your **Flight Director Log** often as a step-by-step checklist of the entire event. A blank Flight Director Log is in your manual; copies will be given out at Link-Up Day.
- ☑ TEAMS should likewise use their **TEAM Mission Log** on Link-Up Day as a step-by-step checklist of the entire event. Check their TEAM Mission Logs every so often to verify they haven't skipped anything, and see what step they should be on next.
- ☑ Your Colony Commander can also help you and the habitat stay on track. They have a **Colony Commander Log** checklist, too!

Construction Instruction

- Tape the door panel on the inside front wall of the habitat. When taping fan/connecting tunnels, think *short* and *fat* (the tunnels, not the people!).
- The fan tunnel goes in the middle of the back wall *near the ground.* Cut the hole for the fan tunnel as close to the floor as possible. The connecting tunnels should be taped and flanged prior to connecting to your habitat, also as close to the floor as possible.
- Your connecting tunnels connect to the tunnels on either side of the habitat. Your habitat CREW helps tape the connecting tunnels on *both* sides together. *Note: The habitats at either end of your colony will not have habitats on one end to connect to. See your floor plan.*
- Grey tape is very forgiving; it can make up for slightly mismatched pieces of plastic.
- DO NOT pre-cut a hole in the wall for connecting tunnels—wait until Link-Up Day, after lunch, to make the cut.



NOTE: *Each Flight Director takes his/her completed habitat back to Earth to display at his/her school after completion of Link-Up Day. Reduce, reuse, recycle!*

Your commitment to this mission is crucial to its success

MM MYM Held

The Mars Missions Mid-Year Meeting was held 23 February 2012. Teachers received rolls of habitat plastic for their students to measure and cut.

They ran through the Link-Up Day event in detail, received helpful advice from veteran Mars Missions Flight teachers, and practiced assembling scale-model versions of the habitats. Next stop, Mars...

Link-Up Day Date/Site

Date	Site	Habitats
4 May 2012	Albuquerque Conv. Ctr.	59

DoD STARBASE Flight

for elementary fifth and sixth grade students

Coordinating and Fueling Learning Geometrically

STEM increases learning geometrically in Days 2 and 3 of the DoD STARBASE Flight.

In Day 2, the geometrically-shaped components of a satellite circuit board have fallen off, so the student engineering team reads the coordinates of the shapes and communicates them to the student STARBASE crew to reassemble correctly. Students also study the coordinates of places of interest in Washington, D.C. and program a security robot to patrol the Washington Mall.

In Day 3, students study the laws of motion, and investigate whether increasing the amount of fuel in a fizzy antacid tablet-fueled rocket will affect its vertical launch capabilities. Likewise, students assemble, decorate, and race carbon-dioxide-cartridge-fueled racecars, to see whether using a larger capacity cartridge affects the car's speed.

Then they find places on a globe using *longitude* and *latitude* coordinates.

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, too!

TECH Flight

for sixth and seventh grade students

Technology and Engineering Challenges Flight

LEGOSats, Lasers, and Lightboxes

Students explore satellite construction and various forms of light in TECH Flight Day 1.

The students use a simplified version of the *Plug and Play technology* AFRL uses to create a model of a multi-purpose satellite less expensively by building LEGOSats.

Then, students begin investigating light. First, they explore ultraviolet (UV) light using UV frisbees and sunscreens. UV light has a *frequency* human eyes can't see, in the same way that dogs can hear sounds that people can't hear.

The students get focused by shining focused red laser light through green JELL-O lenses, and vice versa, and continue exploring light and lenses using *lightboxes*.

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, too!

STEM Challenge Flight

for high school students

Phase 1 Complete; Phase 2 Nearly There

Phase 1, R&D and Pitch, of the STEM Challenge Flight is now completed. Assignments included:

Team Name and Logo; Supportive Evidence – Launching Device; Supportive Evidence – Payload Protection; Project Plan; Prototype; Mathematical Model; Budget and Materials; and Video Pitch.

Submitted team names include:

Amy Biehl High School
- BNC
- Exploding Ninjas
- Kung Fu Ninjas
- The Insane Dragonflies
- The Ones That Got Away

Cottonwood Classical Charter School
- Alpha Cobras
- New Paradigm
- Reality Warp
- Verken

Hot Springs High School
- Bazinga
- Hot Springs Hot Shots

Media Arts Collaborative Charter School
- Amateur Science
- Project Angry Birds
- Slack Mesa
- The Collaborators
- Trebuchet

West Mesa High School
- West Mesa Mustangs

Submitted ideas have been quite creative. For example, the *West Mesa Mustangs* are proposing a spring-loaded device, while *New Paradigm* is proposing a system of air-pressurized pipes.

Teams are now wrapping up Phase 2, the building phase, due 7 March. The teams submit a list of materials needed to build their devices, which we then purchase.

Teams provide pictorial evidence of their building assignments for their launching and payload protection devices, and create a video illustrating how their trigger mechanism operates from a minimum of 5 feet away (to avoid accidents involving stored energy).

Phase 3: The BIG Phase

During March and into April, STEM Challenge Flight participants will work on Phase 3, the *Test, Modify, and Retest* phase. This is the big one: 2,400 points worth! (Phase 1 had 700 possible points; Phase 2 had 900; and Phase 4 will have 1,000.)

Now that students have designed, purchased, and built their egg-launching mechanism, they have four weeks to test the device, analyze and record data, make modifications, and retest the device. They'll be making spreadsheets, tables, and videos of their results (see chart below).

There's a lot of points at stake here, so we're hoping students don't "shell" themselves short. Let's get cracking on these eggs!

PHASE 3 – Test, Modify, Retest	Due Mar 14	Due Mar 21	Due Mar 28	Due Apr 4	Total Points
Trigger Mechanism: Create a video (1 min. max) demonstrating the trigger mechanism for your launching device reliably operating from a minimum distance of 5ft.	200				200
Payload Distance: Create a video (1 min. max) showing that your payload can travel between 20-25ft.	200				200
Payload Trajectory: Create a video (1 min. max) that demonstrates that your payload can pass through a hula hoop placed at multiple locations based on your mathematical calculations.		200			200
Mathematical Representation of Test Data: Create a spreadsheet(s), use scatter-plot graphs, and/or other mathematical modeling tools to analyze and report your test data.		200			200
Launching Device Accuracy: Create a video (1 min. max) showing that the payload consistently hits the target following the desired trajectory based on your mathematical calculations.				200	200
Payload Protection: Create a video (1 min. max) or photo collage that shows the payload is consistently protected, and the raw egg is unbroken upon landing.				200	200
Quality of Analysis: Record in a table detailed inputs (changes to your launching device, etc...) which resulted in the outputs (where payload landed, followed planned trajectory, etc...) attained. Include analysis linking data predicted or theoretical data, noting the differences between them and postulating reasons for the differences.		200	200	200	600
Redesign: Create a video (2 min. max) with current date providing improved performance data and design improvements for each week. In these videos your team will pitch their redesign, including clear rationale for changes made and with sufficient clarity and accuracy so that others could replicate under similar conditions		200	200	200	600
Total Points – Phase 3	400	800	400	800	2400

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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)

DoD: Department of Defense

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

LF: Leadership Flight

MELT: Microprobe Evaluation of Lava and Titanium

PRS: Phillips Research Site

PWN: Pinpoint WeatherNet

STEM: Science, Technology, Engineering, and Math

TECH: Technology and Engineering Challenges

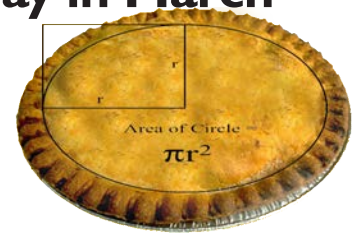
T²: Technology Transfer

TTE: Technology Transfer for Education

USAF: United States Air Force

National Pi Day in March

The Greek letter π ("pi") is used to represent the mathematically constant ratio of a circle's *circumference* to its *diameter*. *Pi* times the *radius squared* is a well-known formula giving us a circle's *area* ($A = \pi r^2$).



Pi's decimal representation is famous for being an *irrational number*: it's *unending*, and it *never repeats*. Using modern computers, it has been calculated out to at least *10 trillion* digits.

The first hundred digits are:

3.14159265358979323846264338327950288419716939937510582097494459230781640628620899862803482534211706 79...

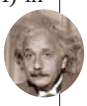
...but it's usually rounded to 3.14.

March 14 is **National Pi Day**. Why? Because it's 3/14. Get it???

And if you write "3.14" on a piece of paper and hold it up to a mirror, it spells "pie!" Math is *so* funny.

A common approximation for pi is 22/7, so July 22 is known as "Pi Approximation Day," too.

To celebrate Pi Day with your students this March 14, have them bring in pies or other round objects and measure/compare circumference and diameter. See who can memorize the most digits of pi. Or, check out the Pi Day celebration at the National Museum of Nuclear Science & History (NMNSH) in Albuquerque. They'll also be honoring Albert Einstein; he was born 14 March 1879.



Google celebrated Pi Day 2010 with a "Google Doodle."

For more Pi Day ideas, see www.piday.org. For more about Pi Day at the NMNSH, see www.itsatrip.org/events/details/pi-day-14567.

Oh, and about that whole "area of a circle" thing?

Pi r squared. But pie are *not* squared. Pie are *round*. *Cornbread* are squared.

Looking For Leadership Flight Students

We're looking for 15-20 middle school students to help as members of Mission Control for our Mars Microprobe Evaluation of Lava and Titanium (MELT) Mission Link-Up Day event on Friday, 4 May 2012 at the Albuquerque Convention Center.

To qualify, a student must:

- Exemplify Air Force Core Values (*Integrity First, Service Before Self, Excellence in All We Do*)
- Demonstrate ability to work independently

If you would like to nominate any students to be Mission Control members for this event, please contact Ms. Ronda Cole at 846-8042 or ronda.cole.ctr@kirtland.af.mil.

Fifty Years Since Friendship 7

Fifty years ago, a NASA astronaut became the first American to orbit the Earth.

On 20 February 1962, on a mission known as Mercury-Atlas 6, astronaut John Glenn orbited the Earth three times aboard a ship called *Friendship 7*. The flight lasted only 4 hours, 55 minutes, and 23 seconds, but it officially established the United States as a major player in the Space Race.

It paved the way for future Gemini and Apollo moon missions, the International Space Station, the Space Shuttle, and all the spaceflight activities that followed it...even, someday, to the first manned mission to Mars!

See http://history.nasa.gov/friendship7 for more information on this historic spaceflight.

Coming Next Issue...

Take a look at what's coming in the next exciting issue of this newsletter:

- MM Link-Up Day: What to know, what to bring
- Chillin' with Cryo Mike
- Get ready for the STEM Challenge Symposium

Watch for it!