



# AFRL LA LUZ ACADEMY

“CREATING THE POSSIBILITIES”



Inspiring Future Scientists and Engineers

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# February Shaping Up to Be a Busy Month at AFRL La Luz Academy

February may be the shortest month of the year, but it promises to be long on activity this year for AFRL La Luz Academy, with big meetings, big launches, and big Expos planned.

Mars Missions Flight teachers have a Mid-Year Meeting coming up on 27 February 2013, where they'll receive plastic and walk through the Link-Up Day activities they'll be guiding their students through step-by-step in April (see page 2 for more details).

STARBASE 2.0, the afterschool



program for middle school students, this year from Van Buren and Wilson Middle School, has two rocket launch events scheduled for February. One is scheduled for 5 February 2013,

at Balloon Fiesta Park; the other is scheduled for 26 February 2013. Students begin testing their rocket designs in preparation for the Team America Rocketry Challenge event (see page 2 for more details).

Robot Systems Flight students show off the robotics and programming skills they've learned during the year at the Robotics Expo on 16 February 2013 (see page 3 for details).

## Awesome Engineers Week

**National Engineers Week** ([www.eweek.org](http://www.eweek.org)) is this month, 17-23 February 2013. "Eweek" celebrates positive contributions engineers make to society, and is a catalyst for engineering outreach across the country. This year's theme is "Celebrate Awesome!" A partial list of features includes:

**DiscoverE Visits®.** Engineers work with students and teachers in elementary through secondary schools and afterschool programs through classroom visits and extracurricular programs, using educational materials provided by the National Engineers Week Foundation.

**DiscoverE Educator Awards.** Applications due 8 March 2013; prizes include \$2,000, a 3M digital projector, and a recognition event

in Washington, D.C.

**INTRODUCE A GIRL TO ENGINEERING DAY**

**Introduce a Girl to Engineering Day®**

(21 February 2013). "Girl Day" gives thousands of women engineers, with support from their male counterparts, the chance to directly mentor more than one million girls and young women in



CELEBRATE AWESOME  
grades K through 12.



## Thanks, Space Place

Our friends at NASA's Space Place, for whom we proudly display a bulletin board in our classroom, recently awarded us a Certificate of Appreciation, which we certifiably appreciate! See [www.spaceplace.nasa.gov](http://www.spaceplace.nasa.gov) for space facts, games, and activities.



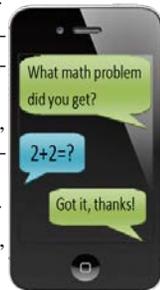


# Mars Missions Flight for fifth graders

Mars Microbial Asteroid Research Survey (MARS<sup>2</sup>) Mission 2012-13

## Telecommunication? There's an App for That

Each team must *telecommunicate* (pp. 81-86 in your handbook) with the other two teams in their Crew. Telecommunicating enables team introductions, ensures everyone has the right habitat pieces, facilitates choosing a habitat decoration theme, helps the team determine their colony's location on Mars, and is worth points on the Mission Log.



for that! Text, email, Skype, phone, instant messaging, Facebook...

One could also use a desktop or laptop computer...or a tablet. Or, go oldschool and fax over a note.

Crews need to make sure they know the colony site coordinates. What if the teams get separated? Mars is smaller than Earth, but

it's still plenty big enough to get lost on, even with all the rovers driving around up there.

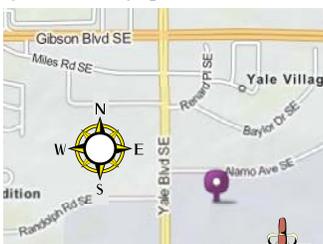
So—do the math! We send each team one of three math problems (let us know if you didn't get yours). Teams telecommunicate their respective math problems to the other two teams and do the math. The answers provide clues to the colony's *latitude*, *longitude*, and position relative to the Martian *equator*, using the Mars map we provided.

When a team receives a telecommunication from another team, thank them/acknowledge receipt. Fill out the Telecommunications

Log (pp. 85-86); turn it in on Link-Up Day at the "Uniforms and Telecommunications" station for Mission Log points.

### New MYM Location

This year's Mid-Year Meeting is Wednesday, 27 February 2013, 12:30 to 3:00 pm, at the PTi Sunport/COSMIAC building, 2350 Alamo Ave SE, Albuquerque, NM 87106 (see map). We'll give out plastic and go over the Link-Up Day process. Contact us if you have any questions.



### ReMMinder

Send us your **TEAM Registration Forms**, if you haven't yet.



## Astronaut Fuel

Without lots of *rocket fuel*, rockets traveling to Mars won't even make it past Earth's atmosphere. But without lots of *astronaut fuel* (what the rest of us call "food"), the astronauts won't even make it



to the *launch pad*! Can you say, "Houston, we have a problem?!"

Teams use teamwork, problem-solving, and math to plan/pack a Link-Up Day lunch before they *launch* (pp. 97-98). Flight Directors (teachers) bring the same lunch as the students—there's no all-night taco stands on Mars (yet).

Nutrition, weight, and space are

important to astronauts. Meals must be nutritionally complete, including 8 oz. of fluid per TEAM member. Total weight of food and liquid must not exceed 20 oz./TEAM member. Carry all food in five or less 1-gallon ziplock bags.

Fuel me once, shame on you; fuel me *many* times, THANK YOU!!!!



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



## DoD STARBASE Flight for fifth graders

### The Egg-citing Adventures of Eggbert

DoD STARBASE Flight Day 1 fifth grade students are starting the new semester in a most "egg-citing" way. Eggbert the Astronaut's shuttle is "egg-spected" to have a rough landing on the moon. So, using their engineering design skills, our team of bright DoD STARBASE students design a safety restraint system to help cushion his landing.

Much like the scientists and engineers at the Air Force Research Laboratory (AFRL) do, the students design their proposed solution and "purchase" enough materials such as rubber bands, string, cardboard, and bubble wrap to hopefully do the job, while staying under "budget." The team works to-

gether to construct their safety restraint system, and then Eggbert tries to land safely with it.

Students in Day 1 further test their engineering design skills by making a Space Station module on the computer using PTC Pro/ENGINEER® 3D design software.

The Day 1 fifth graders show that they measure up when they go on a Metric Mission. At various stations, students use scales, rulers, protractors, and other tools to measure objects and complete tasks involving metric units.



### STARBASE 2.0 Building Up to TARC

Van Buren and Wilson Middle School STARBASE 2.0 students, with the help of mentors, are now building the rockets they've designed. The excitement is also building, as we get closer to launch day and determining whether the rockets qualify for the Team America Rocketry Challenge (TARC) competition in Washington, D.C.



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!





# Plugging and Playing

Day 1 of the Spring semester of the TECH Flight has middle school students plugging and playing.

They watch a Lab-TV video (available at [www.ndep.us/Plug-N-Play-Satellites](http://www.ndep.us/Plug-N-Play-Satellites)) on the *Plug and Play* technology AFRL uses to build versatile, multi-purpose satellites less expensively. Then the students plug along, playing with building their own plug-and-play model LEGO®-Sat models.

Students investigate *ultraviolet radiation* by comparing how effective various levels of *sun protection factor* (SPF) sunscreen lotion are in keeping blue "nature print" sun-sensitive paper from turning white when exposed to sunlight.

After that, there's always room in their Day 1 class to explore lenses and light in a Laser JELL-O activity. Students cut various lenses out of red and green JELL-O, and shine red and green laser beams through the lenses. This, they find, is easier to do if they can avoid eating the lenses first!

Then, the students plug in light-boxes and play with combining different *frequencies* (colors) of light to create white light, and bend the light through various non-JELL-O lenses.



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!



# Robot Systems Flight

for middle schoolers

## Flowing to the Expo

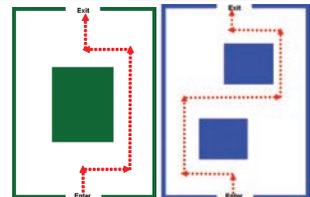
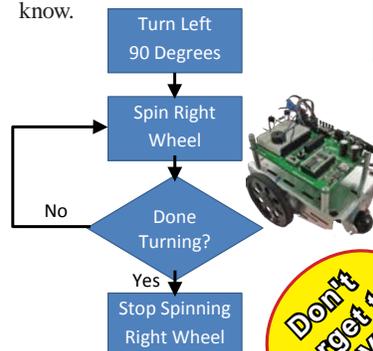
We're flowing to the home stretch. The Robot Expo is this month, Saturday, 16 February 2013! Is your class planning to participate? **Please RSVP to Ms. Diane MacAlpine at (505) 853-8110 right away** and let her know!

For months, mentors from AFRL have been going out to participating Robot Systems Flight schools and assisting the middle school students as they learn how to program their Boe-Bot® robots to ma-

neuver through obstacle courses. Word on the street is, they've been doing an excellent job! Thank you, mentors.

You know, as with any computer programming project, it can often help the flow of your thoughts to construct a *flowchart*. Flowing top to bottom, using rectangles for statements and diamonds for decisions, all connected by arrows, flowcharts help show the flow of logic in a computer program. If

your class hasn't made a flowchart yet; try it! It may make things easier, and it's generally just a good computer programming skill to know.



# STEM Challenge Flight

for high schoolers

## Testing, Testing, One, Two, Three, Testing...

After obtaining \$100 or less of supplies, your team should have completed construction of your remotely-triggered egg-launching device by now. Remember to take some pictures or video of what you made, and post to the Coursesites website.

You should also have arranged for your mentor to visit your team location to provide feedback and advice on the device you built. If you and your mentor haven't completed those steps yet, *that* is your top priority.

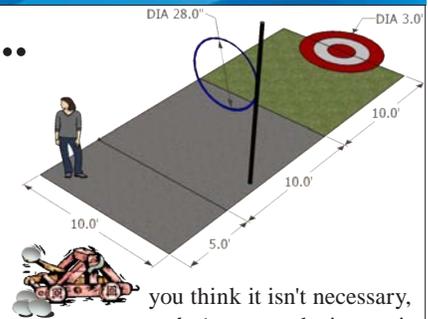
Now is where the rubber meets the road, as they say. Or, rather, where the egg meets the ground! If you haven't already done so, now it's time to *test* the device you built, and see how well it performs in the real world.

Get out your video camera and film three launch attempts using your device. Show that your trigger mechanism operates from outside the 5' x 10' box as shown on your launch course diagram, and that your payload travels a measurable distance in its at-

tempt to pass through the hula hoop and land on the target. Also show the condition of the egg after landing.

We want *video* of three attempts on Coursesites, but keep on launching. We also want a *written* document containing a data table and scatter-plot graph showing at least 20 total launch attempts.

Then, unless you can provide supporting documentation why



you think it isn't necessary, *redesign* your device so it will function better, document your critical design change(s), and sketch your redesigned device.

Remember, testing and redesign are worth 400 points *each*.





### AFRL LA LUZ ACADEMY

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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

**MARS:** Microbial Asteroid Research Survey

**MM:** Mars Missions

**PRS:** Phillips Research Site

**PWN:** Pinpoint WeatherNet

**RS:** Robot Systems

**STEM:** Science, Technology, Engineering, and Math

**TECH:** Technology and Engineering Challenges

**T<sup>2</sup>:** Technology Transfer

**TTE:** Technology Transfer for Education

**USAF:** United States Air Force

# STEM Bytes

## NASA Makes Link-Up Day Lunches, Too

As your students plan their Link-Up Day lunches, Mars Missions Flight teachers, remember that NASA is hard at work doing the same thing.

NASA is currently spending about a million dollars a year researching ways to make healthy, nutritious, and appealing meals for astronauts going to Mars. They need enough food to feed six-eight astronauts for a six month journey, eighteen months there, and six months back.

Dairy and meat can't be preserved that long, so scientists are using lots of vegetables, which could be grown in a hydroponic garden on Mars, with tofu and nuts for protein.

They've actually got about a hundred recipes designed so



NASA's Advanced Food Technology Project manager Michele Perchonok, right, and Lockheed Martin Sr. Research Scientist Maya Cooper, try a pizza recipe being tested in a kitchen at Johnson Space Center for use in a manned Mars Mission. (AP Photo/Michael Stravato)

far, including a vegetarian Thai pizza! Check out this video for more info: [www.youtube.com/watch?v=frB6YDsPin8](http://www.youtube.com/watch?v=frB6YDsPin8).

## Now Everybody Wants to Go to Mars

NASA is already planning to send a manned mission to an asteroid in 2025. Following that, they want to send a manned mission to Mars in the 2030s. But now everybody else is jumping on the bandwagon.

Mars One is planning a one-way, manned mission to the Red Planet in 2023, and has already released its astronaut selection criteria. See [www.thenextgiantleap.com](http://www.thenextgiantleap.com).

SpaceX wants to ship people to Mars to start a colony of maybe 80,000 people at about \$500,000 a trip. See [www.space.com/18596-](http://www.space.com/18596-mars-colony-spacex-elon-musk.html)



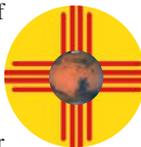
[mars-colony-spacex-elon-musk.html](http://www.space.com/18596-mars-colony-spacex-elon-musk.html).



## Mars—Land of Enchantment

Mars, like New Mexico (wait... there's a "new" Mexico?!), could soon be known as the Land of Enchantment.

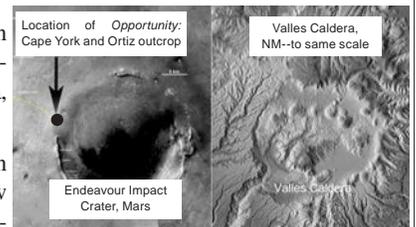
Rover *Opportunity* has been exploring Cape York, in the Endeavour impact crater (a crater about the size of Valles Caldera, New Mexico). There's a target outcrop there called Ortiz, named after New Mexico's Ortiz mountains, between Albuquerque and Santa Fe. Other New Mexico-



named outcrop targets on Mars include: Laguna, Acoma, Sandia, Manzano, Cibola, and Clovis.

And that's not all. Martian craters with New Mexico names include: Chupadero, Jal, Tecolote, and Santa Fe. All they need now is Old Town, Española, and Hatch! I wonder if green chile would grow on the Red Planet?

See Dr. Larry Crumpler's <http://nmnaturalhistory.org/rover-field-reports-from-mars.html> page.



### Coming Next Issue...

- Habitat construction instruction
- DoD STARBASE robots patrol Washington, D.C.

**Watch for it!**

