

# How To Write a Synergy Demonstration for LABRats

By Shawn Carlson

In LABRats, Demonstrations are presentations that the Senior Youth Leadership performs for the entire Synergy.

Since the LABRats program is focused on hands-on science skills, we want to keep spectator events to a minimum. Still, there are times when an important principle must be witnessed firsthand, but doing so requires an apparatus that is too expensive, too dangerous, or in too short supply to allow the Groups to do on their own. Demonstrations are, therefore, sometimes absolutely essential.

## Background

When writing a Demonstration, keep the following points in mind:

- 1) Demonstrations are performed by the senior Youth Leadership under the supervision of the Chief Mentor.
- 2) Demonstrations are short. They should require no more than seven minutes to perform and discuss.
- 3) Your text (10 point type, single spaced) and images must fit on a single page.
- 4) Demonstrations can involve caustic chemicals, flames, and safe high voltage supplies (like a Van de Graff generator, or a power supply for a photomultiplier tube). However, they cannot employ potentially lethal power supplies, reactions that require a fume hood, explosive mixtures, or create reaction products that are difficult to discard safely. Also, although the demonstration can use animals (comparing the heart rate of a small dog to that of the Chief Mentor, for example) the demonstration cannot harm any animal in any way.
- 5) Demonstrations can use volunteers, so long as there is no danger whatsoever to the volunteer. For example, charging up the body of fellow Labrat using a Van de Graff generator until his or her hair stands on end is perfectly OK. But asking a LABRat to lift a heavy weight, which could cause injury if mishandled, is not.
- 6) The best demonstrations use simple household items to illuminate basic scientific principles. The more exotic the

required equipment, the fewer Synergies will be able to perform your demonstration.

- 7) Think entertainment. The demonstration must be fun for the youth leaders to do, and fun for the rest of the Synergy to watch. Add suggestions for patter and performance techniques that can turn a simple illumination of a scientific principle into a real crowd pleaser.

## Demonstration Template

All Demonstrations have the following sections:

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### **"Acknowledgements"**

The Acknowledgement should flow like this:

"This monograph was written by [YOUR NAME]." Thank contributors of copyrighted materials, if any, and cite your primary sources. Then thank any person or organization that provided assistance to make this monograph possible.

To this the National Office will append credits for donations and other support that helped to make this work possible.

### **Copyright Notice**

The copyright notice must read.

"This monograph is copyrighted by Labrats. All rights reserved. © YEAR"

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### **"Learning Goals"**

What scientific principal(s) does your Demonstration teach? Think about the broad concepts that underlie your Demonstration. And even

more important, think about what your Demonstration teaches regarding the process of science itself. LABRats emphasizes habits of mind and putting the process of science into practice, as well as foundational scientific concepts.

### **"Materials"**

This section contains a bulleted list of necessary materials. Note, try to use only materials that a Synergy is likely to have on hand, or something that the adult leaders are likely to have at home. For a list of materials, download "How To Start a LABRats Chapter" from the [labrats.org](http://labrats.org) Website.

### **"Presentation"**

Clearly describe the exact procedures that the Youth Leaders must carry out to complete your Demonstration. If something can go wrong, make sure to say what and explain any contingencies. Sprinkle any performance tips liberally throughout this section.

### **"Talking Points"**

What questions should the Youth Leaders ask while performing your Demonstration, and after its over? What questions are the Youth Leaders likely to be asked? What are the most essential points to communicate about this Demonstration?

Talking points are usually presented as questions that stimulate discussion. On points of science, you should also supply the answers. (See the Example below.)

Remember, total length not to exceed one page in single-spaced 10-point type.

## Permissions Document

A Synergy Demonstration consists of two documents: The text and, if necessary, a Permissions document. The Permissions document must contain email messages, including the addresses and a FAX number, from the owners of copyrighted images, if any, that you use. These messages must state that the owner is willing to grant SAS permission to use their images in the LABRats educational materials.

We will contact the owner to get their signature on a contract granting SAS non-exclusive rights to use the image. Please understand that we cannot release any monies to you until all permissions have been obtained. We recommend you send the owner of the copyright the following message:

Hi there,

I am writing a science lesson for a revolutionary new educational program called LABRats. The program is run by the Society for Amateur Scientists (SAS), a non-profit organization. (You can see what LABRats is all about by at [www.sas.org](http://www.sas.org).)

I ran across an image on your Web site [WEB ADDRESS] that I'd like to incorporate into my lesson. The image shows [DESCRIBE]. So, I am writing to ask that you allow the Society for Amateur Scientists permission to include this [these] image[s] and distribute it [them] over the Web to all LABRats members.

Sorry that SAS can't afford to pay you anything for this, they are a non-profit organization after all. But they would be happy to include in this lesson an acknowledgement to you and your Web site thanking you for your generosity.

Please let me know if this sounds OK to you. If so, please respond with a FAX number so SAS get you the permission slip you'll need to sign.

Thanks for supporting science education in America!

Sincerely,

YOUR NAME

## Titles

All Demonstration documents must begin with the letter 'D' for "Demonstration." The Permissions document that you submit must have the same title as the text document, except with the letter PD appended to the end. For example, "DBloodFlow.doc" and "DBloodFlowPD.doc."



## Example: The Suction Prison

**Learning Goals:** This demonstration provides a powerful visceral experience of atmospheric pressure.

**Materials:**

- About a dozen large heavy-duty plastic trash bag. (Only one is needed for the demonstration, but it's good to have spares so the whole Synergy can experience this!)
- A Shop-Vac

**Presentation:**

- 1) Have a volunteer remove their shoes and any sharp objects and then be seated inside the trash bag with their knees bent. Pull the bag up over their knees and tuck it under their arms so their legs are completely enclosed and their arms are free.
- 2) Insert the vacuum hose into the bag. Ask your volunteer to use both hands to clench the bag around the nozzle and also to make sure that it does not touch the bag or their body.
- 3) Draw the bag tight around the person's body using the drawstring.
- 4) Turn on the vacuum. The bag should quickly shrink and mold itself tightly around the person's body encasing your volunteer inside a thin plastic prison. If this doesn't happen then there is a problem with the seal. Most Shop-Vacs powerful enough to make up for most leaks. Otherwise, ask another Labrat of the same gender as your volunteer to press any gaps in the seal against the volunteer's body.
- 5) Ask your volunteer to move his or her legs, or extend a foot. The experience will give them a very real understanding of the power of atmospheric pressure.
- 6) Let the Synergy return to its activities, but call up each Group one at a time so that each of its members can experience this before the meeting is over.

**Talking Points:**

- 1) Where does the force come from that presses the plastic bag around the volunteer's body?
- 2) Why is it so hard for the person to move their legs inside the bag?
- 3) If atmospheric pressure is about 15 pounds per square inch, how much force would they have to exert to extend their legs? (How much force is acting against the soles of their feet? Multiply the approximate area in square inches [square centimeters] of the volunteer's foot by 15 [65] to get the approximate answer in pounds [newtons]. For a 12in x 4in foot the answer is 720 lbs!)
- 4) Astronauts in the Skylab space station put their legs in a vacuum bag like this one for extended periods every day. Can you think of a reason why? (Without gravity to pull the fluids downward, more blood ends up in the body's trunk and head than normal. The suction bag forced blood back into the legs for a time to let the body recover from this unnatural distribution.)
- 5) **Safety:** What would happen if you put the bag over someone's head and repeated the experiment? Emphasize the danger and tell everyone that they must never repeat this experiment at home without adult supervision. Someone could get suffocated or severely damage their lungs their head were encased in a partial vacuum for even a few seconds!

## How to Submit Your Synergy Demonstration

First, if you haven't already done so you'll need to logon to [www.labrats.org/developers](http://www.labrats.org/developers) and register as a LABRats Developer.

Then, you need to use the Developer's "Propose Content" form to send us a proposal. You'll be asked to describe what Demonstrations you'd like to write, and explain why you are the right person to write them. Please understand that developers must agree to irrevocably assign all copyrights to their Demonstrations to the Society for Amateur Scientists.

Before you begin, make sure you check the list of Synergy Demonstrations that are either completed or already in progress. You don't want to waste your time writing Demonstrations that already exist.

We will promptly notify you by email as to whether we accept your proposal.

Should we accept it and you are a first-time writer for LABRats, we will ask you to submit just one Synergy Demonstration so we can evaluate your work. You'll need to submit the Synergy Demonstration document, and the Permissions document (if necessary) in Microsoft Word format through the upload feature on the LABRats developers' Web page. Do not write a second Synergy Demonstrations until we have approved your first one. If we feel that your work does not meet the high standards of the program, we will reject your piece and tell you frankly why.

If we accept your work, then LABRats will compensate you and invite you to submit additional material. Please note that we cannot pay a kill fee.

## Frequently Asked Questions

Q: Do I keep the copyright if my Synergy Demonstration is not accepted?

A: Absolutely. We only take possession of copyrights for material that becomes part of the LABRats program.

Q: Will my name appear on the Synergy Activity when it is published?

A: No. However, we do list all developers on the LABRats Developers website along with the titles of all materials they have written for the program. You may claim authorship of all your work on your résumé, and direct people to the Developer's webpage for confirmation.

Q: Do I have to supply all of the images?

A: Yes. You need to supply enough photos to illustrate your text. For sake of consistency and quality of production, we may replace yours with images that we generate. Please keep in mind that if you provide quality images that we can use directly in the text, you are much more likely to receive additional assignments from us.

Q: Can I borrow information from on-line sources?

A: You are completely free to review any material from any source to prepare your Synergy Demonstration. However, you must make certain that you obey all copyright restrictions in producing your Synergy Demonstration. Developers are required to affirm under penalty of perjury that they hold the copyrights to any written material they submit. Moreover, we routinely search the Web for key phrases in submitted Synergy Demonstrations. Please understand that when we identify someone who is not trustworthy that person is banned from participating in LABRats in any way for life.