

How to Write a Science Skill Award for LABRats

By Shawn Carlson

Science Skill Awards (SSAs) sit at the core of the LABRats education program. The younger members progress largely by earning Science Skill Awards and putting the skills they learn into practice. They gain skill points for each Science Skill Award they earn. Those points count towards advancement in rank, and well as towards earning the lower-level merit badges.

What is a Science Skill Award?

A Science Skill Award covers a narrow topic at an elementary level; usually something that a beginning student can master in a single sitting. Although members must learn facts to earn the award, every SSA focuses on learning how to *do something* basic that is necessary for success in some area of science or technology. In other words, each SSA must add a basic tool to the member's personal scientific toolkit that he or she will ultimately draw from to do original experiments.

Keep in mind that SSAs must be brief (no more than about 1200 words for a one point skill), and they must communicate their content as simply and efficiently as possible. They generally include no jargon whatsoever, and use only the simplest possible language. Those directed to the lower ranks must be written so that a sixth grader could understand them.

This monograph explains how to write SSAs for LABRats.

The Three SSA Documents

An SSA consists of three documents: The text, a set of exam questions, and if necessary a Permissions document. The text and exam document are described in the sections below.

The Permissions document must contain email messages, including the addresses and a FAX number, of the owners of copyrighted images that you use, if any. 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 at 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 SSA documents must begin with the letter 'S' for "Science." 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, "SResistors.doc" and "SResistorsPD.doc." For Test Questions documents the PD is replaced with a TQ, ie. SResistorsTQ.doc

The SSA Template

All SSAs follow the same basic format. You can download the template from the labrats.org/developers web site. The fundamental parts are explained below:

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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.

"Prerequisites"

If there are any SSAs that the member must earn before tackling yours, list them here.

Copyright notice

The copyright notice must read.

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

Page 1

Title

The title should be formatted like this:

Subject Area: Level—Specific Topic
(Point value)

For example,

Electronics: First Steps—Resistors
(One point)

An SSA qualifies as "First Steps" if it has no prerequisites. Otherwise, the level is denoted as "Next Steps".

Note: The title of the electronic document you submit must be "Specific Topic.doc", where "Specific Topic" is taken from your title. For example, for the SSA on resistors the document uploaded onto the LABRats Web site would be "Resistors.doc".

Directly below the title is the point value of the skill. An SSA can be worth one, two or three points depending on how long it takes a typical Labrat to complete it. Any skill that can be taught during a single Science Skills Training session at a Synergy meeting, which lasts about 30 minutes, is a one-point skill. Skills that most members will need to come back to are two point skills. Likewise, three point skills require most members three sessions to complete. There are no four-point skills.

The program guidelines require that at least 85 percent of all SSAs must be one-point skills, so try to make every SSA you write a one-point skill. If you find yourself writing a two point SSA, see if you can split it into two one-point SSAs.

"Welcome"

The Welcome section should entice the member into wanting to get started on the skill. It must be *short*. Use upbeat, conversational and exciting prose that gets the member pumped up about earning this skill.

The title of this section should read Welcome to [descriptive phrase]

For example, the title of the Welcome in the resistors SSA reads...

"Welcome to the Wonderful World of Resistors!"

And the text reads...

"If you'd like to do cool things with electronics then you've got to know a little about resistors. Just try to find a circuit that doesn't have one!

"By the time you've earned this Science Skill Award, you'll know everything you need to use resistors in real electronic circuits."

"You will be able to..."

This is where to list everything the member will be able to do once he or she has earned this Science Skill Award. Make sure to emphasize the *doing* aspect, not the *knowing* aspect, and use positive emotive language.

For example, don't say...

"You will learn how to read a resistor's color code."

Say instead...

"You'll be able to tell the value of a resistor just by looking at it."

Remember, it is the "doing" that makes young people feel empowered and makes them excited about learning the skill.

This section must end with a strong positive statement. For the Resistors SSA that statement might be...

"Once you've mastered these skills you'll be use resistors in any circuit. Moreover, you'll be one important step closer to designing you own circuits to do all sorts of cool things."

"And that will prepare you to..."

Members need to see not only what's at their feet, but what's down the road as well. This section should put what they are about to learn in the greater context of what it will prepare them to do. For example, for the resistor SSA this section might contain a single sentence:

" Build all kinds of electronic circuits, sensors and gadgets."

This is the last section on page 1.

"Background"

(Length—Not more than 300 words)

"Background" tops page 2.

The Background section provides only the most essential facts that the Labrat needs to perform the skill and to put the skill into context. In selecting what you put here, remember these rules:

- 1) Just the essentials! SSAs are short, bite-sized cornels of how-to science info. That means you are going to have to leave out a lot of information that you'd like to put in. Rest assured that many Labrats learn that material when they take on the advanced work. But make your SSAs as brief as possible. For example, the resistors SSA does not say,

"Resistors are often constructed out of a carbon-based compound that is stuffed into an insulated housing."

Why? Because this information isn't necessary to build a circuit or understand how one works. Keep a laser focus on the essentials.

- 2) Whenever possible, use clear physical analogies to help explain how things work. For example, the resistors SSA describes a resistor's function like this:

"If a wire is a pipe along which current flows like water, then a resistor is like a short section of narrow pipe that restricts the flow."

Concrete physical analogies provide the best way develop a person's physical intuition.

- 3) Illustrate your text with an ample number of clear images.

- 4) Break each different key fact into separate sections each with its own title. For instance, the Resistors SSA has sections titled:
 - a. What is a Resistor?
 - b. Resistors on a Circuit Diagram
 - c. Unit of Resistance—The Ohm
 - d. Kilo and Mega

These sections should be as short as possible. For instance, section b. contains just image and just 24 words.

- 5) Increase the readability of your text by breaking it up into as many short paragraphs as you can.
- 6) Call attention to important points by using "call out" phrases at the start of an extremely short (one or two sentences only) tightly focused paragraph. For instance: "Key Point:", "Watch Out!", "Try This:" etc. For example, the resistors SSA contains the following:

"Watch Out! The unit ' $K\Omega$ ' is pronounced 'kilohms', not 'kilo ohms' as you might expect. Likewise, $M\Omega$ is pronounced 'megohms', not 'mega ohms.' "

- 7) To quote Einstein... "Make everything as simple as possible, but not simpler!" Use most direct language possible. The material must be presented so that an 11-year old can grasp it. After completing this section, the Labrat should be able to explain its content to others.

"Practice"

(Length—Not more than 800 words per skill point)

This is heart of the lesson. "Practice" teaches the practical science skills that are necessary to earn the SSA, and does so as concisely as possible.

Keep the following in mind:

- 1) Thoroughly illustrate all procedures with digital photos showing the procedures step-by-step. Remember, most members will be totally unfamiliar with your topic and they will struggle to learn by working directly from your images.

- 2) Put each different procedure in a separate section with its own title.
- 3) Increase the readability of your text by breaking it up into as many short paragraphs as you can.
- 4) Call attention to important points by using special call out text at the start of one or two sentence paragraph. Look to add as many short tips (titled "Tip:") as possible.

"Summary"

This section contains as bulleted points the essential facts that the member needs to know in order to pass the SSA. The test questions can only cover points that are listed in the summary.

Test Questions

To earn a Science Skill Award each member must pass two brief tests; one knowledge-based and one technique-based. You must create a list of test questions from which the instructor will select five to test the student. Any calculation should be done on paper. All other test questions must be given orally.

All of your questions must be answered in the text and included in the Summary section. Also, you must list those essential skills that the Labrat must demonstrate to earn this award.

To pass, the student must score four out of five questions right, and show competence with all of the essential skills.

How to Submit your Science Skill Awards

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

Then, you need to use the Developer's "Propose SSA" form to send us a proposal. You'll be asked to describe what SSAs 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 SSAs to the Society for Amateur Scientists.

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

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 SSA so we can evaluate your work. You'll need to submit the SSA document, Test Questions 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 SSA 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 SSA 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 SSA when it is published?

A: Yes, but in the Acknowledgement section. We do not publish a bi-line below to title. 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 SSA. However, you must make certain that you obey all copyright restrictions in producing your SSA. 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 SSAs. Please understand that when we identify someone who is not trustworthy that person is banned from participating in LABRats in any way for life.