Finding your way through your **SPARK!LAB** Inventor’s Notebook!

Welcome to Spark!Lab ........................................ 2

Staying Safe ....................................................... 5

How to Use Your Notebook .................................. 7

Spark!Lab Worksheets ........................................ 9

<table>
<thead>
<tr>
<th>YOUR VISIT</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>LAB BENCH</td>
<td>11</td>
</tr>
<tr>
<td>CURATOR’S COLLECTION</td>
<td>15</td>
</tr>
<tr>
<td>INVENTOR’S FILES</td>
<td>19</td>
</tr>
<tr>
<td>INVENTION CORNER</td>
<td>21</td>
</tr>
</tbody>
</table>

Inventing at Home ......................................... 27

Share Your Invention ...................................... 31

Spark!Lab Sponsors ......................................... 31
Welcome to SPARK!LAB, a hands-on activity center where you’ll learn that invention is a process. You will also learn about each step of the process and all the fun and hard work that goes into inventing.

TO INVENT YOU HAVE TO:

**Think It**
- Have a great idea for an invention.

**Explore It**
- Investigate inventions and ideas of the past.

**Sketch It**
- Draw pictures and diagrams to figure out how your invention might work.

**Create It**
- Build a prototype or model of your idea.

**Try It**
- Test your invention!

**Tweak It**
- Keep improving your idea.

**Sell It**
- Market your invention to people who might buy it.
We want SPARK!LAB to be a safe and fun place for you to EXPLORE the invention process. Please follow these SIMPLE rules while you’re here. These are also good rules to follow at home.

1. Wear safety goggles when conducting an experiment or working with tools.
2. Handle all equipment, artifacts, and tools carefully.
3. Listen to SPARK!LAB instructors carefully before you begin any experiment at the lab bench.
4. If any chemical should splash into your eyes or on your skin, tell a SPARK!LAB instructor immediately and use plenty of water to wash off the affected area.
5. Do not eat, drink, chew gum, or run while in SPARK!LAB.

STAYING SAFE IN SPARK!LAB!
Inventors use lab notebooks to write down their ideas, record their observations, and document the results of their tests and experiments.

They write down things that work (and don’t work), sketch ideas for new inventions, and make notes about their invention process.

This notebook will help you document the things you do and learn in Spark!Lab. It also includes ideas for inventing at home.
Record the DETAILS of your SPARK!LAB VISIT here.

Date of visit:

What I did in Spark!Lab:

What I learned:

My favorite Spark!Lab activity:

Name and signature:

print          sign
When scientists and inventors conduct experiments, they record details about what they do, what they observe, and what they learn. Use the questions and activities below to document an experiment you do in SPARK!LAB—or at home!

What are you trying to learn from this experiment?

List the steps you took while conducting the experiment.
What happened during the experiment? What did you observe?

_________________________________________________________________
_________________________________________________________________
_________________________________________________________________

Sketch one of the tools you used in the experiment. Remember to label your drawing.

What did you learn from this experiment?

_________________________________________________________________
_________________________________________________________________
_________________________________________________________________
_________________________________________________________________

Write down one question you still have about the experiment.

_________________________________________________________________
_________________________________________________________________
Imagine you are a museum curator. Curators collect and care for objects, and use artifacts to learn about the past. What can you learn by looking at the objects in the box? How has this invention changed throughout history?

Type of object:

<table>
<thead>
<tr>
<th></th>
<th>object #1</th>
<th>object #2</th>
<th>object #3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does this object look like anything you have seen before?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Can you tell what it is made of?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How big is the object?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How much does it weigh?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is this object old or new?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>What was or is this object used for?</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
How are the objects similar?

In what ways are they different?

If you had to choose one of these objects to use, which would it be?

How do you think you could make the object better? Draw a picture of your idea below. You can also use the graph paper to the left for extra space.
Imagine you are an archivist. Archivists preserve documents and keep them safe. They also use them to learn about the past. What can these documents tell you about this inventor and his or her invention?

What types of documents did the inventor create during the invention process? Circle the documents you find.

- Patent
- Photograph
- Letter
- Sketch
- Advertisement
- Notes

List two things you think are important about this inventor or invention.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

Use the space below or to the left to draw or record other discoveries you make while exploring this invention.
Inventors keep detailed records of their ideas and the steps they take to create their inventions. Document your invention process here. Use this in Spark!Lab or when you’re inventing at home!

**Think It**
Describe the problem you want to solve.

**Explore It**
Make a list of possible ways to solve this problem.
SKETCH IT
Draw a picture of your idea.

CREATE IT
Build your prototype. Write down each step so that you will remember exactly how you built your model.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
Perform some experiments to find out how well your prototype works. Write down the results of each test:

**EXPERIMENT #1**


**EXPERIMENT #2**


**Tweak it**

How can you improve your prototype?


**Sell it**

Give your invention a name.


INVENTING AT HOME!

EXPLORING SIMPLE MACHINES
Take apart a mechanical device that no longer works. Broken clocks and
discarded toys are great choices. Remember to get permission before taking
anything apart, and ask a parent or adult to assist you with your experiment.
Always wear safety goggles!

How many simple machines, such as wheels, gears, or pulleys can you find
inside? Can you create something new out of these old parts?

TAKE AN INVENTION WALK
Go on an invention walk around your neighborhood or school with your family,
friends, or classmates. As you walk, call out things that have been invented.
When you get home or back to school, talk about what you saw and ways to
improve your neighborhood or school. Have each person pick one invention
to redesign to help make the community better. Share your ideas and drawings
as a group.
TRY THIS ARMONICA ACTIVITY

When you hear Ben Franklin’s name, you probably think about his famous kite experiment to conduct electricity. But did you know that he was the creator of an instrument called the armonica? (Armonica is the Italian word for harmony.) With some drinking glasses and water, you can create your own armonica!

HERE’S HOW:

1. Clean your finger and wet it with water.

2. Gently rub your finger on the top rim of an empty glass.

3. Move your finger smoothly in a circular motion, making sure to cover the entire rim.

4. As you move your finger over the rim, notice the pitch of the sound produced.

5. Now, add water to the glass and repeat the same procedure. Listen for the pitch. Does it sound the same as when the glass was empty?

6. Experiment with different glasses and water levels and create your own armonica band!

For more at-home invention activities, visit sparklab.si.edu.
SHARE YOUR INVENTION!

Have a great IDEA for an invention after you leave SPARKLAB?

Think it, explore it, sketch it, create it, try it, tweak it... and then TELL US about it! Take a PICTURE of your invention and ask a parent or guardian to E-MAIL it to sparklab@si.edu.

Be sure to INCLUDE your first name, age, hometown, and a brief description of your invention, and we’ll DISPLAY the photo of your invention in SPARKLAB! If you are under 13, you must have parental permission to submit your photo.

SPARKLAB is made possible by the GENEROUS CONTRIBUTIONS of:

The Lemelson Foundation
improving lives through invention

Merck Company Foundation

Merck Institute for Science Education

The Rice Family Foundation