Spark!Lab is a real place located in the Smithsonian's National Museum of American History. It's a hands-on invention activity center where visitors learn that invention is a process and that everyone is inventive.

Activities incorporate history, science, engineering, technology, and art. A visit to Draper Spark!Lab "sparks" imagination and curiosity, and can be the first step to exploring our own inventiveness and invention in the world around us.

To learn more, visit us at: http://www.invention.si.edu/try/sparklab

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SPARK!LAB
Smithsonian

8+

Invent

A Stellar **Solar Lamp**

Inventor's Guide

⚠ WARNING:
FUNCTIONAL SHARP POINT/EDGE

Did you know that we are surrounded by invention?

Life today is much easier, safer, faster and more convenient thanks to creative problem solving through invention. Since the beginning of time, people have used their imaginations as a way to solve a problem or overcome a challenge…

Your Challenge:

You're camping with your family and there's no electricity around. Your only source of light during the night will be a fire, but the forecast is calling for rain which is sure to put out your flames. Luckily, you have a solar powered light device that charges in the sun. How can you design a lamp that allows the light from your solar device to provide enough illumination for you and your family?

Light...

is defined as "the natural agent that simulates sight and makes things visible". – Google (www.google.com)

Lamp...

is defined as "a device for giving light…" – Google (www.google.com)

The solar light battery is not replaceable.

Real inventors follow a process as they create. Learn what the steps are by going through your own journey of invention. You may skip ahead or re-visit a step along the way. Let's begin!

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.

THINK iT

Think of what kind of lamp you would like to create. Write down all of your ideas no matter how crazy or weird. Remember ideas can be limitless!

Using the solar light device and components given, design your own lamp to spread your light for the entire camp.

To help you think of a design, try answering these questions.

1.) Does your lamp need to move or should it stay in one place?

2.) Do you need the light to travel in many directions?

3.) How can you help the light travel further?

4.) Will the lamp be different colors?

5.) Is it easy to charge and turn on and off?

6.) How will your lamp look different from ones that already exist?

EXPLORE iT

How does Solar Power work? What kind of solar lights exist that could give you ideas? Do a little research of your own to learn more about solar power.

Here are examples of lamps & lights from Smithsonian's collections to get your research started:

Lamps and lights have been designed and redesigned throughout the years in order to better their usage. As you can see below, different jobs call for different types of lights to serve their purpose in the best way.

This is a miner's cap with a lamp on its leather brim. Without light, miners had no sight, no work and no wages. Miners chose their own cap and would wear it all day and would use it for decades. They also personalized their caps using pins or in more recent times, stickers.

In 1872 Andrew Dick made an improvement to an existing locomotive signal light. The lamp would include a stationary and movable headlight so that train workers could identify the train name or number as it came into the station at night.

This unique lamp has a padlock latch on it for safety purposes. The John Davis & Son safety lamp manufactured in the early 20th century was fueled, locked, and distributed at the entrance of the mine by the mine boss. Opening the lamp inside the mine could expose the flame to potentially flammable gas that could cause dangerous explosions.

SKETCH iT

Use the space provided to do a few quick sketches of what your solar lamp could look like.

CREATE iT

Start putting your pieces together to build your creation. Think about which items will help your solar lamp look and work the way you imagine.

TRY iT

Does your solar lamp work like you thought? If yes, congratulations! If not, think about how you can improve or tweak it.

TWEAK IT

How could you adjust your solar lamp to make it work better or differently? Make the changes you'd like.

SELL IT

If you were going to sell your solar lamp, these are some of the questions you would want to think about. Try talking to your friends and family about your invention to help promote your sales.

1.) How would you package it?

2.) What would you call it?

3.) How much would it cost?

4.) Where would you sell it?

5.) Who would use it?

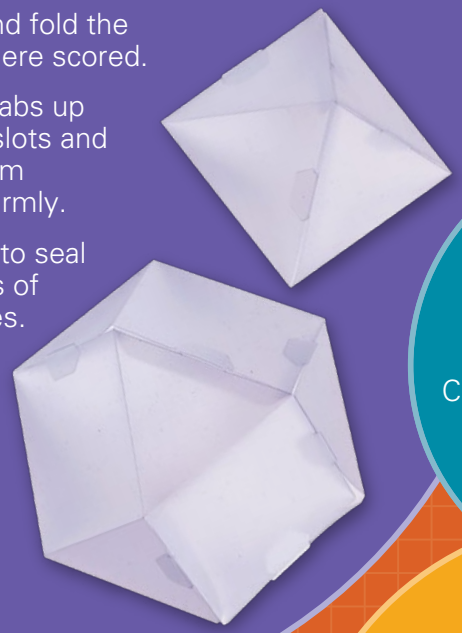
Helpful Tips:

To create the Plastic Shapes:

1.) Crease and fold the shape where scored.

2.) Line the tabs up with the slots and insert them pushing firmly.

3.) Use tape to seal the edges of the shapes.

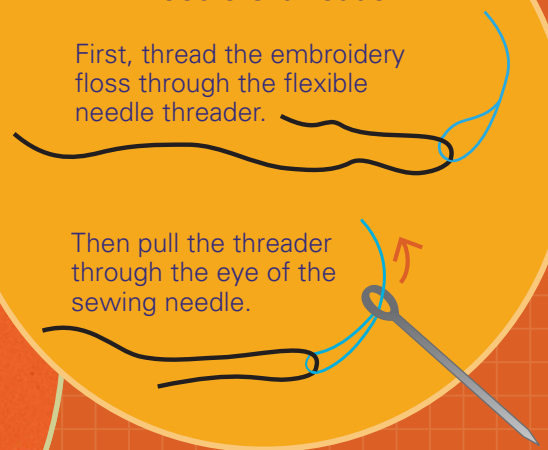


Charge the solar light device by placing it in the sun for a few hours.

To use the needle & threader

First, thread the embroidery floss through the flexible needle threader.

Then pull the threader through the eye of the sewing needle.



Use the sticks and foam gears to give structure to your solar lamp designs.

Cellophane sheets change the color of the light.

Fold and shape the printed paper and plastic sheet into whatever shapes you imagine.

The plastic sheet can even hold air if you seal it up.

Use the plastic mosaic pieces to add color to your invention.

Glow in the dark stickers and string charge under light. Turn out the lights to see!

Discover ways to add foil so it reflects the light, adds shimmer and strengthens the light source.

Project Hack!

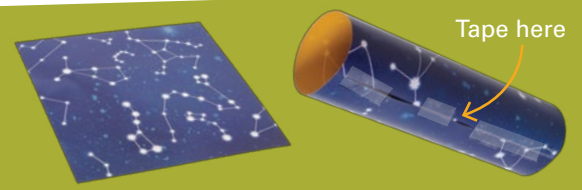
Using items found around the house, try to create another solar lamp or enhance the one you've just made. Always ask before taking and using.

A folded card stock stick makes a great stand for the solar light device!

We filled an empty peanut butter jar with water and glitter. Then we added foil to reflect the light and cellophane to create a purple hue. Glow stickers top off this awesome hack!

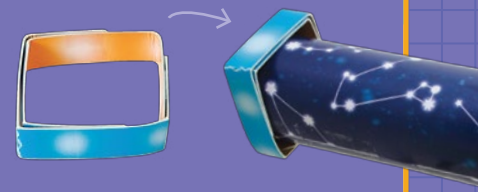
How we made a Starry Glow Light

1. Wrap the printed paper square into a tube and tape it along the edge.



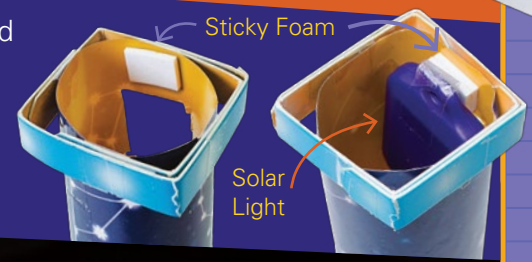
2. Construct the small plastic shape and tape the edge. Now tape the shape onto one end of the paper tube.

3. Bend two craft sticks into a square shape that will fit around the end of the paper tube. This will be the base. Tape onto the tube.



4. Cut a rectangular shape out of the tube near the base. This is where the solar light panel will go.

5. To keep the light in place, add double-sided sticky foam to the inside of the tube. Stick the light with the solar panel facing out, inside the tube.



6. Add glow-in-the-dark string to the top of your Starry Glow Light and decorate with stickers and foil tape.