

Rescue Squad™

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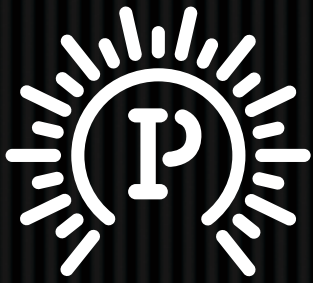
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Invention Project®

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**RESCUE
SQUAD™**

FOREWORD

Introduced in 1990, National Inventors Hall of Fame® programs have encouraged students to explore their creativity and innovation through Science, Technology, Engineering, and Mathematics (STEM) activities and real-world challenges, fostering a lifelong interest in inventive thinking.

Created by the National Inventors Hall of Fame®, Invention Project® is inspired by the Inductees, who are integrated throughout the curricula. In collaboration with the United States Patent and Trademark Office, Invention Project® gives children the opportunity to take risks, use creative problem solving, and develop an entrepreneurial mindset.

To date, the National Inventors Hall of Fame® has impacted over two million children, teachers, parents, college students, and inventors through education and recognition programs, including Invention Playground®, Camp Invention®, STEM Maker Lab®, Club Invention®, Invention Project®, and the Collegiate Inventors Competition®.

Please visit the Invention Project® website at invent.org/IP to learn more. The National Inventors Hall of Fame® makes no warranty, explicit or implied, as to the safety or suitability of our activities. We urge you to always use proper safety equipment and precautions.

SAFETY AND HYGIENE

- For the safety and hygiene of participants, please be sure all children wash and sanitize their hands before and after each session.
- Be sure to follow all local and state fire and safety regulations.
- Ventilate the classroom when using markers.
- Demonstrate to the children how to properly hold and use scissors. Do not allow anyone to run with scissors.
- Remind children to safely handle objects with a point, such as pipe cleaners.
- Do not allow children to shoot each other with rubber bands.
- Ensure children use caution with binder clips and clothespins to avoid pinching skin.
- If any participant has an allergy, remove any materials that may trigger an allergic reaction for them.
- Make sure children do not put materials in or near their eyes, mouths, and ears.
- Keep marbles and beads away from faces and mouths to avoid choking hazard. In addition, ensure loose marbles or beads are not on the floor to avoid slipping hazard.
- Do not allow children to play with or place plastic bags near the face or mouth.
- Do not allow the floors to become wet. If floors do become wet, use a mop or towels to dry them.

- Only Instructors should use glue guns. Practice caution when handling glue guns. They are hot.
- Liquid iodine and iodine water should only be handled by Instructors. Please wear gloves when handling and do not allow children to come into direct contact with iodine. Conduct the activity with iodine on tiled, nonporous floors or outside.
- Coin batteries can be harmful if swallowed. Please take precautions to make sure they are not placed near the children's mouths.



- Do not allow coin batteries to touch when not in use.



SETTING THE STAGE

Program Protocol During the COVID-19 Pandemic

- Sanitize hands prior to handling materials. Sanitize all shared materials in between uses. When it is designated to “distribute materials,” arrange the materials so they can be easily accessed without cross-contamination.
- Locate and label a box to hold all materials that need to be sanitized. Have children return used items to this box so that Instructors know what items need to be sanitized.
- Space seating at least 6 feet apart when feasible. Turn desks to face in the same direction (rather than facing each other), or have students sit on only one side of tables, spaced apart.
- Use masking or painter’s tape to create boundaries on the floor for children to use as a visual cue to help keep them separated.
- Tape directional arrows on the floors and signs on walls to ensure that Instructors and children remain at least 6 feet apart while in lines and at other times (e.g., guides for creating “one-way routes”).
- Some sessions are collaborative. To ensure a safe environment, modify or eliminate these activities as needed.

Upcycled Materials

- Create an Upcycled Materials space where recyclable items can be brought in, sanitized, stored, and are made available to help fuel children’s imaginations.
- Turning these recyclables (e.g., empty jugs, fabric, old toys, cardboard, containers, etc.) into prototypes is called upcycling. This

process is valuable for several reasons. It shows that selecting items promotes creative problem solving, that inventing and solving challenges does not always require special equipment, and that manipulating items by cutting, taping, and gluing develops fine motors skills.

Addenda

- An Addenda section has been provided at the end of the curriculum, which contains the following:
 - **Instructor Background**
 - Read each Unit’s Instructor Background ahead of time for additional information on highlighted topics from the activities and the stories of the featured National Inventors Hall of Fame Inductees.
 - **Video Transcripts**
 - When unable to play videos, read the provided transcripts to participants.
 - **Squad Knowledge**
 - Each Unit has themed multiple-choice Knowledge Questions, which may be used as an additional assessment tool. Integrate these questions as needed and when time allows. Correct answers are highlighted in bold.
 - The information necessary to answer the Squad Knowledge questions are in the Background Music Tracks. Remind participants to watch these tracks during the session to gain squad knowledge.

- ✓ For nonreaders, share the Squad Knowledge facts from the videos out loud during each session as children build.

Prepare the Media

- The Invention Project program has provided media tracks containing music, posters, and/or videos.
- ✓ Access all media tracks online at: invent.org/IP/curriculum-videos.
- Click on the In-Person Classroom tab for videos to play at school. Click on the Virtual Classroom tab for the interactive video and script to use during any sessions run online.
- Review and download all media tracks prior to the program start for ease of use.
- ✓ Ensure there is video and audio capability to play videos and music that can be seen and heard by the entire class.
- ✓ Use the music tracks to create ambiance while participants are designing and inventing.

Posters

- Some Plan Ahead sections call for posters to be hung up. When this is not possible or convenient, simply have posters easily accessible to show. Keep all posters handy throughout the duration of the program.
- ✓ All posters can be found in the Instructor Rescue Squad Kit.

Handouts

- Hard copies and digital copies of Primary and Intermediate handouts have been provided in both English and Spanish.
- Select the appropriate handouts, and prepare them for each participant to be distributed in advance of each session.
 - Session Eight has multiple sets of leveled reading handouts. Be sure to select the appropriate Primary or Intermediate grade-level, and print or digitally share the desired number of copies for each selection.
- ✓ Access the digital copies online at: invent.org/IP/curriculum-videos.

Instructor Resources

- ✓ All Instructor Resources can be found online at invent.org/IP/curriculum-videos.
- Instructor Guide
 - An Instructor Guide has been provided. Review it prior to the program for information on the key components of a successful Invention Project program along with facilitation strategies and inclusion accommodations.
- Technology Guide
 - A Technology Guide has been provided to enhance the experience with supplemental resources if there is access to computers or tablets.
- Book List
 - A book list has been provided to assist with building a robust content-themed classroom library collection to support the children's learning.

- Digital Curriculum
 - A PDF copy of the curriculum can be accessed digitally.
- Timing Guide
 - Sessions typically range between 45 and 90 minutes. A Timing Guide to use as a pacing guide has been provided. Adapt to fit the specific scheduling needs of your site and student engagement level in activities.
- Rubrics
 - Rubrics have been provided to help with formal assessment of the individual activities.
- Pre- and Post-Assessments
 - Pre- and post-assessment questions have been provided. Use these questions alongside the rubrics to guide and assess student growth and learning.
- Materials Lists
 - A list of materials included have been provided for the:
 - Instructor Inventor Supplies Kit
 - Instructor Rescue Squad Kit
 - Participant Inventor Supplies Kit
 - Participant Rescue Squad Kit



RESCUE SQUAD™ OVERVIEW CHART

Unit	Session	Anchor Standard
Unit One: Ecosystem Explorations	Session 1: Operation Eco-Adventure	STEAM
	Session 2: Ziplining	Math
	Session 3: What Would Rescue Squad Do?	Responsible Decision-Making
Unit Two: Nature's Engineering	Session 4: Operation Bear Trouble	STEAM
	Session 5: Hatch or Slide	College and Career Readiness
	Session 6: Save the Salmon	Relationship Skills
Unit Three: Lights - Bioluminescence and LEDs	Session 7: Operation Night Light	STEAM
	Session 8: My Glowing Plant	Reading
	Session 9: Enlightened	Self-Management
Unit Four: Water Pollution	Session 10: Operation Red-Winged Rescue	STEAM
	Session 11: Pipeworks	Writing
	Session 12: Pollution Problems	Self-Awareness
Unit Five: Earth and Human Activity	Session 13: Operation Leave No Trace	STEAM
	Session 14: Plastic Pollution Is Not the Solution	Speaking and Listening
	Session 15: Empathy and the Environment	Social Awareness

Session Seven: STEAM

Operation Night Light

In Session Seven, children report to a vibrant metropolis for their next planet-rescuing operation. A public park filled with bright, energy-guzzling floodlights is throwing off the balance of nature. Squads receive their next operation: protect the park’s nocturnal animal inhabitants while maintaining nighttime visibility for people. Children create glowing plants to light the park’s pathways at night without disturbing the animals.

✓ Concepts

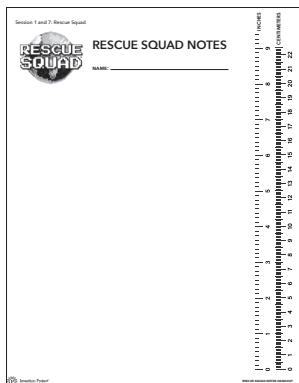
- Energy
- Circuitry
- Construct Explanations and Design Solutions
- Influence of Engineering, Technology, and Science on Society and the Natural World
- Structure and Function

✎ Plan Ahead

- ✓ This session has two activities. Activity One has a different Primary and Intermediate version.

For Activity One

- Prepare one copy of the Rescue Squad Notes handout per participant.



- Set up a Glue Gun Station near an outlet as follows:
 - Place a piece of cardboard from the Upcycled Materials on a workspace. Set the glue guns and glue sticks (for glue guns) from the Instructor Inventor Supplies Kit on top of the cardboard.
 - Plug in the glue guns. They need approximately 5 minutes to warm up.

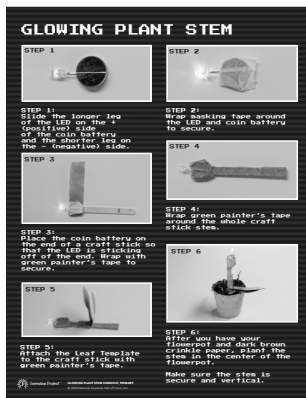
- ✓ Unplug the glue guns at the end of the session.

- ✓ Glue guns should only be used by Instructors.

- Decide whether the class will be making the Primary or Intermediate Glowing Plant.
- If using the Primary version:
 - Locate the following materials from the Instructor Rescue Squad Kit:
 - Coin battery
 - Craft stick
 - Crinkle paper, dark brown
 - Flowerpot
 - Leaf Template
 - Lei flower
 - Painter's tape, green

✓ Keep coin batteries inside their packaging until use. When multiple coin batteries touch, they generate heat.

- Locate the following from the Instructor Inventor Supplies Kit:
 - Masking tape
 - Scissors
- Create a sample of the Primary Glowing Plant using the instructions on the Primary Glowing Plant Stem handout.



- Prepare one copy per participant of the Primary Glowing Plant Stem handout.

- If using the Intermediate version:
 - Locate the same materials as listed above for the Primary version, as well as the conductive tape from the Instructor Rescue Squad Kit:
 - Measure and cut the conductive tape into one 5-inch piece and one 9.5-inch piece. There is a ruler on the Rescue Squad Notes handout for reference.

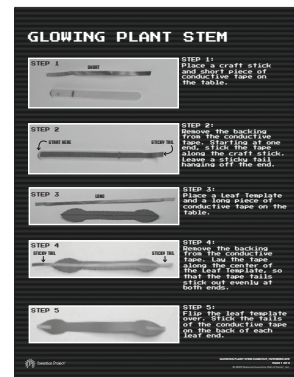
✓ Measure carefully, as lengths need to be precise.

🎬 Watch the "Glowing Plant Stem" Track ahead of time, following the instructions to create an Intermediate Glowing Plant sample.



✓ The instructions are also available on the Intermediate Glowing Plant Stem handout.

- Prepare one copy per participant of the Intermediate Glowing Plant Stem handout.



- If at any point during the program, a glowing plant is not lighting up, use the following troubleshooting tips:
 - Be sure that the conductive tape is visible on the front side of both green stems and extends to each end of the craft stick.
 - Be sure that the green stems are taped to the front side of the craft stick, conductive tape out.
 - Be sure that conductive tape is adhered to the back side of the craft stick and is visible.
 - Check that the shorter leg of the LED is on the same side of the craft stick as the coin battery.
 - Ensure that the coin battery is plus side up and that the conductive tape tail is flipped over and in contact with the coin battery.
 - Check that the LED legs are in contact with the conductive tape on both sides of the craft stick.
 - Press down on the masking tape around the LED legs and around the coin battery to ensure tight electrical connections.

For Activity Two

- Insert one AA battery into the UV flashlight (found in the Instructor Rescue Squad Kit).

✓ Check all AA batteries for any leaks or “dry rust” spots, which indicate a leak that has dried. Properly discard any batteries that show signs of leaking.

- Write the following Glowing Message on a sheet of copy paper using the UV marker from the Instructor Rescue Squad Kit:

Thanks for taking care of my home.
Now I don't have to be alone.
Some glowing flowers are even blue.

Look at me, my belly glows too!

- Color the white parts of the underside, or belly, of the plush flying squirrel using the UV marker.
- The marker will go on clear, but once dry and exposed to UV light, it will fluoresce pink.
- Roll the Glowing Message, and attach it securely to the glowing squirrel with string.
- Create a single zipline that spans across the room as follows (**see Figure 5**):
 - Attach a string to a door hinge or other sturdy high point.
 - Place a chair at the other end of the room. Unroll the string so that it is long enough to span from the high attachment point to the leg of a chair. Cut the string.
 - Flip the metal parts of a jumbo binder clip up to make a V shape. Thread the string through the metal parts.
 - Secure the string, tying it to the leg of the chair.
- Clip the flying squirrel to the jumbo binder clip on the zipline. Attach a medium binder clip in front of the squirrel to keep it in place until use.

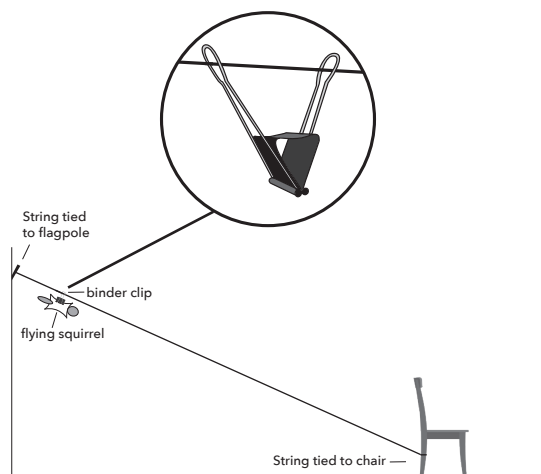


Figure 5. Squirrel Zipline Setup

ACTIVITY ONE: GET GLOWING (INTERMEDIATE)

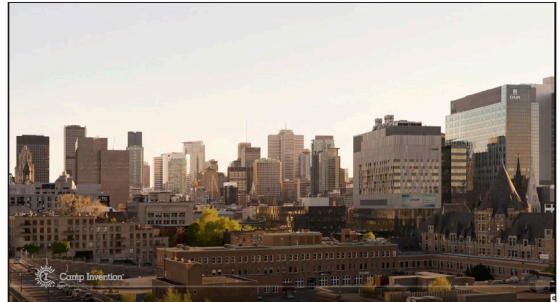
Materials

- Clothespins
- Coin batteries
- Conductive tape
- Crinkle paper, dark brown
- Flowerpots
- Glowing Garden Book
- Glowing Plant Sample, [Intermediate](#)
- Glowing Plant Stem handouts, [Intermediate](#)
- Inventor Supplies
- Leaf Templates
- LEDs, rainbow
- Lei flowers
- Glue Gun Station
- Painter's tape, green
- Permanent marker, black
- Rescue Squad Notes handouts
- Think Green stickers


Step-By-Step Instructions


Part One

 Play the "Unit Three Music" Track.



1. Say the following:

 *Welcome back to Rescue Squad Headquarters! Based on the success of your previous operation, you've just been given another important mission!*

 Play the "Operation Night Light" Track, or read the transcript at the end of the curriculum.



2. Say the following:

Sometimes too much light can be unhealthy for people and the environment because it uses a lot of electricity or makes it too bright at night, which can also be confusing for animals that rely on the dark, like owls, lightning bugs, and even flying squirrels. It's important to consider nature when we are using outdoor lights at night.

3. Tell children they are ready to Get Glowing.
4. Show Intermediate participants the rainbow LED on the Intermediate Glowing Plant Sample, and explain that they will use the special LED when they make their own glowing plant as a part of an energy-efficient, night-friendly city park garden.
5. Demonstrate how to turn the light on and off by pinching and releasing the leaves.
6. Give each Intermediate participant an Intermediate Glowing Plant Stem handout and a Rescue Squad Notes handout.
7. Have Intermediate participants get the following materials from their Rescue Squad Kit:
- Clothespins
 - Coin battery
 - Conductive tape
 - Craft stick
 - Crinkle paper, dark brown
 - Flowerpot
 - Leaf Template
 - LED, rainbow

- Lei flower
- Painter's tape, green
- Think Green stickers

8. Have Intermediate participants get the following materials from their Inventor Supplies Kit:

- Masking tape
- Scissors



Play the "Glowing Plant Stem" Track, and read the instructions listed on the Intermediate Glowing Plant Stem handout, pausing when necessary as participants create their Glowing Plant Stems.



Use plain masking tape to secure all LED and coin battery connections instead of the green painter's tape since it will provide a more secure connection. Use the green painter's tape to wrap for decoration.

9. Use the Intermediate Glowing Plant Stem handouts, the Glowing Plant Stem video, or the steps below to complete the activity.
- Gather a craft stick, scissors, and conductive tape. Use the ruler on the side of the Rescue Squad Notes handout to measure and cut a 5-inch piece of conductive tape.

- ✓ Measure carefully, as lengths need to be precise.
 - Remove the conductive tape backing, sticking it to the craft stick, starting at one end. Make sure to leave a sticky tail of tape hanging off the end.
 - Use the ruler on the side of the Rescue Squad Notes handout to measure and cut a 9.5-inch piece of conductive tape.
 - Remove the backing from the long piece of conductive tape. Lay the tape along the center of the Leaf Template, so that the tape tails stick out evenly at both ends.
 - Flip the leaf over, stick the tails of the conductive tape on the back of each leaf end.
 - Fold the Leaf Template in half, lengthwise. Unfold the Leaf Template, and cut it along the fold line.
 - Tape side up, fold each leaf back toward the stem. They should look like clapping hands.
 - Lay the craft stick, tape side down, on the table.
 - Lay the two leaves (tape side up) on top of the craft stick, clapping hands together. Use two clothespins to hold them together.
- ✓ Ensure that the green stem lines up with each craft stick end to be able to successfully form a circuit.
 - Wrap a piece of green painter's tape around the craft stick and one leaf stem, close to the leaf. Do not wrap green painter's tape around the area covered by clothespins. Repeat for the other stem. Remove the

clothespins.

- ✓ Make sure to leave some conductive tape at each end of the craft stick exposed.
 - Check with the Instructor to make sure the stem is correctly assembled before moving on to the next step.
 - ✓ Refer to the Troubleshooting Tips in the Plan Ahead or at the end of the Glowing Plant Book, as needed.
 - Place the coin battery plus side up on the end of the stem right next to the conductive tape tail. Wrap the conductive tape tail around the coin battery.
 - Tightly wrap plain masking tape around the coin battery and craft stick.
 - Lay the stem so that the leaves are facing up and the battery is on the right side. The LED will go on the left side of the stick at the opposite end from the battery. Place the shorter leg of the LED on the same side of the craft stick as the leaves.
 - Pinch the leaves together. Does it light up? If yes, secure the LED with masking tape. If no, then see the Instructor for help.
 - Wrap green painter's tape around the rest of the stem.
 - Plant the stem in the center of the flowerpot, filling in around it with crinkle paper.
 - Pat it down, and add more crinkle paper as needed to hold the stem securely.
10. Tell each Intermediate participant to place their Think Green sticker on their

flowerpot and write their name on the flowerpot with a marker.

Part Two

1. Tell Intermediate participants that they can now make the flower part of their Glowing Plant.
2. Explain that they will make a flower and attach it to the Glowing Plant Stem so that the LED sticks out of the middle of the flower.
3. Show the Glowing Garden Book, and explain that children can look in it for inspiration when making their flowers.
4. Explain that they can use the lei flower and/or items from their Inventor Supplies to make their flowers.
5. Have children design and make the flower, attaching it to the Glowing Plant Stem.

✓ Lei flowers attach best with glue (from glue guns). Paper flowers can be assembled with tape or glue (from glue guns).

6. If some Intermediate participants finish ahead of others, give them a Rescue Squad Notes handout and have them get a marker from their Inventor Supplies.
 - While waiting for other children to finish, have them draw different nature-inspired designs for glowing lights that might be used in a park setting (e.g., glowing clouds for streetlights, glowing leaves throughout a tree, etc.).
7. When all children are finished, congratulate them on accomplishing this phase of Operation Night Light.

Intermediate Guiding Questions

- What inspired your plant or flower design?
- What do you like best about being a maker?
- Why do you think small glowing lights would be less harmful to the environment than large flood lights?

Intermediate Discussion

Did you know that there are animals that glow in the dark or when exposed to UV light? Animals like flying squirrels and some species of owls have bellies that fluoresce, or glow pink, under ultraviolet (UV) light. Scientists hypothesize this is to communicate with each other. Additional creatures, like ocean plankton, jellyfish, glowworms, and fireflies, create their own light, or bioluminescence, to attract other animals to them in the dark.