

WELCOME

Maker Camp was designed as an exploration of all things Do-It-Yourself for young makers. Since it started in 2012, over a million campers have connected and shared experiences through Maker Camp, focusing on using science, technology, engineering, art, and math (STEAM) to learn, create, build, and discover through both online and hands-on activities.

We welcome Makers of all ages and skill levels: advanced Makers can take our projects to the next level or serve as mentors to those who are just getting started. Homes, libraries, schools, museums, makerspaces, clubs, and other community centers worldwide open their doors to become local hubs of creativity, invention, curiosity, and togetherness: making. As we say, "We are all makers."

At Maker Camp, our camp motto is "Explore-Make-Share." Want to join us? Visit makercamp.make.co to learn more and to register for free.



WRECK THIS BOOK

This not a book to sit on the shelf. It's not the kind of book to hold carefully. It's not a book meant to be wrapped up and preserved for future generations.

This is book you can wreck. THIS is a book you SHOULD wreck.



In the process it will get dirty. It will lose pages. It will get folded and wrinkled and messy. These are very good things. You should wreck this book.

You might get messy too. You may end up with glue on your fingers and paint under your fingernails. You might have to tape things back together and try again. You might even get a little frustrated.

That's ok. You're a maker. Sometimes we get messy and frustrated when we're creating and inventing. This is also a very good thing. Because it means we're on the right track. It means we're learning.

So wreck this book. Have fun. Discover a new idea. Explore. Tinker. Play. MAKE something.







USE YOUR GEAR

Hair up, goggles on, minds engaged.







THINK FIRST Plan well to protect yourself & others.



TAKE PRIDE Create a safe, productive place to work.

MAKER CAMP GOALS

- Know you are a maker.
- Build a positive attitude toward creating handson projects.
- Explore you own special creative expression.
- Try something new!
- Design, experiment, iterate, and persist through failures.
- Learn something new!
- Try a new tool or technology.
- Collaborate and make together.
- Discover STEAM science, technology, engineering, art and math.
- Develop your curiosity.
- Share what you've learned and made.
- Feel inspired.
- Celebrate making, crafting, and creating.
- Play, especially outside.
- Have fun!

REUSE, RECYCLE, RE-MAKE

Many materials best suited for making are abundant and free. Stock up on scavenged materials. You can often collect plenty of "junk" materials from your family, friends, and neighbors trying to de-clutter

Start an "invention bin" or "idea box" and fill it with recycled materials and broken items that can be repurposed. Use these random odds and ends for brainstorming or enhancement of projects. Some are raw materials that go into building a project, others might spark an idea for a whole project.

Your items should be very thoroughly rinsed, clean, nontoxic, non-brittle (e.g. no glass) usable, and sorted.

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Use your common sense: Skip items like chicken wire, broken glass, TV sets, blades, rusty hardware!

The most ordinary thing may be the perfect item to use in a maker project! So turn that trash into treasure!



CAMP CHALLENGE BUBBLE WAND

Challenge:

Plan, design and construct a bubble wand using pipe cleaners. Test your design in bubble solution. Modify if required.



Materials:

Pipe Cleaners Bubble Solution Tray for Solution

Test:

Does your wand remain intact when blowing bubbles? Can you make bubbles consistently?



Communicate:

Describe your creation. What did you like about your design? What would you do to improve it next time?





1. The collection of alphanumeric characters in certain computing languages to produce software, including apps, games, and web design.

2. To build, craft, conjure, code, or otherwise manifest.

4. The branch of science and technology concerned with the design, building, and use of machines and structures.

5. To create something that didn't exist before.

6. The application of scientific knowledge for practical purposes, especially in industry.7. To strategically probe, analyze, break, or hi-jack.

10. A device that is capable of detecting external actions or stimuli and responding accordingly.

ACROSS

3. To update a design with new features, functions, elegance, etc.

8. The playful and curious interaction between a maker and their 'things'.

9. Any system of knowledge that is concerned with the physical world and its phenomena and that entails unbiased observations and systematic experimentation.

11. The approach of design through refinement.

12. Strategic decisions for a specific purpose.

13. To reuse something, generally with a different function than the one it originally had.

WORD SEARCH

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ADHESION AXLE BASE BATTERY **ELECTRONICS** BUG **ENGINEERING**

COMPUTER DESIGN DIY

ITERATE ROBOT LASER SCIENCE LED SOLDER MAKERSPACE SUSTAINABLE **MECHANISM** TECHNOLOGY







Cut and fold your Maker Challenge Finder. The instructions are on the next page. Then play with a friend as you both create, tinker, and make new things together!

CHALLENGE FINDER

Fold Your Challenge Finder:

- 1. Cut out the square along the outside solid lines.
- 2. Place printed side down.
- 3. Fold diagonally (point to opposite point) and open.
- 4. Repeat in opposite direction.
- 5. Fold all points into the center. Turn over.
- 6. Fold all points into the center again.
- 7. Fold the square in half.
- 8. Slide your fingers under all four flaps using both your thumbs and pointing finger.
- 9. Pinch fingers together and push them towards the center.

Play the Game:

- 1. Ask a friend to pick a Makey.
- 2. Open and close the fortune teller, alternating the direction you open it, as many times as the number indicates.
- 3. Have your friend pick a tool. Again open and close the fortune teller, as many times as the number they chose.
- 4. Ask them to chose a second tool. Flip the paper flap out and do the task described.

Keep Going!

- Use a piece of paper to fold your own Challenge Finder.
- Use Scratch to code a Challenge Finder on the computer.
- Invent a different way to randomly pick new maker challenges.



PAPER RACE CAR

Build Your Racer:

- 1. Cut out template along solid lines.
- 2. Fold inward along dotted lines. Crease well.
- 3. Glue or tape tabs inside the racer.
- 4. Scavenge materials for wheels and axles and add them.

Using Your Racer:

- Add weight to your racer to make it move fast and straight.
- Try making a racetrack using books, scrap wood, or cardboard.
- Add a motor, like the Lectrify Shake It Board, to get your racer moving.
- Redesign the racer to be more aerodynamic, hold a driver, have doors that open and close or some other feature you imagine.
- Want more fun projects for home or school? Check out the Make: Circuit Scout Kit in the Maker Shed!





INVENTOR NOTEBOOK

Folding Your Inventor Notebook

- 1. First fold in half along the short axis of the paper to create a crease. Unfold that and fold in half along the other axis. (Wide dash lines)
- 2. Then fold in the sides to divide the long axis into quarters. (Dotted lines)
- 3. Unfold and let just the middle stick up and cut along that crease (along solid line, NOT all the way across, just the middle quarters) to leave the page intact except for a slit in the middle.
- 4. Then fold along the short axis as before and the middle quarters will separate and can be folded into pages sticking out.
- 5. Then fold the whole thing so that the title page ("Inventor's Notebook") is in the front and the other pages follow.

This project was originally created by Elise Engelhardt as "Easy Eight Page Story Book" on Instructables. It is available at https://tinyurl.com/463v73bd.

Let's Use Your Notebook!

- Make up five new uses for a box. Don't be afraid to think of something wacky and unusual. Sometimes the silly ideas are the best ones!
- Come up with fun and different things you can make from circles.
- There's more than one way to solve most problems. Sometimes we stick with the same way of doing something just because we're used to it. Try solving the same problem 10 different ways.
- To come up with new ideas, inventors have to see and understand people's needs. Now it's your turn to make a "needs list."
 Pick a common activity that you do and think of 5 ways to make it better.
- Try brainstorming how to solve a problem with a friend or group.

This material was adapted from the Girls Scouts Brownie Inventor badge. Learn more at https://tinyurl.com/yj8wcnx6.

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	LIST OF NEEDS rite down five problems bout an activity or task.	SOLVE THE SAME SOLVE THE SAME 6. 7. 8. 8. 9. 10. Now try two of your ideas
	Solve A Problem Pick one problem and brainstorm ways to solve it.	Solve THE SAME PROBLEM TO WAYS Make a list of ten ideas! 1. 3. 4. 5.
	MAKE IT REAL Make a simple drawing or sketch of your invention.	THINK IN CIRCLES Make the circles into any- thing you can imagine.
My Name:	INVENTOR'S Notebook	WARM UP YOUR ENVENTOR'S MIND Five new ways to use α box. 3. 4. 5.

MAKE A PINWHEEL



Instructions:

1. Cut along all the solid lines.

2. Fold the top left corner to the center dot. Do not crease. Use clear tape to hold the point in place, if desired.

3. Rotate the square 90 degrees. Repeat step 2 until all four points are attached to the center. (Continued on next page.)

MAKE A PINWHEEL



Instructions (cont.):

4. Push a pin (we suggest a sewing pin with a round or t-shaped head) through the center dot and into the eraser of a pencil.

5. If desired add a pony bead between the pinwheel and the eraser to act as a ball bearing for easier movement. Enjoy!







MAKE A PAPER MAKEY

What Will You Make?

A paper craft Makey that waves his arms when a crank is turned. This is a more difficult project for experienced makers.

What Will You Need?

This Template 2 paper clips Tape Glue Pliers Cardboard Scissors

Want more ideas, additional instructions and step-by-step photos? Register for Maker Camp today. It's free! Go to makercamp.make.co for more information.



MAKE A PAPER MAKEY

Instructions

- 1. Folding on the dashed lines, glue together the back and sides of Makey.
- 2. With the white side up, fold the white flap down on Makey's arm and apply glue to it. Pinch the seam of the arms to pop it out and form a tube. Fold the red side up and stick it to the glued area.
- 3. Pinch the seam of the arms to pop it out and form a tube.
- 4. Straighten out a paper clip and then form one end of it into a square hook. Slide the two arms through the side of Makey and push the hook through the arm tabs where they cross.
- 5. Draw a 3"×3" square, and then adjacent to each of its four sides, draw four more 3"×3" squares, making a large + sign. Cut out around the edges of the outer shape.
- 6. Fold the sides together to form a box with an open top. Tape the sides to keep them in place.
- 7. Use a paper clip to poke holes through the center of three sides of the box.
- 8. Glue or tape Makey to the top of the box with the paper clip coming from Makey's arms down through the center hole. Push another paper clip through the two side holes and bend off one side so it can't pull out.
- 9. Make a squared U shape inside the box with the paper clip and then bend the paper clip coming down from Makey around it. Make sure that when the "u" is at its lowest point, that Makey's arms are at their highest.
- 10. Bend the clip 90° down and then 90° away from the box to form a crank. Glue the front of Makey on and you're done.
- 11. Turn the handle to make Makey wave his arms.





Cut out template from page. Add circuit. Fold on dashed line to create card.









REFLECTIONS WHAT DID I LEARN?



CAMP CHALLENGE MARSHMALLOW STRUCTURES

Challenge:

Plan, design and construct a famous building using marshmallows and toothpicks. Your structure must be able to stand freely.



Materials:

Marshmallows Toothpicks Cardboard base

Test:

Does your design resemble the structure you modelled it from? Was it freestanding?



Communicate:

Describe your creation. What did you like about your design? What would you do to improve it next time?

WORDS TO KNOW

- 3D Printing: The action or process of making a physical object from a three-dimensional digital model, typically by laying down many thin layers of a material in succession.
- CNC: The automated control of machining tools (drills, boring tools, lathes) by means of a computer.
- Coding: The collection of alphanumeric characters in certain computing languages to produce software, including apps, games, and web design.
- Computer-Aided Design (CAD): The use of computers to aid in the creation, modification, analysis, or optimization of a design.
- Design: Strategic decisions for a specific purpose.
- DIY: Do-It-Yourself.
- Hack: To strategically probe, analyze, break, or hi-jack.
- Laser Cutting: A fabrication process that uses a thin, focused, laser beam to cut and etch materials into custom designs, patterns, and shapes as specified by a designer.
- Invent: To create something that didn't exist before.
- Iterate: To update a design with new features, functions, elegance, etc.
- Make: To build, craft, conjure, code, or otherwise manifest.
- Prototyping: The approach of design through refinement.
- Reuse: To reuse something, generally with a different function than the one it originally had.
- Sensors: A device that is capable of detecting external actions or stimuli and responding accordingly.
- Tinker: The playful and curious interaction between a maker and their 'things'.
- Technology: The application of scientific knowledge for practical purposes, especially in industry.
- Science: Any system of knowledge concerned with the physical world that entails unbiased observations and systematic experimentation.
- Engineering: The branch of science and technology concerned with the design, building, and use of machines and structures.



BASIC SKILLS FOR MAKER CAMPERS

- Use basic scientific and critical thinking.
- Understand basic computer programming languages.
- Learn CPR and general First-Aid.
- Learn to swim, ride and fix a bike.
- Learn to solder and understand basic electronics
- Learn to use a fire extinguisher.
- Learn basic sewing techniques, including straight and whipstitch.
- Learn how to safely handle power tools and how to sharpen tools & knives.
- Set up a tent or build a lean-to, collect and purify water.
- Cook and understand food safety.
- Navigate with a map, a compass, or the sun.
- Practice electrical safety, understand house electrical systems, how to shut off or reset a breaker.

MAKING NEWS HOW THINGS GET MADE

SPACESUITS

Have you ever wondered how they make spacesuits for astronauts? Special fabrics are needed to help keep them safe in space. Every suit is custom made for each crew member so that it fits them well. When the crew sit in their seats, they plug in the suit to the umbilical that provides communication, electronics, and air they need. What else would be important for a spacesuit to have?

BIG PRINTING

It's fun to design and 3d print toys or other small items. Did you ever wonder what kind of bigger things could be 3d printed? Some companies have created giant 3d printers that use cement instead of plastic filament. These printers can make houses, swimming pools, or foundations for windmills in just a few days (it just takes the cement a little longer to dry than plastic). Why would this be such a good idea?





PRECIOUS MINERALS

Did you know you have a gold mine in your home? Not a literal gold mine, with shovels and gold nuggets. Every tech device, like phones, computers, and other electronics, use precious metals in the circuitry, and that can add up. Since old technology, or e-waste, is more common as people upgrade their devices, recycling and reclaiming those tiny bits of gold and other precious metals can be profitable. In a typical gold mine, there are about 5 grams of gold in 1 ton of dirt. But in 1 ton of e-waste there's about 350 grams of gold!

MAKING NEWS cool careers

MEDICAL ROBOTS

Do you like helping people when they're sick or injured? Doctors and nurses do amazing work to help people every day in hospitals, but did you ever wonder where the technology they use comes from? Biomedical engineers use knowledge of how the human body works to create all kinds of hi-tech devices used in hospitals. They've even started creating robots to help patients. Robots are being designed to help patients recover after surgery, deliver medications to patients, and sanitize rooms in hospitals. There are even robots being used to perform surgery on people, especially helpful when a

doctor isn't available in a certain area. If you like robotics and helping people, this may be a career for you.



ART CONSERVATOR

Did you ever wonder what happens if a priceless painting or sculpture gets damaged? Art conservators are people who repair, preserve, and clean priceless works of art. Sometimes they even have to determine if a piece of artwork is authentic or a forgery. People who work in art conservation must study the chemistry and properties of materials used in artwork. be able to analyze the artwork using various types of technology, and have a love of history. They must have good analytical and critical thinking skills. If you think a career in art conservation sounds interesting, learn more about Art Conservators.



WANT MORE MAKING NEWS?

Register today for Maker Camp at makercamp.make.co to enjoy all six special issues written by Chris Woods of The Daily STEM (http://dailystem.com).

LOOKING FOR MORE?

Our Maker Camp project library has hundreds of step-by-step projects for you to explore. Plus we have a playbook full of ideas to help you on your Maker journey as well as additional resources to build your knowledge and skills. Just register for FREE at makercamp.make.co for instant access!

We also have a huge collection of books with projects and many educational kits available in the Maker Shed at makershed.com.

Download additional templates and projects from the Activity Book at {insert page]



Make: make.co

Make: is a vanguard of the maker movement with the publication of its namesake magazine over 16 years and its network of Maker Faires. We have two goals: one is to increase the number of people exposed to making and become makers, and two is to elevate the variety of projects that makers create and their impact on our society. We believe it is essential to provide more youth access to the tools, materials, concepts, and support to grow as makers through formal and informal learning opportunities in their local community.

Make: makezine.com

The premier publication of maker projects, skill-building tutorials, indepth reviews, and inspirational stories, accessible by all ages and skill ranges.





Maker Campus is a place to connect, learn, and make together. Find enriching and interactive events, classes, workshops, and more A celebration of the Maker Movement, a family-friendly showcase of invention and creativity that gathers together tech enthusiasts, crafters, educators across the globe.



Our Official Store features a smart collection of books, magazines, electronics kits, robots, microcontrollers, tools, supplies, and more curated by Make:.



OUR SPONSORS









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Mstickermule



CAMP CHALLENGE MOVING TOY

Challenge:

Plan, design and build a toy. Your toy must be able to move. Test and modify your design throughout the build.

Materials:

Cardboard Masking tape Recycled junk

Test:

Is your toy able to move? Does it move the way you planned? Is the movement smooth and reliable?

O D E C

Communicate:

Describe your creation. What did you like about your design? What would you do to improve it next time?

CAMP CHALLENGE BUILD A BRIDGE

Challenge:

In a small group, plan, design and construct a bridge that can hold the weight of five toy cars. Test, evaluate and modify your design as needed.



Materials:

Test:

Cardboard Paper straws Tape

Can it hold the weight of five toy cars? How long is its span? Does it stand on its own?



Communicate:

Describe your creation. What did you like about your design? What would you do to improve it next time?