

We are  
**ALL**  
MAKERS



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Makers are everywhere. They are children, adults, students, teachers, toddlers and teenagers — anyone who creates and makes things that interest them.

A makerspace is a place where people make things. It can be anywhere — in a kitchen, warehouse, garage or even a bedroom. There is no standard formula for a creating a makerspace; the only things you need are a space, some materials and some tools.

A makerspace should fit the needs of the person or people using it and accommodate the projects that are made in the space. Makerspaces can also build a community through socialization and collaboration, whether it is a family using their kitchen table, a group of people setting up workbenches in a community center, or a teacher in their classroom. The people using the space create the community by sharing, discussing and collaborating on ideas.

A makerspace can be initiated anywhere that has a work surface. What follows are some ideas to help you start your own makerspace. So get going!

RRRIP!

## Getting Started: Creating your Makerspace

- *Can I do it?* Yes, you can. Believing in yourself is the first step to doing anything.
- *What do I want to do?* It is very important to think about your objectives. Get together with your siblings, friends or parents, or stand in front of a mirror and ask yourself:
- *What am I trying to accomplish?* For example, you can start with one project, gather the necessary tools and materials, set up on an available table, and get to work. Or, if you would rather start with a couple different projects with multiple people using various tools, you might consider a permanent space.
- *What type of projects do I want to do?* If you want to work with everyday tools and materials such as tape, hot glue guns, scissors, cardboard and clay, you might set up in your kitchen or bedroom for a short time. If you want to work with wood, saws, hammers and other hand tools, it would be better to find an area you can use for a longer period that provides plenty of space for such tools.
- *Do I want to have a dedicated space to work at home or elsewhere?* If you have an area in your home, you can set up your tools and materials for various projects over an extended period of time.
- *Do I want to create a pop-up space in my home or neighborhood?* A pop-up space is a fun, temporary setup that changes location depending on availability. For example, if your garage usually has a car in it, but this Saturday someone will be using it to run errands, you could have a pop-up makerspace until the car returns. This would require setting up a table, tools and materials after the car leaves, then cleaning up and putting everything away by the time it comes back.
- *How many people will be using the space?* The size of your space will help determine this; if it is a small work surface, you may want to limit how many people use it at the same time. However if you have plenty of space, you can invite your siblings and friends to work on projects together.
- *Who will be using the space?* It is important to think about who will be using the space to ensure that the tools are being used properly. For example, if you have a variety of different age groups using the space, you want to keep it safe for everyone. There should be adequate storage space to keep materials and tools accessible only to the people using them. If you are using any tools that need to be plugged in, you will need accessible electrical outlets and extension cords.

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- *I'm not sure what I want to do.* Simplify your approach and maximize your resources — a maker's mantra! The following two methods are here to help collect your thoughts and ideas. Try them out and feel free to mix these ideas in any way that suits your needs.



## Method #1: Tools, Inspire Me!

Search your home to see what materials and tools you already have. Once you have gathered your available resources (tools/materials) and know your inventory, it is time to explore the potential of those tools. In other words let the tool inspire your project! Go through all your tools and materials and ask these questions:

- *What is this tool/material meant to do?*
- *What other ways can I use this tool/material?*
- *How can I use/combine it with another tool/material to do something cool?*

This will provide a springboard for instant making. You might notice a tool you would like to learn how to use and the best way to do that is to make something with it. What are you waiting for? Go! Make with tools!



## Method #2: I Love This!



Think about something you love. If that is too much pressure, then think about something you really like or want to do. It could be your favorite toy, game or object that you regularly use. Look at it, turn it upside down, backwards, and observe it from every angle. Ask yourself these three questions:

- *Could I make this?*
- *What type of tools/materials might I need?*
- *What would be my first step?*

Asking these questions will lead you down a path of discovery, revealing things about your favorite items that you might not have known. Now take that first step. Go! Make what you love or really like or want to do!



## To Be A Maker, Think Like A Maker

*“Everything should be made as simple as possible, but not simpler.”*

—Albert Einstein

**Process** [noun] a series of actions or steps taken in order to achieve a particular end.

This next section includes prompts to inspire your creative process.

*Deconstruction:* During this stage, we figure out how the object works by taking it apart. There are two ways of doing this, depending on the object being deconstructed. The first is by opening the object up and separating all the pieces. The second is through observation: Look at the object, turn it upside down, and look over, under and around it.

### Ask yourself:

- *What is it?*
- *What do you notice?*
- *What materials is it made of?*
- *What is each material's function within the object?*
- *How do these materials work together to achieve its purpose?*

Make a list of all the materials you come up with. Write down what their functions are, how they are connected, and how they work together. Make a drawing of the object labeling the parts and functions. Get to know the object so well that you feel you could make it.



Deconstructing through observation can be just as valuable an experience as physically taking it apart. However, if it is an enclosed object with electronic components, it will be impossible to observe the parts you can't see. You must take caution when opening up electronics because you are dealing with an electric charge that could be hazardous and cause injury. Make sure to use necessary safety precautions and equipment to protect yourself.

*Discover:* During the deconstruction of an object there is an amazing amount of discovery going on, which leads directly into the discovery phase. Once you have your lists, drawings and labeled diagrams, think about where else you see the materials.



**Ask yourself:**

- How does this material or component relate to the world around me?
- Where else do I see it?
- What else can it do?
- How do these materials work together to accomplish an objective?
- What shape is the material? Does that affect its function?
- Is there an additional component that connects the materials, such as glue, a screw or a nail?

Focusing on the seemingly infinite uses of the same material is the first step to understanding all the potential behind everyday materials.

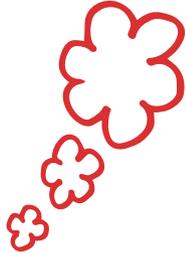


*Skill Challenge:* Take a paper clip and make observations. What is it made of? How does it work? What is it meant to do? What other functions is it capable of? Make a list of all the things you can come up with, limited only by your imagination. Once you have your list, choose your five favorite ideas and make them.

Making connections between how materials work together to do a job is important when you are considering your own project.



*Skill Challenge:* Gather some cardboard and packing tape. Look at a desk, chair, bed or any other piece of furniture in your room. What shape is it? How many different pieces are used to make it? Use the cardboard and tape to make a replica. Depending on how much cardboard you have, the replica can be made to actual size or to scale.



This investigation and discovery will reveal that the only limit to material use is your imagination and the ability to transform your mindset to maximize your resources.

*Design/Make:* There are a number of ways to approach the design process and to bring that design to fruition. A good start is to reflect and discuss experiences, observations and information collected during deconstruction and discovery. *What did you learn about the objects or materials?*

What follows are a few suggested methods to approach the design and making process. Keep in mind that there is never just one way to do something and that you should explore, research and create your own way to design and make. Taking the time to do this will help you further understand your process, which leads to realizing your full maker potential.

## Method #1: Copy That!

*\*When using this approach you will notice a boost in your technical skills while gaining a better understanding of how to maximize your resources.*

Look at the object you took apart in the deconstruction on page 9. Take precise measurements of all the pieces, figure out all the components that go into it, and make a materials list. Gather the necessary tools and materials and make an exact copy of the object.

### Benefits:

- You don't have to take on the challenge of being the "creator."
- You can concentrate on the technical aspects of making the object, which increases your skill set.
- You will increase your ability to solve problems effectively.
- Copying it may inspire ideas that lead to modifying and improving the design to suit your needs (*see method #3*).

## Method #2: I'm in Charge!

*\*This is a challenging endeavor, but it will increase your creative confidence and will lead to you changing the world!*

This approach is on the other end of the spectrum from copying; it provides a platform for total creative control. Look at the object you deconstructed and review the function of the materials and components that make up the object.

### Ask yourself:

- *How do the materials work together to do what it does?*
- *What makes the connection of materials possible? (tape, screws, bubblegum, etc.)*
- *How might I use this information to make something unique?*

Think about objects that inspire you and how you can modify them to make them better. Sketch out several potential ideas and decide which one you want to set out to make.



## Method #3: Inspire Me!

*\*This will create harmony between your creative and technical processes and you will notice an increase in your desire to pursue interesting things.*



### Ask yourself:

- What tools and materials will I need?
- How will the materials work together?
- What will I use to connect the materials? (tape, screws, bubblegum, glue, nails, etc.)
- What will be my first step?

### Benefits:

- You will understand your process better.
- You will increase your understanding of your potential.
- You will increase your creative confidence and technical skills.
- You will encounter challenges and make mistakes over and over which will lead to on-the-fly problem solving as well as learning a lot about your process.
- You will create a one-of-a-kind object.



This approach is a middle ground between copying something and taking full creative control. Look at the object you took apart, and think about why you like it.

### Ask yourself:

- What would I change? (It could be aesthetic or functional.)
- How would I go about making that change?

Then take precise measurements of all the pieces, figure out what all the components are, make a materials list, and gather the necessary tools. When you make your creation, copy your favorite aspects of the object you took apart and customize where you feel necessary.

### Benefits:

- You will exercise your creative and technical muscles.
- You will begin to realize your full potential.
- You will sharpen your problem solving skills.
- You will begin to understand that you can change things if you want to.

## Congratulations!

At this point you have gone through a transformative experience, which has altered your view of the world and increased your understanding of your capabilities. It is time to give yourself credit. Go ahead — pat yourself on the back and smile.

Then share your project and process with others. This could be as simple as showing it to family, friends and classmates either in person or online. You can show them what it does, explain your process, and how you had an idea and took action to get it done. Sharing your project, ideas and personal interests with others will provide another opportunity to articulate your process and, best of all, inspire others to ask: “Can I do this too?” At this point you know the answer to this question is **YES!**



## The Makerspace Cheat Sheet

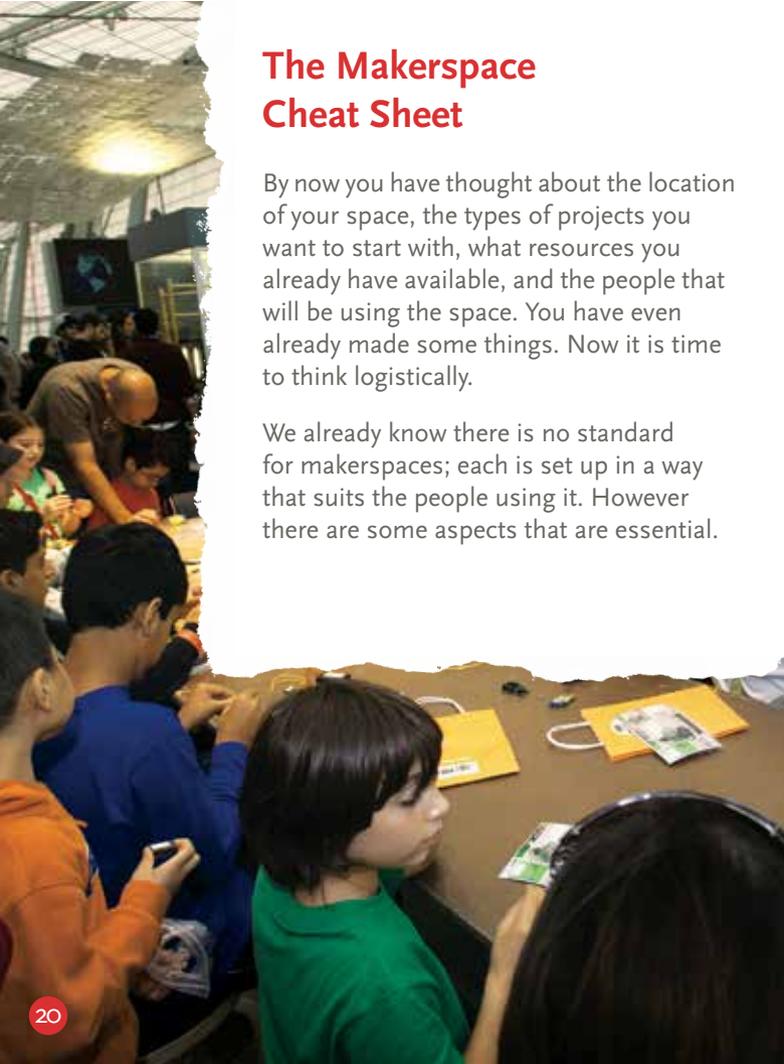
By now you have thought about the location of your space, the types of projects you want to start with, what resources you already have available, and the people that will be using the space. You have even already made some things. Now it is time to think logistically.

We already know there is no standard for makerspaces; each is set up in a way that suits the people using it. However there are some aspects that are essential.

### Work Space Set Up

This should be a flat surface with plenty of light and space for the intended project and in close proximity to electrical outlets. Here are some questions to ask:

- How much room will I need for this project?
- Can I do the entire project on one space or do I need multiple spaces?
- How long do I think this project will take? When starting a project, think about your tools, materials and process.
- Decide what you want to tinker with or make.
- Make sure you have enough room.
- Figure out which tools and materials you will need.
- Clear away anything that is not necessary to your project.
- Develop a plan of action. What do I need to do first, second, etc.?
- Know that this is all subject to change as your project unfolds.



You can never have enough storage space.

If you have many tools and you have the space, you can make a tool rack using magnet strips and hooks or use a storage cabinet.

## Storage

There should be plenty of storage space for tools and materials. We suggest using bins and drawers to separate tools and materials according to size, intended purpose, or how often you use them. The more often you use a tool or material, the easier it should be to access.

- Labeling bins and drawers helps to keep track of your tools and materials. Make large and legible labels that are easy to replace in case you change your mind about where things should go. Masking tape and a Sharpie work well.



## Clean Up

When working on any project, you need to include time to clean up and to put all tools and materials away. This will help to maintain your space, keeping it organized and making sure that when you need something it is where it should be.

- Put all tools back in the proper storage bin, drawer or cabinet. If you are using a variety of tools throughout your project, cleanup is easier if you put each tool away after you are finished using it.
- Collect all remaining materials and consider possible ways you might use them for future projects. Then, organize them in the proper bins.
- Have plenty of cleaning supplies such as rags, paper towels, household cleaners and solvents, as well as a broom, dustpan, bucket and mop. A scrub brush and paint scraper is handy if you need to remove any dried goopy materials such as paint or hot glue.

## Tools

The tools and equipment you have in your space are as individual as the space itself; there is no standard list. The only tools you need are the tools essential for the projects you want to do. It is very important that you research and buy the proper safety gear for any tool you would like to use in your makerspace. For example, if you are working with wood-working tools, it is important to have protective eyewear and gloves. If you are using turpentine or any other toxic solvent, you will need a respirator mask and proper ventilation.

## Inspiration

Some ways to get inspired are:

- Look around your community to see if anyone else has a makerspace. Go there!
- Check out local businesses that use tools to make and fix things. Go there!
- Go to your local hardware store and look at all the different ways they display their tools and materials.
- [For project ideas, visit our Maker Space blog at makerspace.nysci.org.](https://makerspace.nysci.org)

Ask questions like:

- *What do you use these tools or materials for?*
- *Why did you organize your tools that way?*
- *Where did you get that tool?*
- *How do you clean or take care of this tool?*

