



Craft and Tinker

Problem solvers needed! All around the world, people have problems to solve. You can help by making or crafting solutions. A potholder helps keep cooks safe. An ID tag helps people find lost items.

Makers craft using their imaginations, tools, and materials. They also tinker or make changes to make their crafts even better.

Steps

1. Explore making
2. Learn the basics
3. Figure out the function
4. Discover form and fit
5. Tinker with your craft

Purpose

When I've earned this badge, I'll know how to craft and tinker to solve a problem.





Step 1: Explore making

If you like ice cream, do you like to eat it in a cone or a bowl? What if you had no way to hold the ice cream? What could you make to solve the problem? Some bowls or cones are made by a machine. Some are crafted by a maker!

Makers use their care, skill, and imagination to **craft** objects that solve problems. They also **tinker** to make something better or different. Adding a handle can turn a bowl into a mug. Different ingredients can change the flavor of the ice cream cone.

Choices—do one:

Search for crafts and inventions. Look around your home or school. Find a place where people come together to craft or tinker, such as a studio, woodshop, or makerspace. If you can't visit in person, search online. What objects have people made to solve a problem? A basket holds things. Toys are made to have fun! Were they made by a machine or a maker? What materials or tools might have been used?



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Get inventive. People have always solved problems with inventions. For example, they used to need open fires and candles for light. Now we also use flashlights and lamps. Search for inventions around you or online. What problems do they solve? Did humans solve the problem another way in the past? What else could you invent to solve the problem?

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Learn from a maker. Talk to someone who crafts. They might do it for their job, for fun, or for another reason. A chef crafts food. A mechanic tinkers with cars and trucks. A florist crafts AND tinkers with flowers! Make a list of questions. Find out what they craft and how they learned to do it. What materials, tools, and skills do they need?

**What crafts
and inventions can
you name?**

Explore different
kinds of crafts and
inventions on the
next page!

Words to Know

Craft: To make something with care, skill, and imagination. The craft you create solves a problem.

Feature: Any part of an object that is useful, fun, or different from other similar objects.

Fit: How the parts of an object combine to make it work.

Form: How an object looks, including its size, shape, color, and weight.

Function: What an object is meant to do or be used for. It's the object's goal or purpose.

Maker: A person who creates art or designs objects.

Material: What something is made of, such as wood, clay, metal, or fabric.

Measurement: A number that shows the size or amount of something.

Tinker: To make changes in order to make something better or different.

Tool: An object used to do a job or change a material.

Upcycle: To use materials that are old or were thrown out to make something new.

Crafts and Inventions Across Time

The Past

People have been making crafts for thousands of years. For example:



- **Ceramics**, such as cups, plates, or bowls, are made of clay. Potters can use their hands or tools like a stamp and a potter's wheel.

- **Textiles** are made of cloth, thread, or yarn. Makers can use needles, scissors, tape measures, looms, and pins. They might weave a potholder, crochet a scarf, or sew a shirt.



- **Woodworking** is crafting things such as furniture, spoons, and boats out of wood. Woodworkers use tools such as saws, hammers, screwdrivers, and sandpaper.

The Present

Did you know that we still use many crafts from the past today? We tinker with past ideas, too. For example, we still write letters, but now we write texts and emails, too.

Can you match the old crafts with new inventions?

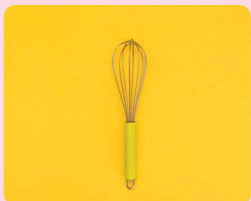
Old



Quilted Blanket



Paper Calendar



Whisk



Vintage Shirt with Embroidery

New



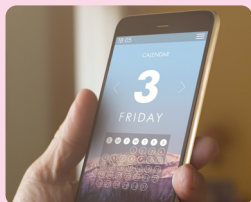
Graphic Tee



Electric Mixer



Down Sleeping Bag



Phone Calendar

The Future

Technology can help make crafting faster and easier.

For example:

- **Makers craft with digital tools.** 3-D printers can make it easier and faster to build things. Laser saws cut with precision. Makers can create and test new games with virtual reality.
- **Makers learn new skills online.** They can find projects and watch video tutorials. They can join virtual classes. They can meet and work with other makers online, too.
- **Makers buy supplies and sell art online.** They can buy materials and tools. They can advertise with photos and videos. They can sell their crafts to a larger audience.

Answer Key: Quilted Blanket/ Down Sleeping Bag • Paper Calendar/ Phone Calendar • Whisk/ Electric Mixer • Embroidered Shirt/ Graphic Tee

Step 2: Learn the basics

Makers choose the **materials** for their craft. **Tools** help us put the materials together. We can also use them to **measure** the size and amount of materials needed. Imagine building a bookcase with wood, nails, and a hammer. Wood is the material your bookcase is made from. The hammer is a tool to put nails in the wood.

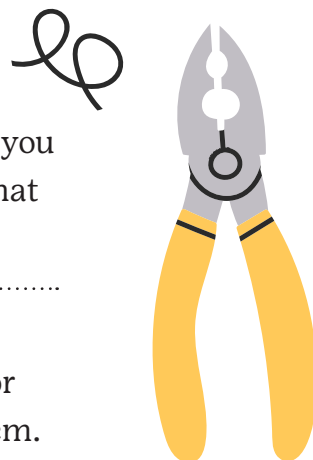
When you craft, you might make jewelry, pottery, or knit. You might build with wood, metal, or cardboard. You might use a hammer, ruler, or glue. You might even use technology, such as a computer and 3-D printer. It's up to you as the maker!

Choices—do one:

Focus on tools. It's important to find the right tool for the job. Choose a craft, such as making a necklace or sculpting a vase. For jewelry-making, you might need pliers and wire cutters. For pottery, you might need a potter's wheel and glaze. What tools will you need? Learn how to use them safely. Then tinker with the tools. What else could you use? Test them out. Then make the craft.

Focus on measurement. Makers measure wood, fabric, paint, and other materials. Choose something to make, such as a shirt, card, or toy box. What measurement tools will you need? Practice using them. Then imagine you didn't have them—what else could you use? Choose a small object, such as a pencil or eraser. Measure your materials with it. Write down any measurements. Then make the craft.

Focus on materials. When you **upcycle**, you tinker with old materials to make something new. It helps the planet, saves money, and solves problems. Could you make pom poms or fluffy mats with leftover yarn? Could you make a cat scratcher or table from cardboard boxes? Look at any materials you have. What problems could you solve? Brainstorm ideas and upcycle to craft something new.



Maker Basics

Tools: Makers might use hammers, pliers, needles, or paintbrushes. Some tools, such as computers, 3-D printers, and laser cutters, are digital. When makers don't have a tool they need, they tinker and invent one!

Measurement: Rulers and tape measures tell makers how long something is. A scale is used to weigh things. This tells makers how heavy something is. Sometimes they even measure with lasers!

Materials: Makers choose their materials carefully. They might need materials that are sturdy, light, or waterproof. They might use wood, clay, plastic, cloth, metal, or paper. Sometimes they use unusual materials such as dryer lint or bottle caps.

Safety: Makers always make sure they're safe. They read the instructions. They use tools carefully. They protect their eyes with safety goggles. They tie back long hair to keep it from getting caught in materials or tools.



Step 3: Figure out the function

What you craft has a **function**. It reaches a goal, like having fun or holding objects. It helps solve a problem. A woven basket can hold blankets. You can play a board game.

Crafts are made from parts that are put together to work. Think of a handle on a mug—it helps the mug function. Crafts also have **features** or parts that can make them fun, special, or help with function. A cat collar, for example, might glow in the dark to find the cat at night. It might also have a fish bone pattern.

Choices—do one:

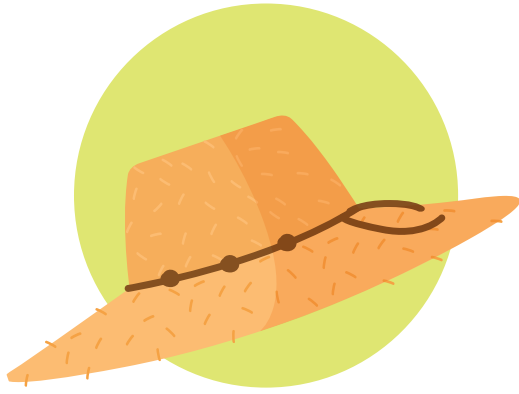
Make something to play with. Makers can make puzzles and games with wood, paper, or a computer. They can make dolls out of cloth, plastic, and even corn husks. The function of what they make is to play and have FUN! Now, what would you like to make? You might make a puppet, a card game, a toy car, or anything else to play with.

Make something to wear. Do you like to wear fun outfits? People's clothing, jewelry, and other accessories can show how they feel and what they like. Makers can craft leather belts, beaded necklaces, knitted sweaters, and many other objects to wear. What will you craft to wear? What materials, tools, and skills will you need?

Make anything else. What's something you need help with? Pick a problem, such as organizing or transporting your stuff. Brainstorm how a craft can help. Do you forget to take your homework to school? Make a reminder magnet! Do you mix up your backpack with someone else's? Make an ID tag.

► **For more fun:** Tinker with function. Choose something you already have, like a pencil box or sweatshirt. What's its function? How could you make it even better? Sketch your idea or make a model.





Step 4: Discover form and fit

Sun and winter hats protect your head, but they have different functions. Sun hats are best for a sunny day. Winter hats help keep you warm when it's cold.

These hats have different shapes, or forms, that help how they function. **Form** is what something looks like. It's the object's size, shape, weight, and color. All the parts and features of an object also need to **fit** together, like a hat on a person's head, to function and be easy to use.

Choices—do one:

Focus on function. Is a box just a box? Toolboxes and lunchboxes have different functions. A toolbox can hold and organize tools. It has a handle, places for tools, and other features that help it function. Choose something to craft, such as a bracelet or tote bag. What's its function? Make sure to test your craft. What works and what doesn't? How could you tinker to make it function better?

Focus on form. Why is a bowling ball heavy? Why does a basketball bounce? Bowling balls are made to knock things over. Basketballs are made to dribble. They have different forms for different functions. Choose something to craft, such as a pillow, necklace, or notebook. What's its function? Focus on the form of your craft. What will it look like? How big will it be? What colors and materials will you use?

Focus on fit. What happens when you have the wrong piece of a puzzle? It doesn't fit. If you leave it there, the puzzle will turn out wrong. That's why fit matters! Focus on the fit of your craft. Choose something to craft, such as a mosaic, suncatcher, or bookmark. What's its function? How will you fit the parts and features together?



Brainstorm
and create a
plan for your
design on the
next page!

My Maker Plan

I am making _____

Function: What's the goal or purpose?

I want the craft to (do) _____

My craft's parts and features: (Add as many as you need!) _____

Form: How will it look?

Style and shape: _____ Materials: _____

Colors: _____ Measurements: _____

Fit: How will you craft it?

Tools: _____

How to build: (Add as many steps as you need!)

1. _____

2. _____

3. _____

I'll test my craft to make sure it works by _____

Step 5: Tinker with your craft

Makers love to tinker! They make changes, big and small, to find a fit and form that functions. They might even tinker with function and turn what they made into something else.

Tinkering is an important part of making. You can tinker with form, for example, by changing the size or color. You can tinker to make the parts fit more closely together. You can tinker with function and change how something is used!

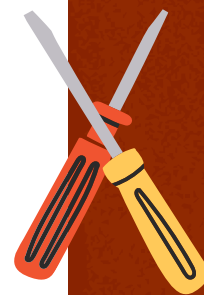
Choices—do one:

Make it fit a theme. Have you ever been to a craft show or maker market? These are events where makers sell what they make. Sometimes there's a theme, like a holiday or back-to-school. Choose something you've made and a theme. How can you tinker with your craft to fit the theme? You might change colors, add words, or use other materials. You might make something brand new. Sketch and share your ideas.

Tailor it for a gift. Have you ever found the “perfect gift” for someone? Think about people you know. Who might like something you've made? Choose a person and a craft you made. Brainstorm ways to tinker and make the craft “just right” for them. For example, you might add a favorite color or tinker with the size. Sketch and share your ideas.

Add a new feature. Makers like to tinker and try new things. They plan, build, and test their ideas. They try different parts and add new features. Choose a craft you've made. Add a new feature, such as lights, storage, or something else. Sketch and share your ideas. Did you tinker and change how the object functions?

► **For more fun:** Craft your changes! Follow your sketches and plan to tinker with your craft.





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