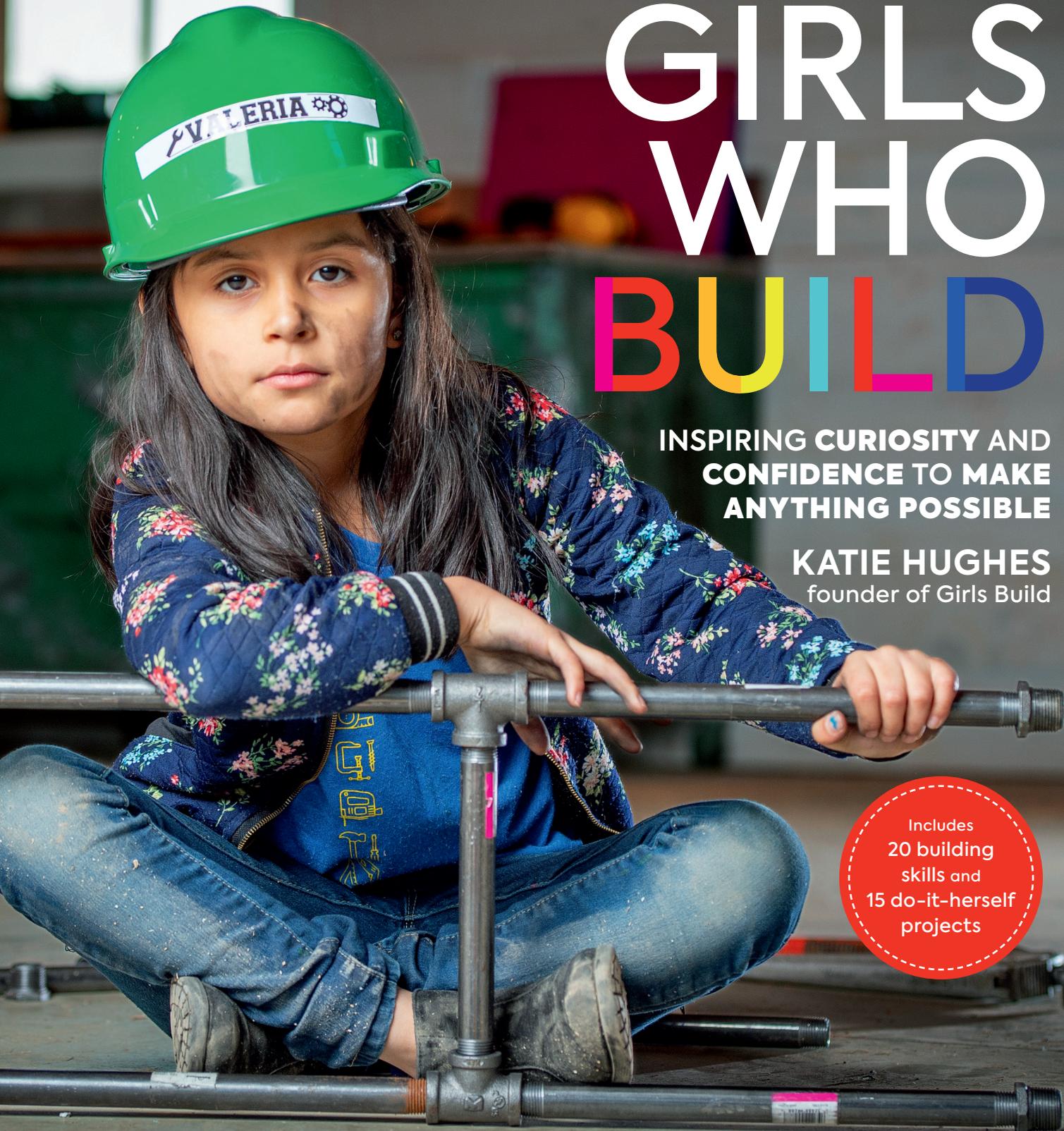


# GIRLS WHO BUILD

**INSPIRING CURIOSITY AND  
CONFIDENCE TO MAKE  
ANYTHING POSSIBLE**

**KATIE HUGHES**  
founder of Girls Build

Includes  
20 building  
skills and  
15 do-it-herself  
projects



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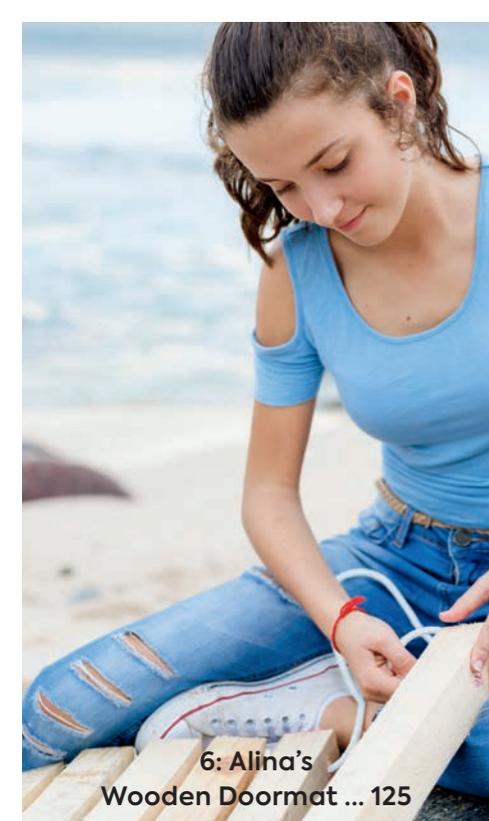
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# CALLIE

AGE: 8½

LOCATION: Brooklyn, New York

WHERE CALLIE LEARNS: In her lab in her apartment  
and at Curious Jane summer camps

“Don’t be scared by a blowtorch.  
If you ever use it on a cold day, put gloves on.”

**What are some things you want us to know about you?**

I’m learning to play the piano. I’m awesome. I like drawing but I’m not very good. I don’t want to be the first woman president because then I’ll have to fix *so much*. I want to be a playwright because I get to make plays. But I guess I don’t really want to be a playwright; I want to be someone in a play. I can sing really fast. I like to wear my glasses backward and upside down. I don’t know why, I just do. I also want everyone to know I invented the tuna and potato chip sandwich. You take bread and then you take some tuna, however you make it. First you put water to it and then you add mayonnaise. Then you spread your tuna onto the bread. You take potato chips—on these sandwiches, I prefer kettle-cooked—and place

them on the tuna, and then you *crunch!* It’s so good.

**What is the first thing you ever built?**

I think the first thing I ever built was with my Legos. I made a double Lego bunk bed. Because my figures, they were sisters and I wanted them to have a bed together. Like the sister I’ve always wanted.

**How does building make you feel?**

Happy because I get to create.

**Why do you build?**

I build because it makes me happy. I build because I enjoy new things being created.

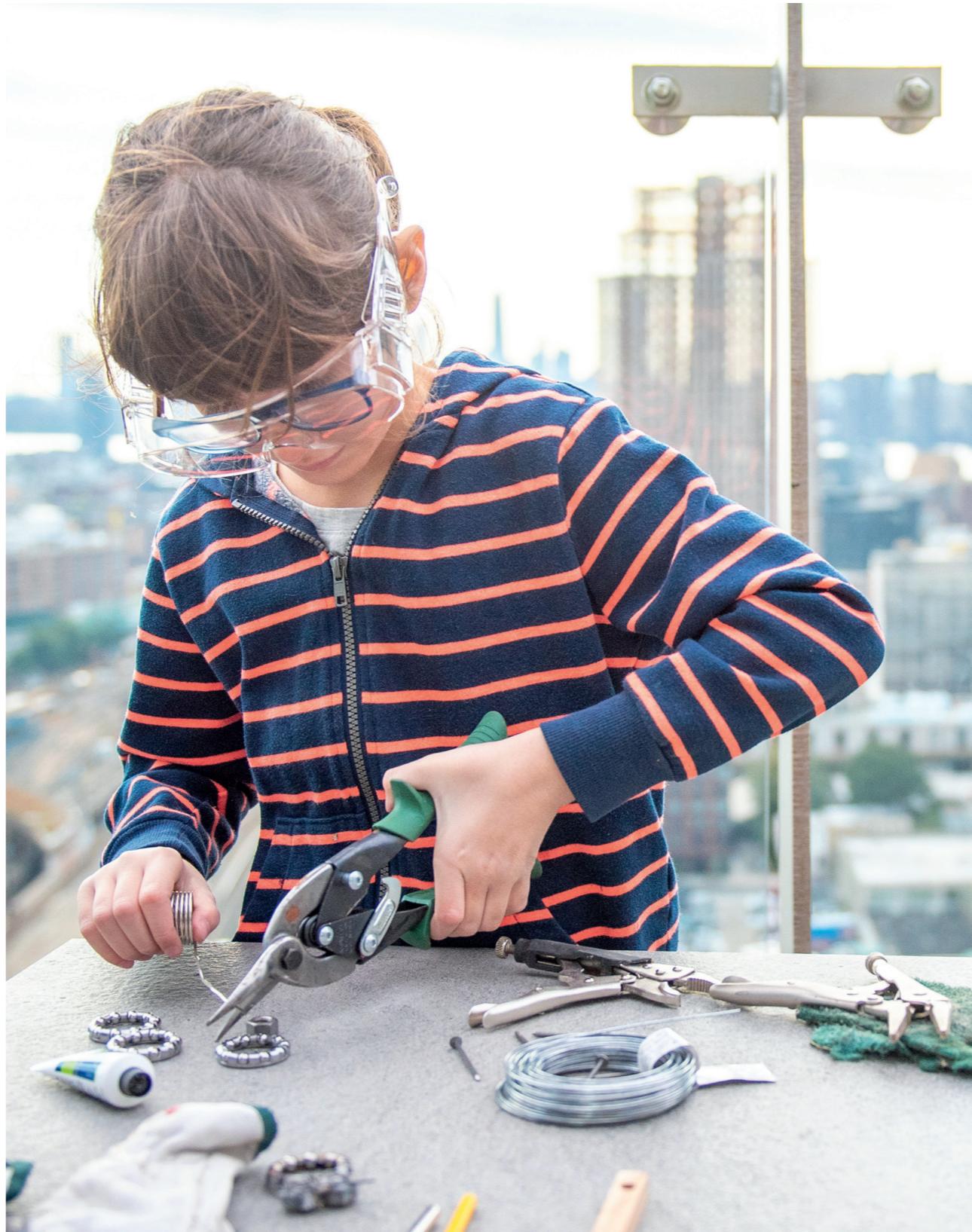
**What advice do you have for other girls?**

Don’t be scared by a blowtorch. If you ever use it on a cold day, put gloves on. One

thing about my project, if your solder thingie balls up, that’s not good and you need to add another piece.

Don’t crack under pressure. Because if you crack under pressure, you show that you’re scared. Even though being scared is good, you don’t want to be scared all the time. Sometimes you have to be brave. What I do when I’m scared, I breathe.

Don’t wear too much pink. Unless you choose to. Because if you wear too much pink, the boys will think you are dainty. And you’re not dainty, you are *tough*. One time, there was a time to do something messy and all the girls said they wanted to do it and the boys didn’t want to do it. Which proves girls like taking risks, and they should be the heroes in most books.



**What's the first step in trying something new?**

The first step in trying something new is making sure you're comfortable. Say, like, you're not comfortable using a Sharpie. You should *try* to get over it. But if you can't or you're still uncomfortable, don't do it. It's like stepping out of your comfort zone but not going too far that you can't find your way back in.

**Who do you look up to?**

I look up to Ruth Bader Ginsburg because she's basically an older version of me. She's Jewish, so am I. She's a girl, so am I. And she's left-handed, so am I. She did a lot of great things for the world, so that's another reason I look up to her.

I also look up to my mom because she's awesome. Because she's the one who taught me who I am. She's the one that taught me that girls don't have to be dainty. She's the one that helped me step out of my comfort zone.

**What are some other activities that make you feel courageous, strong, and bold?**

Doing tae kwan do. Because it has a lot of yelling involved. Because you're learning how to defend yourself, and every time there's a belt test, you can have something to feel proud about. It makes me feel bold and strong because even though people think it looks hard, it's not. You learn the basics and then you can do extraordinary things.

**What are some ideas of things girls can build at home?**

You can build Popsicle-stick houses and people. You can perhaps make robots. You can do anything at home as long as it doesn't involve too much fire.

**What project are you sharing with us?**

I made something called a "less angry owl." His name is Crackle. And he has another owl named Friend.



**ARIYA**

AGE: 11

LOCATION: Metairie, Louisiana

WHERE ARIYA LEARNS: Electric Girls

“If you have a fear, just believe you can do it.”

**What are some things you want us to know about you?**

I live with my mom and my two brothers. I have one older brother and one younger brother. I like to read and do projects on the computer. I want to learn how to engineer and learn how to use tools and soldering and things. I really like reading, and books have a lot of interesting stuff because there are all different types of books. I like reading books about people, and comic books. Blue and purple are my favorite colors. My favorite tool is the soldering gun.

**What is the first thing you ever built?**

The first thing I built was a little car, and it had, like, moving wheels I recycled from an old plastic car. I made it out of old wood, sticks, and cardboard. It had little round light-up balls, and I used those as headlights. I was nine when I made it.

**How does building make you feel?**

Building makes me feel like I can build mostly whatever I want, and have the courage to do most stuff. And feel positive.

**Why do you build?**

I build mostly because it's fun. I like getting to use different types of tools and explore different types of things I can use.

**What advice do you have for other girls?**

Never be afraid to do something. Never listen to what other people say if it's negative.

**What's the first step in trying something new?**

Believe that you can do it, mostly. If you have a fear, just believe you can do it.

**Who do you look up to?**

I look up to a lot of people. Like my parents and my friends and family members. Because they help me and I can help them with other things.

**What are some other activities that make you feel courageous, strong, and bold?**

I like climbing and rock climbing. It makes me feel free and excited. I go rock climbing with my stepmom and my brothers and my mom.

**What are some ideas of things girls can build at home?**

Probably building a small little house out of cardboard, wood, Popsicle sticks, or like a little birdhouse.

**What project are you sharing with us?**

Last year at Electric Girls camp I built a two-story hotel and it had a downstairs and a café. It was called Unicorn Hotel.



# SAMANTHA

AGE: 12

LOCATION: New York, New York

WHERE SAMANTHA LEARNS: Tools and Tiaras

“I like to build because it makes me feel like I am part of our world.”

#### What are some things you want us to know about you?

I am a Girl Scout Cadette. I love cats, adventure, and getting down in the dirt, and my favorite mythical creatures are dragons.

#### What is the first thing you ever built?

The first thing I built that I can remember is a miniature fortress made from wooden blocks, plastic cups, and jumbo-sized Popsicle sticks.

#### How does building make you feel?

Building makes me feel happy and joyous because I get the chance to turn something from a dream into reality.

#### Why do you build?

I like to build because it makes me feel like I am part of our world.

#### What advice do you have for other girls?

For other girls I give this advice because it helps me get through life: Get into many after-school programs, and get out there and explore the world around you. Find out everything you can.

#### What is the first step in trying something new?

Always prepare beforehand, and then you can dive into whatever you're planning!

#### Who do you look up to?

I look up to Judaline. She leads a girls' summer camp called Tools and Tiaras, which shows girls opportunities and careers that aren't stereotypical for women and girls. It empowers the girls that go to this camp.

#### What other activities make you feel courageous, strong, and bold?

I love to draw, zip-line, and swim, as well as rowing.

#### What are some ideas of things girls can build at home?

They can build with Legos, and can create anything that pops into their heads.

#### What project are you sharing with us?

A swing that can hang on a bar or a tree, and it is so much fun to swing on! I loved building it!



## PROJECT



# SAMANTHA'S SWING

Samantha built her swing in Brooklyn Bridge Park with tourists and locals humming about. Her mom spent the time warding off a park ranger who thought that Samantha's workbench was furniture and therefore shouldn't be allowed in the park. Although Samantha was serious while working, her demeanor completely changed when she finished her swing and put it to use. It's pretty fun to swing on a swing you built in Brooklyn Bridge Park.

### MATERIALS

- At least 24" of 2x6 (see step 2)
- ½" braided nylon rope (or rope of a similarly strong material)

How much rope do you need? Well, you'll need to know where your swing will hang. Measure that length, add 6', then double it. Rope = (Length + 6') x 2.

### TOOLS

- Tape measure
- Pencil
- Speed square
- Lighter (for adult use only)
- Handsaw, chopsaw, or jigsaw
- Two bar clamps
- Drill
- ⅝" drill bit
- Heavy-duty scissors to cut rope

### SKILLS

- Measuring
- Drilling
- Clamping

#### Adult oversight:



#### Cost after tools:



#### Safety gear:

- Safety glasses
- Gloves (optional)
- Ear protection

#### Work surface:

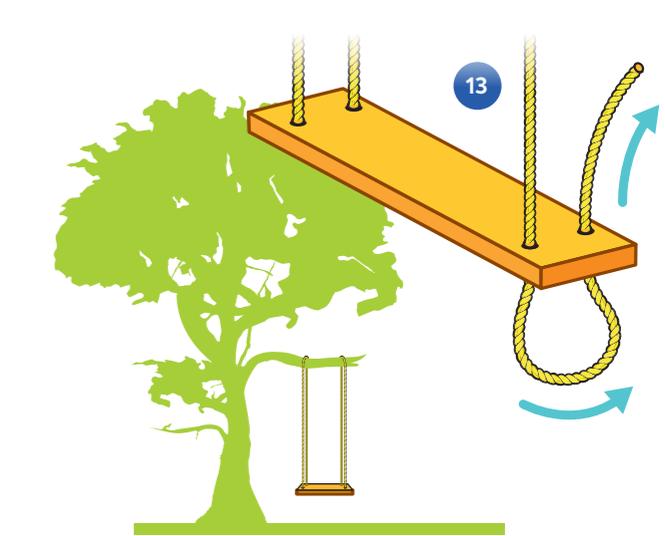
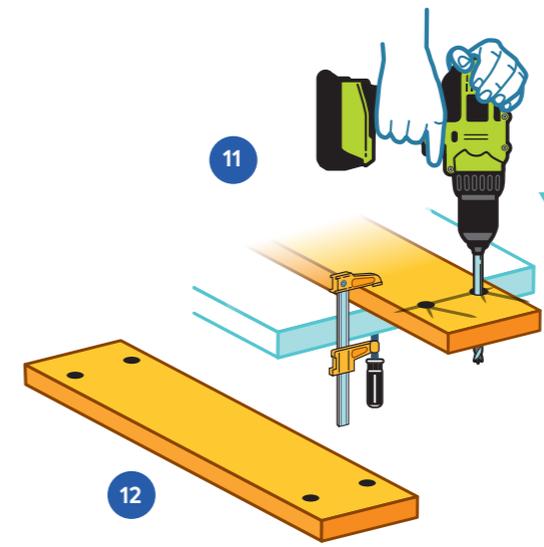
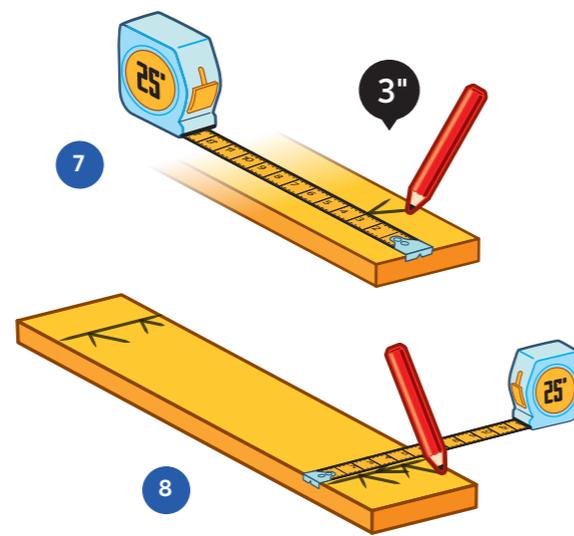
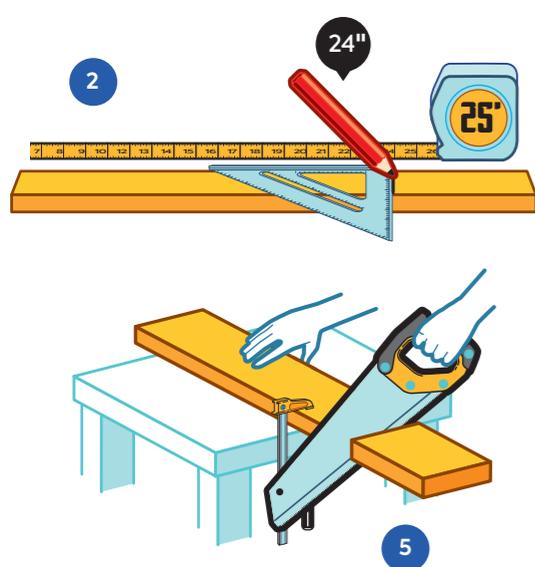
Flat table

#### Skill level:



#### Time:





## STEPS

**1.** Put on safety glasses and ear protection. Check for and remove loose clothing and jewelry, and make sure hair is tied back.

**2.** Mark your wood at 24". (This is actually a flexible measurement. Want a longer swing? Make this measurement longer. Make it shorter if you want a shorter swing.) Draw a crow's foot at 24" (or your desired measurement) and draw a line through the crow's foot with a speed square.

**3.** Cut your wood to 24" (or whatever measurement you marked in step 2). If you are using a chop saw, you must know how to use one and have an adult nearby. If you are using a hand-saw or jigsaw, you must also know how to use it, and have an adult nearby, but we'll give you a few tips. Using clamps, attach the wood to the work surface so the line you marked hangs over the table by at least 4", leaving the majority of the wood on the table.

**4.** For a handsaw: Place your nondominant hand on the portion of the board still on the table.

**5.** Place the handsaw on your line, holding it with your dominant hand. Begin by sliding it along your line lightly and quickly. Do this over and over, and slowly the saw will begin to cut. Saw until the extra wood falls to the ground.

**6.** It's now time to mark the holes to drill. Lay your 24" board on the work surface. Using your tape measure, from the short end of the board, measure 3", and mark the point with a crow's foot. Using your speed square, draw a line through the crow's foot, from one long end of the board to the other.

**7.** From the long end of the board, measure 1½" and 4" along the line you've just drawn, and mark it with a crow's foot.

**8.** Repeat steps 6 and 7 on the other short end of the board. The four crow's feet you've marked are your drill points.

**9.** Get out your drill and insert the 5/8" bit into the end, tightening the drill bit snugly into the drill.

**10.** Making sure the 2x6 is secured with either an adult's help or clamps, place the tip of the bit onto any of the four crow's feet you marked on your 3" line. Take one quick look under the 2x6 to ensure that your drill isn't going to drill through the board and into your work surface. If all is good, move on to the next step.

**11.** With the drill secure, hit the trigger, and bore a hole through the 2x6 until you come out the other side. Run the drill up and down a few times to make sure the hole is clean and free of wood bits.

**12.** Repeat this step on the remaining four drill points; your board will have two holes on each end.

**13.** It's time to run the rope through the swing. Cut your rope to length using your heavy-duty scissors. (If your measurements were right when you bought your rope, this means you should cut your rope in half.) Have an adult burn the ends of your rope if they are not already burned. The rope can melt and drip, so keep bare skin away from burning rope. To push the ropes through the holes, you might need to twist the rope.

**14.** Next, find a good, thick branch to which you can attach your swing. Search the internet for how to tie knots, or ask an adult for a lesson on how to best secure your ropes to the tree, then the ropes to the swing.

**15.** Once your swing is all tied up, hop on, kick those legs, and have a grand old time!

# BROOKE

AGE: 12

LOCATION: Brooklyn, New York

WHERE BROOKE LEARNS: Tools and Tiaras,  
and from her mom



“The skills you learn [in building] are math, planning, problem-solving, organization, confidence.”

## What are some things you want us to know about you?

I'm a twelve-year-old girl living in New York City, and am a seventh grader at Philippa Schuyler Middle School for the Gifted and Talented. I live with my parents, sister, and younger brother. I really like my school because it focuses on the arts as well as academics. One of the classes I am currently enrolled in is beginning steelpan [the steelpan is also known as the steel drum]. I like this class because, being West Indian, I think the pan is an extremely important instrument, and I am fascinated by the range of sounds you can create with it.

## What is the first thing you ever built?

I helped my mother build a Native American cradleboard. It was a project for my fourth grade curriculum showcase. It is traditionally made out of wood, but I made mine out

of sheet metal because my mother is a sheet metal worker and had access to all the materials I needed to replicate the cradleboard.

## How does building make you feel?

Building makes me feel like I'm on top of the world. I like to build by myself just to accomplish what I can. Building is my hobby.

## Why do you build?

I build to relax. I use many different tools and materials to build many different things. I also have the confidence to fix things that are slightly broken based on the skills I've learned from building.

## What advice do you have for other girls?

I would tell girls to learn how to build so they can have the confidence to help themselves and be who they want to be. Building involves planning,

which is also a good skill to have in life. Traditionally, building is looked at as a guy's job. But to me, building is just problem-solving. It's like looking at a puzzle and then putting it all together. Some puzzles have a ton of pieces, and some puzzles have a couple of pieces. The skills you learn are math, planning, problem-solving, organization, confidence. These are the only ones I can think of off the top of my head.

## What's the first step in trying something new?

For me, the first step in trying something new is to wrap my mind around what it is I will be doing. Then I ask myself a bunch of questions like, Is it simple? Have I done this before? Will I have to use things I am unfamiliar with? Will I have to ask for help? I ask myself these questions to better understand what needs to be done, and I make a list of the

things I am capable of and what I may need assistance with. If it's something that I have to do on my own, without any assistance, I will research it. Google is my best friend. I will read generally and then ask specific questions on Google about the things I still am not clear on. Reading and understanding how things work help me to build up my confidence in taking on new tasks. Once I feel confident, which is the most important thing for me, I just jump all in and get to work. Remember, even after taking all these steps it's still possible to mess up, and that's okay.

**Who do you look up to?**

I look up to the women in my house. I look up to my mother because she works as a sheet metal worker all day and still has time to make other projects. She just built her own bed frame. I look up to my sister because she is an EMT [emergency medical technician] for the fire department and responds to medical emergencies for the people of New York City. The women in my house are extremely hands-on and not afraid of challenges.

**What are some other activities that make you feel courageous, strong, and bold?**

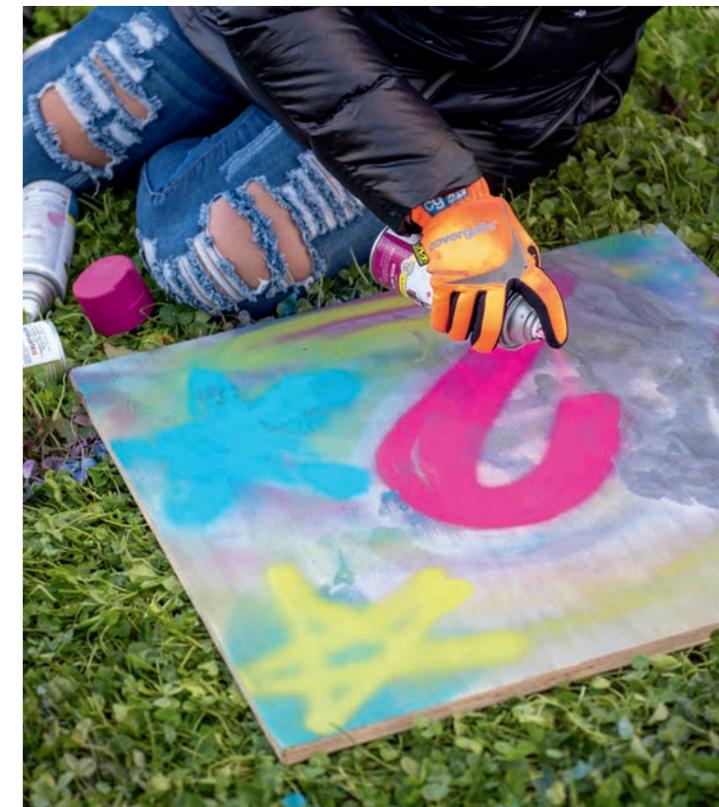
When I was in my choir group that made me feel bold. It makes me feel bold because I had to perform in front of people. I would get a rush of adrenaline before I went on stage. I love to sing.

**What are some ideas of things girls can build at home?**

I would recommend starting off small. You can build whatever you want as long as you start small and work your way up. You could build, like, a house or a boat made out of Popsicle sticks. Then you can work your way up, like building a kite, which involves more than one type of material.

**What project are you sharing with us?**

I made a jigsaw puzzle out of wood. I spray painted a wooden board, and I used a jigsaw to cut it into pieces; then I put it back together.





PROJECT

4

# BROOKE'S JIGSAW PUZZLE

Brooke built her jigsaw puzzle in Brooklyn Bridge Park with her mom and brother nearby. Her mom may be one of the coolest people I've ever met. She works on high-rise buildings in New York City, repairing and installing sheet metal ducting. Brooke created her jigsaw puzzle using precut wood, a cordless jigsaw, and spray paint (including a little bit of glitter spray paint). She then put her puzzle together in the park with her brother, Dash.

**MATERIALS**

- 1 piece of 3/4" plywood, measuring 2' x 2' (you can purchase this size precut at most large lumber stores)
- Spray paint (we recommend about three colors)

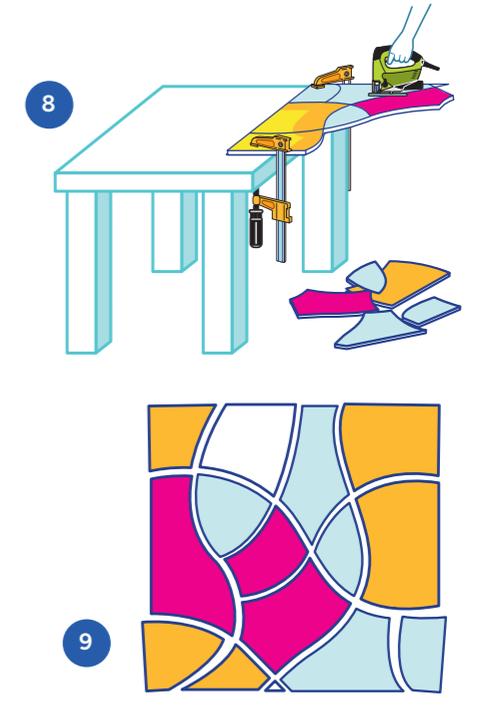
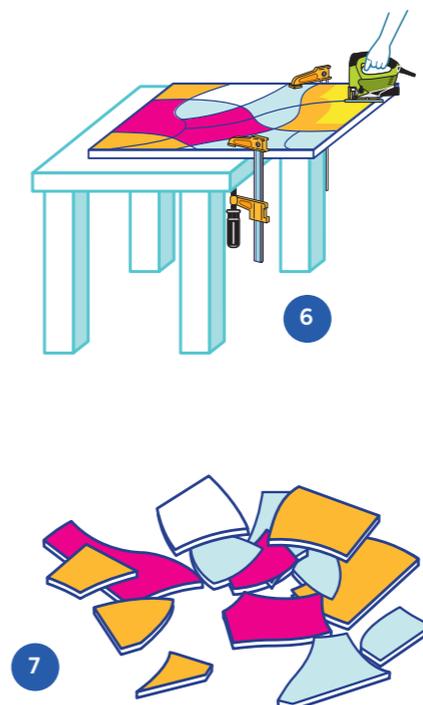
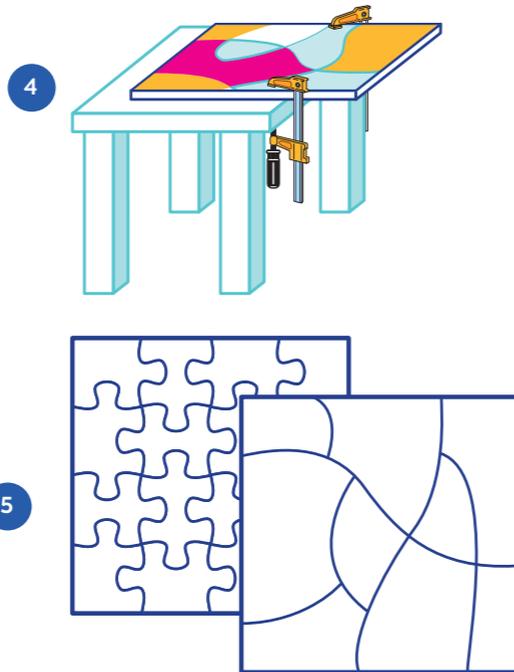
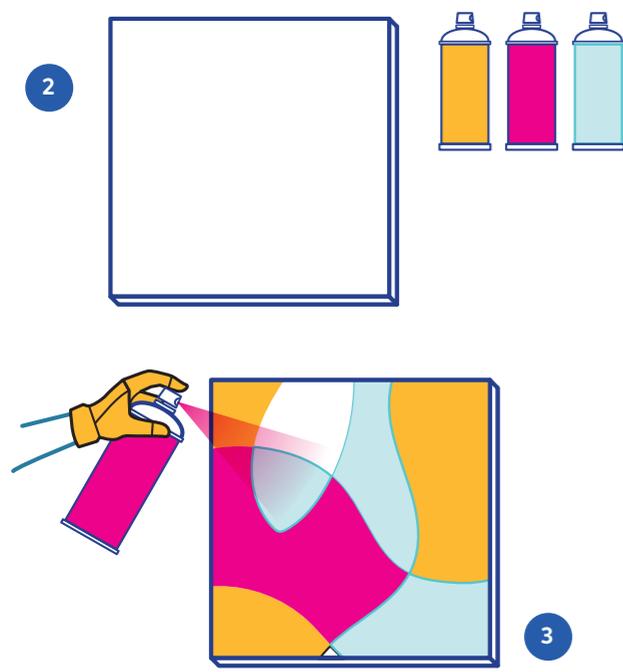
**SKILLS**

- Clamping
- Using a jigsaw

**TOOLS**

- 2 pipe or bar clamps
- Jigsaw with rough or fine wood blade
- Optional: Pencil

<b>Adult oversight:</b> 
<b>Cost after tools:</b> 
<b>Safety gear:</b> <ul style="list-style-type: none"><li>• Safety glasses</li><li>• Ventilating mask</li><li>• Gloves</li><li>• Ear protection</li></ul>
<b>Work surface:</b> Workbench
<b>Air space:</b> You will need an outdoor space or a well-ventilated indoor space to spray paint
<b>Skill level:</b> 
<b>Time:</b> 



## STEPS

**1.** Put on safety glasses, mask, and gloves. Check for and remove loose clothing and jewelry, and make sure hair is tied back. You should create this project outside or in a space where it is well ventilated.

**2.** It's time to get creative! Grab your spray paints, and begin painting your board in whatever way you feel inspired. Remember, if you paint the board and change your mind, you just need to let the first coat dry a little bit (about five minutes) before you paint over it. The great news is that you can paint it over and over again until you get just the look you are going for. The busier the better, as this will help make putting it back together more fun. Tip: If you have never spray-painted before, read the directions on the can.

**3.** Take off your mask and let the paint dry completely. Use your own judgment here, but know that your board shouldn't be sticky at all. It can take anywhere from thirty minutes to two hours, depending on the weather.

**4.** Turn your board over so the unpainted side is facing up. Clamp it to the workbench, leaving about  $\frac{1}{2}$  of the board on the table and  $\frac{1}{2}$  hanging over the edge. Make sure the clamps are very tight. Note: If your paint is not dry, it will get ruined in this step.

**5.** You can draw out your cuts, if you'd like. If you don't want to draw them, you can skip to step 6 and design as you go. Either way, you have two options for cutting your design. You

can cut it into the traditional jigsaw shapes that will hold together once the puzzle is put back together, or you can cut it into more of a mosaic, with pieces that slide together but don't interlock. If you choose to design at this stage, use a pencil, and draw out the lines you will cut. Or design it to look like Brooke's.

**6.** Now is the time to cut out your jigsaw puzzle. It's time to put on your ear protection. Place the table of your jigsaw on the board, with the blade away from the puzzle (the blade should not be touching wood when you start). Hit the trigger, and begin cutting slowly, either along your pre-drawn lines or on the path you choose as you go. Start by cutting the parts of the plywood that are hanging off the table.

Be aware of the table below your plywood. It is common to accidentally cut the table along with your board. Try to avoid doing this!

**7.** As you cut, let your cut pieces fall to the floor. They will be okay.

**8.** Once you have cut the pieces from the part of the board that was hanging off the table, unclamp the board and turn it sideways on your work surface. Reclamp it to the table and cut the remaining pieces. Repeat as necessary.

**9.** You should now have a pile of painted plywood at your feet. Find a buddy and a flat surface, and get to work putting your jigsaw puzzle together!

# TOOLS

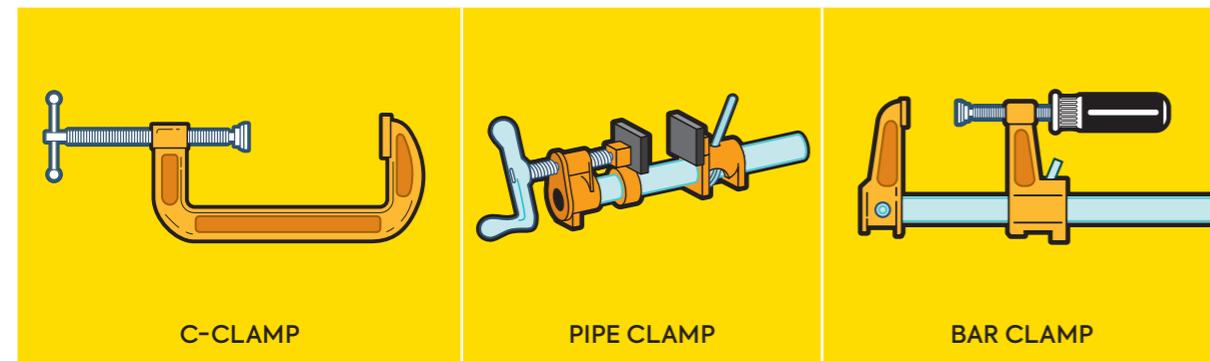
Tools are expensive. Some are more expensive than others. Adults, if you buy a low-quality impact driver for \$50, you will buy that same impact driver over and over as it breaks after an average amount of use. Or you can buy one drill and driver set for \$150 to \$300, and never buy another drill or driver again. This is the better choice all around, so save yourself some dollars, get excited, and go buy that nice drill and driver set you've been eyeing for months. The same goes for hand tools, but the price difference is much smaller. A plastic speed square is about \$3, and a thick, metal, top-of-the-line speed square is \$10. Get the \$10 one. It comes with a book, so you can geek out learning all kinds of things you never knew, and you'll have that speed square your whole life.

Here is a list of the tools you will need to do the projects in this book. Don't run out and buy all of them, unless that's something you like to do. Most of the projects are simple and only require a few items. You can always borrow from neighbors or friends, or see if your town has a tool library.

## CLAMPS

Pipe clamps and bar clamps are essentially the same, but pipe clamps tend to be longer and are used in professional wood shops. Bar clamps are smaller and are perfectly great for any project you are working on from this book.

C-clamps are less commonly used in woodworking, but if you have some at home, they may work for holding down a piece of wood on a table. They will not work for many of the projects in this book, though. My suggestion is to invest in two 36" bar clamps.





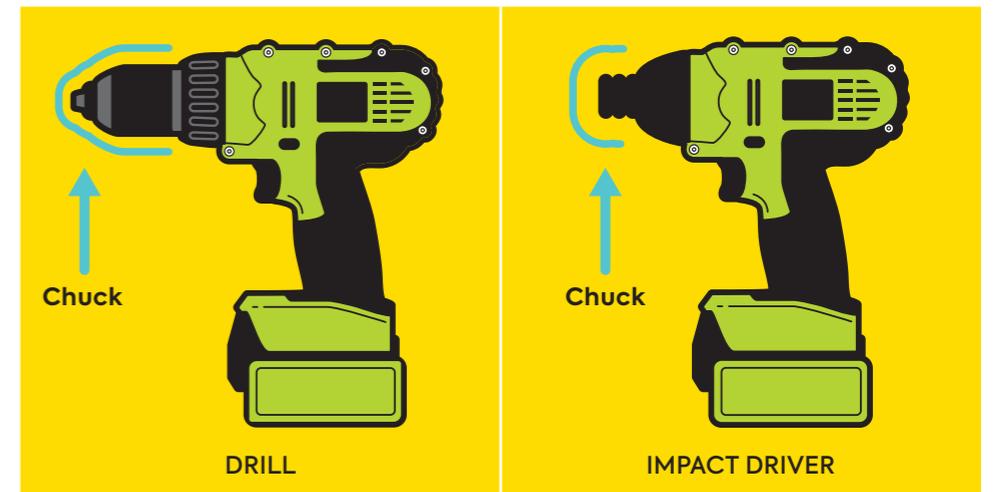
## CROWBAR

A crowbar is primarily used to pull wood apart. It looks like a large, metal candy cane with a slightly curved stem. It has a claw on the end, like a hammer does, which will pull nails out easily when you have to take apart a project.

## DRILL AND IMPACT DRIVER

A drill is a handheld power tool that bores holes.

An impact driver looks like a drill but has a shorter nose. The impact driver is a great tool that hammers as it turns, making driving a screw much easier, especially for kids. It reduces the possibility that you will strip a screw (hollowing out the head of the screw so you can no longer drive it), as long as you use it correctly.



### Chuck

The chuck is the part of the drill that opens and closes around a bit. By spinning the outer ring, three prongs inside come together to clutch the bit tightly.

COMING OCTOBER 6, 2020

Celebrating the can-do attitude of dozens of fierce girls who know how to wield a hammer, fire up a saw, and build everything from a bookshelf to a playhouse, *Girls Who Build* provides illustrated, practical ideas for girls 8–14, giving them the skills to learn that they are capable of anything.

**C**arpenter Katie Hughes frequently found that she was the only woman on construction worksites. To change that, she began teaching classes to girls ages 8–14, showing them how to drill, saw, and weld. Her classes quickly became sold-out summer camps, and she has now founded her own nonprofit: Girls Build.

This book features candid and arresting photographs of 45 girls showing off their skills along with profile interviews where they speak to their inspirations and favorite builds plus give tips to others just starting out. Also included are building skills, techniques, and safety tips to teach girls—and older beginners—how to handle hammers, drills, and saws, plus 15 do-it-herself building projects (from the featured girls themselves) such as picture frames, nightstands, playhouses, and more.

Both practical and inspirational, *Girls Who Build* will empower girls and other budding carpenters to get off their digital devices, get outside, and get building!

In 2018, **KATIE HUGHES** founded Girls Build, an organization out of Portland, Oregon, that offers girls ages 8–14 the chance to learn mechanical and electrical skills as well as wood and metalworking. Last summer, Hughes was featured on an episode of *Returning the Favor*, hosted by Mike Rowe of *Dirty Jobs*, which now has nearly 6 million views. Her summer camps in Seattle sell out in less than a day. Look for Girls Build online: [girlsbuild.org](http://girlsbuild.org) | [🐦 girlsbuildpdx](https://twitter.com/girlsbuildpdx) | [f girlsbuild](https://www.facebook.com/girlsbuild)

### MARKETING AND PUBLICITY

- National author publicity including print, broadcast, and online
- Author events (Pacific Northwest)
- Holiday gift guide campaign
- Early endorsement and influencer effort
- Consumer advertising online
- Trade and library advertising including *Shelf Awareness* and *SLJ.com*
- Book video content
- Extensive social media campaign
- Preorder initiative encouraging single and bulk purchases with incentives
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