marbleocity™

MINI COASTER ASSEMBLY INSTRUCTIONS

TINKINEER™

At Tinkineer we are constantly working to improve your maker experience. You may observe that the shape of a part differs slightly from how it is depicted in the assembly instructions.

WELCOME!

I'm Adam, the founder of Tinkineer™ and the creator of the Marbleocity™ product line.

When I was a kid I loved machines, contraptions and, of course, marble ramps. I also loved building models but I found the plastic materials unsatisfying and model cement hard to work with. Today, amazing laser-cutting technology exists to craft highly detailed shapes out of wood. The real wood parts in your kit have a great tactile feel and can be assembled easily with household white glue.

The kit that you are about to build was carefully designed to be a great maker experience that you'll enjoy in-of-itself. But beyond that there's a little physics and a lot of engineering experience waiting for you. The graphic novel that begins on the next page will teach you about some of the underlying science that goes into real roller coaster design. Our goal is to expose you to some introductory physics that you'll encounter when you get to high school. More importantly, the construction of the Mini Coaster will show you how you – yes you! – can build a seemingly complex machine out of simple parts. Simple parts become sub-assemblies and sub-assemblies come together to construct an amazing, working machine that you built yourself. So grab your glue and let's get started!

GETTING HELP FROM OUR COMMUNITY

Have a question about a step you're working on? Need a video tutorial? We're building a community of Tinkineer's – just like you! Please visit us online at Tinkineer.com/community.

LEARNING MORE

The physics that you'll be learning about today is called Conservation of Energy and it's one of the fundamental tenants of our favorite area of physics, called "mechanics". You'll see this concept again, most likely in your introductory high school physics class. With Marbleocity our goal is to expose you to the high-level concepts so that when you get to the classroom, the subject matter is familiar. If you'd like to learn more, on your own, there are great resources available on the web. If you're looking for a place to get started, check out Khan Academy at khanacademy.org/science/physics.

A NOTE ABOUT SAFETY

The kit that you are about to assemble is designed for children and adults ages 9+. It contains marbles and other small parts that can be a choking hazard for children under 3 years old. If you have younger siblings or other small children living in your household, please keep these small parts safely out of their reach.

TABLE OF CONTENTS

Introduction..... 3

Playland, a Graphic Novel .. 4

Assembly Instructions..... 12

Next Steps! 18

LET'S DO THIS!

Hope you enjoyed Iggy's adventure and that you picked up a little physics along the way! Now it's time to build the real thing and see those principles in action. The "build" will take you ~1-2 hours and don't be afraid to take your time! What you're building is not only fun to look at – it's a machine that really operates! Take time to make sure that tabs are fully inserted into slots and that mating surfaces are flush. Follow the tips on this page to achieve a great finished product!

READY TINKINEER?

For this project you'll need:

Elmer's® Glue-All® Multi-Purpose white glue.* A good, household white glue is the best glue for the job – it's easy to work with, makes a strong bond in ~20-30 minutes, and dries perfectly clear so your finished marble machine will look great!

(Recommended) Wax paper. Scavenge a sheet of wax paper from your kitchen – it's the perfect work surface. Household white glue will not stick to it and you'll avoid mom's wrath by protecting the kitchen table.

(Recommended) Round toothpicks. These are perfect for applying glue. Make a puddle on your wax paper work surface and use the tip and/or edge of a toothpick to apply glue to your wood parts.

TIPS ON TECHNIQUE

Check Tinkineer.com/community for helpful videos including a full build of this model!

Test Fit First!

Most steps can be test assembled without any glue at all! Check your part fit and marble operation first and then apply glue second.

Applying Glue to Flat Surfaces

Use enough glue so that your parts feel tacky when pressed together but don't go overboard! Wipe away excess glue using your finger or the edge of a clean toothpick.

Applying Glue to Perpendicular Parts

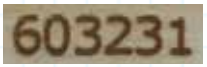
Lay glue into corners like these using the edge of your round toothpick. In this way, you can test-fit first and add glue second.

"Check Square"

In engineering the word "square" means "at ninety degrees". Check square, using the included tool, any time you are assembling surfaces like these.

BREAK SOMETHING? NEED A REPLACEMENT PART?

Marbleocity is a natural wood product! Sometimes a hidden knot can slip past our quality control gurus. If you need a replacement part contact us at Tinkineer.com. Please have your batch code handy, which is on the rear coaster dip.



* Elmer's® Washable School Glue will bond but Glue-All® is recommended for the best experience. Do not use glue sticks or generic products.

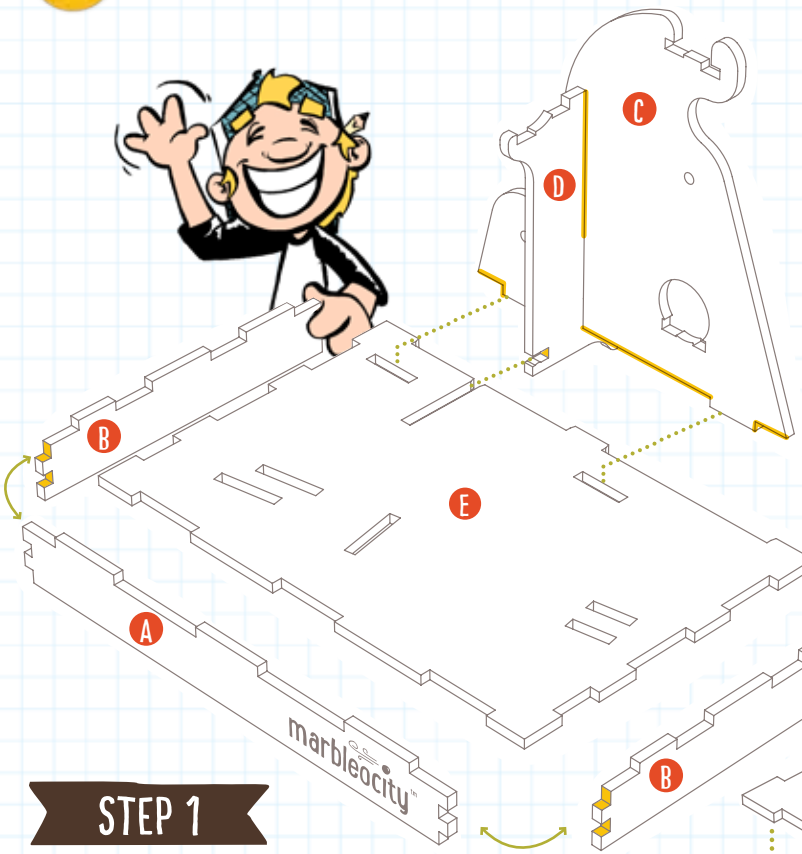
For the first few steps, we'll show you exactly where to add glue, highlighted in yellow.

LET'S GET STARTED!

PREPARATION

Spread a sheet of wax paper over your work surface. Make a small puddle of white glue, about the size of a dime, to work from. Remember, a little glue goes a long way – use a toothpick to apply it.

Some wooden parts are contained in a sheet by tiny tabs. Gently rock each part, forward and back, until it falls free. If a small bump remains where the part was attached, use an emery board (nail file) to smooth it down.



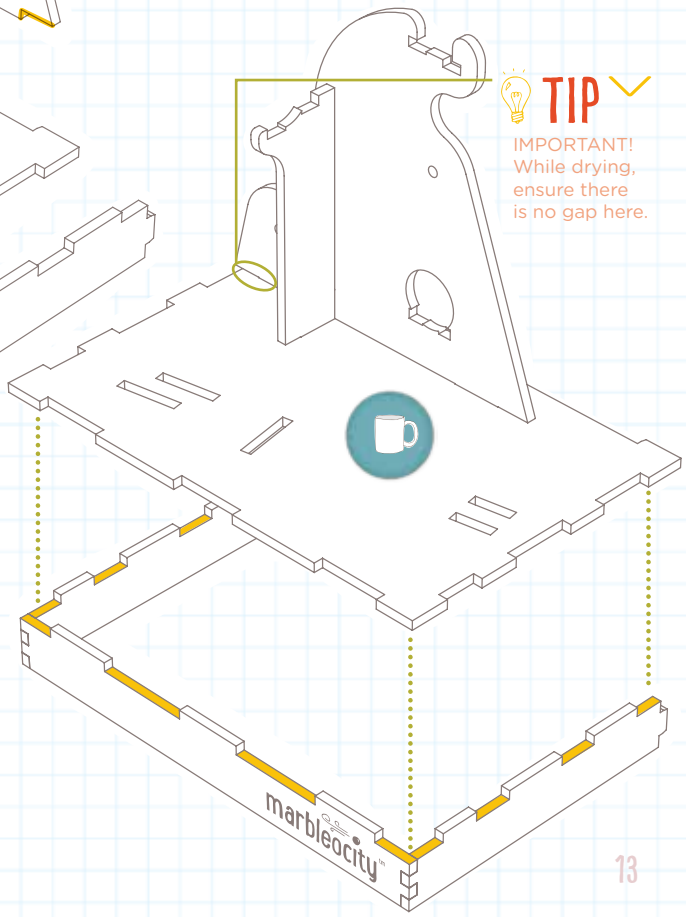
STEP 1

PLATFORM

First, glue the platform front (A) and sides (B) together (we call this the "skirt") and set aside.

Separately, slide the Ferris wheel bracket (C) into the slot in track support (D) to form the assembly shown. Then slide your C-D assembly into the slot on platform top (E) and snap the tabs into place, as shown. Apply glue on adjoining surfaces.

Next, apply glue and then lower your completed top assembly onto the skirt. Check that all parts are square using the tool provided and place a heavy coffee mug on the platform. Set aside to dry for 20-30 minutes.



TIP

IMPORTANT! While drying, ensure there is no gap here.

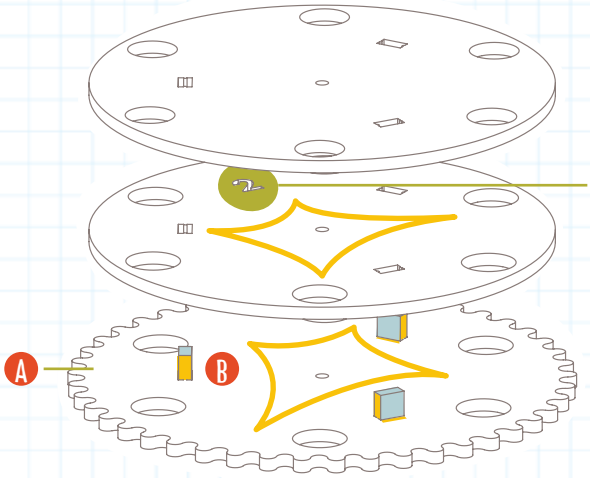
STEP 2

FERRIS WHEEL

Lay your Ferris gear (A) on a sheet of wax paper and insert your three keys (B), applying a small amount of glue to each one.

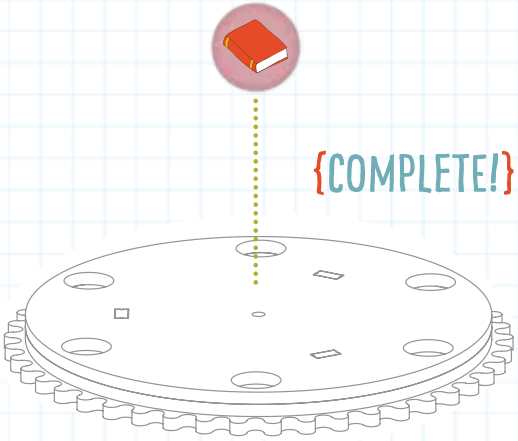
Next, press your smooth wheels onto the protruding keys, noting the assembly order! Apply a thin layer of glue to the flat faces being careful to avoid getting glue too close to the holes (wipe away any excess!).

Cover your completed wheel with another sheet of wax paper and place a heavy book on top. Set aside to dry for ~20-30 minutes.



TIP

Notice the number "2" on the center wheel. It is important that this part be the cream filling in your Ferris wheel cookie!

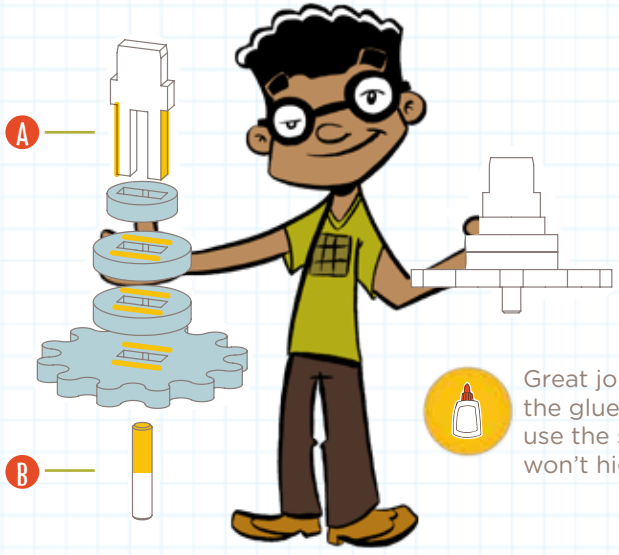


{COMPLETE!}

STEP 3

PINION GEAR

Assemble your spacers and pinion gear to the wooden shaft (A), as shown. Next, fill the resulting slot with a dab of glue and insert a metal axle (B), wiping away any excess glue. Make sure the axle is square to the gear face. If it's not, gently adjust it before the glue dries.



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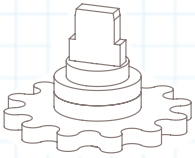


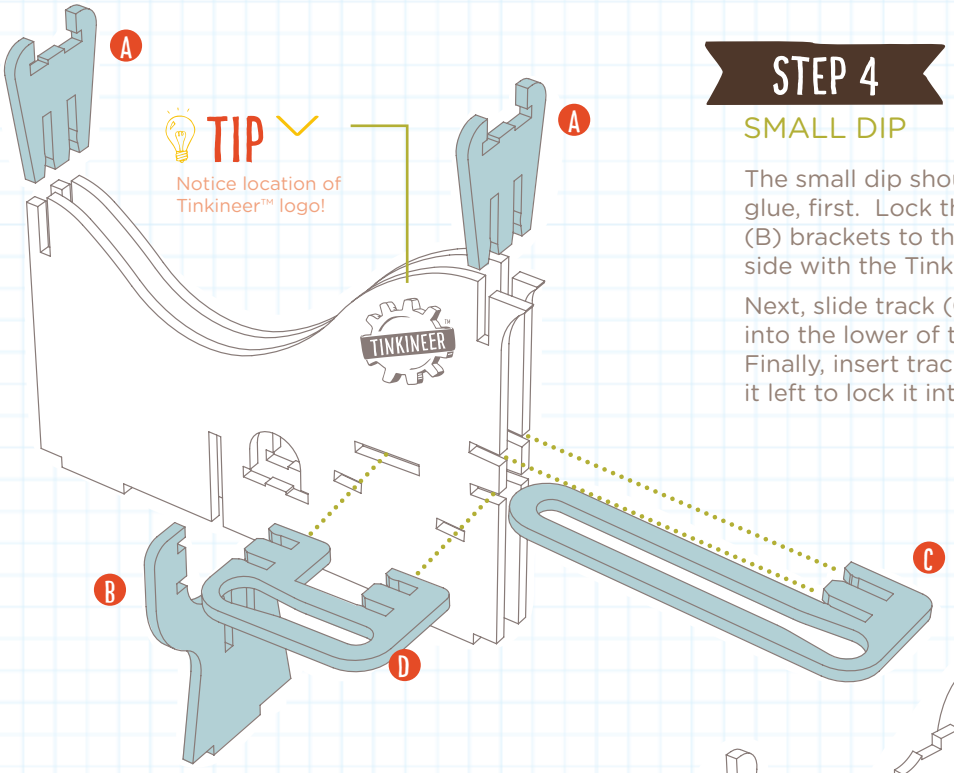
Great job! You've got the hang of the glue technique. From here on, use the same approach but we won't highlight each and every spot.

STEP 4

SMALL DIP

The small dip should be assembled entirely without glue, first. Lock the two upper (A) and one lower (B) brackets to the coaster dip sides. Note that the side with the Tinkineer logo faces front.

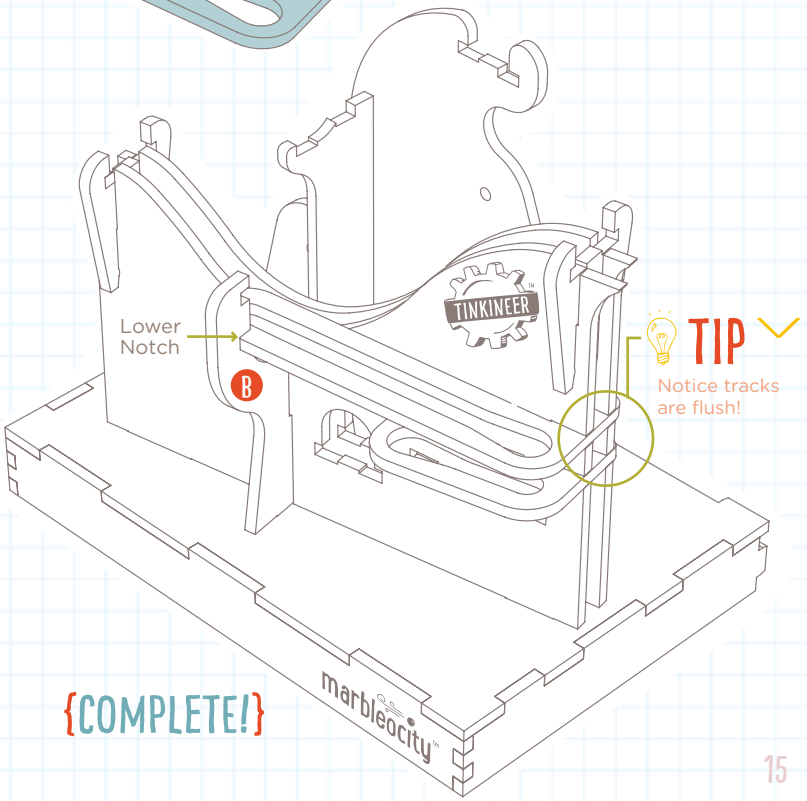
Next, slide track (C) into place – notice that it slots into the lower of the two notches in bracket (B). Finally, insert track (D) from the front and then slide it left to lock it into place.



Ensure that all parts are fully inserted. Test fit your completed dip assembly to the platform before gluing! When everything looks good glue everything in place using the techniques that you've been practicing. Refer to the tips on page 12 and don't forget to check square.

Whew! Nice work! Take a 10-minute break to let the glue set up a little before continuing on to the next step.

NEED HELP? See helpful videos at tinkineer.com/community.



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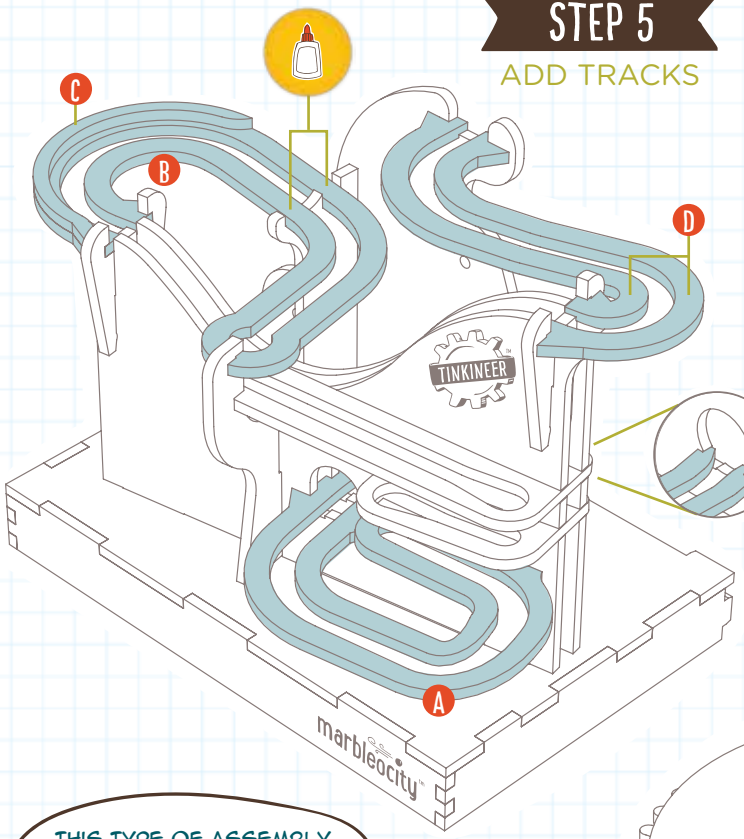
STEP 5

ADD TRACKS



Exciting! Add the tracks to your model. Test each fit first and then add glue. Start with return track (A). Slide the long rails through your dip and then gently flex the curved end so that the two tabs can be fully inserted.

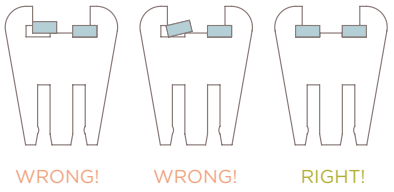
Next, install your hairpin track (B) and rail (C). Finally, install your upper rails (D). IMPORTANT: Ensure that the ends of all tracks are properly seated. See tips below!

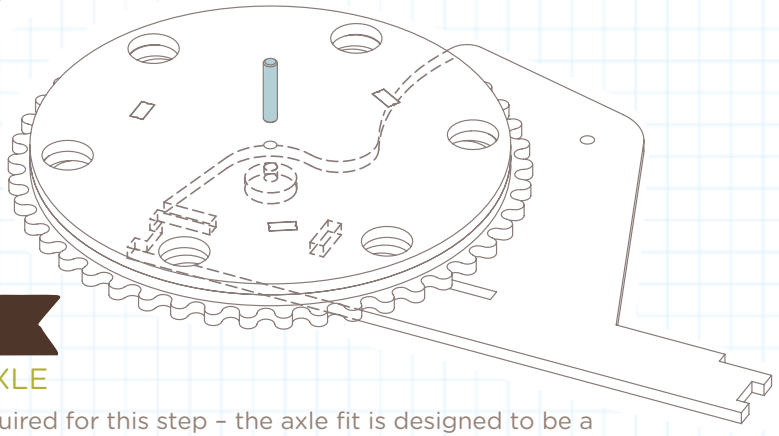
Do a test run. Give a marble a little nudge with your finger from the top. Overall operation will improve once the glue dries (and the tracks are rigid) but now is the time to fix any major problems. Cool!

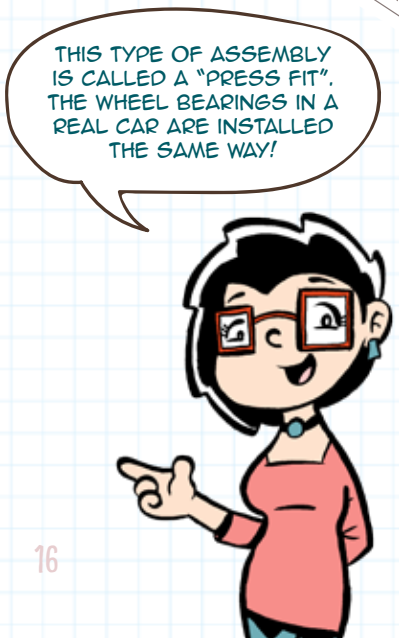
Make sure your return tracks are fully inserted to form a nice, flush fit.

TIP

IMPORTANT! Check that each track is properly seated.







STEP 6

INSTALL AXLE

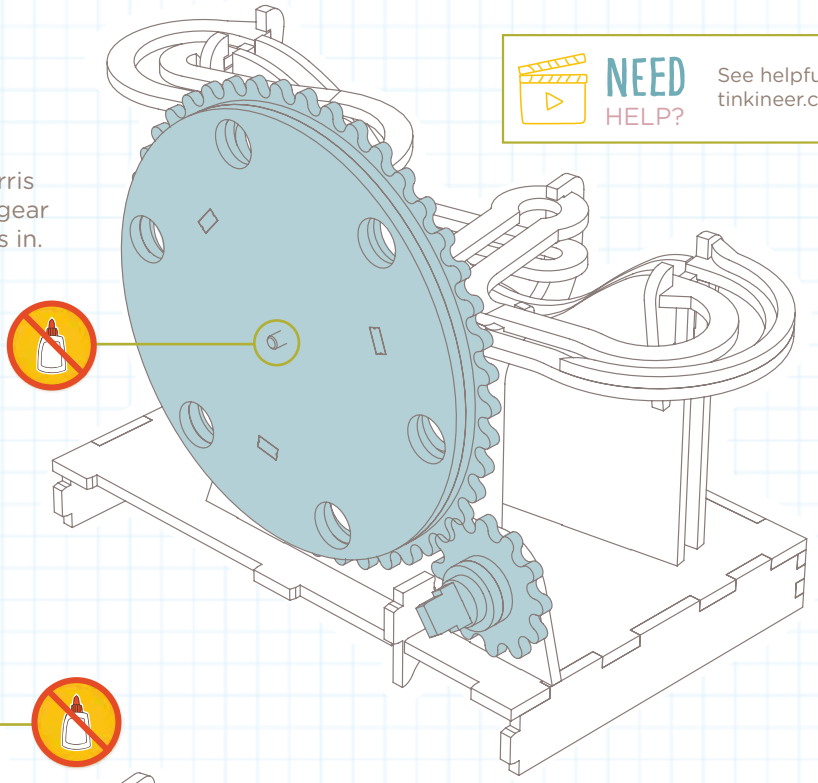
No glue is required for this step – the axle fit is designed to be a little tight so that you have to press it into place. Here's how:

Align the center hole in your completed Ferris wheel over the large hole in the rear Ferris bracket. The Ferris bracket forms a spacer so that when you press your axle in, it protrudes the same amount on both sides. Ready? Use the flat side of your square tool to press the axle down until it hits your work surface. Thunk!

STEP 7

INSTALL GEARS

Without glue, install your Ferris wheel and pinion gear. The gear side of the Ferris wheel faces in.



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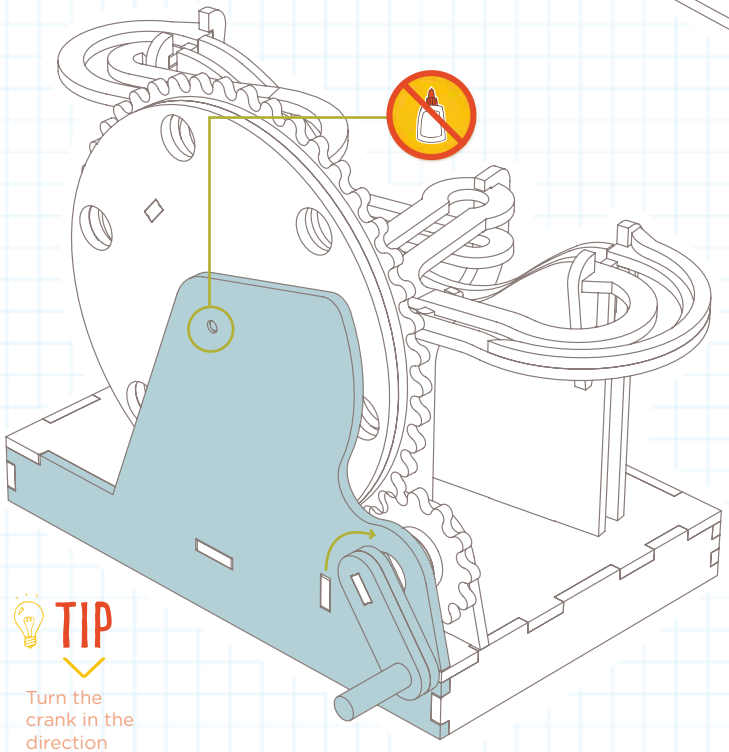


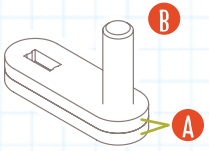
TIP

Turn the crank in the direction indicated.

STEP 8

COMPLETE ASSEMBLY

Assemble the two halves of your crank arm (A) and lay it flat on your work surface. Dab the handle (B) in some glue and press it into the crank arm – check square and set aside.



Meanwhile, without glue, trial fit the rear Ferris bracket. Test the operation of your gear train by twisting the exposed wooden shaft with your fingers – the gears should rotate freely. When everything looks good, add glue.

Finally, glue your crank arm assembly in place and make sure it's square while it dries.

Congrats! You're ready to roll!

WHERE TO FROM HERE?

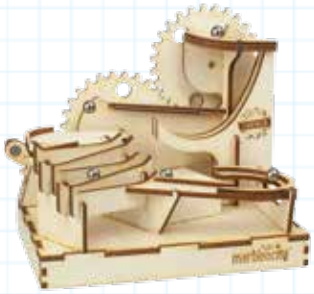
CONGRATULATIONS!

You've just built a complex, three-dimensional marble machine out of flat wooden parts and learned some physics in the process. Nice work!

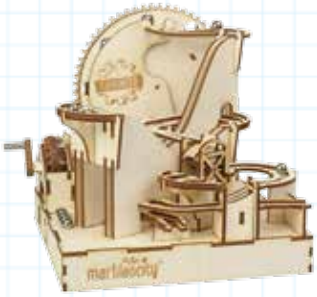
TELL US ABOUT IT! SHOW US!

We hope you enjoyed building/making with us. We'd love to see your Marbleocity Mini Coaster. Did you decorate your model? Where did you put it?

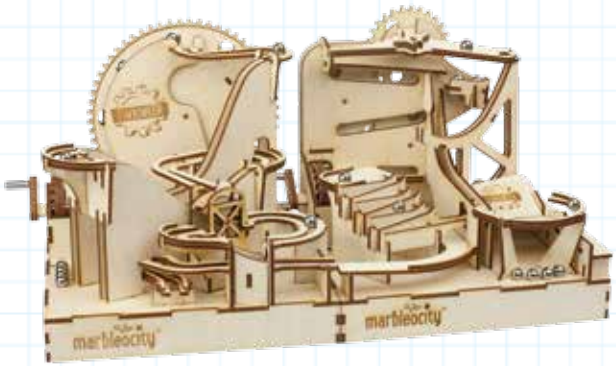
Share your photos and comments on our Tinkineer Facebook page and Instagram feed. Tag us @tinkineer. Or contact us directly at www.tinkineer.com/community.



Good news, there are more kits available in the Marbleocity line. They come in two sizes. The model you just built is from our "Mini" series. Each kit takes 1-2 hours to construct. You can build these in any order but the next one in the series is called the Mini Skate Park.



Ready for something ... bigger? The full-size Marbleocity kits are more challenging and are designed for the intermediate maker. Each one is designed to be completed in five, one-hour sessions. It's a great project to complete together with a parent.



What's even cooler is that the large models interconnect! Any large model will work as a stand-alone marble machine but if you have more than one, you can link them up ... passing marbles between the modules to build an expanding marble empire!

VISIT TINKINEER.COM/PRODUCTS TO LEARN MORE. WE'LL SEE YOU THERE!

EVERYONE
IS A TINKINEER
LEARNING
IS THE BEST!
BUILD FUN
CUT IT,
TRIM IT,
GLUE IT,
MAKE IT.
MAKERS HAVE
MORE FUN
PSSST
HE'S A TOTAL
SMARTY PANTS
ADVENTURE
AWAITS!
{ LET'S EXPLORE }

⚠ WARNING:

CHOKING HAZARD.

Kit contains marbles and small parts.

Not for children under 3 years old.

tinkineer.com

Printed in the United States of America.