

GO-CART



STEP-BY-STEP INSTRUCTION MANUAL



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Designed and Built by Kevin Ayer

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Go-Cart: You Will Need



Photograph by Peter N. Fox

MATERIALS:

- 1½-inch diameter wood closet rod (at least 4 feet long)
- 2 (8-foot-long) 2 by 4 spruce studs
- ½-inch AC/sanded plywood, half sheet (24 by 48 inches)
- Lawn mower replacement wheels with ½-inch hubs (with ball bearings), two (10-inch) for the back and two (8-inch) for the front (we used Power Care brand)
- 4 hex-style wheel bolts that fit a ½-inch bore wheel hub (generally sold to go with the replacement wheels)*
- 4 (2- by 4-inch) angle brackets (we used Simpson brand, model #A24)
- 20 (2½-inch) coarse thread drywall screws
- 40 (1⅝-inch) coarse thread drywall screws
- 24 (1¼-inch) pan head screws
- ⅜-inch hex bolt (6 inches long)
- ⅜-inch hex bolt (3½ inches long)
- 10 (⅜-inch) flat washers
- 4 (½-inch) flat washers
- 6 (⅜-inch) lock nuts
- 6 (#4, or ¼- by 2½-inch) eye bolts with wood threads
- ½-inch galvanized pipe fittings: 2 flanges and a 3-inch nipple with threaded ends
- Lubricating oil
- 2 (7-foot-long) ⅜-inch braided ropes
- Paint and paintbrushes
- Boat floatation cushion with straps
- 18-inch bungee cord

* If you can't find packaged bolts that go with the wheels, you'll need 4 (⅜-inch) hex bolts with a collar, 2½ inches long.

TOOLS:

- Tape measure
- Carpenter's square
- Pencil
- Eye and hearing protection
- Dust mask
- Work gloves
- Jigsaw
- Circular saw (if you don't have one, a jigsaw will suffice)
- ⅜-inch power drill
- Drill bits
 - Spade style: 1½-inch and ⅞-inch
 - Twist syle: ⅝³²-inch, ⅜¹⁶-inch, ⅜⁸-inch, and ½-inch
- Phillips power driver
- 2 (⅝¹⁶-inch) wrenches (or 2 adjustables)
- ¾-inch wrench (or adjustable)
- Screwdriver
- 100 grit sandpaper
- File
- Utility knife
- Coffee can or paint can (for tracing)



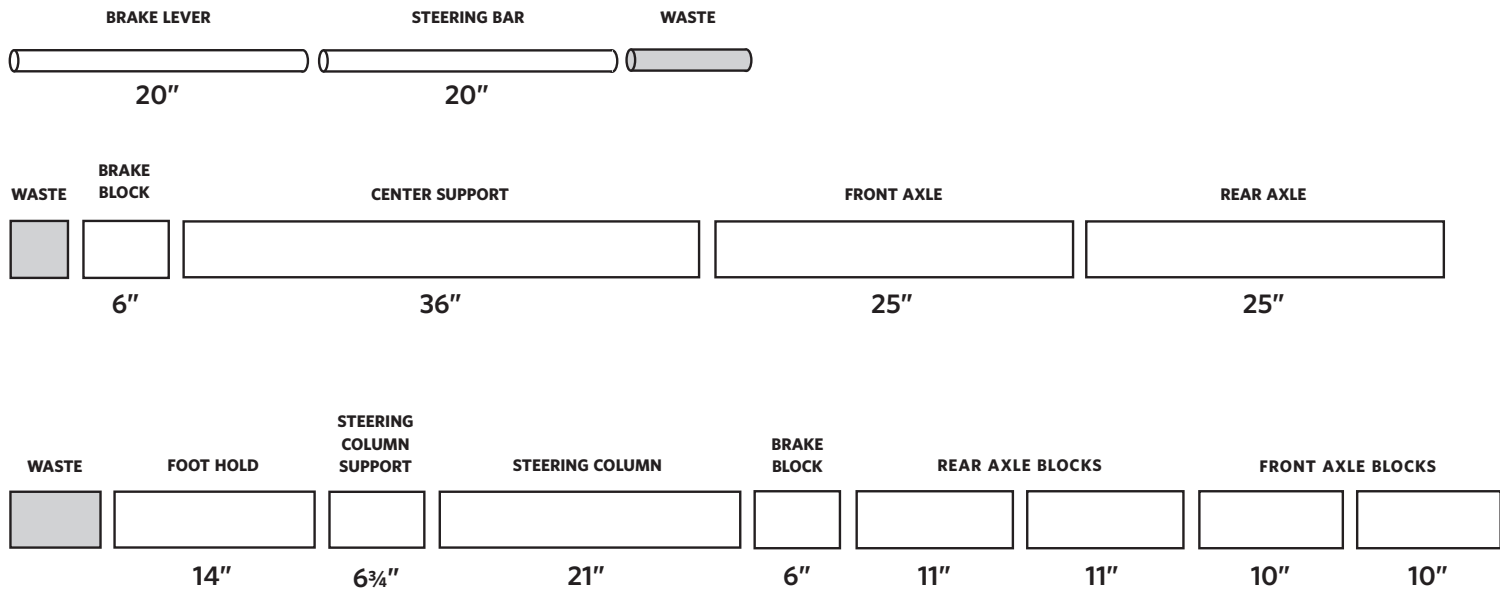
Photograph by Kevin Ayer



Go-Cart: Cutting Directions

FIGURE 1

Cut the **closet rod** and the **2 by 4 spruce studs**, as shown.

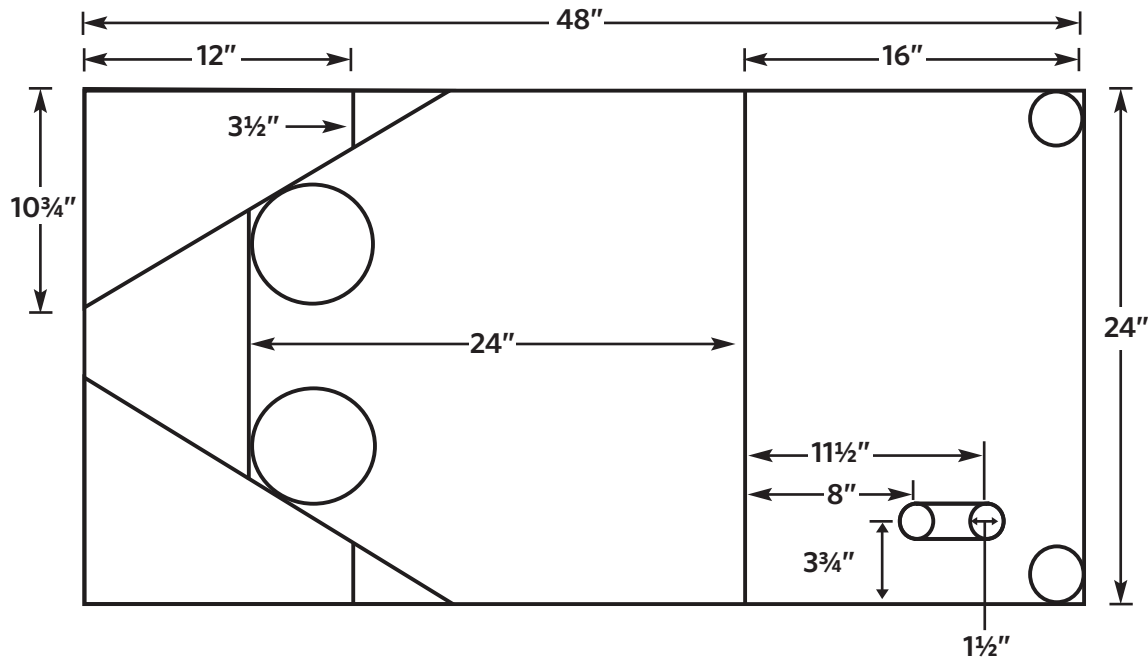
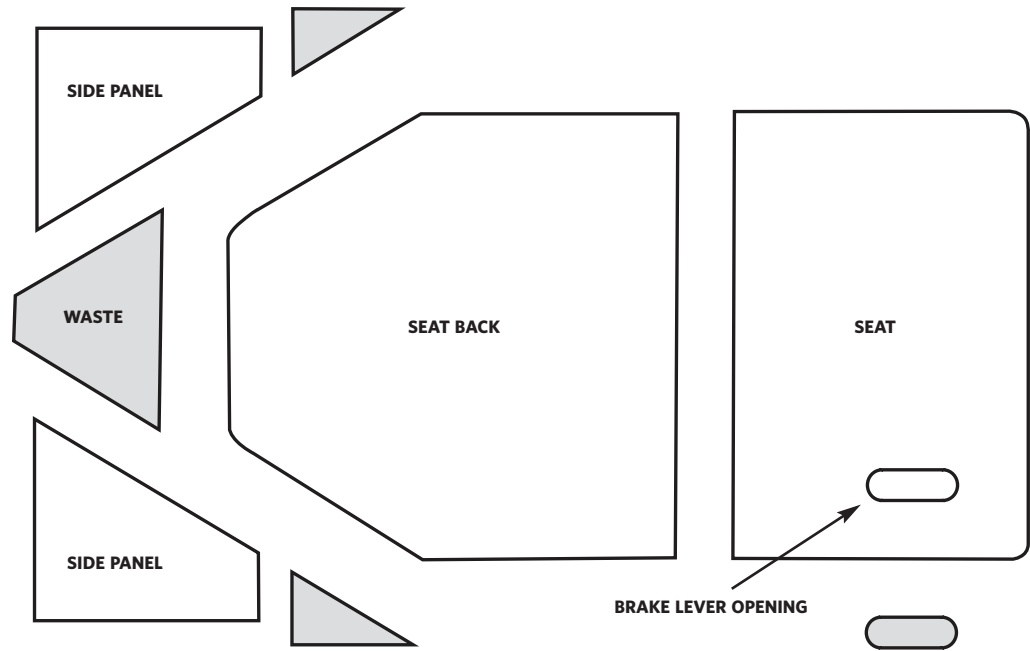




Go-Cart: Cutting Directions

FIGURE 2

Cut the **plywood** as shown. To round the corners on the seat pieces, use a **pipe flange** and a large **coffee or paint can** to trace circles as shown, then use the jigsaw to cut around the outer curves (see **Figures A and B**). To make the brake lever opening in the seat, drill $1\frac{1}{2}$ -inch-wide holes through the wood, as shown, and then use the jigsaw to cut out the wood between the holes.



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Go-Cart: Drilling Directions

FIGURE 3A

Use the $\frac{3}{8}$ -inch twist bit to drill one hole through each of the **brake blocks** (3 inches from one end and $1\frac{3}{4}$ inches from the side edge) and through the **brake lever** ($7\frac{1}{4}$ inches from the bottom).

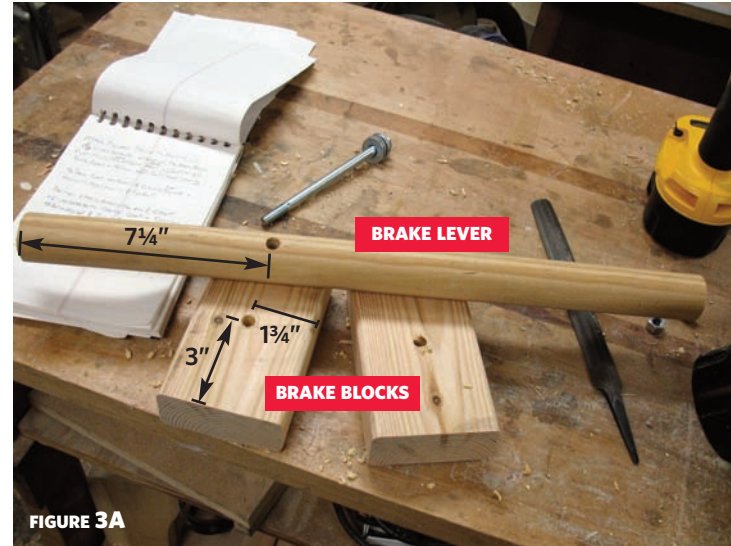


FIGURE 3A

FIGURE 3B

Using the same $\frac{3}{8}$ -inch bit, drill a hole centered on the **steering column** $1\frac{3}{4}$ inches from the top. Then slowly drill a $\frac{3}{8}$ -inch hole through the center of the **steering bar** (as shown in Figure 4).



FIGURE 3B

FIGURE 4

Using the $\frac{1}{2}$ -inch twist bit, slowly drill holes $1\frac{1}{2}$ inches in from each end of the **steering bar**, positioning them at a 90 degree angle to the center hole. To help index the angle, insert a bolt or drill bit in the center hole of the steering bar, and make sure it is parallel with your work surface.

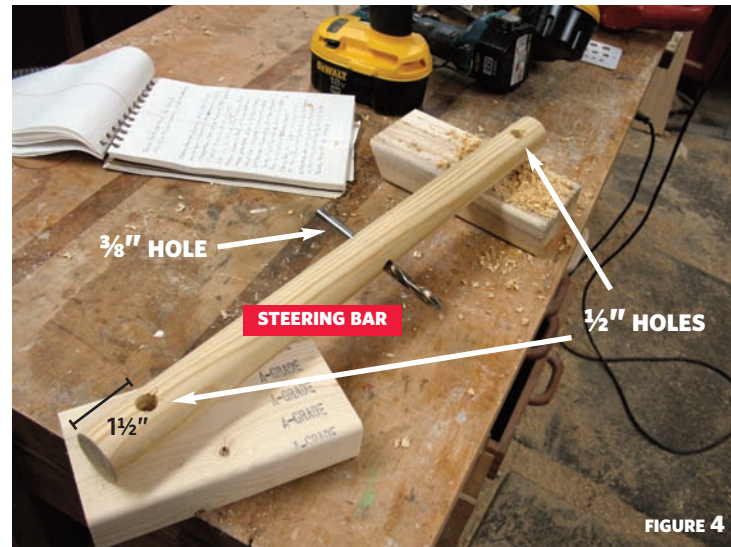


FIGURE 4

Drilling Tip:

Place a wood block underneath the piece you are drilling to prevent blow-out splinters and to protect your work surface.



Go-Cart: Drilling Directions

Go-Cart: Piece Assembly

FIGURE 5

Create countersunk pivot holes for fitting the **pipe flanges** onto the **front axle**. First, mark a point on the top of the **center support** $1\frac{3}{4}$ inches from the front end and $1\frac{3}{4}$ inches from the edge. Use the **$1\frac{1}{2}$ -inch spade bit** to drill a $\frac{3}{8}$ -inch-deep hole at the mark. Drill a matching countersunk hole on the underside of the axle $12\frac{1}{2}$ inches from the end and $1\frac{3}{4}$ inches from the edge. Then, use the **$\frac{7}{8}$ -inch spade bit** to drill through the center of each of the $1\frac{1}{2}$ -inch-wide holes, this time going all the way through the wood.

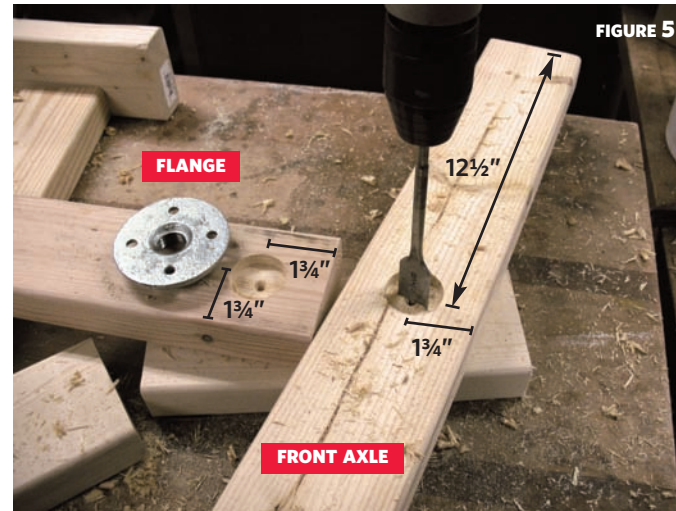


FIGURE 6

Thread the 3-inch **pipe nipple** into one of the $\frac{1}{2}$ -inch **flanges** (first applying a few drops of lubricating oil to the threaded ends), and then insert the nipple through the countersunk hole in the **center support**. Attach the flange to the center support using four $1\frac{1}{4}$ -inch **pan head screws**.

Assembly Tip:
Pre-drill all the screw holes.





Go-Cart: Piece Assembly



Photograph by Peter N. Fox

FIGURE 7

Unscrew the **nipple** from the attached **flange** and thread it into the second **flange**. Insert the nipple up through the countersunk hole on the bottom of the **front axle**, flip the axle over, and attach the flange, again using four 1¼-inch pan head screws.



FIGURE 8

Next, thread the free end of the **nipple** into the first **flange**, turning the **axle** to tighten the connection until there is about ⅜-inch between the **center support** and the **front axle**, and the pieces pivot freely.





Go-Cart: Piece Assembly



FIGURE 9

To assemble the go-cart frame, first use three **2½-inch drywall screws** to attach the back end of the **center support** to the center of the **rear axle**, positioning it so that the end of the support extends $\frac{1}{4}$ inch past the back edge of the axle. Then use drywall screws to attach the **rear axle blocks** to the top of the rear axle, positioning them so that they overhang the back edge by $\frac{1}{4}$ inch just as the center support does. They should also extend $\frac{1}{4}$ inch over the ends of the axles where the wheels will go. (**Note:** Overhanging these pieces will help to better support the seat back and the wheels when you attach them later).

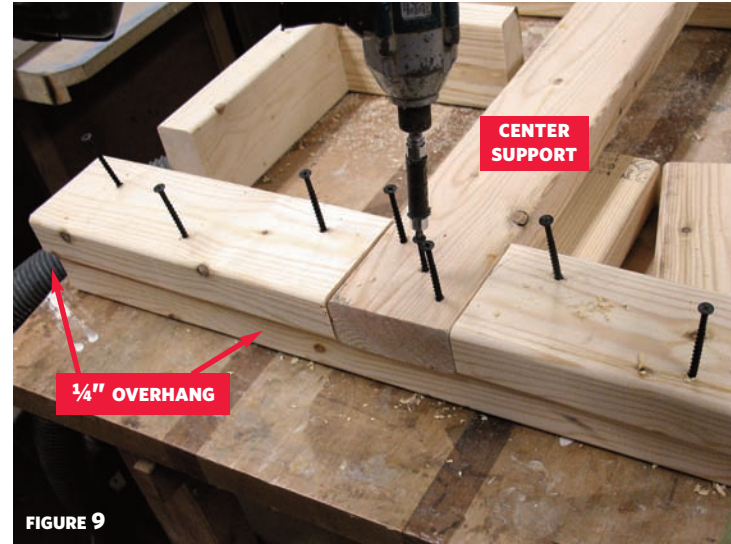


FIGURE 9

FIGURE 10

Attach the **front axle blocks** next, overhanging them $\frac{1}{4}$ inch past the wheel ends of the axle but keeping them flush with the long edges. (**Note:** while one end of each front block supports the wheels, the other end helps control the steering by acting as a stop that prevents the axle from turning too far.)

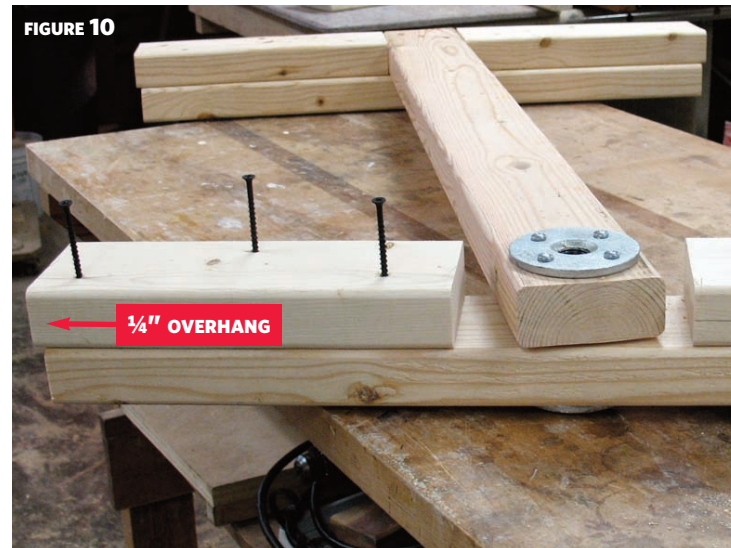


FIGURE 10



Go-Cart: Piece Assembly



FIGURE 11

Now it's time to attach the **wheels** to the **axles** (the larger ones to the back, the smaller to the front). To create the assembly for each one, use a screwdriver to remove the small plastic hub in the center of the wheel rim. Then, thread a **metal collar** on a **wheel bolt**, leaving about $\frac{1}{2}$ inch of bolt threads exposed between the head of the bolt and the collar. Insert the bolt through the $\frac{1}{2}$ -inch hole on the smaller face of an **angle bracket** as shown.

Slide a $\frac{1}{2}$ -inch **washer** onto the bolt and insert the bolt through the center of the wheel. Slide on a $\frac{3}{8}$ -inch **washer**, then screw on a $\frac{3}{8}$ -inch **lock nut**, tightening it until the assembly is snug but the wheel still spins freely.

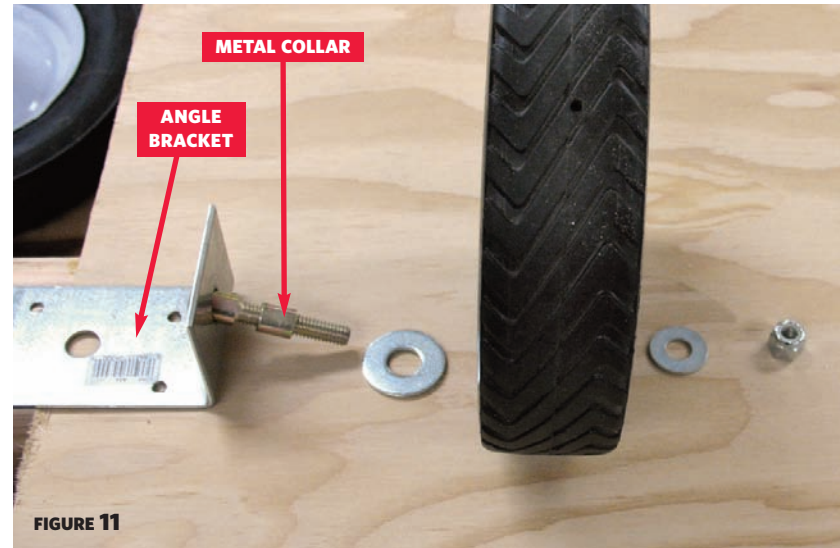


FIGURE 11

FIGURE 12 (A & B)

Use four $1\frac{1}{4}$ -inch **pan head screws** to attach the **wheel brackets** to the underside of the **axle ends**.

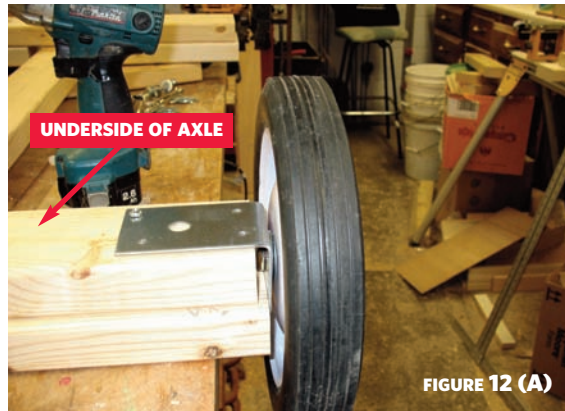


FIGURE 12 (A)

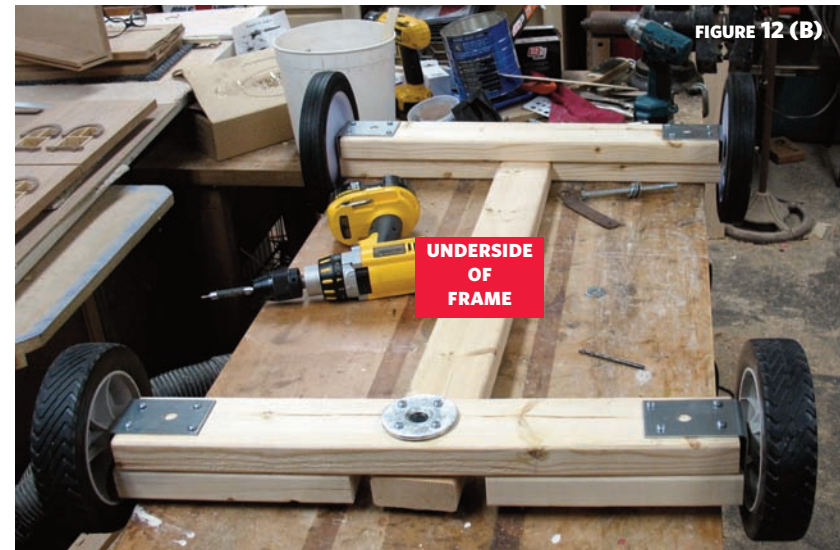


FIGURE 12 (B)



Go-Cart: Piece Assembly



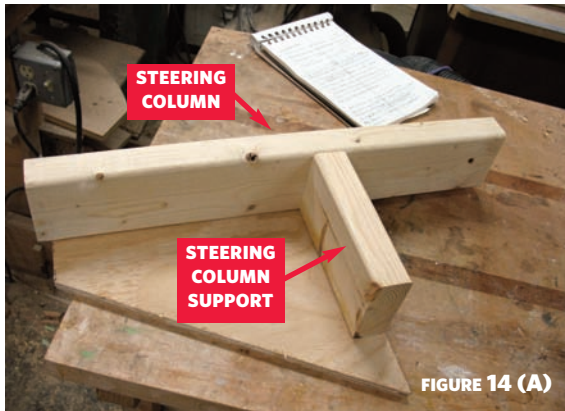
FIGURE 13

Mark the **steering column** 9 inches from the top. Butt the **steering column support** up against the **steering column**, centering it on the mark. Use two **2½-inch drywall screws** to secure the two pieces together.



FIGURE 14 (A & B)

Using eight **1½-inch drywall screws**, attach the **steering column side panels**, lining the edges up with the top of the **steering column** and the side of the **steering column support**, as shown.



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Go-Cart: Piece Assembly



FIGURE 15

Attach the remaining plywood parts to the frame with 1 $\frac{5}{8}$ -inch drywall screws. Start with the **seat back**, lining up the bottom edge with the bottom of the rear **axle**, and screw into both the axle and the **axle blocks**. Next, set the **seat** on the frame, butting it up against the seat back, and screw it to the axle blocks and the **center support**.

Position the **steering column assembly** on top of the center support, butting it up against the seat. Fasten it in place by screwing through the plywood into the center support on both sides.

FIGURE 15



FIGURE 16

Attach the **steering bar** to the top of the steering column with a $\frac{3}{8}$ - by 3 $\frac{1}{2}$ -inch bolt, sandwiching $\frac{3}{8}$ -inch washers between all pieces. Thread a $\frac{3}{8}$ -inch lock nut onto the end of the bolt and tighten it until it's snug but still allows the bar to pivot.

FIGURE 16



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Go-Cart: Piece Assembly



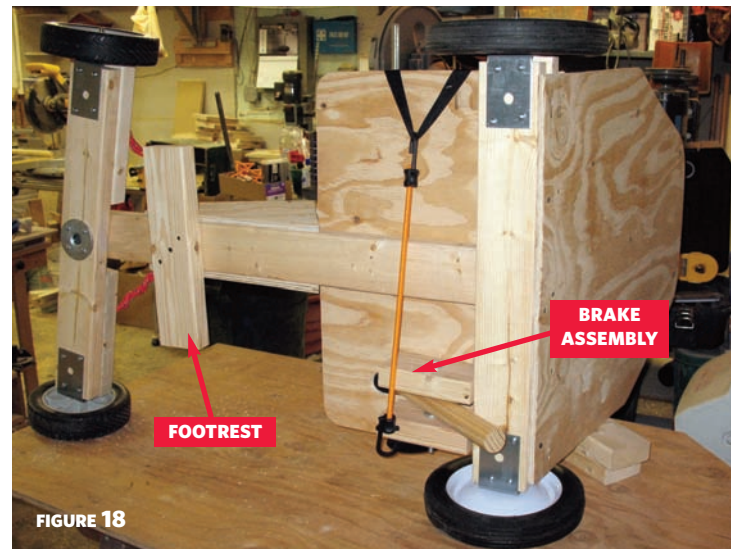
FIGURE 17

Assemble the brake by slipping a $\frac{3}{8}$ -inch washer onto a $\frac{3}{8}$ - by 6-inch bolt and then inserting the bolt through one of the previously drilled brake blocks, two $\frac{3}{8}$ -inch washers, the brake lever, two more $\frac{3}{8}$ -inch washers, the second brake block, and one more $\frac{3}{8}$ -inch washer. Finally, screw on a $\frac{3}{8}$ -inch lock nut and turn it until it's snug but still allows the lever to pivot.

Thread the long end of the brake lever through the slot in the seat from the bottom, angling it toward the front of the go-cart. Butt the brake blocks up against the rear axle and use $1\frac{1}{2}$ -inch drywall screws to fasten them in place, screwing down through the seat top. Make sure the brake lever is centered in the hole so that it can operate freely.

FIGURE 18

Turn the go cart on its side and, using three $2\frac{1}{2}$ -inch drywall screws, attach the footrest to the underside of the center support about 5 inches back from and parallel to the front axle. Attach the seat cushion, too, looping one of the handles over the brake lever on the seat and using the bungee cord to connect the strap handles under the go cart. In this position, the bungee cord serves to hold the brake lever up when it's not in use.



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Go-Cart: Finishing Touches

FIGURE 19

Sand and paint the go-cart, if you like. Then complete the steering assembly. Start by drilling $\frac{3}{16}$ -inch holes in the **steering column** and **axle** where shown. Screw **eye bolts** into the holes. (**Tip:** to tighten them, insert the shaft of a screwdriver through the eye bolt and twist.)

Next, connect the **steering bar** to the **front axle** using the **7-foot lengths of rope**. Tie an overhand knot in the end of one length and thread the other end through one of the holes in the steering bar and then through the eyebolts on the same side of the steering column and the front axle. Do the same with the second length of rope on the opposite side of the steering assembly.

Now make sure the front axle and steering bar are parallel. Pull each rope taut and knot it around the axle eyebolt. Trim the rope ends, leaving a little excess so you can retie them if they loosen. Now you're ready to roll!

SAFE DRIVING PRECAUTIONS

As with all vehicles, this go-cart requires routine maintenance and should be driven with caution. Regularly check the nuts and bolts and the steering ropes to make sure they're sufficiently tight. And keep an eye on the brake — you'll want to replace the lever when the bottom becomes worn.

FIGURE 19

