

BW Derby Car Step By Step Instructions.

1. Cut (1) 2 X 4 at 52" for main frame.
2. Cut (2) 2 X 4's at 28" for axles.
3. Cut (2) 2" 2 X 4 pieces for the steering blocks.
4. Make an "X" on each end of each axle and drill a hole at the intersection of each "X."
5. Drill 6" deep using an electric drill (5/16" wood bit works well). Drill the hole as straight as possible in the axles.
 - **Pro Tip:** Every hole drilled on this car needs to be as straight as possible, 90 degrees, to the surface. This will ensure smooth steering and alignment of the car.
6. On front axle 2 X 4, measure 2" from each end and drill a hole large enough for your rope on each end near the back of the board for the steering rope. Or drill a hole appropriate for the size of your rope to fit through.
7. Drill a 3/8" hole at center of the front axle 2 X 4. This is for the steering pivot bolt.
8. At front of main frame 2 X 4, drill a 3/8" hole (in the center 1-5/8" from the front end of the board.) This is the front axle pivot bolt hole.
9. Attach the front axle to frame using a 3/8" X 4" hex bolt, 4 washers, and a locking nut. (Tighten enough to allow steering). Re-Tighten after a few test rides.
10. Attach the (2) 2 X 4 steering blocks to front axle 1/8" out from the main frame on both sides. Use glue and (8) #8 X 2.5" screws. **A gap of 1/8" must be met. This will allow a proper steering tolerance for safe driving and must be met to pass technical and safety inspection.**
 - **Pro Tip:** Any time 2 pieces of wood are joined together, pre-drill the wood piece that the screw will start in. Pre-Drilling simply means drilling a hole large enough for the screw to pass through. This prevents the screw threads from pushing the pieces apart and creates a secure bond.
11. Align back axle 2 X 4 at right angle to the main frame 2 X 4 all the way to the rear of the main frame board. Clamp if possible. Drill (2) 3/8" holes through axle and main frame while clamped together.
12. Attach main frame to back axle using (2) 3/8" Hex bolts, (4) 3/8" washers, and (2) 3/8" locking nuts. Apply glue between them before final tightening and alignment. It is critical that the rear axle be at a 90 deg angle to the mainframe for the car to drive straight easily.
13. Cut out seat (10" X 20") from plywood.
14. Cut out back rest (8" X 20") from plywood.
15. Sand Edges of seat and backrest to prevent splinters.
16. Cut one 2 X 4 to 12"-14" in length for back rest support. (Angle the bottom cut about 5 degrees if possible).
17. Attach back rest support, leaning toward the rear, to main frame using glue and 2 screws (#8 2- 1/2") at an angle. Pre-drill the backrest 2x4 to start the screws perpendicular to the main frame easily.
 - The position of this support depends on height of the driver, have driver sit on 2 X 4 frame to estimate a comfortable position from the front axle. Legs should have a comfortable bend when seated.

18. Cut out 2 triangular shaped pieces of plywood from the remaining 12" length of plywood. See photos for example. The pieces should be flush with the back rest support and the bottom of the main frame.
19. Attach triangular pieces to both sides of the backrest support and main frame with glue and screws (#6 1-1/2"). Pre-drill the plywood holes.
20. Attach seat and back rest using glue and screws (#6 ... 1-1/2").
21. For the brake, cut 2 X 2 surveyors' stake to 14-16" at an angle appropriate to be parallel with the ground.
22. Drill a 3/8" hole through stake at the point it will meet main frame when the stake is touching the ground at an angle.
 - See photos of other builds for this concept.
 - **This is a critical safety factor for stopping the car at the bottom of the hill this part must pass technical inspection.**
23. Cover end with rubber using screws.
24. Drill hole 5/16" into main frame at point to attach brake. Mount brake using 3/8" X 4" lag screw and washer to side of main frame.
 - Brake should be tight enough to stay in up position but easily movable.
25. Attach seat belt with two 3/8" lag bolts. Predrill holes with 5/16" drill bit. Offset the bolts from each other 1" to avoid contacting each other in the main frame.
26. Attach 6-7' of 1/4" rope to front axle. Push rope through the top of the axle and tie knots to prevent the rope from coming through when pulled hard. Cut any excess rope from the end of the knots.
27. Place washers on both sides of the wheel and attach using the 3/8" X 4.5" lag screws.
 - Tighten until wheel slows slightly while spinning. Then loosen bolt just enough for the wheel to spin freely

Cubmobile Blueprints:

