Step-by-Step Instructions
Building the Car

Choose Your Design

- Decide if the *design* is more important to you or if *speed* is more important
- If you need ideas, look through the books, the Internet, etc.
- Chose a template if you can (we can help with this)
- Once you have your idea, draw it on the blank template

Key to Speed

- Weight
  - Winning cars generally weigh the maximum 5.0 ounces
  - The weight should be concentrated as far back as possible.
- Aerodynamic Shape
  - Aerodynamic drag is very small, but if you want to reduce all possible sources of friction, then choose a streamlined shape.

Key to Cool Designs

- Originality
  - Be creative and use your imagination! Your car does not need to look like a car; you can make it into whatever you want, as long as it is within the size limits.

Shaping the Car

- Put the design on paper first, then cut out the design and transfer it to the wood block.
- The Scouts can use a hand coping saw
- Parent (or other adult) can use the power scroll saw, Dremel tool, etc.

Weights

- You will need to supply your own weights
- There are several different types of weights that you can choose from
- Decide where you want your weights to go (in general, weight placed just behind the rear axle and higher makes the cars faster)
- The Dremel tool can cut out the body weights easily
- An adult can use the drill press to cut holes for round weights

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Sanding

- Once the car is cut out, fill any gouges or divots with wood putty.
- Sand your car as much as you want. In general, the smoother it is the better.
- Use finer and finer grit sandpaper to remove all visible scratches.

Wheel Preparation

- *You should not install the wheels and axles until you are all done with everything else*
- Wheels must be obtained directly from Official Pinewood Derby Car Kits #17006 or #17000 or Official Pinewood Derby Wheels and Axles #17553 thru #17557.
- No modification of wheels will be allowed, except that burrs or excess plastic from the factory molding process (if any) may be removed or sanded.
- Wheels must be original width thickness and height and the tread surface must remain flat so that the whole tire surface can simultaneously meet the track surface.
- Tapering or coning of the outside surface of the wheel hub is allowed.
- Wheels may not be shaved.

Axle Preparation

- Polish your axles. Friction is the enemy. Less friction = faster car. Smoother is better.
- Most axles from the kits are not straight. Straighter axles will make a car run straighter.
- An axle press is very simple to use and it is something even the youngest Scouts can do (with proper supervision).
- Gluing the axles in the car is not recommended. If you need to change wheels or axles, glued axles tend to lead to a broken car and an upset Scout.
- Remove the ridges on your axles—sand them using progressively finer sandpaper and ending with steel wool
- Straighten your axles with the axle jig
- Flatten the nail head on your axles using the axle jig
- Use a light lubricant like graphite on the axles.

Extras

- You may want to add extra pieces for looks (e.g., fins, miniature people, etc.) Decide if you are adding these before you paint or after you paint.
- Keep in mind the official rules for the length of the car and the width of the car; it has to fit on the track and it cannot be too long
- Make sure that all pieces are secure so that they do not come off during the race
- Add your car number and other decals or attachments carefully after finishing

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Painting

- Paint the car (you will need to supply your own paint)
- Avoid getting any paint in the axle holes!
- After the paint dries, you will want to bring your car, wheels, and axles to be weighed and determine how much weight (if any) you need to add or subtract to your car. At this time you can install the weights and screw or glue them in place. You do not want the weights to come flying off during the race.
- Apply a clear coat of lacquer or use wax to give your car a nice shiny appearance.

Wheel and Axle Assembly

- Put graphite on all axles where the wheels spin
- Only graphite is allowed – see the official rules
- Use the jig to help align the wheels and give you the proper spacing between the car body and the wheel.

- Line up axle tool ridge into the car's axle slot
- The spacer rests on the car
- This keeps the wheels the proper distance from the car body

- Set wheel/axle in place

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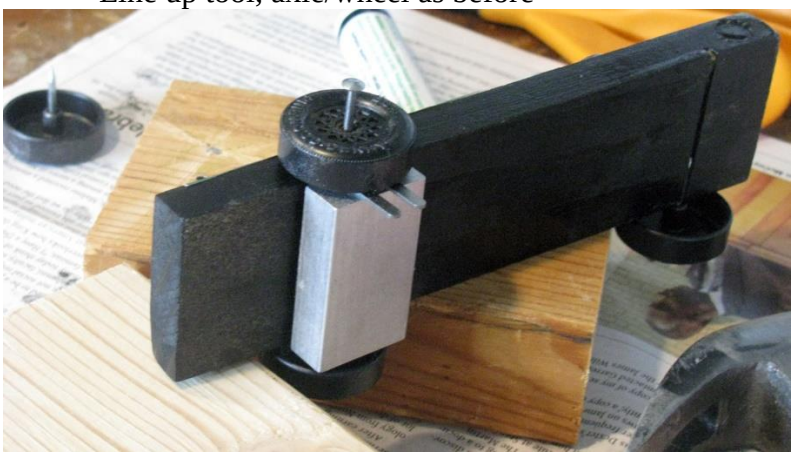
- Gently tap axle into position
- Keep pressure on axle alignment tool.
- Try to hit only the nail and not your wheel

- Do both wheels on the same side of the car
- When you do the last two wheels, use blocking so that there is no pressure on the first two wheels
- Line up tool, axle/wheel as before



- All of your wheels must touch the judging table at the same time, and all four wheels should spin at the same rate
    - Three wheels is faster than four, but is against the rules
- If one doesn't, *gently* bend wheel/axle down and recheck

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Final Work

- Do a final weight check with your assembled car
- Double-check to make sure that it meets all official rules.
- Take a photo of your car if you would like
- We will have supplies to help you make minor adjustments to the weight of your car on race day
- You should also apply a new coat of graphite just prior to the race

Supplies

- Official Pinewood Derby supplies can be purchased from the Scout Shop
- Lowes often has a selection of Pinewood Derby supplies