

77 Tips to Help You Build a Fast Pinewood Derby Car

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Weights

- Weights should be added to the back of the car for the most speed so keep this in mind when designing your car's shape.
- When your car is completed, it should balance 1" to 1 1/2" in front of the rear axle. Position the weights to adjust the car's balance. To check the balance, place a pencil across the car and move it forward and back until the car balances on it.
- If you will be racing on a rough or uneven track, place the weights low on the car. Also, place the weights so that the car balances about 2 inches in front of the rear axle.
- Use easily removable weights such as screws and washers to put your car slightly over 5 oz. then remove what you need to at the weigh in.
- Use Wood putty to seal the weights in a car. If you are in a hurry, use wax from a candle. It is just as strong and sets faster.
- Try to place all of your weights in a single area on the car. This will lower the car's turning inertia.

If you mount weights on the bottom of the car, make sure that your car still has at least 3/8" clearance between the lowest part of the weight and the track. Our Bottom Weights are only 1/16" thick so they can be added to your car without interfering with the clearance. Learn more about our Bottom Weights at <https://www.abc-pinewood-derby.com/bottom-weight.php>

- If you use lead weights, always insert them in the car and seal with wood putty to avoid exposure by anyone handling the car. Use gloves when handling the lead weights and wash your hands when you are done.
- If you do not have an accurate scale to weigh your car, use this technique to adjust your car's weight at the weigh-in. Drill a hole in the back or bottom of your car. Fill the hole with BBs or other weight. Plug the hole with Handi-Tak. Handi-Tak is a clay like adhesive that can be found in the office or school supplies sections of most department stores. If the car is overweight at the weigh-in, just remove the Handi-Tak and pull out a BB then replace the Handi-Tak and have your car reweighed.
- Small Nails can be used to add weight to cars that are slightly under the 5 oz limit. Use brad nails or finishing nails with the small heads. Pound the nails into the back of the car to lessen the chance of splitting. You can also pound the nails into the side or bottom of the car but it is best to drill a pilot hole first to prevent splitting. If you are inserting the nails into the back of the car make sure that the nail is flush with the block so that you don't make the car longer.

Wheels

- Your pinewood derby car will be faster if only three wheels touch the track. There is less friction with 3 wheels rolling than 4. Raise a front wheel by 1/16 inch. Use the slowest wheel/axle combination as the raised wheel. Some race rules require that all four wheels touch the track so check your rules before using this tip.
- Break in your wheels by filling the wheel hole with graphite, insert an axle in the wheel then spin the wheel by hand for about 30 seconds. Full instructions for adding graphite to your wheels can be found at <https://www.abc-pinewood-derby.com/basic-guide.php>
- Don't spin your wheels too much before the race. Wheels start to wear out after about 20 races.
- Polish the inside of the wheel hole by rubbing some graphite on a pipe cleaner then run the pipe cleaner through the wheel hole several times. For a super smooth finish, our hub

polisher includes plastic polish, pipe cleaners and drill attachment. Learn more about our Hub Polisher at <https://www.abc-pinewood-derby.com/bore-polisher.php>

- Wheel vibration will slow your pinewood derby car down. Make sure that the outside of your wheel (the part that touches the track) is as smooth as possible and that your wheel is as round as possible.
- Check your wheels for roundness before you attach them to your Pinewood Derby car by rolling them, one at a time, on a table top. They should roll straight and smoothly with little or no wobble. Replace any wheels that wobble or don't roll straight.
- Fast pinewood derby cars have light wheels. Trim as much weight from your wheels as possible (but keep the wheel balanced) without violating your race rules. We have wheels that have been lightened on a lathe. Learn more about our wheels at <https://www.abc-pinewood-derby.com/wheels.php>
- Some Pinewood Derby wheels are faster than others. Buy several sets of wheels and spin each wheel on an axle. Use the wheels that spin the longest.
- Improve the looks of your wheels by painting the spokes with a silver, white or red marker. It is very easy just rub the marker on the outside of the spokes.
- Place the best wheels in the back of your pinewood derby car. Your car is heavier in the back so the rear wheels generate more friction.
- If it is too late to replace a bad wheel, move that wheel to the front of the car and raise it 1/16 inch so it doesn't touch the track. Check your rules first to make sure that raised wheels are allowed.
- Most tracks have a center guide rail but some do not. If your track does not have a raised section that the car straddles, then you can improve your car's speed by sanding smooth the outer part of the wheels that come in contact with the sides of the track. This will involve removing the lettering from the outside of the wheel. If your rules don't allow removing the lettering, then sand the lettering as smooth as possible without removing it.

Alignment

- It is important that your car run straight. Our Rail Rider tool is one of the easiest ways to adjust your axles for a straight running car. You can learn more about our Rail Rider at <https://www.abc-pinewood-derby.com/rail-rider.php>.
- After installing the wheels and axles, roll the car on a flat surface. The car should roll 8 to 10 feet without turning more than 6 inches from straight. If the car does not run straight, you will need to adjust your front axles.
- Most pinewood derby cars will fishtail to some extent as they go down the track. Fishtailing slows the car down by increasing friction when the wheels touch the center guide rail. One way to reduce friction is to sand the front of the car so that the wheels on the front are slightly closer together (about 1/32" on each side). Then as the car goes down the track, only the front wheels will touch the center guide rail.
- Improper wheel alignment is one of the most common reasons that your pinewood derby car is running slow. If your car drifts to the side, the wheels will rub against the center guide rail and slow your car. To minimize this, make sure that your axles are aligned so that your car will run as straight as possible.
- If your pinewood derby car doesn't roll straight, the first thing to check is dirt on the wheels. A small piece of dirt on the tread area can cause a car to turn. Clean the tread area (the flat part of the wheel that touches the track) with a dry clean cloth then test your car again.

Car Design

- Design your pinewood derby car so that the axle groove closest to the end of the car block is the rear axle. This will make your car more stable when you add weights to the back.

- Air drag is a very minor factor in your Pinewood Derby car's speed. Friction from the wheels and axles easily overwhelm the small amount of air drag. Select a design that you like rather than one with low drag.
- The front of your pinewood derby car should be at least 1/2" wide to make sure that it rests against the starting pin correctly and will trip the timing trigger at the end of the track.
- If you know that you are going to be up against some very fast cars, focus on one of the workmanship or design prizes. Building a good looking car with a creative design can be more fun than making a fast car.
- Know the rules for your pinewood race before you start building your car. Most have rules that limit what you can and cannot do to your car.
- Save the clear molded plastic that is part of the packaging for small products. They are a variety of shapes and can be used for cockpits, cowling and so on.
- If your rules don't specify the distance between the axles and the end of the car, cut 3/8" from the back of the block and glue it to the front of the block. This will shift your wheelbase to the rear and will make your car more stable. Do not cut any more than 3/8". You do not want the wheels to extend past the end of the block. Design the car so that the front has little wood. Add as much weight as you can to the rear of the car.

Car Building

- Use a final gloss clear paint coat to give your car an extra shine. Some people use car wax but clear paint gives better results.
- If your rules allow it, extend the wheelbase of your car. This will make your car more stable and allow you to put more of the weights in the rear of the car. Move the wheelbase so that the wheel edge is even with the end of the block. (Don't go further or your car will exceed the 7" maximum length.) Our Body Tool can be used to drill new axle holes. Learn more about our Body Tool at <https://www.abc-pinewood-derby.com/body-tool.php>
- Paint the first one inch of the bottom of your pinewood derby car black. This will prevent reflections from interfering with the tripping of the track timer.
- The gap between the wheel and car body should be between 0.02" and 0.06". Our Feeler Gage, Axle Installer and Wheel Alignment tools can be used to set this gap. Learn more about these tools at https://www.abc-pinewood-derby.com/pinewood_derby_tools.php
- You will get better results if you give your car several light coats of paint rather than one or two thick coats.
- Your pinewood derby car block should be as square as possible before you begin cutting it. Place each side of the block on a flat surface and try to rock the block by pushing down on a corner. If it rocks, the block is not square and should be discarded.
- Sand your car lightly after the first coat of paint dries. This will smooth out any raised grain and give your car a smoother finish.
- If you have the time, make several cars and enter the fastest.
- Cutting your Pinewood Derby car can take a long time (and be very frustrating) if you don't have the right tools. For making the big cuts, try to find a friend with a band saw. A coping saw should be your next best choice.
- Before you install the wheels on your car, grind the end of a new pencil eraser in some graphite then rub the graphite on your car in a 1/2 inch diameter area where the axles will go into the car. This will reduce friction when the wheel rubs against the car body. You can also use our graphite pads for even less friction. Learn more about our Graphite Pads at <https://www.abc-pinewood-derby.com/graphite-pads.php>.
- To reduce friction when the wheels touch the car body, apply a coat of clear nail polish around where the axle goes into the block. Do this before mounting the axles on the block.
- If your Pinewood Derby race uses a judge to determine the winner of each race instead of an electronic timer, paint your car bright red. It will give your car a psychological advantage and may give you the win in a very close race.

- If a chip breaks off of your Pinewood Derby car during construction, it can usually be glued back. Then use masking tape or a rubber band to hold the chip in place until the glue dries. If it is a small chip use wood putty to make the repair.
- If you use a vice to hold your car during cutting, put a thin piece of wood between both sides of the car block and the vice to prevent the vice from damaging the block.
- After you cut your car with a saw, use a Wood Rasp to smooth the cut and give your car more shape. Use a metal file to smooth out the grooves created by the rasp.
- Sand the inside of the wheel wells before gluing fenders on your Pinewood Derby car. A smooth wheel well will allow you to place the fender closer to the wheel. Learn more about our fenders at <https://www.abc-pinewood-derby.com/fenders.php>
- For an extra smooth finish, spread a very thin layer of wood putty on the car with your fingers before painting. Let dry then sand until smooth. The putty will fill any irregularities in the wood.
- Paint your car several days before the race if possible. Paint that hasn't fully cured will cause more friction when the wheel hub touches the car body.
- If you are in a rush, use a hair dryer to speed up the paint drying. Keep the dryer at least 6 inches from the paint and use constant movements. This technique also works on glue.
- Make it easier to add graphite after the wheels are on the car. Before the wheels are mounted, use a round file to shape a small groove on the bottom of the block below the axle to allow the nozzle on the tube of graphite to get closer to the wheel.
- Many wait until the last minute to start working on their Pinewood Derby car. Start at least two weeks before the race. This will give you time if the unexpected happens and you will enjoy building the car more.
- When sanding your car block, sand in the same direction of the wood grain for a smoother finish.
- Taper the bottom of your car up slightly at the front to prevent the chance that it will rub against the track when the car reaches the bottom of the track slope.
- Use a little car polish to remove graphite from your Pinewood Derby car's finish.
- *If you are drilling your own axle holes, and your rules don't specify the distance between the axles and the end of the car, drill the rear axle hole 5/8" from the rear of the block. This will allow you to add weights farther back on the car.
- Build two (or more) cars and take the fastest car to the race. Our Practice Track can be used to compare the speed between two cars.

Before the Race

- If you have access to the track before the race, carefully watch your Pinewood Derby car as it goes down the track. If it continuously bumps against the rail or bounces back and forth then your axles are out of alignment and should be adjusted. Make only a few runs. Each run down the track risks damage to your car.
- Sometimes a car rolls faster backwards than it does forwards. If you can, test your car before the race to see which is faster.

At the Race

- Wheels pick up dust and dirt when they go down the track. Brush your wheels off between races with a paint brush if you can, to keep your car fast.
- Your car loses graphite fast so add more if you can between races.
- When placing your car in the starting position, make sure it is centered on the track and pointed straight down the track. All wheels should be pulled away from the body.

Lubricant

- If you purchase our Graphite Pads, rub the extra pad on your axles to give the axles a final polishing. Learn more about our Graphite Pads at <https://www.abc-pinewood-derby.com/graphite-pads.php>.
- If your group has a 'Test Run' day, run your pinewood derby car once down the track to break-in the graphite. The first run is always the slowest. Make only a few runs.
- Don't mix graphite and Oil. They do not work well together and will make the car slower.
- Graphite can get on everything including all over your car. You can usually wipe loose graphite off of your car with a dry cloth. For graphite that is hard to remove, put a small amount of toothpaste on a dry cloth and gently rub the graphite off. Use a damp cloth to remove the toothpaste.

Axles

- The head of the axle should be tapered about 15 degrees to reduce friction between it and the wheel hub.
- Prepare two sets of wheels and axles then use the fastest on your car.
- Awana axles have a slightly larger diameter than the BSA axles so they fit better in the BSA wheels. The Awana axles are also better made. Use the Awana axles if your rules allow.
- Many axles that come in the kit have a slight bend. A bent axle will slow your car. To check your axles, spin the axles in a drill. If they wobble, they aren't straight and should be replaced.
- Use a small file to remove the burrs on the axle shaft and head. Use only moderate pressure. The axle metal is soft and it is easy to file too deep. Learn about our axle polishing kit at <https://www.abc-pinewood-derby.com/axle-polishing-kit.php>
- Do not use a low grit (below 400) sandpaper on your axles. It will scratch the axle shaft. Use a small file to remove the crisp marks and file only where needed.
- Use wood glue (not epoxy or super glue) to glue axles in the slot. Put a drop of glue in the slot about a quarter inch in from the side of the car before inserting the axle in the car. Keep the glue away from the wheel!
- An easy way to insert axles into the car block is to use a drill press. Place the block under the drill press then, with the drill off, lower the chuck until it makes contact with the axle head. Continue lowering until the axle is fully inserted.