



MICHAEL'S WOODSHOP

Before You Arrive

- Purchase one or two BSA Official Pinewood Derby kits. The precut kits sold in stores are professionally done to exact engineering specs and do not follow the spirit of the Pinewood Derby. Many people buy two kits to insure against cutting errors.
- If you can, find the car pattern the Cub wants and bring it with you.
- **Purchase weights** – and the round ones that can be inserted into the car body are recommended. The holes to insert them are easily drilled (3/8”), and put the weight in the center of the car body, which is great for speed. They are \$5.26 per pack on Amazon – get 2. The Shop also has a program where we will provide weights and expertise to get your car to the right weight at \$10 per car.
- **Note: If you get the more expensive Tungsten Weights, the hole for them needs to be measured – they vary in diameter by brand.**





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Safety Briefing & PWD Build Day Station 1 - Label and Bag Your Kit Target time to Complete - < 5 minutes



- Receive your safety briefing (review The Rules and Adult Expectations at the end of this document)
 - Take all the materials from your box except your wood block and put them in a zip lock bag.
 - Write your full name on it, legibly with the Sharpie
 - Zip lock it closed
 - Write your name on your car block
 - If you wish to re-drill your axle holes and your district allows it – proceed to Station 2.
 - If you do not want to re-drill your holes, proceed to Station 3 at the main table of the shop.
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- **Please – put the Sharpie Back!**



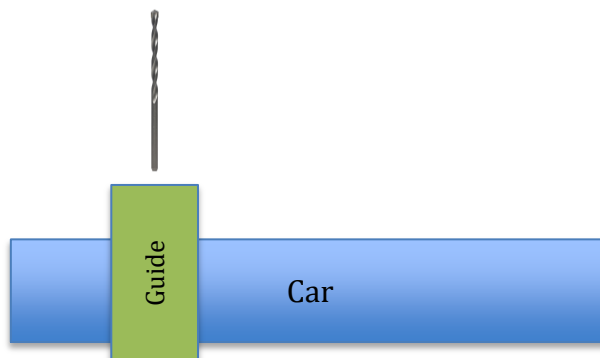
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PWD Build Day Station 2 - Re-drill Your Holes Target Time to Complete - 5 minutes



- **NOTE: Please check your district rules on this issue - some districts allow it, others do not. The current rules for each district on in the Binder labelled NCAC District PWD Rules.**

- Use the square to draw lines that are aligned with the pre-cut slots, but on the other side of the car.
- Use the jig and the clamps to set up the car for drilling.
- Drill the holes -- keeping the bit straight so you do not break it.
- If you break a bit, don't worry. They are replaceable. If your parent breaks a bit because they didn't read the directions, they must glue the broken bit to their forehead and wear it for the remainder of time they are in the shop.
- Repeat for the rear set of holes.



Keep the Drill bit perpendicular to the car body and guide.



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PWD Build Day Station 3 – Select Your Car Design



- **Note- If you re-drilled your holes, you will need to align any car designs opposite the standard holes.**
- Pick a design from the books or draw your own.
- Cut it out (Cut the rectangle that is the same size as the car

block) and use the glue to adhere it to your car block. **Pay attention to the wheel holes – the front of the car is longer than the back.**

- Very thin cars are hard to place weights in – they are problematic.
- Cut your template out – by cutting along the rectangle that surrounds the pattern. This allows you to glue it in alignment with the body.
- Please pay attention to the patten tips and orientation guides posted at the station.
- Test the alignment of the pattern against the car side to make sure the wheel holes align.
- Using *minimal* glue, cover one side of the car by spreading it with your finger. If you don't want to get glue on your finger, the shop steward will spread the glue for \$15.
- Glue the pattern to your car body and *let it dry*.
- Clean up your station. Your mom doesn't work here and the union charges \$24 per hour (plus benefits, 15-minute breaks every 2 hours, and one 30-minute lunch break per shift) to do basic unskilled labor.



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PWD Station 4 - Cut out your Car Target Time to Complete - < 10 minutes



- Using the template, cut out your car on the scroll saw.
- If you are unfamiliar or intimidated by the saw ask the Shop Steward for help,
- **Please do not attempt to cut out elaborately designed cars – the Build days are meant to serve many youth – commandeering the saw for 30 minutes is not Courteous**
- Make sure you hold the wood securely against the table. If it starts sounding like heavy metal drum solo, it means you are not holding it down with enough pressure.
- Don't force the wood, let the blade work.
- Remember, you want a solid flat base to hold against the table. If you are going to change do elaborate body cuts, think through the order to do them so you have a flat base for all cuts.

Notes: Blades Break Easily – no issue. We go through about 3 each PWD build day.



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PWD Station 5 – Put in Your Weights Target time to Complete – 10 minutes



- The weight limit is 5 ounces. You want to get your car as close to that weight as possible. Try to get your weight to 4.9 ounces here in the shop – you can always tape a penny to it if you need to on race day.
- There are several PhD level theses on the placement of weights in pinewood derby cars, but the general rule is the center of gravity should be $\frac{3}{4}$ " in front of the back wheel.
- Drilling holes from the back down the length of the car is done using the horizontal boring feature of the Shop Smith.
- If you did not read the directions for PWD build day and bring your own weights, the shop has a \$10/per car program to weight your car.
- There is a specific drill bit size for the weights in the drill press – please do not change it.
- We have pre-cut weights of various sizes – ask the shop stewards.
- Use the wood putty to cover the holes. It will dry and shrink, so use extra. It only takes a few minutes to dry.



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PWD Station 6 – Sand Target Time to Complete - None



- Sanding your car makes it look great as well as make it aerodynamic.
- Sandpaper is rated by the number of particles per inch on the sanding side – the more particles, the higher the rating, the smoother the finish. For example:
 - 100 Grit sandpaper has 100 particles per inch
 - 200 Grit sandpaper has 200 particles per inch
- SCOUTS are not allowed to use the power sanders unless approved by a Shop Steward. Hand sanding is a rite of passage.



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PWD Station 7 - Go Home and Finish your Car



- Find your original parts bag. Take it with you.
 - Take one of the going away wheel dressing bags.
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- There are thousands of videos on Youtube about how to polish your axles, dress your wheels, and align your car. Check with your district rules before you try them – they may be prohibited.
 - When painting, be patient. It is better to let each coat of paint dry overnight.



The Take Home Kit

- Finishing your car takes time to do a quality job.
- Dressing your wheels and axles is of great value to increase your speed. The take home kit has the sanding paper strips you need to do this—and you must use them in order, from lowest grit to highest.
- This is easiest to do with a drill – check the YouTube videos.
- It may be necessary to add more putty to the holes when it dries and shrinks – the kit has some in it.
- There is a pipe cleaner – this is used to clean the axle holes in the wheel – using teeth whitening toothpaste. Make sure to wash the wheel well after you are done to remove any toothpaste residue.



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The Rules

- There are many dangerous tools in the shop. Do not touch a tool unless you are given permission by the shop steward.
- No horseplay, shoving each other, or yelling allowed in the shop.
- As this Shop is owned by the Boy Scouts – it is a Leave No Trace Shop --- which means clean up after yourself. Leave each station as clean (or better) than you found it.
- Eye Protection to be worn always when operating tools.
- If you don't know how to use a tool, or are unsure as to what tool to use, ASK. Most shop injuries are caused by the incorrect use of a tool or the use of the incorrect tool.
- If you are using a tool, and it starts smoking, flaming, or walking across the floor - or you feel it is not working right, shut it off. A tool can be easily replaced, a finger cannot. The shop stewards will never get mad if a tool is broken to save an injury. **Break the tool, not the Scout.**
- Hitting your finger with a hammer is part of growing up – you will get no sympathy here.
- Your hands or any part of you should never be in the path of the blades – always to the side.
- This is a place of exploration and empowerment – learning how to use tools will make you more self-sufficient.

Have FUN!



Adult Expectations

1. Adults are required to wear eye protection while in the shop. Set a good example!
2. Parents/Guardians are responsible for the safety and behavior of Cub Scouts and are expected to accompany them throughout the build process.
3. Please review and guide your Cub Scout in selecting their car design. While we encourage creativity, please note that designs that are complex may be difficult for Cub Scouts to complete AND they may require a disproportionate amount of time using the tools. Please be Courteous of others. Consult with a Shop Steward about complex designs – you may be required to wait for a slow time before beginning the work.
4. During the car construction, only the following tools may be used: cordless drill, drill press, scroll saws, belt/disc sanders, spindle sander. For safety reasons, the power to all other tools is turned off and/or the tools are unplugged. PLEASE DO NOT plug in tools that are unplugged
5. Cub Scouts must be supervised and assisted AT ALL TIMES when using tools. Cub Scouts require direct, “hands on” supervision when using the scroll saws and sanding machines. Experienced adults may provide assistance to their child with the approval of the Shop Steward.
6. The dust collector and air filtration units must be used whenever the sanding machines are in use. While the dust collector is not too loud, ear protection should be worn by those in close proximity to the dust collector whenever it is running.
7. The Pinewood Derby is a Youth activity, not an adult engineering challenge. Please remember it is not fair for a Professional Certified Engineer (PCE) to compete with 8 year olds. . Don't be "that parent/guardian" who everyone talks about.
8. The rules for each District are different. We have collected rules from most of the Districts and have them in the shop for your review. The shop Stewards don't interpret the rules -- as we do not want to accidentally advise to build a car that is not legal in your District. We encourage you to contact your unit and District leadership if you have any questions.