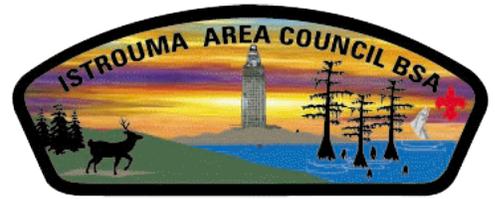


2019 Sewell-Eagle District PINWOOD DERBY RULES



The rules have been changed, some language simplified, and the format changed to a friendlier style. There are now WARNING boxes and INFO boxes to aid your successful build. STEM terms are italicized to note areas of learning. These helpful aids and formatting make the rules look longer than they are; the substance of these rules is only 2 pages.



The main, substantive changes are bolded throughout and include: **advancement to District or Council, car body, wheelbase, and use of air shields.**

GENERAL/ELIGIBILITY

- 1.1. In order to compete, the participant must satisfy one of the two following membership requirements:
 - 1.1.1. Registered as a Cub Scout at some point since January 1, 2019
 - 1.1.2. 5th Grade Cub Scout who bridged (joined) to Boy Scouts since September 1, 2018
- 1.2. The car must be built for the current Pinewood Derby racing season. NO REPEATS or REPAINTS
- 1.3. A completed car purchased from a third party is not allowed.
- 1.4. The car may not be sent to a third party for tuning or other performance enhancements.
- 1.5. **The youth advances to District or Council, not the specific car.** Some Pack or District rules may vary and prevent a car from passing inspection under these rules. Feel free to build different cars for each race. There's more fun and learning to be had building multiple cars with the adult.



Each Pack may send up to 12 racers to the District race. For Packs with enough membership in each rank, we recommend you send the 1st and 2nd place finishers from each rank (Lion, Tiger, Wolf, Bear, Webelos, Arrow of Light). If the 1st or 2nd place finisher does not wish to advance, you may send the next runner-up until all 12 spots are filled.



The youth advances, not the specific car. Since the cars cannot be impounded after Pack or District races to prevent new cars, and because Pack or District rules may vary, feel free to build new cars for each race. You may be able to win your Pack race with a car built for show/design but wish to build purely for speed when stepping up to District or Council competition. Remember, the fun and learning are in building and tuning the cars with the adult partner. Why limit that to once per year?

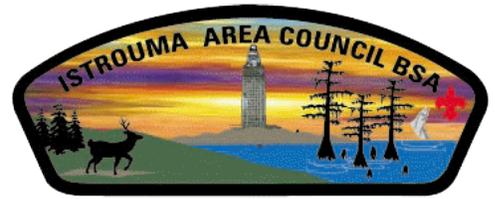
2. CAR BODY and ASSEMBLY

- 2.1. **The main car body structure (chassis) must be made of wood, but you may use pre-cut blocks.** The car design may be enhanced by the addition of other stable materials such as plastic or metal. Any additions must be firmly attached and positioned in such a way as not to exceed car size specifications.



If you lack the tools or resources to cut a car from the stock block of wood included in the BSA kit, we encourage you to attend a workshop hosted by your den, Pack, District, or Council. **Alternatively, you may purchase a pre-shaped block and assemble it with wheels and axles that meet these rules.**

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2.2. The car **with wheels and any attached accessories** must meet the following specifications:

2.2.1. Total Width: not to exceed $2\frac{3}{4}$ inches

2.2.2. Total Length: not to exceed 7 inches



Accessories may not extend beyond the 7-inch length limit, even if only in the rear. This is because of the increased *potential energy* advantage created by adding more weight further up the hill.

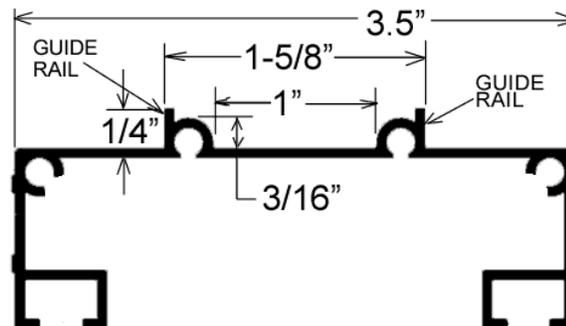
2.2.3. Total Weight: not to exceed 5.0 ounces on a scale accurate to $1/10$ ounce. For scales that have more than a single digit beyond the decimal point, the maximum weight is 5.0500 ounces.

2.2.4. Total Height: not to exceed 3 inches

2.2.5. Clearance: The wheels are the only part of the car allowed to touch any part of the track. There should be at least $1\frac{3}{4}$ inches between inner wheel edges of opposing front wheels and opposing rear wheels to clearly straddle the center guide rail, and the car underbelly (including any attached weight) should be at least $3/8$ inch above the track surface.



The following cross-sectional view of a lane of track demonstrates the reason for these clearance rules. The car body, wheels, fenders, weights, and every other part must be able to clear the center guide rails, or it may not race. Note that some tracks have a solid center guide on the racing surface and nearly all tracks have solid center guides in the stop section. Low hanging or unsecure underbelly weights can cause the car to get stuck, become unstable, flip, or cause the weight to fall off (repairs not allowed for this). Use caution and measure carefully when using under-mounted weights.



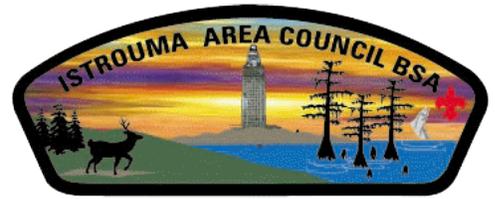
2.3. The front edge of the car must be at least $\frac{1}{2}$ inch wide at the center of the car.

2.4. When placed in the starting position, no part of the car may protrude beyond the starting pin.

2.5. You may use any wheelbase (distance from front axle to rear axle) as long as the wheels do not extend beyond the 7-inch length limit and you acknowledge that should a short wheelbase car become unstable and leave the track or cause a collision, it is subject to removal per Rule 7.6.

2.6. At least 4 wheels must be attached to the sides of the car body. Each wheel must be attached to the car's wood chassis with a legal axle.

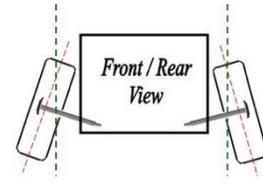
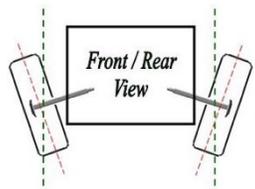
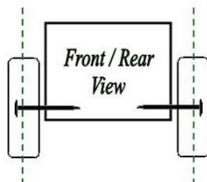
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2.7. Each attached wheel must not be angled (canted) more than 10 degrees from vertical.



STEM: Although at least 4 wheels are required, it is not required that all 4 wheels touch the track surface or that all wheels remain at 0 degrees from vertical, because this can actually be quite difficult to achieve. BSA kit axles are not all straight and the stock axle slots on the kit block can make it difficult to mount an axle at 0 degrees from vertical. Most of the fastest cars have one front wheel slightly raised off the track surface and the rear wheels slightly angled to reduce *friction*.



2.8. The front most and rear most wheels must be positioned across the body from one another.

2.9. All lettering and numbering, both inside and outside of each wheel must be visible when the wheel is attached to the body to ensure compliance with the wheel rules. No part of the car design (wheel weights, fenders, air shields, accessories, etc.) may completely obstruct inspection of attached wheels.



Because interior wheel weights have been allowed, and will continue to be allowed, wheel “air shields” are also now allowed. HOWEVER, anything covering the interior of the wheel must be transparent (clear) or have a slot or opening sufficient enough to allow the entire interior of the wheel to be inspected by rotating.



STEM: Wheel weights provide much the same *aerodynamic* advantage that air shields do - preventing drag caused by air entering the interior wheel cavity. Air shields are available from various vendors, but you can easily make your own from transparent plastic sheeting, balsa wood, cardboard, washers, etc.. Be mindful of the above inspection rule.

Legal wheel weights allow for inspection



Legal air shields allow for inspection



Illegal air shields completely obstruct view and do not allow inspection



2.10. The following items are prohibited: springs; starting devices or propellants; electronic or lighting devices that interfere with the race electronics; liquids, wet paint, sticky substances, or powders of any kind (other than axle lubrication); glass or excessively fragile parts; bearings or bushings; hubcaps covering the nail head; loose/moving objects on car

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3. WHEELS

- 3.1. Only plastic, BSA approved wheels are allowed.
- 3.2. All lettering and numbering, both inside and outside the wheel, must remain intact and be visible with the wheel attached to the car.
- 3.3. The fluting, spokes and other markings on the outside wheel area must remain visible.



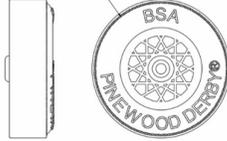
“Fluting” refers to the small bumps on the outside edge of the tread. It is typical for the fluting to become diminished during wheel sanding/polishing. Such reduction shall be permitted provided the fluting is not fully removed around any portion of the wheel.



BSA Licensed Wheel
Interior Markings



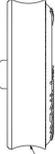
BSA Official Wheel
Interior Markings



Fluting Must be Present
Exterior Markings

- 3.4. The wheel diameter must be no less than 1.16 inches.
- 3.5. The tread surface width must be no less than 7.5 mm.
- 3.6. The tread surface must be flat and parallel to the wheel bore. Therefore, the following modifications are prohibited:
 - 3.6.1. Rounding of the tread surface
 - 3.6.2. Grooving, H-cutting, or V-cutting the tread surface





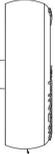
“Rounded H”
Wheel rounded to
2 points of contact



“Straight H”
Wheel shaved to
2 points of contact



“V Profile”
Wheel Shaved to
1 point of contact



“Rounded”
Wheel rounded to
1 point of contact

- 3.7. The following wheel modifications are prohibited:
 - 3.7.1. Removing material from the inside tread surface or the inside sidewall surface
 - 3.7.2. Drilling holes in the sidewalls or tread area
 - 3.7.3. Filling the wheel surface with any type of material
 - 3.7.4. Filling the wheel bores and re-drilling the bore

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Some online vendors sell aftermarket BSA wheels that have been substantially lightened by removing material from inside the wheel surfaces. Per rule 3.7 these wheels are NOT allowed and are easily recognized at inspection. Cars with these wheels will NOT be permitted to race. If you plan to use aftermarket wheels, confirm with the vendor that no weight has been removed from inside the wheel.



STEM: These rules permit many wheel modifications as long as you observe the dimension limits and restrictions listed above. Common legal modifications include but are not limited to:

- Truing the tread surface with sandpaper or lathe to correct *out of round* wheels
- Truing and shaping the inner edge of the tread surface
- Narrowing the tread surface to 7.5mm to get straight wheel edges
- Applying wheel bore treatments such as polish and wax to smooth the bore for reduced *friction*
- Truing and re-coning the tip of the inner hub to reduce the *friction* point of contact
- Removing the double step from the outer hub to reduce *friction* point of contact
- *Balancing* the wheel by applying a small amount of glue or fingernail polish to the wheel

4. AXLES

- 4.1. Only BSA approved metal axles with a nail head are permitted. No 3rd party or aftermarket axles are allowed.
- 4.2. One-piece axles that extend through the width of the car to support both wheels are not allowed.



STEM: Axles may be sanded, polished, and/or grooved to remove burrs and reduce *friction*.

5. LUBRICATION

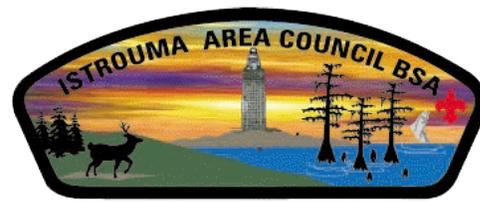
- 5.1. Over application of lubricant, which results in dripping, marking, excessive shedding or otherwise depositing onto the track is not allowed.



Lubricants you may use include but are not limited to: graphite, Teflon, Nyoil, and Krytox

We encourage the use of VERY SMALL AMOUNTS of oil-based lubricants such as Krytox 100 over graphite and other dry lubricants because they do not damage the car's paint, foul the track or slow the wheels of other participants, and generally promote a cleaner and safer work and race area. You can find information regarding the most effective use of Krytox 100 online and through workshop participation, and it is available for purchase at the Scout Shop and local hobby stores. One bottle will last you a lifetime of Scout racing; we encourage you to share with your Pack.

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6. WEIGHTS

- 6.1. Lead (Pb) weight, if used, must be completely sealed and safe from all possible contact with youth. Drilling/Filling/Removal of lead weight is not allowed at the race or check-in venue.



Please avoid Lead (Pb) in cars this year. The 2008 Consumer Product Safety Improvement Act restricts the amount of lead that may be contained in children's toys (ages 12 and under). For a 5-ounce toy, the lead limit would be 3/1000 of an ounce!

Therefore, we strongly encourage you to use other material for weight. Common alternatives include tungsten, zinc, and copper.

For more information see: <http://www.cpsc.gov/CPSCPUB/PREREL/prhtml09/09120.html>

- 6.2. Interior wheel weights are allowed as long as they allow for inspection of the interior of the wheels.
- 6.3. Under-mounted, stick-on weights are allowed; however, make sure that the car remains compliant with Rule 2.2.5 after application.

7. RACE DAY

- 7.1. Each car must pass inspection by the official inspection committee before it may compete. The inspectors will disqualify any car not meeting these rules. Any adult or scout may appeal the findings of the inspectors to the Pinewood Derby Chairperson, whose decision is final.
- 7.2. Every effort will be made to complete the inspection without any tampering or alteration to the car. If the inspectors can't verify that the wheels comply with the wheel rules due to interior wheel weights, air shields, fenders, or other obstructions, they will ask YOU to remove the wheels for inspection.
- 7.3. No car inspected and passed before the race will be re-inspected after the race.
- 7.4. After a car has passed inspection, only race officials may handle the car.
- 7.5. After check-in, car repairs are not allowed unless authorized by the race officials for collisions or mishaps not caused by the damaged car.
- 7.6. If a car leaves the track or causes a collision, that race heat will be re-run. If the same car leaves the track again or causes another collision, it will be pulled from the heat and the heat re-run with an empty lane. The pulled car will receive whatever time the timer times out at (typically 9.9999 seconds) for that heat. A third incident caused by the same car will disqualify that car from further competition.
- 7.7. All decisions by race officials are final with no appeal, unless otherwise specified in these rules.
- 7.8. Good sportsmanship and behavior is expected. Race officials may ask anyone not following this rule to leave.

8. QUESTIONS

Questions may be addressed to Scott Harrington at skywalker@starcarsderby.com