

# PACK 4 OFFICIAL PINWOOD DERBY EVENT RULES AND PROCEDURES



## **WARNING!!!!**

**THIS DOCUMENT IS SUBJECT TO CHANGE OFTEN AS WE  
ADD ADDITIONAL TIPS, HINTS, AND INFORMATION.  
CHECK BACK FOR UPDATES OFTEN!**

### **Table of Contents:**

- I. GENERAL: (Applies to all Race Events)**  
Rules about entering your car. (G1-G12)
- II. CUB SCOUT RACE CAR DESIGN STANDARDS**  
Rules about building your car. (T1-T12)
- III. CONDUCT OF THE RACES**  
Rules that will be used during the races (C1-C15)
- IV. SIBLING RACE CAR DESIGN STANDARDS**  
A race for Siblings and Alumni only (P1-P5)
- V. SPECIAL NOTE TO ALL CONCERNED**  
Some notes on Sportsmanship!

### **I. GENERAL RULES: (Applies to all Race Events)**

**G-1. Qualification:** All registered Pack 4 Scouts may design, build and enter cars are eligible to participate in the "Cub Scout Race" event. Siblings of Cub Scouts registered in Pack 4 may design, build and enter cars that are eligible to participate in the "Open Class" race event.

**G-2. Essential Materials:** All cars entered shall be constructed from the "Official Grand Prix Pinewood Derby Kit" (referred to below as the kit) as distributed in most years at the December Christmas Pack meeting. Additional kits may be purchased from the Scout Store. (Kits may be purchased elsewhere if they are of the exact type manufactured by the BSA as specified above.)

**G-3. Competitor Categories:** All Scouts that are registered within Pack 4. All Scouts will compete against each other. If an open race is declared, then siblings and alumni may enter this Pinewood Derby open competition.

**G-4. Attendance:** The Cub Scout MUST enter his own car. This means that the Cub Scout must be present at "Inspection and Registration" to enter his car into competition. In the event the scout is sick or cannot attend the race, the den leader will be responsible for entering the car into the race and handling of the car. However, the Den leader cannot make any adjustments or modifications beyond adding graphite to the car.

**G-5. "New Work":** Construction of ALL entries MUST have begun AFTER last year's Pack 4 Pinewood Derby Races with all new materials. No parts from earlier years races or other scouts parts may be used on the car. The same car cannot be entered into future year's event. Previously built cars can only be entered into the Open Class Race.

**G-6. Single Entry per Person:** Only one car may be registered by any person in the Pinewood Derby. A separate car may be designed and registered for the Open Class Race.

**G-7. Inspection and Registration:** Each car must pass a technical inspection before it may compete. Technical inspection and registration of cars occurs immediately prior to the race. Immediately following registration and inspection, cars will be turned over to race volunteers who will place it in the staging area. No car owners are permitted in the staging area at any time for any reason.

**G-8. Late Registration and Inspection:** If a Cub Scout fails to register his car by the start of the race, it will be excluded from further participation. No exceptions. It may be eligible for the Open Class race.

**G-9. Failure to Pass Inspection:** The Inspection Committee shall disqualify cars which do not meet the rules as described herein. If a car does not pass inspection, the scout will be informed of the reason his car did not pass. Cars which fail the initial inspection will be taken to a repair area where the repairs can be made separate from the inspection area. Once the scout has made the necessary repairs, he can get back of the end of the line and wait for his turn for inspection. If the car fails to pass inspection by race time, it will be excluded from further participation. It will be eligible for the Open Class race.

**G-10. Impound:** Once the scout hands the car to the qualification inspector, it is weighed, checked for proper size, checked for correct car number, and analyzed for improper components. If the car passes all inspections it is considered officially registered. No car may be altered in any way after it has been registered. After a car passes registration, it will not be returned to the scout, it will be stored by the Pinewood Derby Race Committee in the pit area.

**G-11. Car Design Rules Interpretation:** Interpretation of the rules described in G1 through G-10, and T-1 thru T-9 are at the sole discretion of the Inspection Committee Judges present during the Registration and Inspection process.

**G12. Race-Day Rules Interpretation:** On Race-Day, the Cub Scout must make all questions of rules interpretations and procedures to someone on the Pinewood Derby Chair or Race Officials promptly. Decisions of Race Officials on questions of rules interpretations and procedure may be appealed to the Pinewood Derby Chair consisting of the Cub Master, Assistant Cub Master, and Scout Committee representative. All decisions of the Pinewood Derby Chair are final. Decisions of Race Officials on questions of fact (i.e. the result of a specific race) may not be appealed beyond the Track Master and/or Finish Line Judges. **Note:** Unsportsmanlike conduct by any participant or spectator will be grounds for expulsion from the competition and/or the race area.

## II. CUB SCOUT RACE CAR DESIGN STANDARDS

**T-1. Material:** Race cars shall be constructed for this event from the parts contained in the Official Grand Prix Pinewood Derby Kit (referred to below as the kit) as sold by the Scout store. Materials from the kit may be supplemented but not replaced.



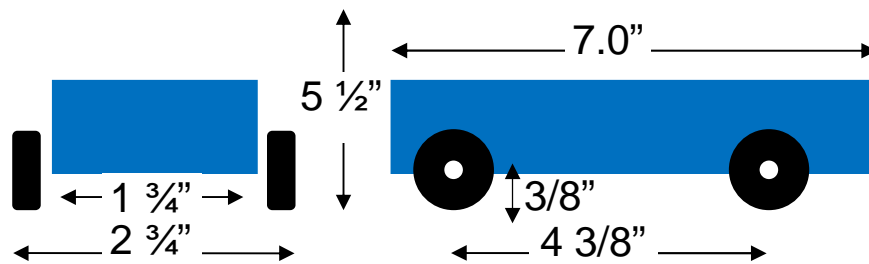
**T-2. Weight:** Race cars may weigh no more than five (5.00) ounces (total weight) as determined on the official scales during the pre-race check-in. Note: The official scale will be available in the Pack Meetings prior to race day.

Weigh your car on accurate scales - household scales are usually not very accurate. If you have access to calibrated scales, compare a known item weight on the calibrated scales to your home scale indication for that same item and then mark this reference for use later. Allow for scale inaccuracies by not adding to exactly the 5.00 oz. (141.75 grams) to avoid having to remove weight on race day. Consider also, while you may have an accurate scale, your pack may not, which could weigh items heavier than they actually are! Another solution is to use weights designed to easily allow removing a small amount at the official weigh-in.

**T-3. Wheels and Axles:** The car shall roll on the original wheels from the kit. The wheels shall turn about the axle nails from the kit. The axle nails shall be firmly affixed to the wood of the car body, and **MUST** be placed in the original 'axle grooves' in the supplied wooden block. It must be obvious to the judges that the grooves, wheels, and the nails from the kit are being used. By using the original axle grooves on the block for wheel placement, this will eliminate the possibility of extending the wheel base which is then not allowed. The axle points must be visible in the axle slots. This is to verify that official BSA axles were used.

### **T-4. Size:**

1. **Width** - The overall width of the car shall not exceed  $2 \frac{3}{4}$ " as determined by the official gages during the registration and inspection.
2. **Length** - The overall length of the car shall not exceed 7" as determined by the official gages during the registration and inspection.



3. **Height** – Though BSA rules do not specify a height limit, the track design prohibits cars with a height greater than 5 ½” from safely running down the track.
4. **Weight** - The weight of the car shall not exceed 141.75 grams (5.00 ounces). Cars will be weighed in on race day using the Pack scale.

**NOTE: CARS THAT EXCEED THE ABOVE WEIGHT ON THE OFFICIAL PACK SCALE AT RACE DAY REGISTRATION WILL NOT BE PERMITTED TO RACE OVERWEIGHT. WE WILL ALLOW WEIGHT TO BE REMOVED FROM THE CAR PRIOR TO FINAL CHECK IN BY THE SCOUT AND HIS FAMILY.**

5. **Wheelbase** - Wheelbase (distance between the front and rear axles) may not be changed from the kit body distance of 4-3/8 inches. The original axle grooves must be **used and visible**.
6. **Underside Clearance** - Underside clearance of at least 3/8 (0.375) inches and inside wheel to wheel clearance of at least 1-3/4 (1.75) inches is recommended, so that the car will run on the race track. Adequate clearance is the responsibility of the race car builder.
7. **Note:** it is acceptable to remove a portion from one side of the block and attach it to the opposite side of the block. This will move the position of the wheels in relation to the car body but still retain the existing axle slots and wheel base. However, make sure the wheels then do not cause the car length to be over 7 inches.



**T-5. Weights and Attachment:** Weight may be added to the car and will be considered part of the car for purposes of all measurements. "Weight" is considered to be any material on the car that is not provided in the kit. All weight must be securely fastened to the car, e.g. by permanent glue, nails or screws, but not by "sticky substances", e.g. tape, or tack spray. Weights shall be passive, i.e. non-moveable, non-magnetic, non-electric, non-sticky, etc. No weights may be added after the car has passed inspection and is considered registered. No loose materials of any kind are permitted in the car. The car may be hollowed out and built up to the 5.00 oz maximum by the addition of weights, provided any additional material is securely built into the body of the car.

1. Internal **moving** weights such as ball bearings are not allowed **if** they can freely roll back and forth in the car. Using metal ball weights, such as BBs or bearings, are acceptable as long as they are fixed and cannot move.
2. The use of **Mercury** is NOT allowed. Mercury is a health hazard and costly to clean up. Also mercury in a car cavity would also be considered a moving part and again not allowed.
3. The drilling/removal of **Lead (Pb)** will NOT be allowed on **School/Church property at any time** due to the toxicity of the material. **All Lead (Pb) must be completely sealed and safe from all possible contact with the youth.** If possible, please try to avoid the use of lead.

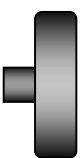
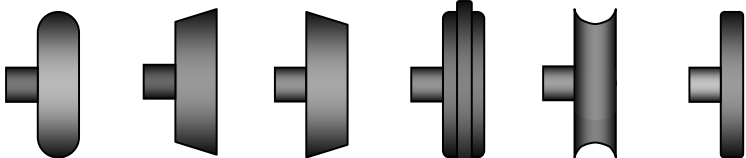
**T-6. Wheel Treatment:** Wheel treatment (hub and tread smoothing and polishing) may not result in substantial removal of mass nor in reducing the wheel width from the original kit wheels. Some of the original "tread marks" on the wheel face must remain intact, i.e. apparent to the inspector. Wheels may not be machined to a beveled condition and the portion of the wheel surface that contacts the track must remain parallel to the axle. Only the official BSA Pinewood Derby wheels and brad style axles supplied in your kit are permitted. The words "Official B.S.A. Made in U.S.A." and other lettering on the

wheels shall remain intact and clearly visible to the inspector. The addition of spacers, washers, and bushings is prohibited. **Axles must utilize the existing axle slots in the car body.** The axle slots must be visible and cannot be covered by tape or any other material. Burrs may be sanded away from the plastic wheels, but excessive removal of material to “crown” the surface of the wheel that meets the track will not be permitted. Axles may not be plated.

Additionally, the axle shaft **MUST** remain smooth without any grooves. It is believed that notching or scoring one or multiple grooves into the shaft of the axle will allow for a cushion of graphite for the wheel to ride on in order to reduce friction and improve speed of the car. However, most people do not have the ability to perform such a task. Therefore, we ask that the axle shaft remain smooth with **NO GROOVES**. Again, intentionally scoring grooves into the axle is **prohibited**. Knowing this, the only way to check compliance on a non-grooved axle would be to pull the wheels off the cars. Therefore, we will have to rely on parent’s good judgment on this rule. We are counting on the Christen ethics of our parents to comply with this ruling. However, if a car clearly blows the barn doors off the competitors, we will retain the right, after the race, to remove the wheels and check for compliance. If intentional axle grooves are found, the car will be eliminated from completion. Additionally, that **family** will also not be allowed to compete the following year.

<p>An out-of-the-box <b>unaltered</b> BSA axle with Burrs and crimp marks:</p> 	<p>A good example of an <b>allowable</b>, polished BSA axle that is smooth, with the burrs and crimp marks removed. The axle is smooth with no grooves:</p> 
<p>An example of <b>prohibited</b> multi-grooved axle:</p> 	<p>An example of a <b>prohibited</b> single-grooved axle:</p> 

**NOTE: THE BSA SIGNATURE ON THE WHEELS MUST BE VISIBLE TO THE JUDGES AT THE REGISTRATION DESK. ANY CAR, WHICH INCORPORATES ANY WHEEL OR AXLE COMPONENTS NOT SUPPLIED IN THE OFFICIAL PINEWOOD DERBY CAR KIT, WILL NOT BE PERMITTED TO RACE.**

<p><b>Good Wheel Example:</b></p> 	<p><b>The Following Wheel Modifications are NOT Allowed:</b></p> 
---	---

**T-7. Unacceptable Construction:** The following may NOT be used in conjunction with the wheels or axles: hubcaps, washers, inserts, sleeves, bearings. **Other Attachments** - The car shall not ride on any type of springs, or incorporate any other devices, which might aid in its travel.

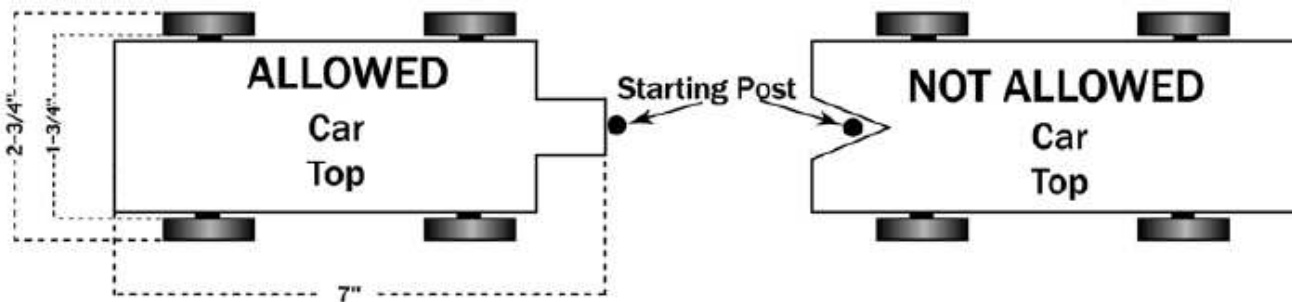
**T-8. Gravity Powered:** The race car may not be constructed or treated in such a way that the track's starting mechanism imparts momentum to the car. (For instance, this provision disqualifies cars with sticky substances on the front of the car and protrusions which may catch on the starting pin such as a magnet.)

**T-9. Lubricants:** Only dry lubricants such as graphite or powdered Teflon "white lube" will be allowed for lubricating the wheels. *Lubricants may not foul the track.* All lubricants must be made prior to qualification. No additional lubrication may take place after the car is registered.

**Some examples of **ILLEGAL** non-graphite liquid lubricants are:  
Krytox 100, XOil, Nyoil, 3in1, and WD40.**

**NOTE: All lubrication must be applied outside of the building. No graphite should be applied inside the St. Gerald Fellowship Hall. Graphite is extremely difficult to remove from the table surface.**

**T-10. Staging:** The entire car must stage behind the starting pin.



**T-11. Body:** The car body may have no moving parts. This includes movable weights be it internal or external.

**T-12 Details** - Steering wheels, driver decals, painting, and interior details are permissible as long as these details do not exceed the maximum length, width, and weight specifications. Make sure they are adequately secured to the car.

**NOTE: METALLIC SILVER PAINT IS NOT RECOMMENDED. THE SENSORS ON THE TRACK CAN REFLECT OFF THIS SURFACE AND CAUSE TIMING TO BE INCORRECT.**

### III. CONDUCT OF THE RACES

Competition will consist of heat races at the Pack level. Track officials are responsible for the proper conduct of the races. All racers will race on all 4 lanes of the track which will record the finish time in 1/1000 of a second and in miles per hour. Standings will be determined from a cumulative sum of time of each car's four races. A heat is not considered complete until the finish line judge or Track/Finish line judge considers the heat race official. Scouts AND PARENTS should also be familiar with these rules.

**C-1. Inspection Gages:** The race-day "Pit Stop" area will have the official scale and length box. That check-in equipment will be the official equipment for the race. Please stress this fact to all Cub Scouts they should be prepared to make adjustments to their cars if necessary.

**C-2. Race Day Lubrication:** In the interest of fairness, the car must be lubricated prior to inspection. No additional lubrication is permitted after registration. **All lubrication must be applied outside of the building. No graphite should be applied inside the St. Gerald Fellowship Hall. Graphite is extremely difficult to remove from the table surface.**

**C-3. Car Handling Responsibility:** Designated Parent Volunteers "on deck" shall be responsible to pick up cars in the "Pit Stop" area, and take it to the starting line for staging. Cars will be staged on the tracks by the "Starter Team." At the completion of the race, a parent volunteer will return the cars to the Pit area. Cars dropped or damaged during racing may be repaired, as long as a race committee official is consulted first, and the car can be re-inspected (if necessary) in time for the next heat, but only if the repair does not hold up competition. Only minor repairs may be made on race day under the supervision of qualification inspector.

**C-4. Lane Assignment:** Lane assignment for each heat shall be determined by Race official. To equalize differences among track lanes, each scout will run in four races in four different lanes.

- a.) In each successive heat, each car will race in a different track lane. For example, in a 4 lane track, each car will run once in lane 1, once in lane 2, once in lane 3 and once in lane 4
- b.) In the event the finish line timer fails, a point system will be used to determine the standings. From each heat, a score will be assigned to the finish place. First place will receive 1 point, Second place will receive 2 points, Third place will receive 3 points and Fourth place will receive 4 points. After 4 races, the car with the fewest points will be considered the winner. In the event there is a tie, the top finalists will run a series of 4 races to determine the winner using the same scoring rule.

**C-5. Car Leaves Lane :** If, during a race heat, a car leaves its lane but proceeds down the track in a manner that does not interfere with its opponent, then the race will be called normally. The errant car will be given a time of 10 seconds and a last place finish. If the car leaves its lane and interferes with another car, the race will be re-staged and re-run. If the same car again leaves it's lane and interferes with another car, that car will be judged last place and given a time of 10 seconds, and the race will be re-staged and re-run without that car.

**C-6. Car Leaves Track:** If, during a race heat, a car leaves the track without interfering with its opponent, it shall be considered to have ended its heat at that point and given a time of 10 seconds. Or the race may be repeated. It is up to the discretion of the Pack Leader.

**C-7. Car Repair (Without Fault):** If, during the race, a wheel falls off or the car becomes otherwise damaged, then the SCOUT may, to the best of his ability perform repairs with the assistance of his adult partner and repair station mentor under the supervision of qualification inspector.

**C-8 Car Repair (With Fault):** If a car is damaged due to track fault, or damage caused by another car or person, then the Trackmaster, at his sole discretion, may allow additional repair assistance to the Cub under the supervision of qualification inspector.

**C-9. No Finishers:** If, during a race heat, no car reaches the finish line on the track, the car which went the farthest in its lane shall be declared as the heat winner and all cars will receive a time of 10 seconds.

**C-10. Call to Race:** Once the cars are loaded onto the track by Parent Volunteers, the starter will release the cars to start the race. The car whose nose is over the finish line first is the winner. This will be determined by the electronic computer controlled finish line, or designated impartial finish line judges. Only the finish line judge can remove cars from the track.

**C-11. Appeals:** The Cub Scout must make all questions of rules interpretations, procedure and fact to the track officials promptly.

**C-12. Track Champion:** The top 4 finishers will have their cars re-examined by the inspection chairperson to verify compliance with the rules of the tournament. If the car meets compliance, the race is considered official. Champions shall be accompanied, with his car, from the track to the stage by his parent or other designee.

**C-13. Track Fault:** If a car leaves its lane, at his sole discretion, the Track Master may inspect the track and, if a track fault is found which probably caused the initial violation, the Track Master may order the race heat to be rerun after the track is repaired.

**C-14. The Race Area:** Only race officials may enter the track area. This rule will be strictly enforced.

**C-15. Rewards and Recognition:** The most important values in Pinewood Derby competition are parent/son participation, good sportsmanship and learning how to follow rules. The Awards Committee is responsible for recognizing and encouraging these qualities in addition to traditional racing awards. Racers will be recognized as follows:

- a.) Speed trophies will be awarded to the first, second, third and maybe a fourth-place overall finishers in the entire Pack. (Fourth place may or may not be awarded due to cost)
- b.) The top 3 or 4 Pack finishers are then removed from competition and the top 3 or 4 speed qualifiers in each Den will then be awarded smaller speed trophies for the first, second, third and maybe fourth-place finishers in each of the Dens. (Fourth place may or may not be awarded due to cost)
- c) Trophies or Ribbons will be awarded to the top cars for design for winning its own unique appearance category (Most Creative, Most Humorous, Most Colorful, Best Paint Job, and Most Fuel Efficient and so on).

#### IV. OPEN RACE CAR DESIGN STANDARDS (If run) (... or "Why should the kids have ALL the fun?")

The purpose of the Open Race event is to have a little fun, to test our Pinewood Derby tracks. It will also help us to 'bleed' off some of our nervous competitive anxiety allowing us to be calm and collected during the Scouts race! (right?)

**ALL PARTICIPANTS ARE ENCOURAGED TO BUILD THEIR OWN CARS.** The open race will be held following the Scouts' race if approved by the race committee. Any sibling of a Cub Scout who is registered in Pack 4 may enter this race.

**P-1. Technical standards:** All the same Technical Size Standards for the Cub Scout race (above) will be used in the open Race. However, the car may weigh over the 5.00 oz but not more than 10 oz. A car from previous year's races may be entered in the Open Class race.

**P-2. Number Of Entries:** **You may race only 1 car per scout or sibling. For any additional cars there will be a \$10 entrance fee.**

**P-3. The Car:** You may NOT use a scout's current car for this race.

**P-4. Weigh-In:** Cars must be inspected, weighed, and registered prior to the race.

**P-5. What Do The Winners Get?** Winners will be recognized with honor, glory, and GREAT accolades!



**HELP YOUR CUB SCOUT DO HIS BEST**



## V. SPECIAL NOTES TO ALL CONCERNED

This project is a parent and son event, and is recommended as such by the National Boy Scouts of America. The Pinewood Derby Committee **STRONGLY SUGGESTS** that each parent emphasize this idea with your son. In all of the events, we require that the cars be built this year.

### **Sportsmanship:**

Two things the Pinewood Derby requires each participant to learn are 1) the craft skills necessary to build a car, and 2) the rules that must be followed. Even more important, though, is how we act and behave while participating in the Pinewood Derby or any other group activity. This is called sportsmanship.

The first thing to remember about sportsmanship is that everyone's skills are a little different. You may be good at something like singing or drawing, but not as good at something else like basketball or computers. Parents have different skill levels, too. This doesn't mean that you are a good person one time and not good another time. You can always be a good person, whether or not you have good car-building skills. Remember, you and your friends are individuals first and racers second. This idea is often called having respect for others.

The second thing to remember is to follow the rules. Without rules, there would be no Pinewood Derby. You will never know if you are really good at doing something unless you follow the rules. This is often called being honest.

The third thing to remember about good sportsmanship is that there are winners and losers in every competition. You accept this when you choose to compete. There may be times when you win and feel happy, and times when you lose and feel unhappy. Being a winner is easy, and losing is sometimes hard. If you win, you must not brag or gloat. If you lose, you must not feel jealous or bitter. To be a good sportsman, you must be able to say "I did my best" and be satisfied with the results. You must also be able to appreciate and feel happy for someone else when they run a good race or build a neat car.



**HAVE FUN**  
**and cheer the other drivers on**  
**in the spirit of Scouting**  
**and doing your best!**



**Important Dates to Remember:**

**3/22/10** Pack Meeting. The Pack scale will be made available at the meeting. This will be the last opportunity to weight your car prior to race day on the pack scale.

**3/24/10** St. Gerald Fellowship Hall 96<sup>th</sup> & Q

Inspection and Registration 8:30am to 9:30am

Pinewood Derby Race! 9:30pm to 12:00pm

Doughnuts and Juice provided by the Pack

**Spring 2012 Car Number Assignments:**

Number Placement: Place the car number on side of the car that you want to go down the track first. If you want the car to run forwards on the track, place the number on the front "hood" of the car. If you prefer the car to run backwards down the track, place the numbers on the back "trunk" of the car with the numbers facing backwards so that the numbers read correctly when the car is running down the track.

**Den 2 Tigers**

- 20 ..... Fehrman Timothy
- 21 ..... Fochek Noah
- 23 ..... Fowler Matt
- 24 ..... Gibson Bryson
- 25 ..... Higgason Phil
- 26 ..... McMaken Quinn
- 27 ..... Mendick Jacob
- 28 ..... Sommers Grant
- 29 ..... Sullivan David
- 30 ..... Wonderlich Jaksen
- 38 ..... Rippenkroeger Caleb

**Den 1 Wolves**

- 10 ..... Balis Jackson
- 12 ..... Cooper Erik
- 13 ..... Cushman T.J.
- 14 ..... Davis Henry
- 15 ..... Ketcham Thomas
- 16 ..... Mendick Vince
- 17 ..... Miller Aidan
- 18 ..... Reed Jackson
- 19 ..... Silva Zachary

**Den 6 Bears**

- 60 ..... Bauer Evan
- 61 ..... Kleinschmit Zeke
- 62 ..... Meister Carter
- 63 ..... Nigro Nicholas
- 64 ..... Reinard Nick

**Den 7 Bears**

- 70 ..... Buchholz Zachary
- 71 ..... Collett Zane
- 72 ..... Gilmore Louis
- 73 ..... Hansen Erik
- 74 ..... Hood Andrew
- 75 ..... Mathouser Ian
- 76 ..... Neumann Nicholas

**Den 3 Webelos I**

- 31 ..... Bourne Nathan
- 32 ..... Davis Dean
- 34 ..... Fuentes Devon
- 35 ..... Lynes Lucas
- 36 ..... McElmeel Sean
- 37 ..... Schrage Colby

**Den 4 Webelos I**

- 40 ..... Fowler Aaron
- 41 ..... Nemec Morgan
- 42 ..... Salistean Thomas
- 43 ..... Silva Brandon
- 45 ..... Stavneak Kaleb
- 46 ..... Zupan Benjamin

**Den 5 Webelos II**

- 50 ..... Brennan Joseph
- 51 ..... Horihan Nicholas
- 52 ..... Kleinschmit Asa
- 53 ..... Munchrath Zachary
- 54 ..... Reisberg Joseph
- 56 ..... Sheridan Ryan
- 57 ..... Steinke Marcus

## Pinewood Derby Project Hints

A Scout's primary goal in Pinewood Derby should be to:

- Work **together** with a parent on a joint project
- Acquire a healthy attitude about competition and sportsmanship
- Become more proficient at woodworking
- Survive the experience with all ten fingers

## Handy Tools & Supplies

- **Safety Glasses = #1 Tool (while drilling, sanding, or when near tools)**
- Electric or Portable Drill Motor (for preparing wheels and axles)
- Wheel turning mandrel (for preparing wheels - from hobby shop or online)
- Small Metal File(s) (Mill or Fine Cut for filing axles)
- 320 and 600 Grit Wet-or-Dry sand paper (for preparing axles)
- Small Strip of Soft Cloth (ie: cut from old Tee Shirt)
- Metal Polish (for polishing axles... a mirror finish is desired)
- Tracing Paper (for drawing car outline)
- Coping Saw (To cutout body... power Dremel or Scroll Saw may also be used)
- 3/8"/10 mm Drill Bit (if round weights are placed internally)
- 3/8"/10 mm Tubular Weight (from Scout Shop, Hobby Shop, online)
- Wood Putty (to fill holes for internal weights)
- Sanding Sealer or Wood Primer (to harden surface for smooth finish)
- 100 Grit and 220 Grit Garnet Sand Paper (for sanding wood body)
- Finish Paint (Either Spray or Brush on)
- Decals and Decorations as Desired
- Time & Patience (must be supplied... not for purchase ☺ ☺)

## Race Car Assembly

1. Sketch out design and tape or draw on block of wood
  - a. 2D designs are much simpler to make!
  - b. Make sure design is within the rules of height, length and width dimensions
  - c. Consider drilling holes and adding weights now or after painting
  - d. Cut out design outline, file and sand smooth
2. Paint the Car and avoid handling for at least 24 hours
3. Use the SAME BRAND of paints and primer to ensure compatibility
4. **Toothpicks in the axle slots** will keep them from plugging up with paint
5. Axle preparation - before sticking axles in the wheels
  - a. Check Axles are straight by rolling on flat surface
  - b. File down sharp edges at nail point
  - c. File down web on nail head
  - d. File down ridges on nail body
6. Wheel preparation
  - a. Sand off bumps and mold flashing on wheel surfaces
  - b. Check that the wheels roll straight on a slight incline
7. Prepare the wheel and axles for final assembly
  - a. Check that the axle slots are square
  - b. Keep a 1/16" to 1/8" space between wheels and car body
  - c. Glue the axles in the slots – non-glued nails have come loose during races

- d. GEL-Super Glue or epoxy work well. Normal super glue is too runny and will run down the axle and foul the axle and wheel. Hobby Lobby, in the model building section, carries Testors Cement for wood and metal (green tube). This is the glue I prefer. (Hot melts don't hold up).
  - e. Keep glue away from wheels – e.g. protect with tape etc.
  - f. Make sure the axle slot is still visible and not totally obscured by glue or epoxy
8. Weigh the Car
    - a. Add your weights and glue them in too
    - b. Patch holes with wood putty and sand smooth
  9. Lubricate the wheels and verify that the car rolls freely on a slight incline
  10. Have fun, be patient and say a few prayers

### **Speed Tips**

Maximize weight

Use a dry graphite lubricant, not grease or oil

Polish axles with very fine sandpaper 400 and 600 grit emery paper even 1200 Grit

Keep Center of Gravity ~1" forward of Back Wheels along centerline

Add weights from the bottom side within the car's volume - do not let them stick out from bottom

### **Detailing Tips**

Sand car smooth and tack off all dust etc.

Consider a primer or sealer coat before final paint

Let dry a full day before handling again

Get the bottom sanded smooth but don't worry about its paint quality

If using tape for designs pull off when paint is still wet

Clear coats add gloss and depth, test to make sure it compatible with your paint

Hobby stores (Michaels) have detailing supplies – decals, drivers, fenders etc.

**FRICITION:** One of the best ways to eliminate friction is graphite. A good dosage may not do wonders for the paint job, but it will for your axles (hopefully you didn't glue the axles too far in or that will impair the wheel). Most axles in the kits have burrs on them around the head. De-burr the axles with a small file.

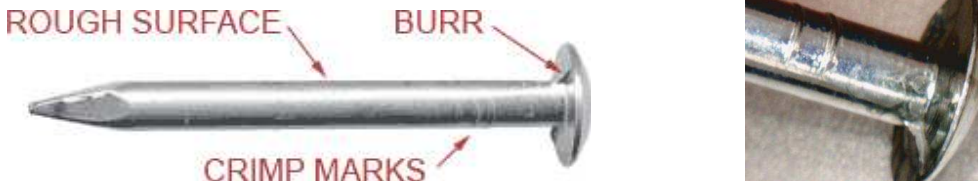
**WEIGHT:** It boils down to this, the closer you get to 5.00 ounces without going over, the better off you will be. The placement of the weight on the car (front or back) is an item which has been argued for years. Weight toward the rear seems to work best, along as the front wheels track straight. Just remember – gravity is the only power these cars use.

**AERODYNAMICS:** There are just about as many arguments on this topic as there are Pinewood Derby racers. It has been tried, several times, to race a car, as is, straight out of the box with no cutting, shaping or painting of the wood. These cars seem to perform, on average, just as well as the low, sleek, aerodynamic models. The bottom line is: Let the boy design the car, and help him achieve his design! If the adult wants to tinker with the car, tinker with the wheels and axles. The car design has almost no bearing on the outcome of the race.

**ALIGNMENT:** Make sure that the car's wheels are placed as straight as possible. Place the car on the floor and roll it about 8 to 10 feet. The car should go in a straight line. Adjust with the axle placement to make double sure the car will roll straight.

**WHEELS and AXLES:** Make sure that the axles are glued securely to the wood. Also ensure that the wheel is not glued to the axle. The wheels are single most important part. Make sure the wheels are on straight and turn freely.

**Axle Burr Removal.** Heads of the nails used as axles in the kit have a mold or casting mark in two places just where the head attaches to nail shaft. Remove the metal webs with a file, being careful not to gouge or scratch the running surface of the shaft. This will prevent the axle from grinding the wheel hub area, slowing down your car.



**DESIGN / SHAPE:** The finish line uses electronic infrared sensors to detect the car moving across the finish line. These sensors are directly centered in each lane of the track. The starting gate of the track uses a bolt in the center of the track. This is to ensure that the length of roll each car will have to the finish line sensors will be the same for each car no matter what the shape of each car is. Keep a high track clearance so that nothing has a chance to rub on the underside of the car. Remember that the cars straddle a wood/metal lath as they roll down the track.

**PAINT:** Let your imagination run wild!! Whether you use 50 coats of hand rubbed lacquer, olive drab or no paint at all, all it will do is affect the looks of your car. It will not run any faster or slower whether it's red, blue, green, yellow, flames, no-flames, or pink polka-dots!! Let the boy paint the car. Drips of spray paint don't slow the car down.

**ACCESSORIES:** Glue those Lego and Pokémon characters in! Anything that falls off in the race stays off. This can lighten you car enough to slow it down.

**Remember to -- Have fun! Do your best! Learn to work with your hands! Be a good sport! Build a happy memory!**

**The following hints will help give you the best chance to win:**

1. Insure your **car is tracking (steering) in a straight line** before check-in
2. Insure that you have **thoroughly lubricated your car before check-in**
3. Check your wheels for minimum friction. **Can you spin each of the wheels and have them spin 20 to 30 seconds before they come to a stop?**
4. **Always handle your car by the body** not the wheels.
5. **Don't roll your car in the dirt or on concrete surfaces.** It's a sure way to ruin the wheels and axles before the real race even begins!
6. **Don't run while carrying your car.** While running you're more likely to drop your car, which may break something, you cannot repair.
7. Insure your car is placed on the track with **wheels spaced so that they do not touch the lane guide** at the starting gate.
8. **Insure when placed at the starting gate** the car points straight down the track.
9. If your car doesn't do very well rolling forward **try racing it backwards.** Cars may run faster one way than another. Remember to place the car numbers on accordingly.



## PACK 4

# PINEWOOD DERBY®

## QUESTIONS & ANSWERS



**I was a 5th-grade Webelos, but crossed-over into a Boy Scout troop. Can I still enter my car in the Pinewood Derby?**

Yes, absolutely!

**The hobby store at the shopping center sells precut car bodies. Can I use those instead of the block from the kit?**

No, not for racing. They are acceptable for the Open Class Race.

For "Scout Derby Class", such resources can be used provided that the original block is "prominent in the design." For instance, using the unimproved original block as a base to set other material on." Reference: "G-2. Essential Materials" under "GENERAL rules" and rule **T-1**.

**A national supplier of pinewood derby stuff sells "performance axles and wheels". Can I use those instead of the wheels and axles from the kit?**

No. The wheels and axles from the kit provided must be used. The performance wheels can be recognized by a slight indentation across the tread profile. That indentation is not a legal profile. Legal profile requires that the tread be straight across. (Reference: Rule **T-6**.)

The axles can be recognized by an indentation on the outer face of the axle head. Reference: "G-2. Essential Materials" under "GENERAL rules" and rule **T-3**.

**My front wheels extend beyond the front of my car. Is this permitted?**

No. See rule T-10 & T-4.7

**My car has a hole in the middle. Can I stage it at the starting line so that the starting pin goes up through the center of the car?**

No. It would not recommend anyway since, even with the head start, it will not perform as well. (Would you believe more than two car lengths slower?) (Reference: Rule **T-10**.)

**My car has only 5/16" clearance between the body and the bottom of the wheels. If my car leaves the track because of a "high spot", will a rerun be allowed?**

Probably not. If the "high spot" is less than 3/8", then the track is proper in that respect (see rule **R-3**), and the car "is at fault" because it ignored the guidance in rule **T-4**.

**(Continuing from last question) Then, can I change my car to correct the problem?**

The track chairman may allow this "improvement", provided that the Cub Scout can perform the changes in accordance with rule **C-5**.

**I must arrive late for the race because of a ball game. Can my brother (or friend, or parent) check my car in for me?**

No. You must choose which activity to participate in. See "G-3. Attendance" under "GENERAL rules". You can have your Den leader check the car in but this is up to their good judgment and willingness.

**My Cubmaster (or Dad, or Grandfather) built a car when he was a Cub Scout. Can we race it in the Cub Scout Race?**

No, but he can show it and race it in the open race event if it is held.

**Do I have to put the axles in the slots of the original block?**

Yes, All cars must use the same original axle location using the nails provided and the slots must be visible.

**When I set my car on a flat surface, one of the wheels does not touch. Is this okay?**

Yes. Not all of the wheels must touch. This can be advantageous in some cases, and disadvantageous in others.

**My car was weighed at the XXXX High Precision Laboratory and found to be 4.999995 ounces. On race day they told me that my car was "too heavy" and that I must reduce its weight before it will be allowed to race. This isn't fair.**

A number of factors come into play in this. First, wood is "not stable". For instance, it can absorb moisture from the air. Thus, its weight can change slightly from day to day. Since you were so close to the limit at that time, it is reasonable to believe that you are now over the limit.

Secondly, if the race official must take your word for compliance, then they must take everyone's word for compliance. So, there would be no need for inspection. Remember, not everyone is as honest as you are!

Third, five ounces is what the official scale says is five ounces. Every effort will be made to assure that the scale is accurate and that a reliable 5-ounce standard is available to verify the scale's accuracy. The important thing is that everyone races according to the same standard.

**Oops! My car is much lighter than 5 ounces. Can I add weight on race day?**

Yes, provided that rules, especially rule T-5, are satisfied. For instance, you may securely attach a penny (nickle, dime, quarter, washer, chunk of lead, etc) to the car. Of course, after the change, the car must still pass inspection. Be extra careful about adding weight to the underside of the car. This could cause the car to drag on the center guide rail if the 3/8" underbody clearance were not present.

**I heard about a "super slick" lubricant that I want to use on my wheels. Is that allowed?**

Yes, provided it is a dry lubricant. See rule T-9. Oil and grease are not "dry." Graphite is dry.

**My wheels and axles from last year performed really well. Can I use them in this year's car?**

No. See rule "G-5. New Work" under "GENERAL rules".

**Regarding rule T-3, how will the judge recognize the nail as being from the kit?**

By looking at the nail head and, if it is visible in the slot, the nail point. The shape and texture of the nail head is the key indicator, so it should not be polished or changed substantially.

**What can I do if the inspection judge says that my wheels are illegally crowned? (See rule T-6)**

The Cub Scout may appeal to the inspection chairman, and to the event chairman. If the appeals are denied, the Cub Scout and his assistant may replace the wheels or decline to race. Additional wheel kits will NOT be available at the race.

**I think that my wheels last year might have been illegal, but the inspection judges let me race. Does that mean that if I do the wheels exactly the same way this year, then I will have no problem with them at inspection?**

The results from last year's inspection don't determine the results of this year's inspection. Perhaps the inspection judge was not trained as well as the team the year, or perhaps the inspection judge just made a mistake last year.

We will be trying to assure that all inspection judges will be well trained this year and that they will do their jobs consistently and in strict accordance with the current rules.

**Two styles of wheels are in the Grand Prix Pinewood Derby kits sold by the Boy Scout Service Shop. Can either be used?**

Yes either the old BSA wheel design or the new BSA wheel design may be used. However, ONLY Official BSA Grand Prix Pinewood Derby wheels are acceptable for racing. Additionally, you cannot purchase pre-polished BSA wheels. All wheel polishing must be performed by the scout/parent/guardian. Purchased pre-polished wheels are strictly prohibited. If it is determined that pre-polished wheels and or axles are being used, the car will be disqualified.

**On close inspection, the wheels that are "fresh out of the BSA box" do not appear to be "flat across the tread" as required in the rules. Can they be raced "out of the box, as is?" Or must the tread be "flattened" in order to satisfy the district rules?**

Wheels can be raced "as is", exactly as supplied by BSA, "fresh out of the BSA box." If the wheels are "worked", then they must conform to the rules. (The inspection judge can tell the difference!)

**Must my axles be level? Is it okay to angle them up or down? [Some builders believe that angling the ends of the axles up so that the wheels stay at the ends of the axles and ride on the inside edge of the tread is advantageous.]**

Axles do not need to be level. (Read the next question and answer carefully before using this.)

**I have not been able to sand the wheels so that they are perfectly cylindrical. The tread has a slightly conic shape. There is a small, but visible, gap when the wheel treads are measured for parallel. [Some builders believe that angling the tread (so that the wheel diameter is larger on one edge than on the other) and causing the wheel to ride on one edge is advantageous.]**

The inspector will determine if the conical shape is used to cause the wheel to ride on its edge by looking at how the wheel rests on the test track section. If the wheel still sits flat on the track, then the conical shape is not excessive. (Note that angling the axles as described in the previous question may cause your car to fail this secondary test.)

**I weighed my car at the Pack meeting and it was under 5 oz, but on race day the scale in the check in line it is overweight. Doesn't the pre-race day weight count?**

No, the official weight for a car is the weight taken on race day during the check in.

**If the weight at the Pack meeting does not count, then what use is it?**

The purpose of the Pack Meeting weighing is to help you get really close to the official weight. Pack meeting scale results will not be "official", but you should expect to be within a couple hundredths of an ounce of the official weight. (One racer used an inch-long bead of hot glue on the top of his car to add about 0.05 ounces to his car. It would have been easily trimmed with a knife if the car turned out to be a bit over the limit.)

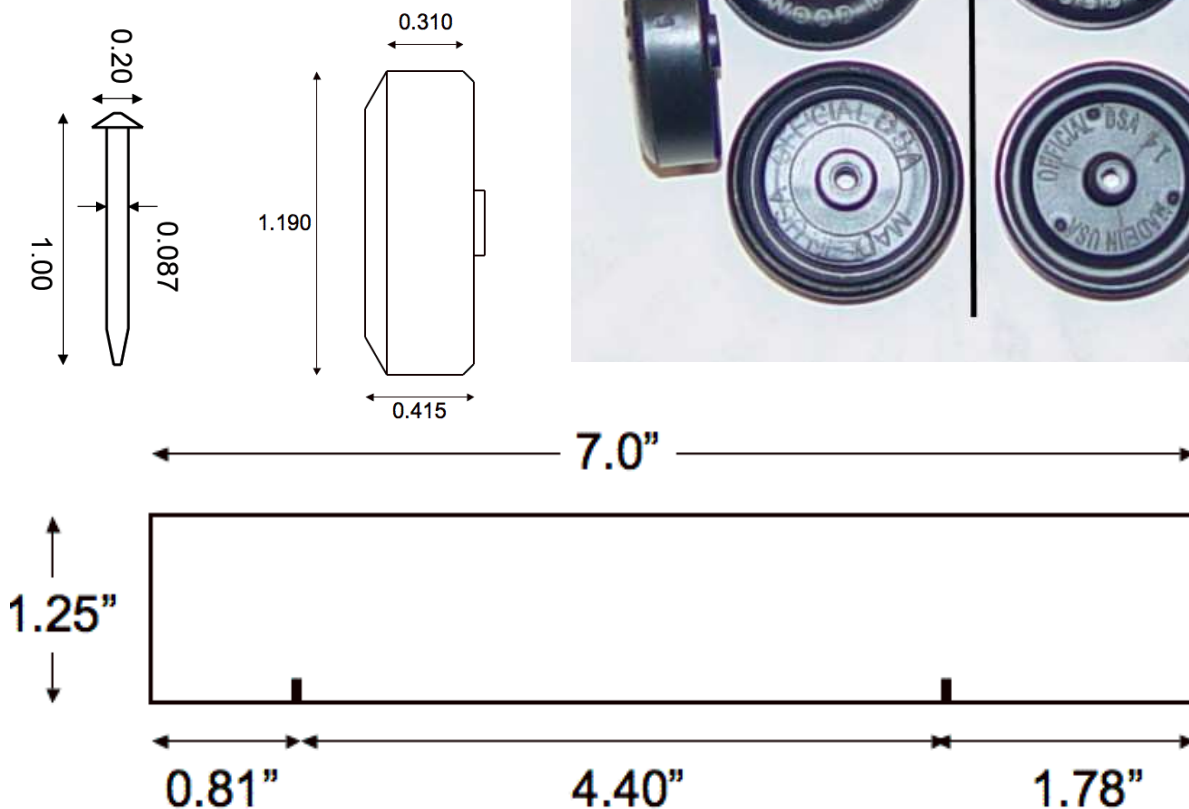
**I can't arrive until after the start of the race. What can I do?**

Notify your Den leader prior to the race and arrive when you can. If your Den leader is willing, they may check in your car. However, they may NOT make ANY adjustments to your car, however slight. This means that if your car is overweight, you will not be eligible for the Pack race. Only the scout and/or the parent may make adjustments to the car.

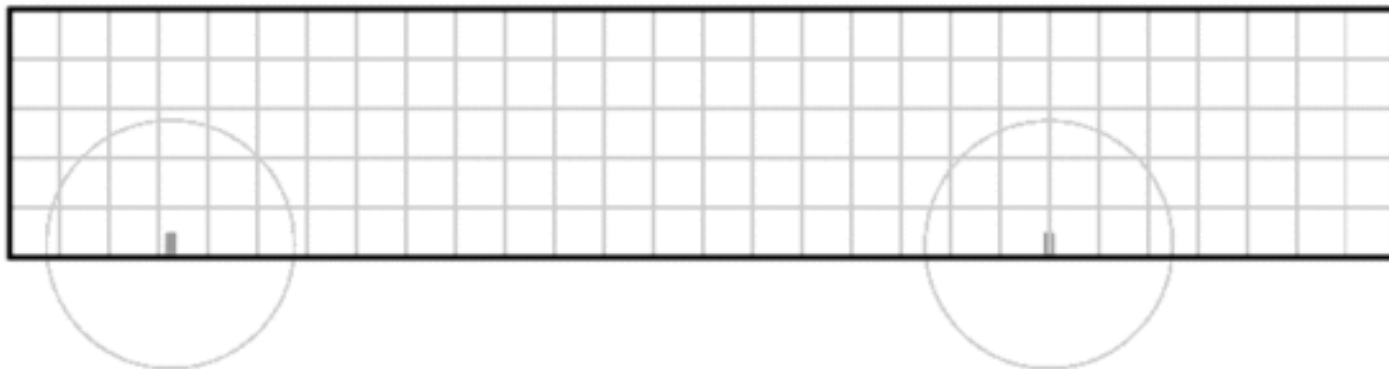
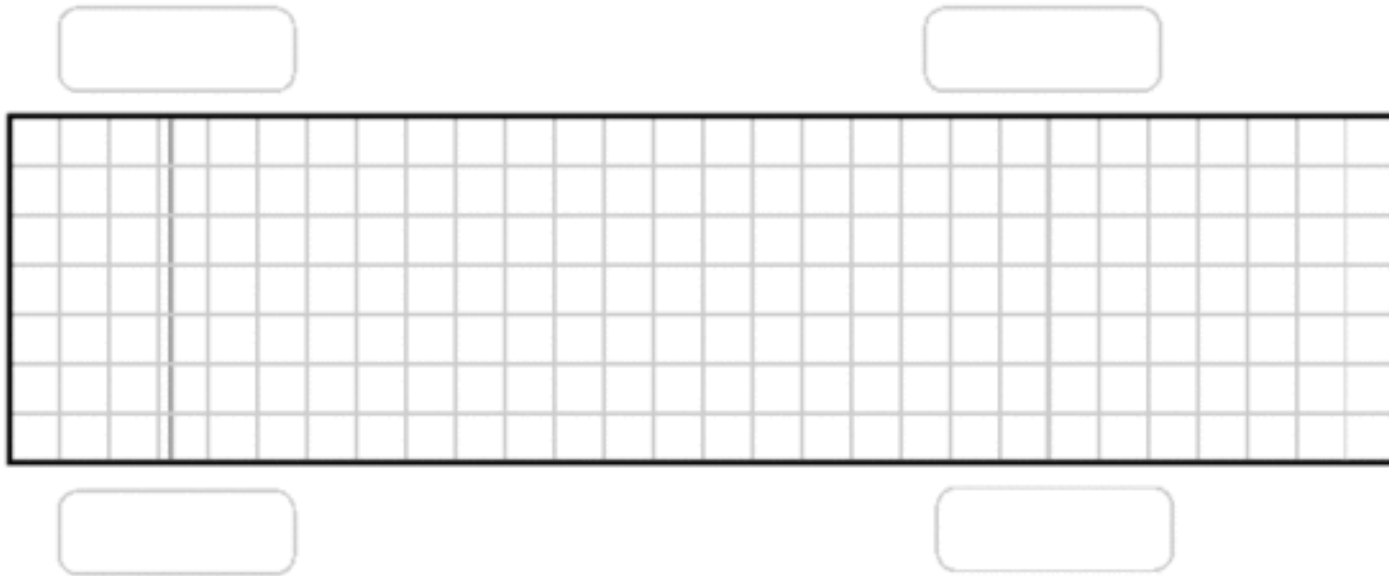
If you should arrive late after the races have started and have not asked your Den leader to check in your car, you will only be eligible to enter the Open Class race. You still have to go through inspection, and you will not get any special treatment there, such as being put at the front of the line. You forfeit any chance at entering the Pack Race.

**FYI:**

Penny	2.5 g	0.088 oz
Nickel	5 g	0.176 oz
Dime	2.268 g	0.080 oz
Quarter	5.67 g	0.200 oz
Half Dollar	11.34 g	0.400 oz
Presidential \$1	8.1 g	0.286 oz



# Standard Block



**Cub Scout Pack 4 Open Class Awards**

<b>Award</b>	<b>Car #</b>	<b>Scout Name</b>
Most Humorous:		
Most colorful		
Coolest name		
Best effort		
Sportsmanship		
Most Fuel Efficient		
Coolest paint job		
Most creative design		
Spookiest		
Most unique		
One of a Kind		
Most artistic		
Best Detail		
Best Use of Imagination		
Best Wheels		
Best Workmanship		
Fastest Looking		
Most Futuristic		
Most Humorous		
Most Original Design		
Most Patriotic		
Most Realistic		
Most Unusual		
Shiniest Paint Job		
Smoothest Finish		
Sportiest Looking		
Most Unique Shape		
Best of Show		
Most creative use of colors		
Most Aerodynamic		
Most Artistic		
Most Creative		
Most Decals		
Most Scout-Like		
Funniest		