

"READY-SET-GO!"

"Ready-Set-Go! Hands-On & How-To's for Bicy Cars, Boats & Planes"

~~(Prepared by Dan Seich, 4822008 Den Leader, Pack 42, Santa Clara)~~

General Information

What Kind of Derby?

Full Competition with Awards?

Just for Fun?

A Little/Lot of Both? (KISMIFF!)

Den or Full Pack?

Consider:

Length of time needed for actual races/judging

Costs involved

Parents available to help

Activities to keep boys occupied while not racing

Who Builds Vehicles & Races Them?

Cubs & Tigers:

Designed to be a joint Parent/Son Activity!

Emphasis should be on the Boy doing most of the work!

Leaders/Parents/Family Members/Friends:

Hold special races for others interested!

This will encourage them not to spend all their time
and effort building the Boys' cars!

People Needed:

Chairperson/Coordinator:

Recruit/Coordinate All Other Derby Staff Members

Obtain/Distribute Kits

Arrange for Construction Assistance (as needed)

Set Up Weigh-Ins (Pinewood Derby)

Coordinate All Race Day Activities

Assistants:

Construction Help (as needed)

Weigh-In Crew (Pinewood Derby):

Registration

Scale Manager

Weight Adjustors

Impounder

Race Day Crew (Pinewood Derby):

Track Crew (set-up/take-down)

Pit Crew (graphite on wheels; repairs)

Crowd Control (try taping the floor or roping off
the track area - all spectators "behind the
line")

Race-Order Announcer/Record-Keeper ("Who's Next?")

Track Loader/Starter

Finish Line

Score-Keepers (2)

Special Awards Voting

Awards (2 or more)

Refreshments
 Clean-Up Boss
 Race Day Crew (Raingutter Regatta)
 Pit Crew (repairs)
 Straw Boss (Issue/Replace Blowing Straws)
 Towel Manager
 (All other positions as per Pinewood Derby)
 Race Day Crew (Space Derby)
 Track Crew (set-up/take-down; maintain line tension;
 replace lines if needed)
 Pit Crew (lubricate/install rubber bands; replace
 rubber bands; repairs)
 Winders (ensure each rocket gets same number of winds;
 send rockets back to Pit Crew to replace broken
 rubber bands; wind them again)
 Track Loaders/Starters (one for each lane - to load
 rockets, hold props, then release on start
 signal)
 (All other positions as per Pinewood Derby)
 Other: _____
 Equipment/Materials Needed:
 Construction:
 Saws:
 Power - 2" min depth scrolling saw (Pinewood Derby)
 Hand - coping saw, miter saw, Radio hobby saw
 Shapers:
 Power - Dremmel Tool
 Hand - rasps, files
 *For Balsa Wood (Space Derby/Raingutter Regatta) -
 Potato Peeler works best!
 Pocket Knife (ONLY with Whittlin' Chip & Adult Supervision)
 Sand Paper (from coarse to fine)
 Glue
 Paint (Brush On/Spray)
 Sealer/Primer
 Main Colors
 Clear Top Coat
 *Note: "water clean up" best for Den Meetings (latex,
 acrylics, water paints)
 Other: _____
 Track:
 (Per Event Being Held)
 Weigh-In (Pinewood Derby):
 Scale (electronic best; postal scale works fine)
 Measure Box or Ruler (to check for legal size)
 Clearance Bar (to check that height clears electronic/
 mechanical finish line)
 Drill
 Hot Glue Gun/Glue Sticks
 Lead Fishing Weights
 Boxes with Padding to Hold Cars After Impounding
 Other: _____

Pit:

Pliers (Needle-Nose)
Small Hammer (Ball-Peen)
Screw Drivers
Drill
Hot Glue Gun/Glue Sticks
Extra Parts/Other Items:
 Pinewood Derby:
 Wheels (pre-spun)
 Axle Pins
 Powdered Graphite
 Newspapers (for Graphite Area)
 Paper Towels/Spray Cleaner (to clean up
 graphite)
 Other: _____
 Balngutter Regatta:
 Nasta
 Tape (to hold sails in place)
 Other: _____
 Space Derby:
 Rubber Bands (Lots & Lots of Them)
 Rubber Lubricant
 Margarine Tub (for lubricating rubber bands)
 Prop Assemblies (pre-assembled)
 Rubber Band Retainer Dowels (rear of craft)
 Rubber Band Mounting Hooks (made from coat
 hanger)
 Rubber Band Winder Hooks
 Other: _____

Race Order:

Qualifying Rounds:
 Each Boy Should Get To Race A Minimum Of 4 Times!
 Each Time A Boy Races It Should Be In A Different Lane!
 2 Racing Lanes:
 4 Racing Lanes:
Top-16 Double-Elimination Finals:
 *Note: Use The Term "Retired" Instead Of "Eliminated"
 A Boy Is "Retired" After 2 Losses

Awards:

Who?
 Top Finishers (Pack)
 Top Finishers (Each Den & Tiger Group)
 Special Award Winners
 Categories:
 Who decides upon categories?
 Who Votes?
 Cubs/Tigers?
 Special Judges?
Participants
Trophies:
 B.S.A.
 Local
 Make Your Own ("recycle" old trophies?)

Medals:
B.S.A. (Top 3 Places)

Ribbons:
B.S.A.
Local

Cards:
B.S.A.

Certificates:
Local
Make Your Own

Other: _____

Publicity (Before/After Event):

Within the Pack/Dens/Tiger Group:

Newsletter

Special Fliers

"Announcements" (Go Ahead - Let Them Sing It!)

Sponsoring Organization:

Newsletter?

Local Newspaper:

Press Release

Other: _____

"Things That Float"

Raingutter Regatta:

Rules (Basic Derby):

Kit

Track:

Saw Horse Legs:

2 pair

2"x6" Frames:

2 each with cutouts to hold gutter

PVC Gutter:

2 pieces 10' long

4 end caps (use caulk if better seal needed)

2 rubber stoppers for drain holes

Other Equipment Needed:

Painting Stand/Display Stand (make your own)

Plastic Straws (blow through them to propel boats)

Towels

Recommended Procedures:

Design Variations (on traditional sail boat)

Viking Boats

Other: _____

Other Vehicle Possibilities (Raingutter Track):

Rubberband-Powered Paddle Boats

Balloon "Jet" Boats

Other: _____

Other "Track" Possibilities:

Wading Pool

Other: _____

"Things That Fly"

Space Derby:

Rules (Basic Derby):

Kit

Track:

2 Each of the Following:

Saw Horse Legs (pair):

2"x6" Frame:

To Hold Upper "T"

2"x4" "T"

Bolt Parts Together

1 Set of the Following Per Lane:

"Eye" Bolts on Top Cross Members

One End "Permanent"

Other End "Adjustable"

50-Pound Test Fish Line

Large Fishing Soap

Large Fishing Snap/Swivel (to allow line to uncoil)

Rocket Carriers (B.S.A.)

Other Equipment Needed:

Painting Hanger (large paper clip)

Rubber Band Lubricant

Margarine Tub (for lubricating rubber bands)

Rubber Band Winder Hooks

Hand Drills ("Egg-Beater" type - to wind rubber bands)

Recommended Procedures:

Design Variations:

Other Vehicle Possibilities (Space Derby Track):

Balloon Races

Paper Cup Races

Other: _____

White Wings Gliders:

Kit

Paper Gliders:

Materials Needed:

Paper (try to recycle old 8-1/2 x 11 paper)

Paper Clips

Tape

Stapler & Staples

Crayolas, Marking Pens, Etc.

Events:

Distance

Time in Air

Stunts

Other: _____

Helicopters:

Kites: _____

Parachutes: _____

Frisbees:

 The Frisbee:

 "Whammo"-Style ("Store-Bought")

 Plastic Lids:

 Coffee Cans

 Powdered Drink Cans

 Margarine Tubs

 Other: _____

Events:

 "Ultimate" (Cub Scout Sports Program)

 Distance

 Accuracy

 Stunts

 2-Boy Team Catch (Like "Egg-Toss")

 Other: _____

"Things That Roll"

Pinewood Derby:

Rules (Basic Derby):

Vehicle Size

Vehicle Weight

Legal Wheels:

Only B.S.A. Wheels Allowed (Wire Spoke Pattern)

Edge Must Be Flat!

Not a "V"!

Not a Bevel!

Not Rounded!

Kit:

Parts

Design:

Draw on paper using template of rough block

Transfer design to wood block

Rough Cut

Shaping

Sanding

Painting:

Painting jig

Prime coat

Multiple thin coats

Top finish (clear coat)

Preparing the wheels:

Special mandrel for power drill

Final assembly

Track:

(See Track Display)

Finish Line Devices:

Electronic

Mechanical

Other Equipment Needed:

Scale

Lead Fishing Weights

Box with Padding (to store cars after Weigh-In)

Powdered Graphite

Newspapers (for Graphite Area)

Paper Towels/Spray Cleaner (to clean up graphite)

Rope/Wood Strips (for Car holding area - to keep them from rolling off the table)

Recommended Procedures:

Order Kits

Issue Kits

Den Meetings: (Invite/Require Parent to Attend)

Design

Rough cut

Shaping

Initial sanding

Special Help:

Tools

Paint supplies

"Spinning" the wheels

Weigh-Ins:

All construction completed prior to....
Must weigh-in prior to Race Day
{Set a schedule & stick to it!}
Electronic scale best
Be prepared to add/remove weight as needed
Cars Impounded at Weigh-In

Race Day:

(per General Instructions)

Design Variations:

Fire Trucks *

Other: _____



PINEWOOD DERBY TIPS



Key Dates

Distribution of Pinewood Derby Kits
Weigh-in and Tech inspection
Race Day (evening)

9AM to 1PM
6PM to 9PM

Here are some tips that I got off the Internet and from past winners. This is broken into two sections, basic techniques and advance techniques.

Basic Techniques

Planning and cutting

Sketch a design and cut out the design. Although you would think aerodynamics would be a major consideration, in actually racing this has proven not be the case. Let your scout be creative in their design and don't worry whether it is streamline or not.

Planning for Weight

Your finished wood block along with the wheels, axles and trim will not usually weigh much over 2.5 ounces/71 grams while the finished car is allowed to weigh in up to 5.0 ounces/141.75 grams. The weight of your car overcoming friction is what will allow you to win over other cars. You must make gravity work for you. Your car must overcome both breakaway friction it will do this by being as heavy as allowed while presenting the smallest profile to the air-stream. In Pack 43 weight is added at the Tech Inspection but you must plan where you want the weight. At the inspection weight will be added using a drill press and 1 1/2oz weights. There is an advantage in placing the weight to the back. The front wheels perform the function of guiding or steering and the less weight on these wheels the easier the car corrects itself when it strikes the guide strip. Fewer and shorter contacts with the guide strip mean a faster car.

Sanding and smoothing

Sanding the wood body will eliminate any of the saw blade marks as well as any small blemishes in the wood surface. If you have access to a motorized belt-disc sander your work will be quickly done but for most of us a sheet of sandpaper and a sanding block will do just fine. Start by using a 220-grit paper and wood or rubber block on the filler and rough portions of the wood car body. Gently smooth the edges and corners of the car while using a little more pressure on the flat areas. When you have the wood smoothed switch to the 400-grit paper. It will provide an excellent surface for your final finish. **DO NOT WET-SAND UNPAINTED WOOD.**

Painting and finishing

The bare wood surface will act much like a sponge when your paint is first applied and it will take several coats of paint to seal and finish the wood. A better approach is to apply a wood sanding sealer or primer to the wood. This acts like a primer coat for the wood and provides a good base to apply the color finish paint. Prepare a place to paint your car that will be out of the house while you are painting and out of the reach of young children while your car is drying. You may either paint one side at a time waiting between coats or suspend the car on a string with a nail in the axle slot and paint all of it. Brush or spray the sanding sealer on the car with a complete coat and wait for it to thoroughly dry. After it is dry, sand it with 400 grit wet or dry sandpaper. You will find that the finish is smoother if you use a wet-sanding process. Wet the paper and the painted car body. Lightly sand until the sanding-sealer is

smooth but not through the sealer to the wood. You are now ready for the finish color coats of paint. The best and smoothest finishes will be had with spray paint but brush-on paint will not affect the overall speed of the car either. Use fast drying enamels and avoid using different brands on top of each other. If you get a run in the paint, let it dry and sand it smooth. Re-coat it later. You can achieve a very, very smooth finish if you wet-sand between coats with 600 grit wet-or-dry sandpaper. If you are going to apply decals and detail work now is time to do this type of work. If you are careful, you can apply a clear coat of finish over the decals to seal them. Don't use too much clear-coat at a time or you'll wrinkle the decals.

Wheel Work

Next to the weight of the car the wheels are the most important element in the car. The biggest problem is that there is not a great deal that you can legally do with them. You must insure that the wheels roll smoothly, in a straight line and roll very easily. The wheels included with kits manufactured through 1998 have a better quality wheel than that of previous kits. Kits produced in the 1999 race year were very inconsistent. Even still, there are things to check and fix on each of the wheels. First, the wheels must be perfectly round. Some molds may produce slightly out-of-round wheels that are slower than others may. To check for this put the wheel on an axle and spin it. It should turn with the outside surface at a single reference point never varying. The run-out or the wheel movement along the axle axis should also be minimal. If you suspect the wheel is out-of-round discard it and buy just the axle-wheel kit at your Scout supply outlet. There isn't much you can do to correct a bad wheel. The wheels are all produced from a mold set and will all vary to some degree. Check the wheel for burrs on the running surface of the tire and hub areas. These need to be freed of any extra plastic residue or molding matrix. Most Packs and council races require the racers to do minimal work on the wheel surface. This means that the outside wheel surface can be sanded or filed to make it flat across the bottom of the "tire". To perform this work you may use either a very small machine screw or nail about 3 inches long to stack all 4 wheels onto and chuck them in to a drill motor. Using a fine flat mill file, turn the drill on and at an angle to the rotating wheels; apply very light pressure to the wheel surface touching at least two wheels at a time. Insure you don't create a rounded wheel surface that may be illegal. If the wheel is noticeably altered it will be rejected at the weigh-in.

Axle Polishing

The 'nail' type axles that come in the Pinewood derby kit must be used in the construction of your of your car. These axles provide no bearing surface so there is friction between the plastic wheel surface and the metal axle. Since this friction reduces speed we need to minimize the contact surface area, make the surfaces smooth and lubricate the mating surfaces. It is usually against the rules to machine the plastic wheel and these procedures usually require a lathe or other tools not typically available to a Cub Scout. That still leaves the axle open to "jaly with". The following suggestions are things you can do with simple hand tools to improve the performance of the axles. First, the heads of the nails used as axles in the kit will often have a mold or casting mark in two places just where the head attaches to the shaft the nail. Remove this web of metal with a file being careful not to gauge or scratch the running surface of the shaft. This will prevent the axle from grinding the plastic hub area and slowing down your car. This is usually best done with the axle chucked up in a drill press or drill motor that is secured into a stable position. Polishing the axle can be finished to a high luster by following the steps detailed here. First, mount the axle in drill motor chuck exposing the head and the first 3/4" of the axle. Secure the drill so that it doesn't move. Now cut a piece of 400-600 grit wet or dry sandpaper to a strip approximately 1/2" wide and 4 to 6 inches in length. Wet the surface of the sand paper with water or light machine oil, start the drill and loop the sandpaper over the axle and pull the paper back and forth like a shoe polish cloth. Work the paper until the metal is smooth in the wheel running area (next to the head of the axle). This usually takes about a minute for each axle. Now, using either paraffin paste or metal polish in a soft cloth (like a tee-shirt), start the drill again and press the cloth and polish compound into the axle with a slight movement back and forth. This will also take about a minute. The finished axle will be very smooth and bright in appearance.

Lubrication

The type of lubrication is usually restricted at most races to dry lubricant graphite or white Teflon lube. They provide very thin plating of microscopic spheres that greatly reduce rolling friction. Plain graphite is available in hardware stores and some variety stores. When installing your wheels fill the axle hole of the wheel while capping the other side. Gently push the axle through the wheel. Do this several times and spin the wheel to help distribute the graphite through the running surface. A good test of the wheel, axle and the lubrication is a spin test. While holding the wheel in the axle in a horizontal position spin the wheel with a flick of your finger. It should spin freely, then slowly coming to a stop after 20 to 30 seconds. If it didn't spin that long take a close at your wheel clearance, axle finish and lubrication. Correct the problems then test them again.

2002 Open Division
Round 1

Race #	Lane 1	Lane 2	Lane 3	Lane 4
1	1	11	20	30
2	2	12	21	31
3	3	13	22	32
4	4	14	23	33
5	5	15	24	34
6	6		25	35
7	7	16	26	36
8	8	17	27	37
9	9	18	28	38
10	10	19	29	39



↑
Lanes
Same



↑
Shift
Down
Two Spots



↑
Shift
Down
Two Spots



↑
Shift
Down
Three Spots

Adjust Lanes

*2002 Open Division
Round 1*

Race #	Lane 1	Lane 2	Lane 3	Lane 4
1	1	11	20	30
2	2	12	21	31
3	3	13	22	32
4	4	14	23	33
5	5	15	24	34
6	6		25	35
7	7	16	26	36
8	8	17	27	37
9	9	18	28	38
10	10	19	29	39

SANTA CLARA COUNTY COUNCIL, BSA
PIONEER DISTRICT
(REVISED 2001)
CAR BUILDING RULES

THE KIT- The car shall be built from the official "Cub Scout Grand Prix Pinewood Derby Kit." All cars must comply with the racing specifications and building instructions furnished with the official kit. The Kit is one piece car body with plated nails for wheel axles and wide tread wheels, designated as the GRAND PRIX PINEWOOD DERBY KIT. Only official BSA wheels and axles may be used as replacements. Unofficial kits will not be accepted. The "Pinc'ar" Pre-Cut Design bodies WILL NOT be allowed to enter the District Race.

THE CAR BODY- This is a Pinewood Derby race for wooden cars. Molded metal bodies over wooden frames are beyond most parent/son team and are therefore not acceptable. This rule does not prevent adding metal to the car to increase its weight.

WHEELS AND AXLES- All cars must have 4 (four) wheels. **THE SHAPE AND FORM OF THE WHEELS CANNOT BE MODIFIED OR RESHAPED**, however wheels may be sanded to remove molding burrs. The official kit provides a nail for the axle. **THE WHEELS AXLES MUST BE INSERTED IN THE PRE-CUT GROOVES THAT ARE ALREADY CUT IN THE CAR BODY.** The wheel base (distance between the axles) must not be changed. Wheel bearings, washers, bushings, axle sleeves, wafering, and wheel covers are prohibited. All four wheels **MUST** be in contact with a flat surface when the car is placed on it.

PHYSICAL DIMENSIONS- Overall dimensions must not exceed the specifications for the kit. 3" wide by 7" long by 3/8" high. In addition, the distance between the wheels must be greater than 1 7/8", inside measurement. No part of the car can extend beyond the starting post and the front of the car must be no higher than 1/2" where it contacts the starting post.

WEIGHT- The car weight shall not exceed 5.0 ounces (141.7 grams). No loose material of any kind is permitted in or on the car. The car may be hollowed out and built up to the maximum weight by the addition of solid materials such as wood or metal provided it is securely attached or built into the body chassis. The weight **MUST NOT** be taped on. No liquid weights are permitted inside or attached to the outside of the car body. No weights may be added after the car has raced in the Pack race.

HINT- The cars run better when the weight is added (to the maximum) in the center of the car chassis. Adding weight at the chassis end causes the car to bounce (cars will be disqualified if they jump out of their lane three (3) times).

SPRINGS- The car shall not run on any type of springs. The car must be freewheeling with no starting devices.

LUBRICATION- The wheels and axles may be lubricated with WHITE LUBE OR DRY POWDERED GRAPHITE. No additional lubricant may be added after the district race starts. If wheel or axle repairs are necessary during the race, the replacement part may be re-lubricated under the supervision of a race official.

TRACK CLEARANCE- Track clearance is specified at 3/8" even though the lane strips are only 1/4" high. The extra clearance is to allow the car to go from the sloped portion of the track to the flat portion without dragging.

REGISTRATION AND INSPECTION

All cars must be registered, inspected, and the fee paid at the weigh-in in order to run in the race. **NO EXCEPTIONS** Cars that are not registered and inspected at this time will not be allowed to race.

Only the First and Second place cars for Tiger Cubs and the First and Second place cars for Cub Scouts/ Webelos Scouts from the Pack race will be allowed to register for the district race (or a Third place alternate if either of the first two cars are disqualified, for example if it is built from an unofficial car kit or has unofficial wheels). A Pack Race Official is required to impound the cars at the completion of the Pack Race and bring them to the registration and inspection. This is to prevent any modification to the cars between the Pack and District races. The car drivers and their parents should be at the registration and inspection in case the car is too heavy and weight must be removed.

CHECK-IN AND RACING

The Tiger Cub or Cub Scout is expected to race their car. If due to illness, they are unable to race their car, another child may drive their car with the approval of the District Race Committee.