



FOR YOUTH DEVELOPMENT®  
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## THE 2021 ANNUAL ADVENTURE GUIDE DERBY DAY

**SATURDAY – MAY 15<sup>TH</sup> AT THE LAKE HIGHLANDS YMCA**

**RACE STARTS AT 3:30PM**

**CHECK-IN BEGINS AT 1:00 PM**

**Register at YOUR LOCAL BRANCH**

**Cost \$12 per child, includes car kit.**

**Registration is open.**

What is "Derby Day"? Derby Day is pinewood derby car racing! Your kids build wooden cars with plastic wheels that, propelled only by gravity, race each other down a set of tracks. This is a four-race event, with the fastest average overall time coming in first.

The competition itself is only a part of the experience; the construction of the derby car is a special achievement for the kids, allowing them to display their creativity, craziness, and style with these unique creations. This is not a "circle-centered" event, but rather a dad/child one. Each competitor races against random opponents, who may or may not be from your circle.

When is registration? Registration will run up until Wednesday May 12<sup>th</sup>. On race day participants will need to check in their cars by no later than 30 minutes before their race in order for the Race Organizers to establish the schedule. Cars checked in late run the risk of not making it into the normal rotation or potentially being left out altogether. Don't be late!

Where do we purchase the derby car kit? All derby cars participating in the race must be purchased through the YMCA.

The cost is \$12 per registration. This includes the car kit, participation ribbon, patch and place in the races.

What are the Rules & Guidelines for derby car construction? A copy of the rules is below. However, the "official" rules are on a sheet provided with your derby car kit (which, with the exception of the trophy categories, govern in the event of a conflict). All core car components (wood, axles, wheels) must be those that were supplied with your kit from the YMCA.

How much should a dad get involved in the car construction? Obviously, dad must use any tools that common sense dictates children should not use. Fathers should do any cutting/sawing of the wooden block. But your daughter/son should be responsible for the decorating of the vehicle, and when possible should determine the shape you cut it.

What should a car look like? Whatever your child's imagination dictates! A small example set of cars we've seen in the past are: teepees, fire trucks, race cars, school buses, arrows, pencils, trapezoids, slides, and in some cases, the original block of wood simply painted (or not!) with the wheels attached.

What are the categories for the trophies / medals? There will be trophies for the fastest cars in each age group. There will also be medals handed out for the most creative car designs. Categories will be: Most Patriotic, Most Creative Design, Best Paint Job, Best YMCA/Adventure Guides Program Theme and Judges Choice. We will have participation ribbons as well as patches.

What happens on race day? You will check-in your car at least thirty minutes before the race begins and then just sit back and enjoy, his program is all computer based. Once you check in your car will be off limits until the end of the race. Any adjustments or fixes need to be handled before you check in. No exceptions.

Though we would love to have everyone there to watch their cars race, you can just drop off your car if your schedule does not allow you to be there for the race.

Who runs and judges the event? Adventure Guides Directors and volunteers predominantly run Derby Day. Please be patient. Everyone is trying their best and wants every kid (and dad) to be happy.

Where can I get weights? Small weights are typically attached to the cars to increase their overall weight. These can usually be found at craft stores such as Mike's Hobby Shop, Michaels, MJ Designs, Hobby Lobby, etc. You can also use washers from the hardware store and/or fishing weights.

Covid Protocols: Everyone must be wearing a mask while in the YMCA, this is a general YMCA rule. Because of space, we are asking that only one parent comes per child. Please let us know if this will not work and we can see what we can work out. We will also be temperature checking each child/dad prior to the race.



**Race Day:** Race Day check-in is a two step process. At Station 1 you must weigh your car on the scale provided. If you are at or under weight, you will be given a Race Card. Fill in your child's name and Tribe. With your completed Race Card head to Station 2. Here you will be officially weighed and given a race number. Your car and Race Card will be taken at this time.

Check In will begin at 1:00 pm and close at 3:15pm. Don't be late to Weigh-Ins.

**About the Racing**

- You must have signed-in and weighed-in before your race time, be early to ensure you place in the race.
- Sorry, no practice runs
- Racing starts at the designated time
- Your car will be assigned a number, a sticker with the number will be provided.
- Dads are not allowed at the starting gates or interfere with the race-track area, you are a spectator.
- The software tracks each cars performance and then ranks and determines the winners.
- Boys and Girls will have separate winners for 1<sup>st</sup> through 3<sup>rd</sup> place – also design winners for Most Patriotic, Most Unique Design, Best Paint Job, Best Adventure Guides Program Theme and Judges Choice.
- Winning trophies will be awarded at the end of the race, participation ribbons will be presented as participants leave.
- *We've done our best to organize this event, race details are subject to change with or without notice...*

**WARNING:** Cars only purchased at the YMCA will be able to race on the track. Cars sold in retail stores and hobby shops will not fit on the track and will not be able to race...

**How to Build a Car.** There are many ways to build a competitive Derby Car. However, past experience and the Derby Day rules have produced a few principles that should be followed to make your car competitive. Don't be scared by all the tales you may have heard. You and your Explorer (Little Princess or Brave) don't have to be engineers or even good model builders to turn out a good competitive Derby car. Only simple tools are required and reasonable attention to the following principles. Before we go further, let's review the problem. The basic rules are:

<ul style="list-style-type: none"> <li>• Do not recycle cars. Build a new car for each race, the experience is building a car with Dad.</li> </ul>	<ul style="list-style-type: none"> <li>• Car kits must be purchased from the YMCA</li> </ul>
<ul style="list-style-type: none"> <li>• Car weight 5 oz. Maximum</li> </ul>	<ul style="list-style-type: none"> <li>• Wheel base (i.e., distance between axel slots) may not be altered</li> </ul>
<ul style="list-style-type: none"> <li>• Car size (L x W x H) = 7" x 2.75" x 3"</li> </ul>	<ul style="list-style-type: none"> <li>• Block can be carved in any manner (subject to #6 above)</li> </ul>
<ul style="list-style-type: none"> <li>• Must use axles and wheels in kit</li> </ul>	<ul style="list-style-type: none"> <li>• Wheels may be attached with caps provided or with tubing</li> </ul>
<ul style="list-style-type: none"> <li>• Cannot alter axles or wheels other than polishing and flash removal</li> </ul>	<ul style="list-style-type: none"> <li>• Any lubricant may be used (please use wet lubricant sparingly)</li> </ul>
<ul style="list-style-type: none"> <li>• Only mode of power: Fall of car down ramp</li> </ul>	<ul style="list-style-type: none"> <li>• Awards may be given for the most decorative designs.</li> </ul>
<ul style="list-style-type: none"> <li>• ¼" clearance required – don't stick anything to the bottom of the cars.</li> </ul>	<ul style="list-style-type: none"> <li>• Make sure decorations and such are secure, cars will be handled by a number of people – we do our best to prevent damage.</li> </ul>

Considering the above, there are four major principles to follow. These are:

- Maximize potential energy (i.e., how far the weight of the car falls)
- Minimize friction, resistance or drag
- Maximize straightness of car's run
- Make the car strong enough to survive

Note that aerodynamics are not a factor. Your car will not go fast enough (10 - 12 mph) for drag due to air resistance to be a factor, so any shape, even a blunt one, will work.



**Potential Energy** – A lot of experience and analysis indicates that the center of gravity (CG) (which is the location of the car body where your car will balance) should be as low to the racing surface and as far to the rear as possible, without causing the front wheels to come up off of the racing surface. This produces the maximum potential acceleration down the ramp, through the rotation at the bottom and into the flat run. The way to control the CG is to:

- Whittle, cut and otherwise remove wood from the front of the car
- Add weight at the rear and below the axles. Lead is the most compact and cheapest material for this.

The starting gate is hinged, so make your car's is such that its' nose contacts low on the starting gate to obtain as early a release as possible, but not so low that the front end hits at the bottom of the ramp. One other factor is that the length of the car is 7" and you can remove wood from the rear of the block (end with the closest axle slot) and add to the nose to move the car further up the ramp. Maintain a 1/4" to 3/8" clearance.

**Minimum Friction** – all the effort above goes for naught if you don't reduce friction to a minimum. Remember, the car must coast to the finish line. The friction sources are:

- Wheel / axle contact points
- Tubing to wheel side contact points
- Misaligned axels
- Foreign matter between wheel and axle (including human hair)

The ways to combat friction are:

- Polish axles
- Set tubing pieces so that only one contacts one side of wheel at a time and minimize size of point of contact
- Use a good lubricant

Misaligned axles and foreign matter are covered under straight run. Also, details on how to polish axle and mount wheels are covered in construction hints below.

**Straight run** – Again, the above two principles will be defeated if the car does not stay on the race course or collides with the other car. There are four things that produce non-straight runs:

- Misalignment at the gate
- Axles not aligned
- Foreign matter between wheel and axle
- Bent Axles

Remember, your Explorer (little Brave or Princess) must place the car on the ramp, so it's a good idea to make the front of the car blunt and spend some time during practice sessions showing your Explorer (little Brave or Princess) how to align the car at the gate.

The alignment of the axles is the Guides (Big Brave's) responsibility and will probably have you pulling your hair out. Many people use shims or alignment mechanisms. You may have to put shims under your axles so that all wheels may contact with the racing surface at the same time.

The most likely foreign matter is human hair. These will wrap themselves around your axles and do two things: slow your car and cause it to veer left or right, so be sure to give your axles an inspection after each race.

Bent axles can be either straightened or returned to the YMCA for straight ones.

**Strength** – If in trying to accomplish any of the above ideas you have produced a fragile car, good luck. Keep in mind that Explorers (Little Braves and Princesses) tend to get excited, so make your car strong enough to survive short drops, collisions, and other potential mayhem.

No matter how you achieve them, if you follow the above principles, you and your Explorer (little Brave or Princess) should have a competitive car. Racers built as discussed above will only be separated by inches at the finish line and whether you are a final winner will depend a lot on luck.

**Construction Hints** – The above give the why. Now I'd like to discuss the how. Much of what follows is based on my experience and you may know better ways or means.

The first step is to sit down with you little Brave or Princess and decide what shape or style car you are going to build. Keep in mind the principles above and your own construction capabilities and encourage your Explorer (little Brave or Princess) to select a useful design. You may be more interested in the class judging, but you will still want to race to as competitively as possible, so apply the principles to

the extent your choice of car style allows. Above all, use your imagination. We've always had many unique and interesting designs at past Derby Days.

The next step is to buy your car kit from the YMCA and register in the racing hour of your choice. When you get your kit home, examine all the parts, particularly the block of wood and the axles. If the axles are badly bent or heavily pitted, return them to the YMCA for replacement.

The next major choice is whether you plan to carve the block or only use it for chassis. I prefer the latter as I feel it allows easier control of the CG and balsa wood can be used to form the actual shape which my Little Brave or Princess finds easier to work with. Good results can be obtained either way. If you choose the chassis approach, cut the wood block down in width (to allow for balsa sides) and in height. Then remove as much non-usable wood as possible. Next, cut out with your little Braves or Princess help the balsa pieces required for your car shape. Glue them together and start sanding or painting.

*The following hints may be useful:*

#### Polishing Axles

- Wrap one end of axle with soft cloth and chuck it in your electric drill.
- Use 600 emery paper and oil to remove the worst pits, etc.
- Use crocus cloth and oil.
- Next use jeweler's rouge and oil.
- Finally use a piece of leather and oil.

The above procedure should give you a mirror surface. If you cannot see yourself in the axle, repeat the process.

**Rounding Wheels** – Get a bolt, put two wheels on it (protect the insides of wheels by putting magic mending tape on bolt). Use a washer and nut on either side to hold them. Chuck the bolt (cut off the head) in your drill and use a file or sandpaper on a board to remove the flashing so that the same amount is removed on both wheels. Repeat for other two wheels.

Run in the wheels on the axles using WD-40 and try to determine if there are any really slow wheels in the lot, if there are replace them.

**Mounting Wheels on Axle** – Cut the tubing with a slant on one side and straight on the other. The slanted side goes towards the wheel with the point of the slant at the bottom. This gives a single point contact on either side of the wheel. The two pieces are separated by just enough distance to allow only one side of wheel to contact one piece of tubing at a time. Cut two thin pieces of tubing to hold the slanted pieces in place. Finally, cut the tubing with a single firm push. (Do not saw it)

**Axle Alignment Mechanism** – One of your axles is fixed using screws so that it is parallel to the car's nose. The other is then steered to align with the fixed axle. The pivot can be a bolt and washer, a nail, etc. It should have a flange so that the axle can slide between it and the slot. Drill two holes through the rear of the block on either side of the pivot and towards the slot. Mount two blind nuts in these holes. Thread in two allen-head bolts and start adjusting. When the allen-head bolts are tightened, the axle is forced up under the lip of the pivot and will not move. The way you will have to move the bolts to adjust the alignment will depend on which axle and which side of the axle you choose to place the pivot. The above sounds like a lot of work but only takes a few minutes to do and really does make it easy to align the axles so the car runs straight.



**Finishes** – This is where the Explorers (little Braves and Princesses) can really apply themselves and they can get good results with the right paints. One technique to fix minor mistakes, gouges, etc., during construction is to fill them in with spackling paste. When dry, it sands easily and gives a smooth finish. The varathane (i.e., plastic) paints give a good high gloss finish in one to two of any type paint and sanded before final painting. Some paints will become sticky and run when sprayed with WD-40. Test on a scrap piece of wood before painting your car. Another approach is to let your Explorer (little Brave or Princess) paint the car with any type paint. Then mix some of the clear plastic used for decoupage and just pour it over the car and let it dry. The finish is equivalent to 20-30 coats of varnish.

Apply decals of striping, etc., but cover with one more coat of clear paint (or before the decoupage plastic). Some lubricants tend to cause decals to come undone.

**Lead Weight** – The cheapest source of lead is used tire weights which you should be able to get from your local garage. Just about any material can be used to build a mould, even balsa wood. Make the mould to the desired shape. Heat the wheel weights in some convenient container. When it is molten, pour into mould (make sure mould is level). Pour slowly so that trapped gas can escape and not form air pockets. If at first you fail, just reheat the lead and try again. Attach weight with wood screws.

Lubricants - Most every type has been used. The silicone base types seem to be slower. I used straight WD-40. Try your luck. There seems to be no "correct" type and maybe you'll discover a good combination. One word of caution: avoid lubricants that attack rubber or plastic.

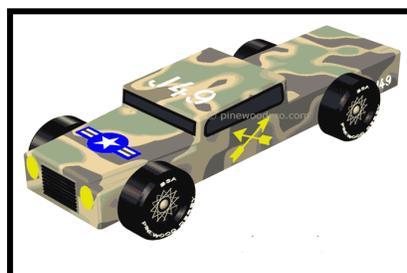
Testing - We will have scales available at the Welcome Center and you are free to use the gym to make sure your car goes straight.

Please remember that the focus of Derby Day is the time that you spend with your Explorer. It is important that they feel as if they are part of the process, and that both of you have fun.

The Finish Line...

- This is a Father/Child event. Please allow your child to be part of the total process. Show them the kit and ask for their ideas, color, shape, style, etc.
- This is your child's car and if they want to look like a banana or an Army tank, you will have to operate the power tools. Have your child help with the design, sketching with a pencil on the bloc of wood. Dad, you then cut it with the power tools. The children should help in the sanding process and other things they can do.
- REMEMBER - Your attitude will dictate how your child reacts if their car gets beaten in a race. You will likely not win every race. A smile and a hug go a long way at this point. Sometimes it is the dad that is disappointed and needs a simple smile and a hug.
- Being Gracious is more important than winning. Keep in mind, if your child wins, there may be a hundred others who don't. Teach your child how to respect those whose cars may not have performed as well as others.
- Be patient - the race is run by volunteers. While everyone is trying their best, no one works for NASCAR and the track quality is somewhat less than Texas Motor Speedway. Sometimes mistakes happen. The "race crew" will do everything possible to try to correct the situation.
- The goal on Derby Day is for everyone to have a good time. It is a very festive and high-energy day. Another great chance to strengthen the love and trust between you and your child.
- The goal of Derby Day is for a child and father do something fun together. Simply building a car together and watching it roll down the ramp is a victory. Therefore, everyone is a winner and will receive a participant medal.

Some samples of cars, Courtesy of Google Images...





Quick Facts

<b>Dimensions: &amp; Weight:</b>	The car must weigh no more than a maximum of 5oz. The length of the car must not exceed the original length of the wood block. The width of the car cannot be more than the width of the axles in the kit. The height of the car may be no higher than 3.5".
<b>Axles:</b>	The two official axles in the kit obtained from the YMCA must be used. Axles may be lubricated with graphite or oil, and may be polished. <i>The original Axle "slots" that are precut in to the wood block must be used. You cannot increase or decrease the distance between the axles.</i>
<b>Wheels:</b>	The four official wheels in the kit obtained from the YMCA must be used. The car must have two wheels on the front axle and two wheels on the back axle. The wheels must be retained on the axles by means of the parts supplied with the kit. The wheels must be placed at each end of the axle in such a manner that all four wheels would normally contact the race surface. No other parts which affect the relationship of the wheels to the axles may be used. Wheels may not be modified (other than sanding). You may not affect the width of the wheels, or paint or attach anything to the wheels.
<b>Integrity:</b>	All parts of the car must be used in their proper positions when the car crosses the finish line. It may not have parts that move with respect to other parts of the car when racing (no moving weights). Decorations or trim that are loose or move back and forth are not to be confused with moving weights.
<b>Chassis &amp; Body:</b>	The wooden block contained in the kit purchased from the YMCA must serve as the chassis of the car. No car parts from previous Derby Day cars are allowed.
<b>Race #'s:</b>	Will be assigned when you check your car in.
<b>Energy Sources:</b>	No force(s) other than gravity may contribute to the forward motion of the car. This means no moving parts other than the wheels.
<b>Check-In:</b>	Once your car has been checked in, you no longer have access to the car until all racing has finished.
<b>Decorating:</b>	Only the children in the program are allowed to paint and decorate the car.