

# The Pinewood Derby Book

## A free service for our customers from SuperTimer.

### **Preface**

This short book has no tricks for making your Pinewood Derby car faster, but if you follow the ideas presented here, you will have faster Pinewood Derby cars - lots of them. This book is for leaders or committee members who are running a race for the first time or who have run a race previously and were not happy with the results.

It goes without saying (but I'll say it anyway), the author is the owner of SuperTimer and assumes that you're going to use our products. That's not absolutely necessary of course, but like chicken soup, it couldn't hurt.

For simplicity I assume a Cub Scout Pack is the organization. This is not always the case; many other organizations use the Pinewood Derby or a similar race and use our products.

Most organizations start thinking about the Pinewood Derby and their first thought is that they need a track. By that they think they need a racing surface. Little initial thought is given to a starting system or stopping system let alone race organization, how many winners will there be, or how the winners will be determined.

Those choices (and more) are what are discussed here.

### **The Monkeys**

Once upon a time there was a cage with monkeys. In the middle of the cage was a pole with some bananas on top. After a while a monkey got hungry and walked over to the pole. As soon as he touched the pole, all the monkeys were sprayed with ice water. Clearly, he did not climb the pole. Sometime later another monkey got hungry and walked over to the pole. As soon as he touched the pole, all the monkeys were sprayed with ice water. Clearly he did not climb the pole. Eventually all the monkeys repeated the experience. The bananas remained untouched.

Then one of the original monkeys left and a new one appeared. And, he became hungry. As soon as he started toward the pole all the other monkeys attacked him! No ice water was needed or wanted. One at a time all the original monkeys left and were replaced by new monkeys. One at a time they walked toward the pole. And, one at a time they were all attacked!

Finally the cage with the pole with the bananas on top was filled with monkeys, none of whom would go near the pole and none of whom knew WHY. It didn't matter why, they had just always done it that way.

If your reason for doing any particular part of the Pinewood Derby is and will remain that "We've always done it that way", please stop reading here. Almost every idea presented here challenges or at least modifies your likely current practice. If you continue reading and try to adopt these ideas be prepared to encounter opposition and be prepared to tell a story about monkeys in a cage.



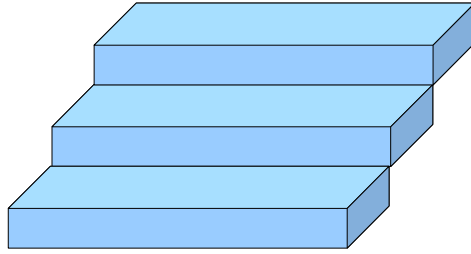
## History

The Pinewood Derby was created in California in the early 1950's. The original track was a sheet of plywood (4'x8') cut in four nearly one foot wide strips and stacked end to end to make a track about one foot wide and 32 feet long. Three lath strips were placed to create lanes. A stand and start gate were added and a line painted at the finish. This design had many problems. Center guiding can cause the cars to rub especially at the bottom of the hill where the curve goes through minimum radius. Wood is heavy and does not take abuse well. 1950's plywood was relatively flexible. This, in itself, is no problem. But the stand was designed to this flexible plywood. Current designs use more modern (stiffer) plywood but keep the same stand dimensions. The result is that the bottom of the stand needs a weight to keep it on the floor. For some reason no one thinks to raise the height of the bottom support. Another significant problem was the eight foot section length that made storage and transportation difficult. Using a seven foot section length instead means the track, even in a box, can stand up in an eight foot room and fit easily in almost all vehicles. This is wasteful with wood but quite easy to do with plastic.

Fortunately, there is no "standard" for the Pinewood Derby Track, so changes to the original design continue to this day. There are several commercial tracks available and probably hundreds if not thousands of user built tracks. These user built tracks include ones that are as long as one hundred feet and ones that loop the loop! The later starts eight feet off the ground in order to give the cars the needed momentum. We believe our ABS plastic SuperTrack is the ultimate design - very light weight, virtually indestructible and easily assembled without tools, but any fair surface is a fair surface if you assume a fair start and an accurate finish judge.

Historically, the administration of the Pinewood Derby has evolved to make survival possible! Without good tracks, good timers and computer race management, administrators were forced to invent variations on single or double elimination, wear flak jackets and keep an ambulance on standby. When I attended training sessions to talk about early versions of our timers, I would frequently hear that an organization had gone away from Pinewood Derby because of the hassle or because it did not promote values consistent with the organization "Do we really want to teach our kids to argue and cheat?". The best part of the Pinewood Derby was making the cars. By far the worst part was the actual race.

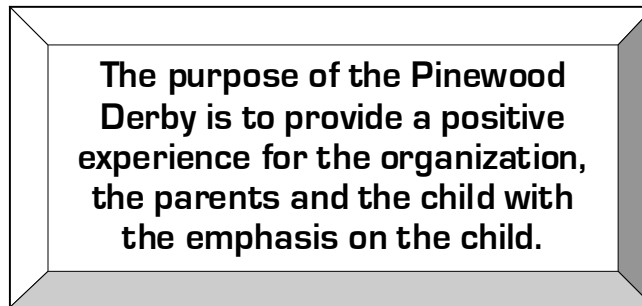
If you're willing to reject "We've always done it that way." and embrace thinking about a better way, then your history can change and the entire Pinewood Derby project can be a delight.



## Step 1

Can you imagine going on a journey without knowing your destination? The most common problem I hear about with organizations doing the Pinewood Derby is just that: the committee is organizing a Pinewood Derby without agreeing on the destination.

The 'destination' question is: What is the purpose of the Pinewood Derby? It's an important question. Some will say, "To have fun." or "To find a winner." or "To teach kids woodworking skills." All of these statements are true to a degree, but none of them are sufficiently comprehensive to serve as a map to a destination. Based on over twenty years of working with our customers, here's the answer I prefer and the answer that is the basis of this book and all of our products. The purpose of the Pinewood Derby is to provide a positive experience for the organization, the parents and the child with the emphasis on the child.



The most interesting part of that statement is that it does not require a race! Actually, it is better interpreted to allow for much more than a race. But most importantly, it's a benchmark against which to measure every decision you make about your Pinewood Derby. Does this particular decision enhance the experience? Could the decision enhance the experience even more? Does it emphasize the child? Does the child think so? That last question is particularly intriguing. Put yourself in the child's place. Think like an 8 year old. A great idea is to add to the committee an elementary school teacher.

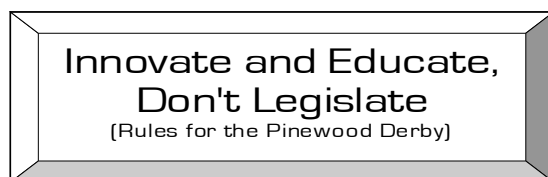


## Rules

Rules for running the Pinewood Derby can range from the simple, "Run what you brung." to many pages. Listening to what our users have suggested, I'm reasonably certain that there are no rules you can write that someone can't beat to their advantage. Think about what your rules are doing. Do we really want to teach a youngster that he can cheat and get away with it? Who really built the winning car? We do know that the younger the racer the faster the car. Why is that? Could it be that after losing for a couple of years the father finally says, "You do it!"?

Here are the simple rules (some values may need to be adjusted for your organization).

1. You must use the car supplied by the organization. Use of pre-cut or purchased speed products is prohibited. This is an honor system requirement. (You can even buy 'championship' cars on Ebay!)



2. Weight: 5.00 ounces or less, 4.90 or more will be accepted without further change. Three attempts to reach the correct weight range. then the committee does it. The official scale is official..

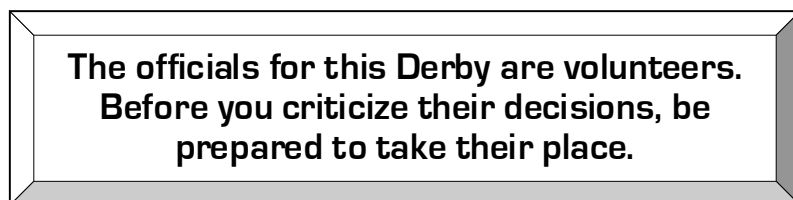
3. Length: 7 inches max. Width: Typically 2.75", can vary by track. Clearance: 3/16" for SuperTrack with no center guide. Higher for center guide tracks. Overall Height: optional specification.

4. Gravity powered. No power assist devices such as rubber bands or magnets.

5. ANYTHING ELSE GOES. (innovate don't legislate).

6. The winning racer, not Dad, in each category must (upon presentation of the award), give a five minute speech on their best speed secrets. (educate). The number of winners who must talk is a committee decision.

The Bad News. These rules won't work if the winners go on to compete at a higher level with different rules, unless you can get the folks at the higher level to follow these simple and smart rules. Instead of teaching the kids to cheat, we teach them to think and perhaps to speak. What a concept!



Those are the rules for the cars. Here's the one rule for the adults courtesy of one of our Soap Box Derby users.



## Macro-Derby

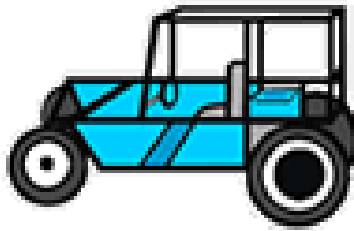
Here I talk about the atmosphere surrounding the race, not the race itself. I can't tell you how many times I've heard from organizations that expect to run the Pinewood Derby Friday night or some other week night. I think this is a huge mistake. Of necessity a week-night race must start relatively late and end relatively early. Parents, racers and officials are tired. The emphasis is on speed and not the speed of the cars but simply getting it OVER! Go back to the purpose of the Pinewood Derby. Does this meet that purpose? And remember, time is a strange parameter. Three hours of close, exciting heats is over before it begins. Ten minutes of arguing seems to take all day, or worse, all night.

So, ideas...

1. Run Saturday around noon. Using our RaceManager software the number of heats that you run will be essentially equal to the number of racers (Because you may not always have full lanes, the minimum number of heats is equal to the number of racers, the maximum number of heats is equal to the number of racers plus the number of lanes minus one.) Each race will take about 2 minutes if you're only moderately organized. You can stretch or shrink that number somewhat if needed but it's a good rule of thumb. So, with 40-50 racers you can expect about an hour and a half of racing. Start racing at 11 AM, take time between the first two periods (assuming four lanes) to announce and post the current standings. Between periods have folks visit the snack bar. Between the second and third periods STOP AND SERVE LUNCH. It will be the most painless fundraising you'll ever do. After lunch, finish the last two periods and award the trophies and ribbons. Does that meet the purpose of the Pinewood Derby?

2. Have more than the Derby. How about a fire truck outside? Or, a race car from the local stock car track? Or, a celebrity, perhaps even a celebrity race where the celebrity gets a rigged car that's guaranteed to win? How about babysitters for the tiny kids so the parents can really watch their "kid of the hour" not just be present?

3. Think production, think event, Super Bowl halftime without the controversy. Local TV coverage. Projection of results on the wall (you may not have a projector but at least someone in the pack has access to one.) If you have a techie, the projection can switch from the computer results to a video camera of the finish line and project a video interview of some racers as well as the 'speed tricks speech' of the winners. If the celebrity is the local TV weatherman (woman), TV coverage is all but guaranteed. Think banners both from local car dealers/oil companies and a banner made by each Den. And, a best banner award! Think out of the box and get a little crazy. This isn't just a race. It's a positive experience for the organization, the parents and the kids.



## Micro-Derby

Here I talk about organizing the pieces of the actual race.

### Advance Testing

By definition, all Pinewood Derby Cars are prototypes. The only guy who reliably makes prototypes work right the very first time is McGyver! If at all possible have building clinics. This is more likely to happen if you have teams, but should occur in any case. Following the building clinics, have a test day. This is especially easy with SuperTrack which can be set up without some of the middle extensions so it will fit in a garage when the building that will be used on race day is not available. You may or may not time the cars, just let the kids run them and see if they like what they see. Let them make changes and try again. No professional race team brings an untested car to the actual race. Plus, it's more fun for the racers.

### Check-In procedure

Assuming you are using our RaceManager software you can enter all the racers names into your computer days before the race even those who later might not show up. If you are going to have teams, be sure to enter the Den or other team information. (If you forget, this can always be done later, even after all the races are complete.) Then print the list in name order and give a copy to the check-in desk.

As each racer checks in the list will show you their car number. Check their name off the list when their car is accepted and send the car to the pit area (see below). When check-in is completed, give the list to the computer operator. The operator can then go to the Entries screen. In the Car # field, enter the number of a car that is NOT there and hit <Enter>. Verify that the record displayed is the correct record, then click on the Running check box to un-check it. This will remove the car from the scheduling software. Don't delete the record! If the racer shows up late, go back to this record and click on the Running check box to check it. The racer will be scheduled the next time you create a schedule (after the current period is complete.)

## Check-In test

During check-in, the cars are usually weighed, measured and inspected. Be sure you have good measuring tools. A simple internet search on "gram scales" will find scales for about \$30 that are accurate within 0.1 gram or 0.01 ounces. Exactly 5 ounces = 141.75 grams (actually 141.7476155, but who's counting?). However, a scale that measures to 0.1 grams or .01 ounces is more precise when measuring grams (1:1417 instead of 1:500). So, accepting 141.7 and rejecting 141.8 would be hard to argue with. Don't forget Rule 2 in the proposed rules. Weird note: According to the US Treasury, a nickel weighs 5.00 grams, so 28 nickels should read 140 and 29 should read 145. This is a cheap way to verify the accuracy of any scale.

And, don't forget to run the car on the track to be sure it makes it from start to finish BEFORE you start racing. Even if you do the recommended trial racing a week or more before the main event, this is still a good idea for those who couldn't get there or for those who might have made a change. Cars that don't make it to the finish either because they are too slow or because they are so fast that they 'fly' and leave the track are to be avoided at all cost. The embarrassment to the racer in front of his peers does not contribute to a positive experience for anyone.

For cars that 'fly' off the track or are wildly unstable, try running them backwards. The instability is usually caused by the weight being too far towards the back of the car. This makes the front of the car very light and the shape of the car like an airplane wing that lifts off at speed. Running the car backwards puts the weight up front, much like an arrow. This means the weight is on the hill for a slightly shorter period of time, but the stability gained is usually worth the change.

If you have a center guided track (the conventional wooden track, not SuperTrack which is edge guided to avoid this problem) be sure that the front or back bumper of the car does not rub the center guide at the bottom of the hill where the radius of the curve is smallest.

## Pit Area

The pit area holds all the cars when they aren't racing. A common folding table can easily hold 8 rows of 10 cars each if it's organized. Divide the number of cars you expect by 10 and round up to a whole number. Go to your local lumber store and buy that number of 8', 1/2" x 1" pre-primed MDF (medium density fiberboard) sticks. Put the sticks on the table, rounded edges up. Since they're pre-primed white, you can even easily add car numbers with magic marker. Numbering by 10's makes finding or replacing a car in its proper place a simple task. This pit area scheme can also serve as an organizational tool for the 'style' judging.

## Room Organization

The chaos ordinarily associated with the actual Pinewood Derby Race has over the years created an atmosphere where control has become the adult solution to survival. Control is not the same thing as organization. Control generally means the racers never touch their cars after check-in. Control means adults handle the cars; kids sit on their hands (hopefully). Unfortunately, this is not a formula that creates a positive experience for the organization, the parent **or** the child.

Counterintuitively, the more the racers are involved the easier it is to maintain overall sanity. Racers with nothing to do but watch are racers that will need constant supervision, monitoring and redirection. Racers that are part of the racing and part of teams will be attentive for their name to be called and automatically interested when their teammates names are called. This description of room organization is specifically designed for maximum racer participation.

Organizing the room to provide the desired positive experience for all usually involves compromise among a number of factors with the ideal of keeping the racers involved. Where is power available? Is there a public address system? Where are the microphone and speakers? How do we minimize the number of wires someone could trip over? Will we serve food? Where can we safely display the trophies? Where can we safely and conveniently display the "style" cars?

For many organizations, the venue is an elementary school multi-purpose room or church basement that includes a meal prep area and often a stage. You certainly want to keep the meal prep area clear. So, frequently the start of the track is placed very near the stage or at least very near a wall (with power and the microphone) so that only official traffic passes between the start and the wall. The computer desk along with the printer (and possible projector, see below) can be placed near the start on one side or the other. For the moment, let's say the left side. Barriers are placed to keep the public away from the computer and a short distance away from the left side of the track.

The pit area can be placed near the start but somewhat further away than the computer on the right side of the track. Barriers are placed to keep the public far enough away from the right side to allow the racers to walk from the start to the finish and from the finish to the pit area. Remember, the racers will be passing each other, so the area needs to be wide enough to allow them to pass easily. Make it obvious that the racers enter and exit at the pit area and do not pass behind the start. This is a safety issue to keep them from tripping on the wires.

You'll also need an area at the finish for the racers to sit comfortably while the race is running. If they don't sit, then many people can't see. And, you'll need an adult at the finish line to be sure the racers do sit down.

## ***Race Organization***

Okay, so now you have the room organized and you're ready to run a race, now what? Well, again, assuming you have our RaceManager software here's how it works.

After you have done the check-in procedure and set the entries who have not come as not running do a double check and be sure that the number of racers running (Entry screen - lower right) is the same as the number of check marks on the check-in list.

Then, go to the Race Screen and click on 'Create Heat Order'. Using the little printer setup icon (4th to the left of Close) on the top line, change the number of copies to 3 and then click OK to print three copies. One copy goes to the pit area, one to the starting gate supervisor and one to the announcer. The pit area uses the report to get the cars ready. The starter uses the report to be sure that the right cars are in the right lanes and usually double checks with the computer operator to be sure the same heat is displayed on the screen. The announcer uses the report to announce who is on the track right now **AND** to announce who will be on the track in two heats (the on-deck racers).

The on-deck racers hear their name and go to the pit area to get their cars. The pit area expects them since they have the list of heats. Once the racers get their cars, they go to the start area and, when it's their turn put their car in the correct lane with the help of the starting gate supervisor. Then they go to the finish line where an adult helps them sit down. Whoever has the car in Lane 1 (eventually everyone has a car in Lane 1 once) gets to push the Red button on SuperTimer II when the speakers say "Ready". The cars run, once they cross the finish SuperTimer II announces the winners. Each racer picks up their car and takes it back to the pit area and then returns to their seat. It's organized, it's fun and it's all kids racing. If a racer drops their car, then the racer dropped the car, not some adult or Boy Scout. "Actions have consequences" is an important lesson.



## **Results**

SuperTimer II announces the results through a pair of speakers that are adequate for small group where 'small' is defined as you don't have your own loudspeaker system. If you do have your own loudspeaker system, and with lots of youngsters around you probably should, SuperTimer II has an output that will match your loudspeaker system's Line or Aux input. The announcements are part of the magic. The racers just love to hear the results. And, unlike most displays with their very limited viewing angles, the announcements can easily be heard by all.

But, if viewing is your thing, don't forget about video projectors. Video projectors are essentially just very big screen monitors. With the advent of LCD and DLP technologies, video projectors are now very common. While you may not have one or have access to one, just ask around your organization. You will almost certainly be pleasantly surprised. Connect the projector to the video output of your computer and project the results on the nearest wall. Let your racers see their name up in lights! By the way, RaceManager includes an on-deck-list scroll on the bottom of the race screen as a further organizational help. And, a 'Full Screen Display' choice will put up the results in extra big type face.

If you have a laptop, it's very easy to have both the laptop screen and projector working at the same time. This usually involves the extra function key (often on the lower left of the keyboard) and one of the numbered function (F1-F12) keys. The switch over usually takes a second or two and cycles through three choices: laptop only, external monitor (projector) only and both.

Finally, don't forget to bring a printer. You'll need it for the check-in list and the heat sheets as already mentioned. But, you'll also want to use it to print out the overall results at the end of each period. Announce the top 5 or so and then post the list (perhaps two copies) on the wall so any interested racer or parent can see their current standing. This is especially important when using the RaceManager. After the first period it schedules the cars in reverse speed order so that a slow car can win or at least not lose by a lot. This is good for the racer's ego but, unless you announce and post the order, can cause some slow racers to think they are doing better than they really are. Put it another way, because we measure speed across all lanes, all cars are really racing the clock. Winning a heat has no real meaning although it certainly can help the immediate feeling of the winning racer.

## **Awards**

Awards include first through 'whatever' place. You can have trophies and ribbons with certificates of participation for all racers. Most organizations also have a similar set of awards based on car appearance. Most colorful, fastest looking, most intricate, I'm sure you can think of lots of others. Be Careful! Style competitions are frequently won by racers who have purchased their cars pre-cut at a hobby store. At least one of the style judges should visit the local hobby stores as part of their education. That's a good reason for Rule 1: You have to use the kit we supplied.

But if you use our RaceManager software, there's a whole new set of winners and a major change to the conventional Pinewood Derby. That change is TEAMS. In the Cub Scouts the most common team is Den. Other organizations can usually find an equivalent. Create a huge team trophy, bought just once (perhaps sponsored) that annually goes to the fastest team. Make sure that trophy is as important or more important than the overall winner. Make the presentation of the Team Trophy (and perhaps 2nd place team trophy) a major ceremony. Think about what happens! The parent who has a clue about how to make fast cars now has an incentive to spread that knowledge within the team to the parent who doesn't have a clue or, more importantly, the kid with only one overworked and graphite-challenged parent. The racer is interested not only when their car is on the track but whenever their teammates are on the track. If you have five teams, 20% of the racers go home in 1st Place!!! The other major advantage of the RaceManager and Team approach is that everyone is there at the end of the Derby. Trophy time is a big part of the event, not a small ceremony attended by the finalists.



## Other Things

### **Number of Lanes**

Tracks exist with 2 to 10 lanes. In the early Pinewood Derby days, three lane tracks were the most common. Lately, it seems that 4 lane tracks are the most common. Our sales of timers for existing tracks has shown a preference for four lanes for some time now. But why more or fewer lanes? If you use our RaceManager software in the most common manner then all cars will run in all lanes.

If you make that assumption, that is that all cars run all lanes, then the number of heats will equal the number of racers *without regard to the number of lanes*. That sounds counter-intuitive but it's true. Here's a simple example. If you have 10 racers and only one lane, you will have 10 heats. That is, each car will run only once in the only lane. If you have 10 racers and two lanes, you will still have 10 heats! The difference is that with two lanes the cars will run twice instead of just once. So, more lanes means the cars will run more often, not that the race will have more or fewer heats or take more or less time. EXCEPT

If all the cars DON'T run all the lanes, then the overall race can be shorter. This can be used by large organizations to reduce the race time. The usual way this works is to use a six lane track and run all the racers across three or four (randomly selected by the software) lanes. Using three lanes will cut the overall time in half, four lanes will cut it by a third.

An additional exception occurs for very small organizations that have only two or three lanes. In this case, all the cars run all the lanes TWICE. This makes the overall race twice as long, but given the relatively few racers, the time of the event is still acceptable. For example, twenty racers times two minutes per heat times twice around is still less than an hour and a half.

### **Track Length**

Tracks exist with lengths from 32 feet to over 90 feet. Some exist with loops, some with humps, some are entirely flat with a constant slope from start to finish, indeed if you can think of it somebody else already has! So, what are the pros and cons of longer track length? As far as I can tell, the only advantage to longer tracks is that they create more front row seats. That is, longer tracks generally have more good seats for viewing. Of course, you'll also need a room that's long enough for the track.

There is some concern that some cars won't make it to the end of a longer track. For any reasonable length track this should not be a concern IF you have team competitions, builder clinics and test the cars before the race.

## **Murphy's Law**

Even with the best preparation, things can go wrong. For a smooth event you should consider ahead of time and perhaps commit to writing what you will do in the event of some common problems including designating the final authority. Common problems include a dropped car, a car that jumps the track and does or does not interfere with another car, a car that has a wheel fall off. As mentioned throughout this book, keep in mind the purpose of the Pinewood Derby when you make your rules and judgments.

## **Very Large Groups**

RaceManager combined with good organization can easily handle over 100 racers in a reasonable amount of time, especially if you race either side of lunch time on Saturday. But for really large groups the logistics can get out of hand. This usually occurs during group meetings, such as statewide church picnics, where the Pinewood Derby is only one of perhaps a dozen or more activities for the participants. Some businesses also use Pinewood Derby as a team building event at a national meeting. Here's the outline of a solution that has worked for some organizations.

Take a 4' x 8' sheet of plywood and put finishing nails or cup hooks in it on 3.5" centers horizontally (along the four foot edge) and 5" centers vertically. Lean it against the wall. (Think about decorating it.) Get enough 4x6 file cards to equal the number of racers. Punch two holes 3.5" apart centered in the long edge of each card. As each racer checks in, have someone with good handwriting fill out the card with the racer's name and predefined group (up to seven for this example but you can change the math as needed). As soon as you have a full track, run a heat and record the time for each racer on their card. SuperTimer II will continue to announce the results until you re-close the starting gate, so you'll have plenty of time to write the numbers down.

The cards then get placed on the plywood under the appropriate group heading, with the fastest time on top. New results are placed where appropriate and the cards below them moved down a peg. The card on the bottom peg (perhaps 17th) gets dropped in a box below. Racers immediately know their position. They can come back later and see if they are still in the top 16. If not, they can pick up their car and get their card from the box if they wish as a souvenir. At some time late in the day, the top 16 (or any other number you choose) in each division can do a full race for first through whatever. Actually all divisions can run together to find overall and division winners from the same results.

You can also allow each car to run up to three (more-less?) times and use their fastest time as their result. Using their average is possible but involves a lot of calculation and potential error. Generally, their extra runs should only be allowed if there are not racers in line to do their first run, but in any case, you can set your rules ahead of time.

This kind of a procedure allows for lots of racing and lots of fun both with the Pinewood Derby and with the other activities of the day. Racers can race their preliminary heat whenever they want. If there's a line they can come back later. If they race early they can easily see at some later time if they are still in the competition finals. A pit area with the current positions shown on the rails and the cars properly placed should also be considered as well as a pit area with the eliminated cars so that they can be easily found.

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