



Cub Scout Pack 107

2010 Pinewood Derby

CAR ASSIGNMENTS AND DATES

Cub Scout Race

CAR #	DEN 1 (Bear)	
1	Carpenter	Mitchel
2	Conrow	Ben
3	Hart	Dylan
4	Lindsay	Connor
5	Merkov	Robby
6	Richardson	Ben
DEN 2 (Wolf)		
7	Cohick	Hunter
8	Odle	Jack
9	Loveless	Adam
10	Potter	David
11	Riesenberger	Austin
12	Rzepkowski	Mason
13	Spiegel	Allister
14	Walker	Jonathan
15	White	Nolan
DEN 3 (Wolf)		
16	Bobowski	David
17	Fame	Ethan
18	Franzese	Christopher
19	Heyneman	Alan
20	Spano	Giuseppe
21	Stowell	Luke
22	Thoman	JD
23	Wendorff	Carter
DEN 4 (Webelos II)		
24	Bhowmick	Reeju
25	Hart	Brennen
26	Hendershot	Alex
27	McBride	Peter
28	Miller	Nicholas
29	Pellingra	Christopher
30	Pettit	Ryan
31	Riesenberger	Jay
32	Scott	David
33	Stone	Daniel
DEN 5 (Webelos I)		
34	Feeny	Dylan
35	Darcangelo	Jake
36	Greek-Anderson	Devin
37	Pilato	Joshua
38	Spiegel	Myles
39	Turcott	Cameron
DEN 6 (Bear)		
40	Austin	Kyle
41	Bateman	Tyler
42	Bickford	Jack
43	Griebel	Jack
44	Mack	Benjamin
45	Scorzelli	Max
DEN 7 (Tiger)		
46	Bateman	Kirk
47	Dick	Ryan
48	Earley	Connor
49	Fiorino	Cameron
50	Franzese	Zachary
51	Gesner	Adam
52	Griebel	Spencer
53	Merkov	Ryan
54	Reeve	Jonathan

Sibling/Parent Race

CAR #	Name
1	Alex Carpenter
2	Hannah Reeve
3	Devin Anderson
4	Madison Griebel
5	Nicki Hendershot
6	Zane Dick
7	Megan Richardson
8	Ryan Feeny
9	Pilato
10	Chris Odle
11	Paulie Coonelly
12	Alex Coonelly
13	Taylor Coonelly
14	Dylan Turcott
15	Colleen Turcott
16	Eric Gesner
17	Anna Rzepkowski
18	Adeline Riesenberger
19	Rodd Riesenberger
20	Mike Earley
21	Courtney Miller
22	Audrey Potter
23	Cohick 1
24	Cohick 2
25	Andrew Mack

2010 WEIGH-IN (Registration and Inspection)

- Klem South Cafetorium
- Thursday, January 21, 2010
- From 6:00pm to 8:00pm

2010 PINEWOOD DERBY RACE

- Klem South Cafetorium
- Friday, January 22, 2010
- From 6:00pm to about 8:30pm

2010 Cub Scout Pack 107 Pinewood Derby

Gentlemen . . . grab your sandpaper!

The purpose of the Pinewood Derby is to promote good sportsmanship and craftsmanship in our cub scouts. The experience a boy gets in the Pinewood Derby race helps him to grow mentally and develop craft skills. So dads, this is the boys' race and the boys' cars to build.



Parts

First, check your box, you should have 4 wheels, 4 axles, a block of wood, instructions, and stickers for your car number. Second, if you are missing parts or mess up or just want more parts or weights, decals, etc, there are a few local shops that have them:

Dan's Crafts & Things, 352 Empire Blvd.
www.danscraftsandthings.com

Strong Scout Shop, East Ave. Rochester
http://www.otetiana.org/contact_sss.php

Hobby Lobby, Holt Road Webster
<http://www.hobbylobby.com/>



Physical Dimensions

- maximum weight is 5 ounces
- maximum length is 7 inches
- maximum width, including wheels and axles, is 2¾ inches
- maximum height is 2½ inches
- minimum width between wheels is 1¾ inches
- minimum clearance under the car is 3/8 of an inch (**VERY IMPORTANT!** Our track has center rails that are 3/8" tall. Your car will have clearance "out of the box", but if you modify the bottom of your car to add weight, you better recess the weights into the body otherwise it will not have enough clearance to roll down the track making for one very unhappy scout!!)

2010 Cub Scout Pack 107 Pinewood Derby

Design Restrictions

- The car must have been made this year, by the cub scout and a parent or adult supervisor.
- Cars must be constructed using the pinewood block supplied with the kit. Alternate car body materials (including your own wood block) are not permitted.
- The wheel base (the distance between the front and rear axles) shall not be changed from the precut slot locations on the pinewood derby block. You must use the slots in the wood block. Also, beware of the clearance for the center rail.
- Cars with wet paint will not be accepted.
- Details such as a steering wheel, driver, spoiler, decals, and painting interior details are permitted as long as they do not result in any other requirements not being met.

Wheels and Axles

- Only the Official Scout Grand Prix wheels and axles can be used
- Axles may be polished, and wheels may be lightly sanded to remove the mold projection on the tread.
- No beveling, tapering, thin sanding, wafering or lathe turning of the wheels or axles is permitted. No additions or deletions.
- Wheel bearings, washers and bushings are prohibited.
- The car shall not ride on any type of springs.
- The car must be free wheeling with no starting device or other propulsion.
- Only dry powdered lubricants, such as graphite, may be used to lubricate the wheels and axles. Oils, silicone sprays or other petroleum products may soften the plastic wheels and collect on the track.

Car Numbers

- You must use the number given to you, and it must be the only number on the car.
- You do not have to use the stickers provided with the kit as long as the number can be read easily. **Please put the number on the TOP of the car if possible** so it is easy for our Derby crew to setup cars during the race.

Weigh-in (Registration and Inspection)

Thursday, January 21, 2010 6-8pm, Klem South Cafeteria

Each car must pass official inspection before it may compete in the Derby. The cars will be examined carefully to ensure compliance with the construction rules above and weighed. This is not the time to be "finishing your car", so make sure you have the project finished well in advance. All cars will then be impounded until the races begin Friday evening.

Please design your car so that you can add or subtract weight easily. This will minimize your time spent during inspection adjusting the cars weight, should it be necessary. All weights must be firmly attached to the car (see Design Tips). Cars will not be adjusted or re-inspected after registration - even if the weights fall out or off - make sure it's permanent!

A lubrication pit will be available for use prior to registration and impoundment. Please be careful with the graphite - it makes a terrible mess.

2010 Cub Scout Pack 107 Pinewood Derby

How Pack 107 Runs the Pinewood Derby Race

Friday, January 22, 2010 6-8:30pm, Klem South Cafeteria



We use a computerized race manager software package and race timer system.

There is one sensor at the starting gate. Once the starting gate is released the timer systems begins timing each of the four lanes using four individual timer circuits. There are four Infrared photo electric sensors at the finish line, one for each lane. The timer system has it's own onboard microcomputer at the finish line. When all four cars have crossed the finish line the timer system will send a message that contains the four individual lane times and the winner of that heat to the computer that is running the race manager software.

We have a four-lane track, so each car will run in four rounds. A round consists of as many individual heats as required to have all of the racers run four at a time per heat. The race manager software organizes the four rounds so that each car will get to run once in each of the 4 lanes.

Due to the way the track timer system works and the race scheduling works, Dummy cars will be used to run in lanes where no cars from the Pack were assigned. The amount of Dummy cars used varies from 1 to 3 depending upon how many boys are in the Pack in a given year.

Each car's overall time for the Pinewood Derby will be calculated using it's average time from the 4 rounds. At the end of the four rounds we consider the race to be finished. The race manager software will sort all of the racers by average times to determine the standings for our Pack.

In all cases and circumstances, the decision of the Derby Committee on determination of winners and interpretation of rules will be final.

The Webster Challenge

Usually in April at Webster Community Arts Day, and usually held at Schoeder High School is the town of Webster's "Webster Challenge" Pinewood Derby Race. This race is for the 11 Cub Scout Packs that reside in the town of Webster. Typically the top 5 or possibly the top 6 boys from each pack get to race in the Webster Challenge (depends upon who is running or hosting the race). The 11 Packs have an average of 60 boys per pack. If your boy qualifies for the Webster Challenge race, his car is in the top 10% out of 660 cars!

The Pack that wins the Webster Challenge hosts and runs the race the following year. For example, if a boy from Pack 107 were to win the Webster Challenge this year (April 2010), then Pack 107 would host the Webster Challenge in 2011.

If your boy is lucky enough to race in the Webster Challenge, please be appreciative of the Pack that is running it because it is no small feat to pull off hosting the Webster Challenge.

DESIGN TIPS & GENERAL INFORMATION

Friction

Your biggest enemy is friction. It is the most significant force slowing your car, so reducing friction is the most important thing you can do if you want a faster car. I have never seen a winning car that didn't address this issue - even the sleek-looking ones. You will encounter friction in five places:

1. Friction between the wheels and axles.

The axles often have burrs and manufacturing marks which will dig into the wheel's hub. To fix this problem, lock each axle into the chuck of a drill, leaving the head of the axle plus about 1/2-inch of the axle itself sticking out. Polish the exposed axle with a thin strip of wet 400 emery paper. Polish both the axle shaft and the inside of the axle head. Keep the emery paper moving to avoid creating grooves in the axle. Test the axle by inserting it through a wheel and spinning the wheel with your finger. The wheel should spin smoothly and slow down very gradually. For an even better polish, you can use steel wool, metal polish, buffing compound, or jeweler's rouge after the initial polishing with emery paper.

Around the wheel's axle hole you'll often find burrs and rough edges. Carefully clean these surfaces (on both sides of the wheel) with a sharp Xacto knife and some 400 wet emery cloth.

2. Friction between the wheels and car body.

Paint that hasn't cured completely tends to be soft and sticky. It will stick to the wheels and slow the car down. Give yourself lots of time (several days) to apply your final finish coat before you put your wheels on. Also, a single heavy coat will take longer to dry and cure, so apply several light coats instead. That soft finish will also act like a magnet for graphite and you'll never get it clean - the graphite will permanently discolor a soft finish. If you're painting at the last minute, use lacquer. Lacquer seems to give a harder, faster finish than other paints. It also hardens much faster.

When mounting your wheels (after the finish is thoroughly cured) don't push the axles in so tight that you bind the wheels. If you push the axles in too far, the wheels will bind against the sides of the car. Also, if you make the car too narrow at the wheel locations, the wheels will bind against the sides of the center guide rail on the track.

3. Friction between the wheels and the track's guide rail.

A car that doesn't track straight will bounce side-to-side against the rails, dissipating considerable energy. Anything you can do to make the car run straight and smooth will help.

4. Friction between the wheel tread and the track surface.

Out of the box, wheels may have irregularities left by the molding process (i.e. burrs, bumps, etc.). You should remove these irregularities, and then carefully sand any remaining roughness with emery paper.

Be careful to avoid reshaping your wheels in any other way, or you may disqualify your car. Don't work too fast or you'll overheat and melt the plastic wheel. At the very least, you should ensure the wheels are perfectly round and concentric with the axle hole and remove the imperfections left by the casting process.

5. Friction between the car's belly and the track's guide rail.

A low-slung car might look cool, but remember that most tracks have a 3/8" strip of wood the car must straddle. Make sure your car has plenty of clearance. The most popular place to add weight to a car is the belly. Make sure it doesn't drag too.

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Weight

As you shape the car, you'll remove weight in the form of wood. However, the more the car weights, the better it'll perform on the track. So, plan the car's design so you can add weight after the car's shape is completed. Weight, according to the rules, is limited to 5 ounces. Depending on how much wood you remove, you will likely need to add about 3 ounces of weight. **Get your weight as close to the limit as possible by weighing your car on a food scale or similar at home throughout the design/build process. Remember to account for the weight of everything that goes on the car including decorations, figures, paint, stickers, etc.**

One theory holds that the further back the center of gravity is, the higher the weight will be when the car is placed in the starting position on the track, and therefore, the more static energy the car will have to get it rolling down to the level portion of the track. However, the center of gravity must be far enough in front of the rear axles to keep the front wheels from bouncing too much over the joints and imperfections in the track. This bouncing will slow the car down. Most people recommend locating the center of gravity of the car a bit forward of the rear axle has the greatest energy and tracks well during the race.

Wheel Alignment

Keep your wheels and axles straight. Crooked or misaligned wheels will cause your car to ride the track's guide rail or to shimmy. The extra friction will slow your car down. Keeping your wheels and axles straight is probably the most important step in building a faster car. Mount the wheels so all four are straight in relation to each other and perfectly perpendicular to the body. Be careful not to bend the axles, either during construction, during pre-race play, or during the race by smacking into objects at the finish line.

- Glue the axles in place with epoxy. I've seen many cars dismantle themselves because the slots just won't reliably hold the axles, much to the joy of those who do use glue.
- As construction proceeds and upon completion, resist the urge to play with the car.
- Never, never, never roll your competition pinewood car on the ground or concrete. These rough and dirty surfaces can ruin the car's wheels, axles and alignment.

The 3 Wheel Theory

It takes less energy to make three wheels roll, than it does to make all four wheels roll. Some racers keep the center of gravity towards the rear and mount one of the front wheels slightly higher than the other. Then your car will roll on three wheels (one front and two rear wheels) instead of rolling on all four wheels.

The danger is that a loss of control might be more damaging and four wheels will track straighter than three. You are placing a lot of responsibility in the track to not upset the car. There is a lot of risk attempting this 3 wheel contact design.

Aerodynamics

Aerodynamics concerns are important, but should not be taken into very serious consideration. Aerodynamic improvements generally do not apply to a pinewood derby car for a few reasons. One is that the car is not moving at a significant rate of speed. Another is that the car is too small to be affected by drag. And finally, The car is traveling too short of a distance. Sometimes an unmodified block of wood can win if it has the proper adjustments to weight and wheels.

Lubrication

Lubricate the wheels. The standard derby lubricant is graphite powder, which is good, but can be messy. Penetrating oils and silicone oils will not be allowed because they can get sticky or even soften the plastic wheels or paint on the car which can have disastrous effects on speed.

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Gravity

Gravity is the main power source moving the car along the track. One formula that applies is force equals mass times acceleration, or $F=ma$. Gravity pulls on an object at a rate of 32 feet per second per second. Gravity moves the car on the slope of the track, and ceases to move the car on the flat of the track. There are two forces; those pushing the car along the track, and those pushing the car into the track. These two forces are components of the car's gravity force vector. Different energies are affecting the race car while on the track. The amount of energy equals the mass times height, or $E=mh$. This formula describes how fast the car will move. When the car is actually on the track and moving it has kinetic energy. When the car is sitting on top of the track and not moving it has potential energy. When the starting device is activated the potential energy transforms into kinetic energy.

More Info Online

Not every technique you read online sites is within our Pack's rules. For example, you will read that you should mount the axles as far apart as possible, but our pack rules state that you must use the factory-made axle slots. Be careful not to break any rules!

<http://www.maximum-velocity.com/>

<http://www.pinewoodpro.com/>

This web information will be useful to anyone who wants to build a fast car. But keep in mind that executing these techniques is time consuming, and requires a lot of patience on the part of the scout and the adult.

KNOTS



HELP YOUR CUB SCOUT DO HIS BEST

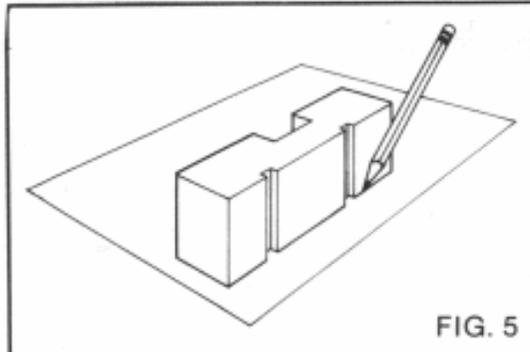


FIG. 5

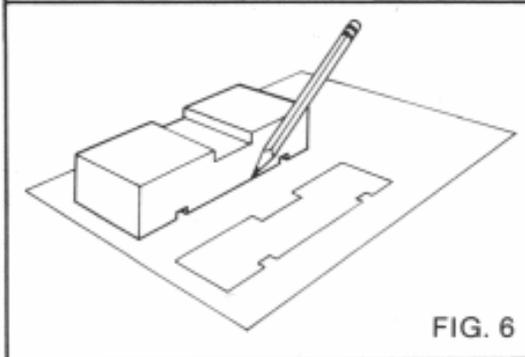


FIG. 6

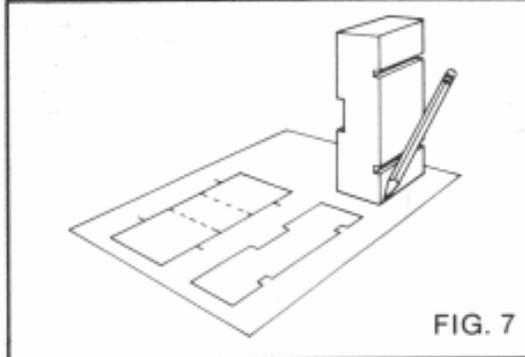


FIG. 7

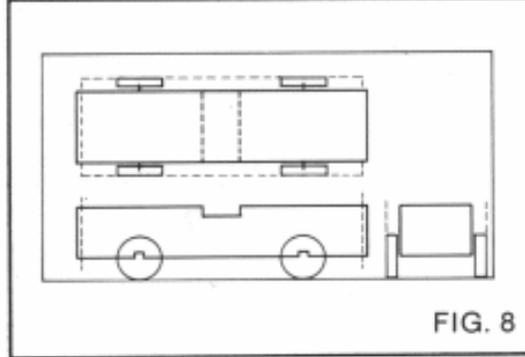


FIG. 8

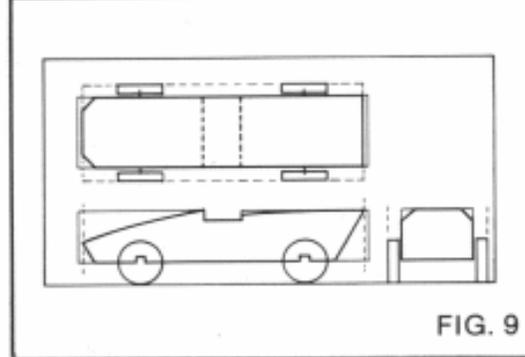


FIG. 9

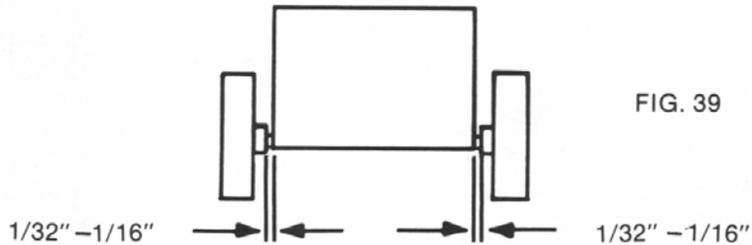
Layout & Design

Now that you have decided on the type of car and design, it is time to put your ideas on paper. To make sure your design will fit on your block, place the block on its side on a piece of paper. Trace around the block with a pencil taking care to mark the axle slots. See Fig. 5. Secondly, place the block top side up on a piece of paper and trace around the bottom, marking the axle slots. If your car has a cutout on the top, mark it by turning the block on its top over the same drawing and marking the cutout with dotted lines. See Fig. 6 and 7. Next place the block on its end on a piece of paper and trace around the end. See Fig. 7. Using a dotted line, mark the maximum width and length dimensions on the tracings of the side, end, and top views. (The maximum dimensions allowed will be different from your block.) As you are designing your car, do not exceed the maximum dimensions allowed. On side view, center wheels over axle notches and trace around wheel. Indicate top view of wheels as shown in Fig. 8. You will probably want to make several tracings of each view or, if you have access to a copy machine, make several copies so that you can try variations of your design ideas.

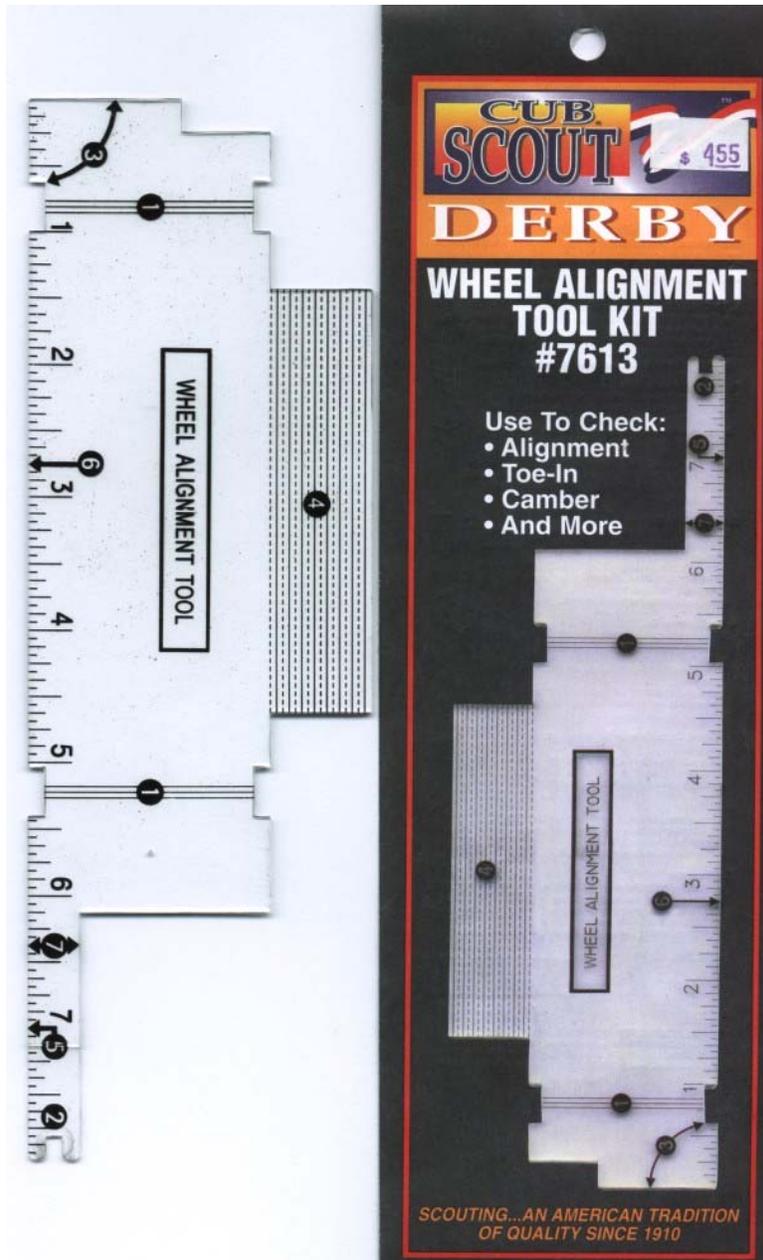
You are now ready to lay out your design on your tracings. See Fig. 9. It will be easier if you draw your side profile first, then the top view, and finally the end views. Be creative, try modifying a few lines and notice the difference. Small changes in a line or two can make a big difference in the overall appearance of the car. Plan now for your details such as decals, engines, roll bars, canopies, and drivers. Wood buildups can be added to give your car a full-bodied look. You can add fenders, spoilers, or pipes as long as they do not exceed the maximum width and length.

Installing Wheels & Axles

Install the wheels and axles with a $1/32'' - 1/16''$ clearance between the wheels and the car body. This helps eliminate friction between the wheels and car body. See Fig. 39.



After you install your wheels and axels you can use an alignment tool like this to verify your alignment, toe-in, camber, etc.



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To provide the proper clearance, make a spacer that is the correct thickness ($1/32''$ - $1/16''$). A spacer the correct size can be made from two or three thicknesses of a match book cover or a piece of cardboard from the back of a tablet. Turn your car body on its side; place the wheel on the axle; put the spacer in place on the side of the car next to the axle; and tap the wheel and axle assembly into the axle slot with a small hammer until the hub of the wheel touches the spacer. Remove the spacer. Repeat procedure with the other wheel on this side of the car.

Place a small block of wood on your work area; turn car over; and place its opposite side on the wood block, centering wood block between the wheels. See Fig. 40. This prevents pressure from being applied to the wheels and axles already installed and maintains the proper space between wheels and body of car. Install wheels and axles as you did on the other side.

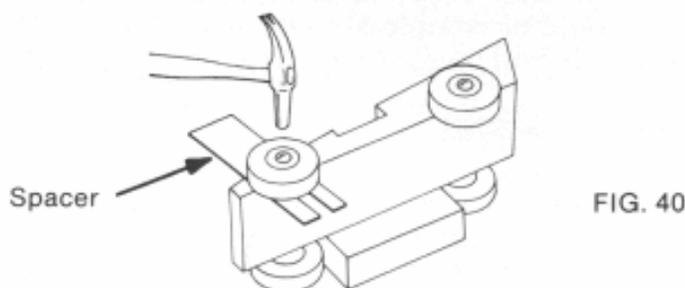


FIG. 40

To install the one-piece axles, lay car on its top; center the axle over the slot making sure you have at least $1/32''$ - $1/16''$ clearance on each side; and gently tap into place using a small hammer.

After you have installed the wheels and axles, roll your car along a flat surface and be sure the wheels are mounted correctly. You do not want any toe-in. You want your wheels aligned straight and parallel. See Fig. 41. Toe-in will slow the speed of your PineCar racer.

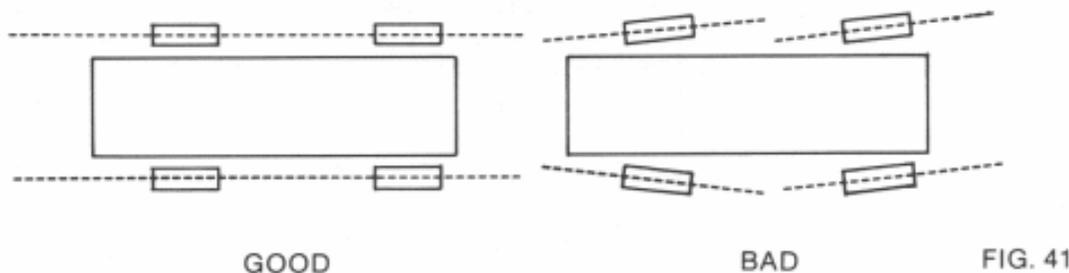
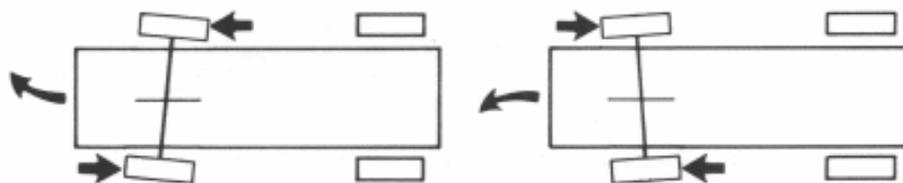


FIG. 41

If your car is veering to the right or left, adjust the wheels to correct the problem. See Fig. 42. Try to get your PineCar to roll as straight as possible or it will bump into the lane guide on the track slowing it down.



Weight

PineCar derby cars are raced with only gravity to propel them, so you want your car to weigh the maximum the rules allow. **THE HEAVIER THE CAR THE FASTER IT GOES.**

Most PineCar derbies have a maximum weight limit of 5 ounces. Check your local rules to find out the maximum weight for your race. If you do not have access to an ounce scale, take your car to your local post office and they will weigh it for you. Be sure to weigh your wheels and axles with your car as they increase the weight. Weigh your car to determine how much weight you need to add.

PineCar's line of accessories include a variety of weights. We recommend PineCar's incremental weights. They come complete with screws and mount on the bottom of the car or can be recessed in the bottom by chiseling out a space if desired. The advantage of these weights is that they are designed so that you can break off small pieces with a pair of pliers to make adjustments to your car even on race day. See Fig. 27.

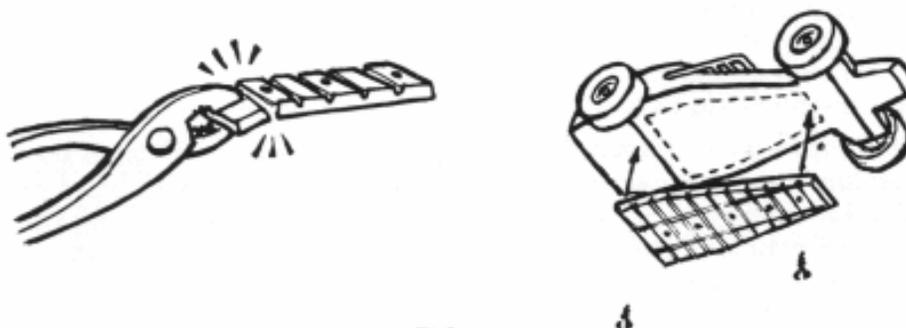


FIG. 27

Scales may weigh differently — even though your scale at home might read exactly 5 oz., you could get to the race and the official scale could say 5.1 oz. It helps to be able to adjust your car's weight easily on race day. If you do use one of the weights that screw into the bottom of the car, make sure that you screw it in tight. You do not want the weight to drag on the lane guide of the track. It will slow the speed of your car.

PineCar also offers a round weight. The round weight is marked with indentations so that you can saw off excess weight if needed. To install the round weight, drill a $\frac{3}{8}$ " diameter hole in the rear of the car and insert as much weight as needed. See Fig. 28.

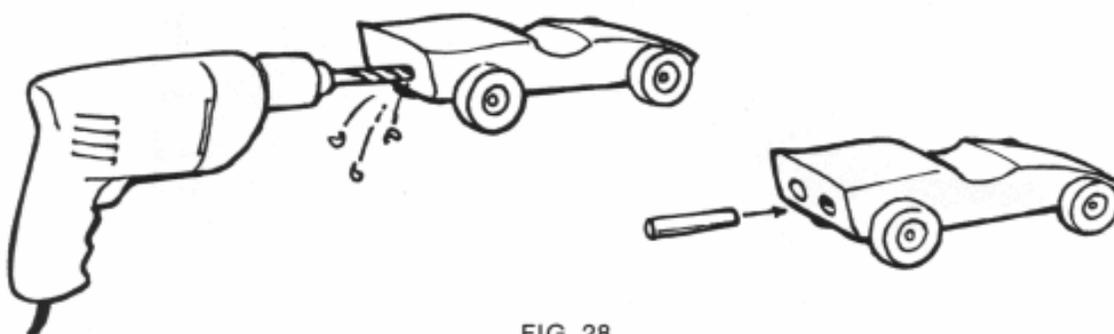
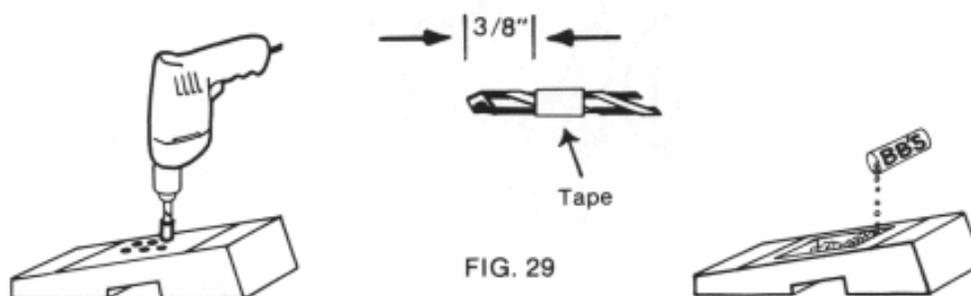


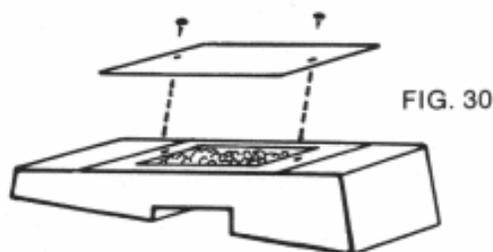
FIG. 28

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Another way to add weight is to drill out an area on the bottom of your car. To ensure that you do not drill through the body, wrap masking tape around a 1/4" drill bit at the depth that you want to drill. Drill a number of holes and then chisel out the remaining wood to form a pocket. Fill the pocket with lead shot or BB's until everything weighs just under 5 ounces. See Fig. 29. Lead shot or BB's can be purchased at your local sporting goods store. Next, cover the weight with Super Glue or epoxy and let dry. Remember, the weight must be securely built into the body and must not move. Total weight of the car must not exceed 5 ounces.



At your local hardware store, you can also find lead wool that you can use to add weight. If you decide to use this, you will have to chisel out a pocket on the bottom of your car. Flatten the lead wool into the pocket and cover with a thin sheet of aluminum or plastic. Use some small wood screws to keep the cover in place. See Fig. 30.



Some people suggest pouring melted lead into a hollowed cavity in the back or bottom of a car to add the necessary weight. We strongly discourage this since melted lead is very dangerous. It can pop and splatter causing burns or eye injuries.

Before race day, check with your race officials to see what the weigh-in rules are. In some races if your car is weighed in and is over the weight limit, they will allow you to take weight off; but, if your car is under the weight limit, they will not allow you to add weight. If your weigh-in follows those rules, make your car heavier so that you can see how it weighs on the official scale. You can then make adjustments to weigh in at the maximum allowed.

This is why PineCar's incremental weights are so advantageous. You can easily remove weight on race day. **REMEMBER THE HEAVIER THE CAR, THE FASTER IT GOES.** You do not want to take a chance on your car being under weight during the race.