

# **Pinewood Derby Building Tips**

**Cub Scout Pack 3171**

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- This is a Scout activity let them do as much as possible!
- A quick start to help if you've never done this before.
- Show you some tricks I've learned along the way.
- The more time and thought you put into your car the better it'll be.
- **Safety first!**

# Outline

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- 1. Block**
- 2. Axles**
- 3. Wheels**
- 4. Weight and CG**
- 5. Finishing/Painting**

# **Component Steps**

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- Coping saw, hand saw or scroll saw
- Vise
- Drill or Drill Press
  - Drill Bit (3/8 diameter) for adding weight
  - Axle Drill Bit (Number 49, .073 inch diameter)
- **Digital Kitchen Scale (Must have)**
- A Combination Square or Machinist's Square

# Tools

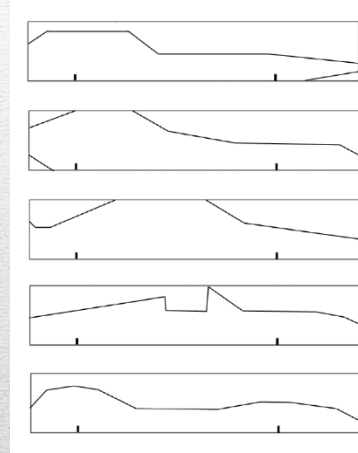
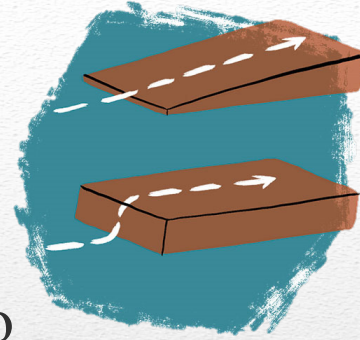
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- Graphite Powder
- Sandpaper (assorted, through 2500 grit)
- Lead, steel or tungsten weight
- Toothpaste or Jeweler's Rouge (polishing compound)
- Craft store acrylic paint and foam brushes
- or
- Spray Paint Primer (high build)
- Spray Paint Color
- Spray Paint (Clearcoat)

# Materials

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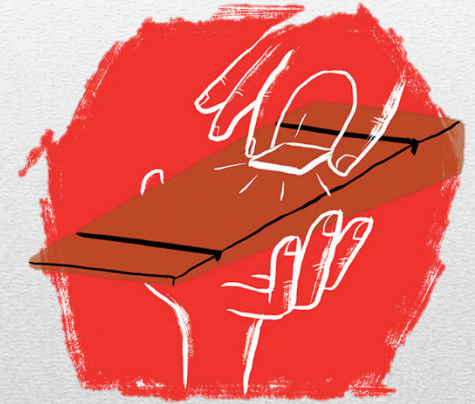
- Aerodynamics do play a role
- The thinner the car the faster, the “wedge” design is simple and fast.
- Choose your design and transfer it to the block.
- Rough cut with a coping saw, hand saw or scroll saw.



# Block

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- Have the Scout sand to shape using #80 sandpaper then work up to #200
- Determine where weights will be installed



# Block

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- Weight placement options:



# Block

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- **Reducing friction** is most important in making a fast car!
- The nail axles have crimp marks and burrs behind the heads which needs removed



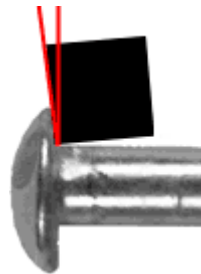
# Axles

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- Mount each nail in drill chuck. Start with a file to remove the crimp and burrs.
- Wet sand with three grades of sandpaper: #400 #600 #1200 or even finer – 2500 grit.
- Use a strip of old t-shirt and polish the axle to a mirror finish with toothpaste or jewelers metal polish.

# Axles

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# Axles

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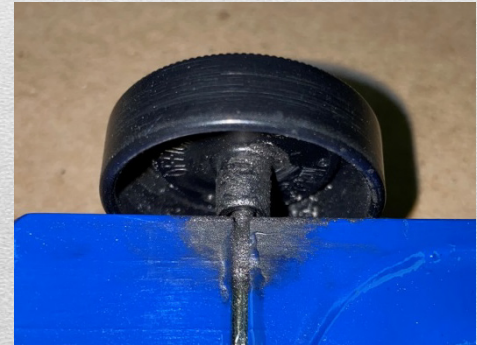
- Trim any flashing off the edge of the wheels.
- True the wheels by sanding if possible, to assure they are perfectly round.
- Polish inside of the hub using a pipe cleaner and graphite.
- Rub graphite on hub of wheel to reduce friction.
- The lighter the wheel the faster the car will be.



# Wheels

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- Graphite trick: make a “slurry” of alcohol/graphite and “paint” onto the wheels and axles.
- This makes the graphite **stick** to where you want it and it’ll last on that surface longer.
- Run in the wheels – that is turn them on their axles to spread the graphite a seat the wheels.



# Wheels

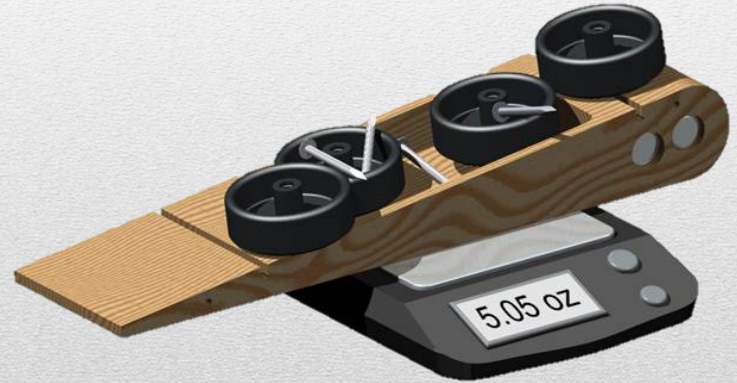
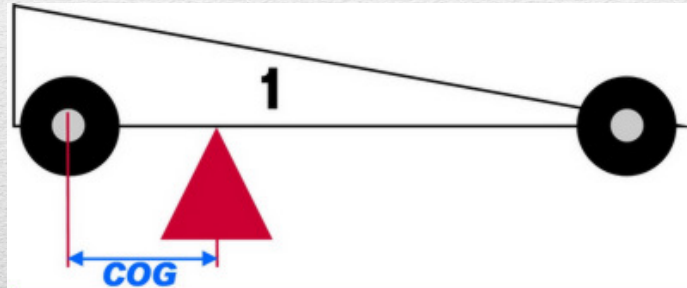
- **Goal is for your car to weigh 5 OZ.** without going over
- A complete uncut stock car and parts weighs about 3.8 oz. weight **WILL** have to be added
- Use steel, lead or tungsten weights.  
**Be careful, lead is toxic and shouldn't be handled by children wash hands!**
- Steel fishing sinkers come in various sizes



# Weight and CG

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- Put weights toward the back of the car, the farther back the weight the faster the car will be.
- Try to attain a **Center of Gravity** of about **1"** in front of the rear axle.



# Weight and CG

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- Cover the axle slot with masking tape to prevent paint build-up and make it easier to install the axles.
- Can be as simple as craft store acrylic paint applied with a foam brush.
- Spray paint, use a heavy build primer, sand then a couple of light coats of color. Optionally coat it with clear gloss.
- Add decals and decorations – do this before the gloss coat.

# Painting/Finishing

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- Transport your car **safely** in a shoe box, wrap with a towel.
- Bring any tools or extra weights if needed for last minute adjustments.
- Don't play with the car until **after** the racing is completed!
- Once the car is checked in it cannot be worked on further.

# Race Day

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1. <https://www.familyhandyman.com/woodworking/projects/how-to-make-a-pinewood-derby-car-with-basic-tools/>
2. <https://boyslife.org/hobbies-projects/projects/138909/use-science-to-make-a-fast-pinewood-derby-car/>
3. <https://www.youtube.com/watch?v=-RjJtO51ykY&t=3s>
4. <https://www.abc-pinewood-derby.com/basic-guide.php>
5. <https://www.instructables.com/id/How-to-Create-a-Pinewood-Derby-Car/>
6. [http://boysdad.com/archives/3306#\\_Toc301429851](http://boysdad.com/archives/3306#_Toc301429851)

# Useful Pinewood Links

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