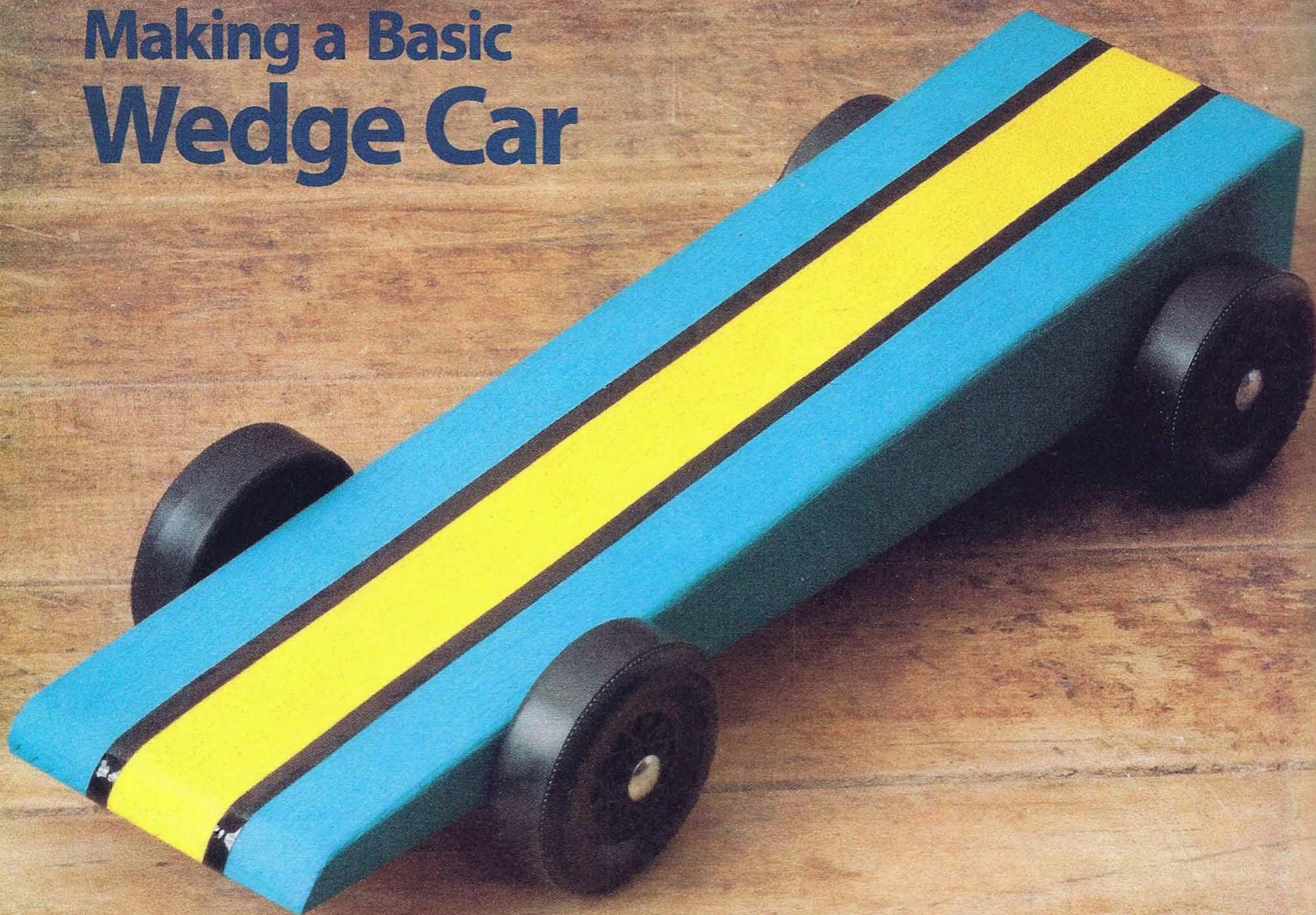


Making a Basic Wedge Car



Step-by-step instructions for a competitive racer your child can build himself

By Troy Thorne

Although this car isn't fancy, it is a competitive racer. The project is simple enough so a child can build both the car and his confidence. Your child will be proud and excited to race a car he built, and he will learn principles of woodworking and science. Making this wedge car will be fun and rewarding for both of you.

Don't wait until the last minute to start building the car. If you try to rush, you and your child will get frustrated with each other. Remember, a young child's attention span is only forty-five minutes to an hour. Plan to work on this project over several nights.

The toughest part of this project is cutting the block into a wedge. If your pack or club has a work night with power tools, it would be a good idea to get help with that step. Otherwise, the only power tool you need is a drill. Remind your child to wear safety goggles and a dust mask when cutting and sanding the car, and when working with dry graphite lubricant.

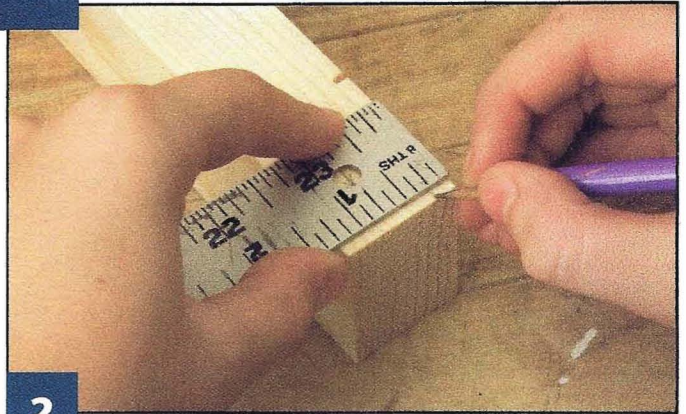
This project focuses on basic techniques. For more advanced instructions, see the articles on painting your car (page 47), adding weight (page 44), wheel and axle preparation (page 58), and wheel alignment (page 68).

WEDGE CAR: PREPARING THE BLANK



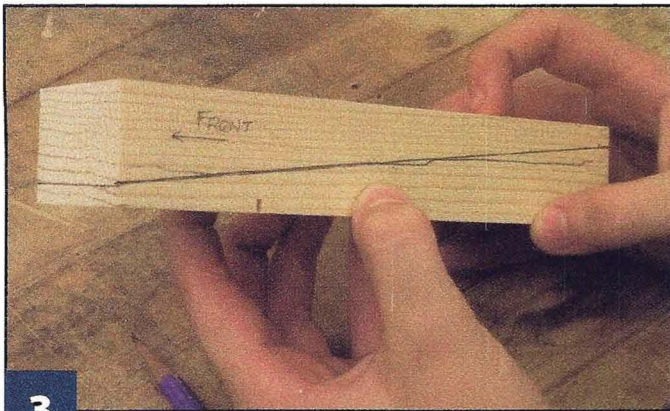
1

Gather your materials. This project uses the Cub Scout Grand Prix Pinewood Derby Kit, but the instructions can be used for other styles of racers as well. Set the wheels and axles aside for later use.



2

Mark the block. The end with the axle slot farther from the end of the block is the front of the car. Mark the front. On the front of the block, measure $\frac{1}{4}$ " from the bottom and place a mark. On the back of the block, measure 1" from the bottom and place a mark. Repeat on the other side.



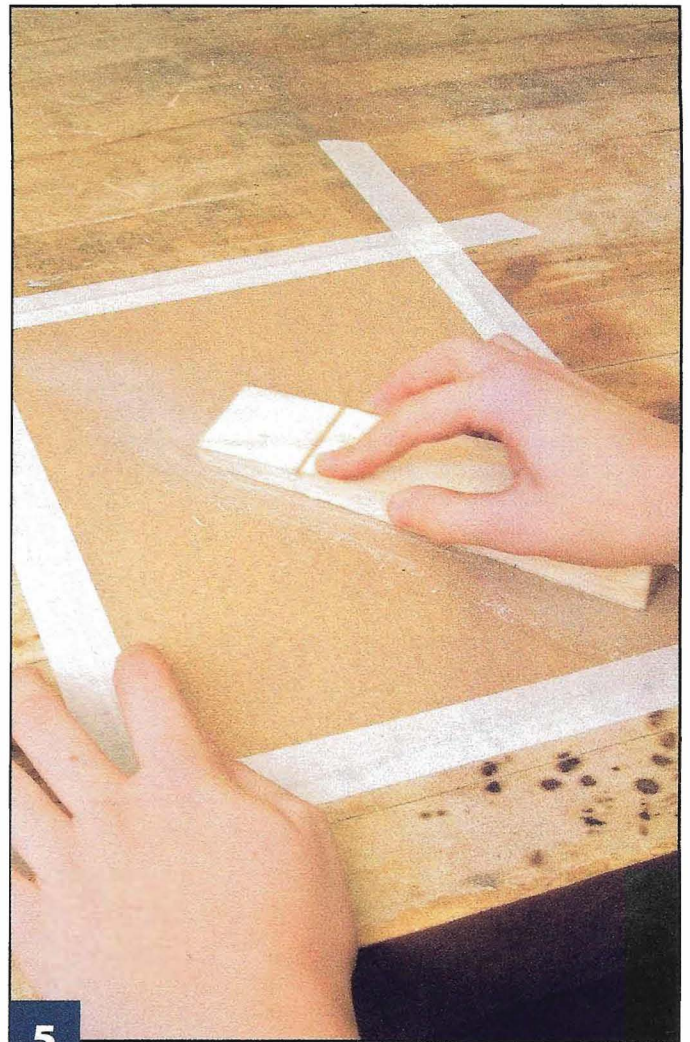
3

Draw the pattern. Use a pencil and ruler to carefully connect the marks on both sides. This forms a wedge shape with the front of the car being $\frac{1}{4}$ " thick and the back of the car being 1" thick.



4

Cut the car. Clamp the block to a work surface. Using a hand saw, carefully cut along the line. When you're about halfway through the block, flip it over and cut from the other side.



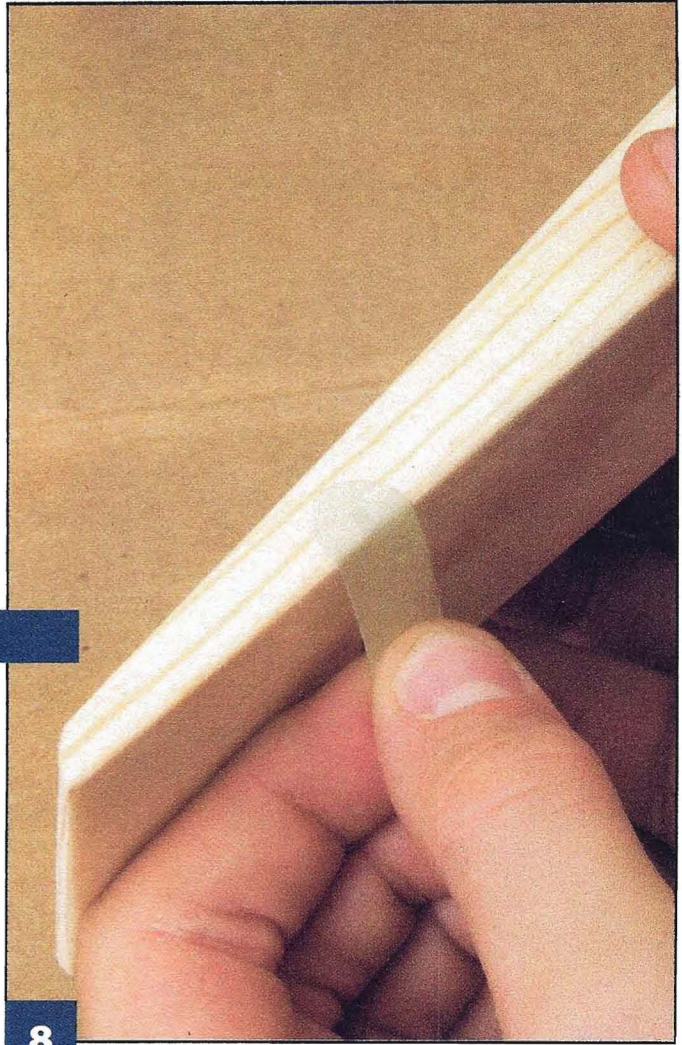
5

Sand the top. Using masking tape, tape all four edges of a sheet of 150-grit sandpaper to the work surface. Rub the car over the secured sandpaper, sanding until the top of the car is smooth.



6

Sand the edges. Round the nose of the car. The front of the car should have a smooth taper, rounded from the bottom edge to the top of the car. Unstick the sandpaper and lightly sand the entire car to remove any sharp edges.



8

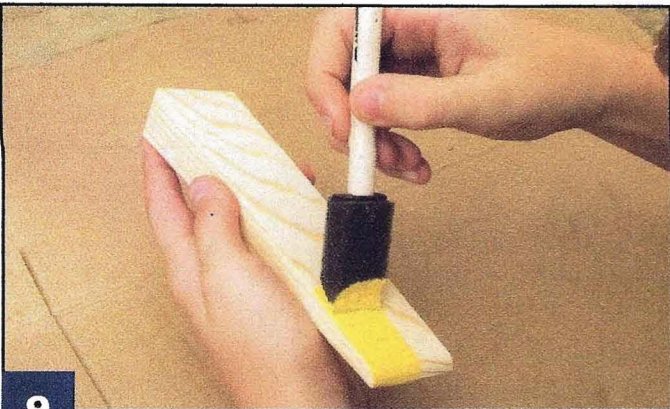
Prepare to paint. Cover the area around the axle slots with masking tape to keep paint from filling the slots. Press the tape firmly in place. Paint around the axle slots will cause friction with the wheels and slow your car.

WEDGE CAR: PAINTING THE CAR



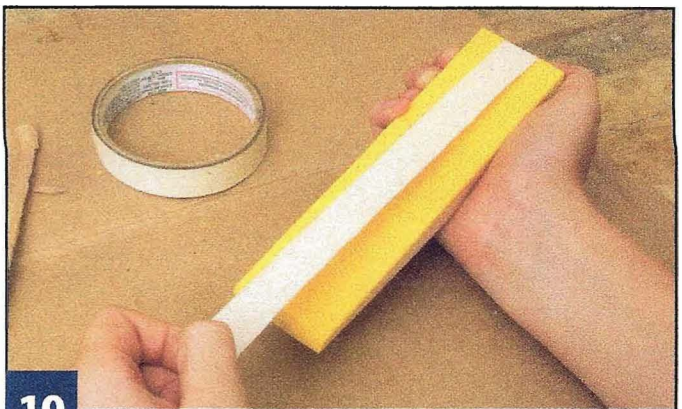
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Prepare your area. Cover your work surface with newspaper or cardboard. Gather any supplies you will need, such as foam brushes, paint, and masking tape.



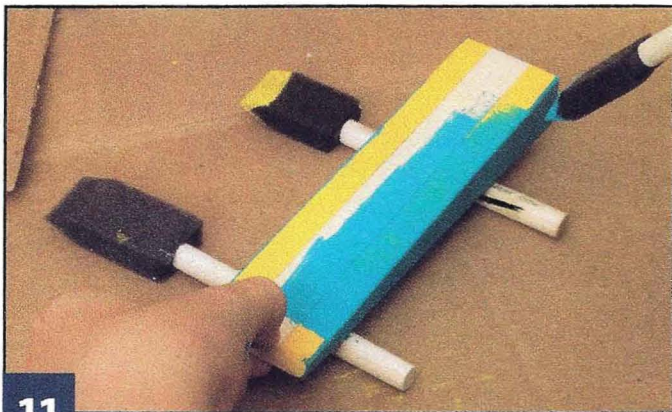
9

Paint the stripe. Using a foam brush and acrylic paint, paint the top of the car with the color for the center stripe. Allow the paint to dry for an hour. If desired, use a hair dryer to speed up the drying time.

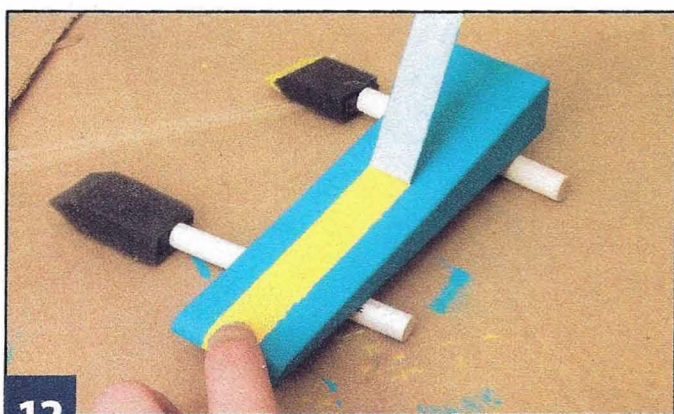


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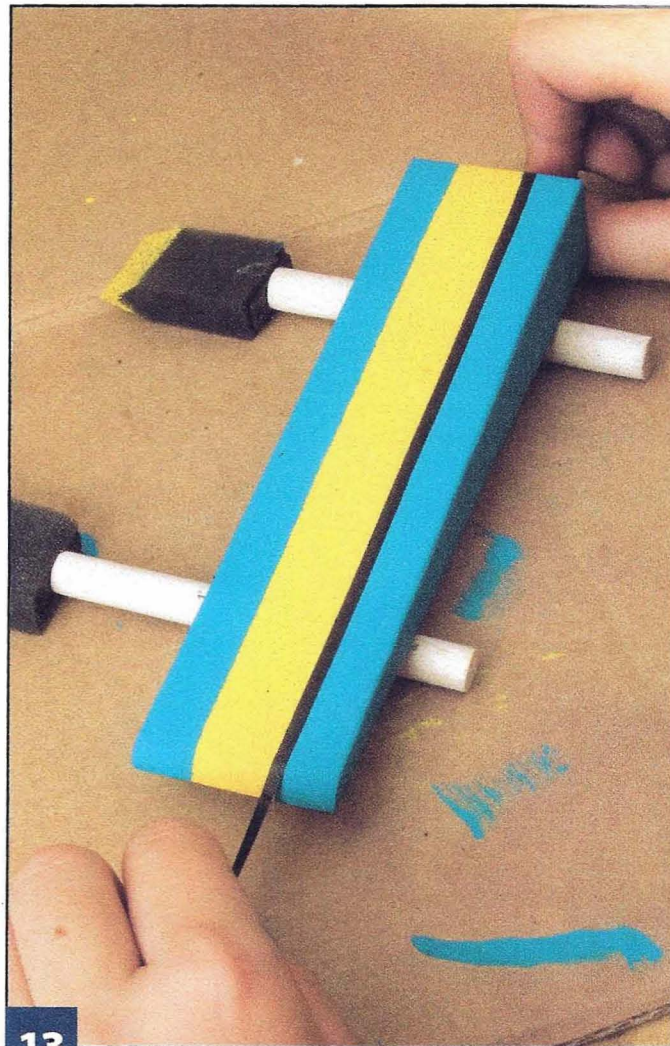
Cover the stripe. Place a piece of $\frac{3}{4}$ "-wide masking tape down the center of the block. Firmly press down the tape. This will keep the second color off of the center area, giving you a clean striped effect.



11 **Paint the second color.** Paint the second color over the entire car. Place the car over the handles of two foam brushes to raise the car so you can paint down the sides. This keeps the car from sticking to the work surface. Allow the paint to dry.

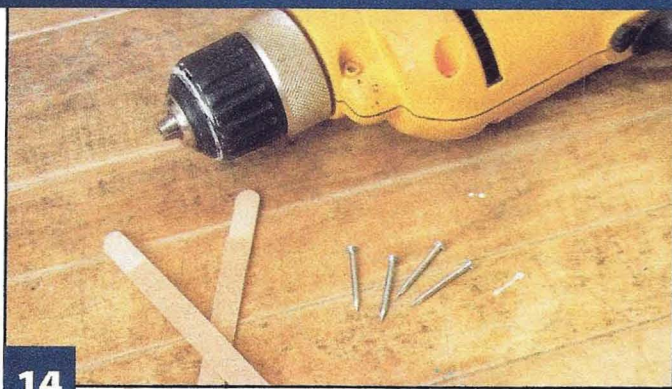


12 **Remove the tape.** Carefully remove the masking tape from the center stripe. Remove the tape from the axle areas as well.

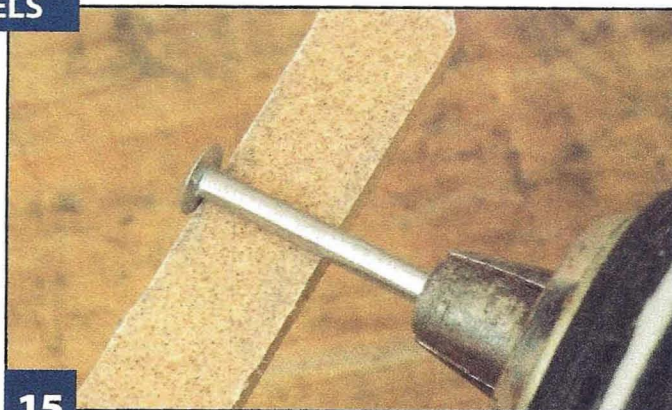


13 **Add pin stripes.** Press $\frac{1}{8}$ " pin-stripping tape where the colors join to cover any areas where the paint seeped under the masking tape.

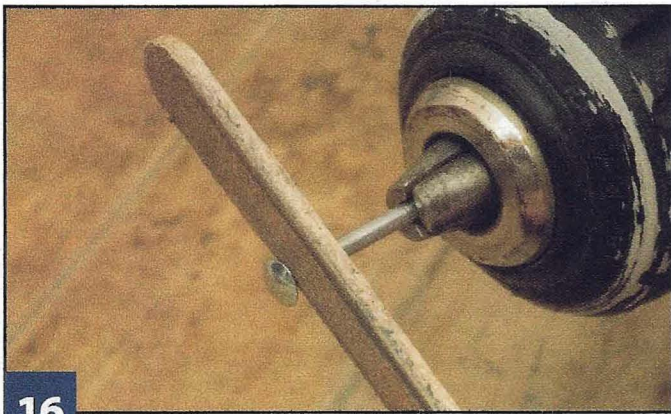
WEDGE CAR: PREPARING THE AXLES AND WHEELS



14 **Prepare your tools.** Glue 150-grit sandpaper to both sides of two craft sticks. Trim the sandpaper flush with the edges of the craft sticks. You will need a power drill and an adult helper to prepare the axles.

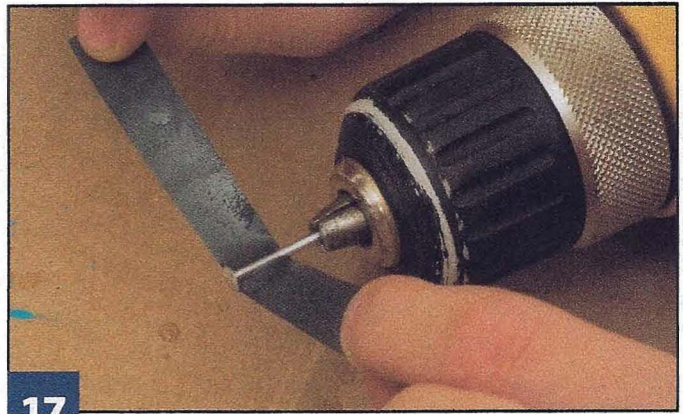


15 **Remove the burrs on the shaft of the axle.** Clamp an axle in the drill. Run the drill at a medium speed and use one side of a sanding stick to remove the burrs from the sides of the axle.



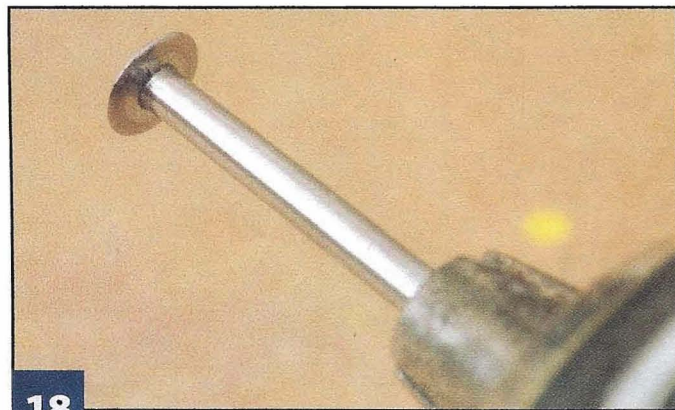
16

Remove the burrs on the head of the axle. Rotate the sanding stick to remove the burrs under the axle head. Repeat Steps 15 and 16 for the remaining three axles, leaving the last axle in the drill for the next step.



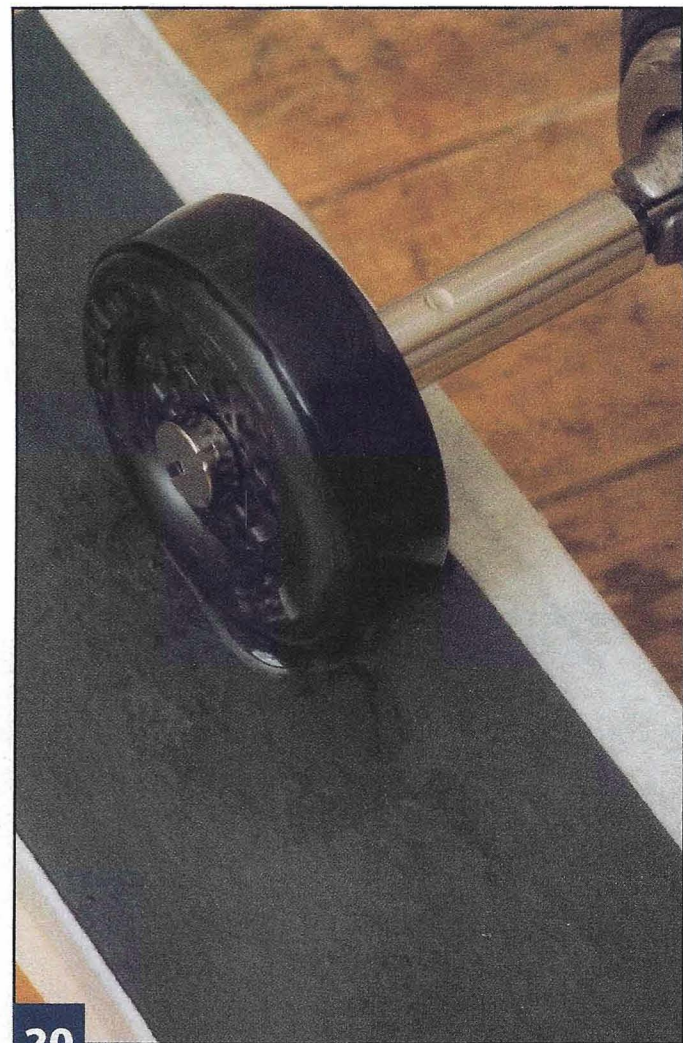
17

Polish the axle. Cut a sheet of 400-grit wet/dry sandpaper into four 1/2"-wide strips, each 4" long. Dip the sandpaper into water. With the drill running at medium speed, sand the axle to remove the scratches from the sanding sticks. Keep the sandpaper wet during the entire process.



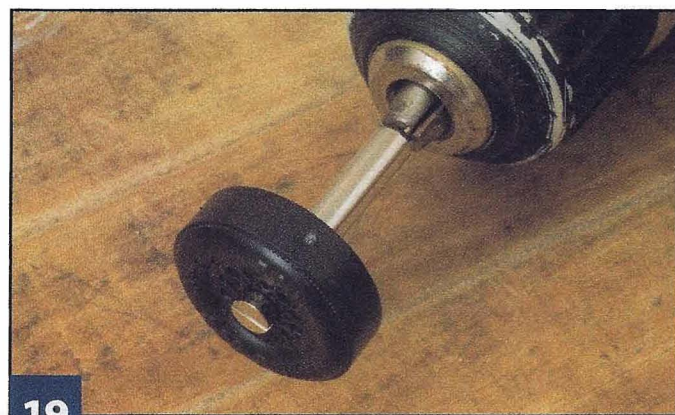
18

Finish polishing the axles. Rotate the sandpaper to sand under the head of the axle. Change sandpaper strips for each axle and remember to keep the sandpaper wet. Repeat Steps 17 and 18 for all of the axles.



20

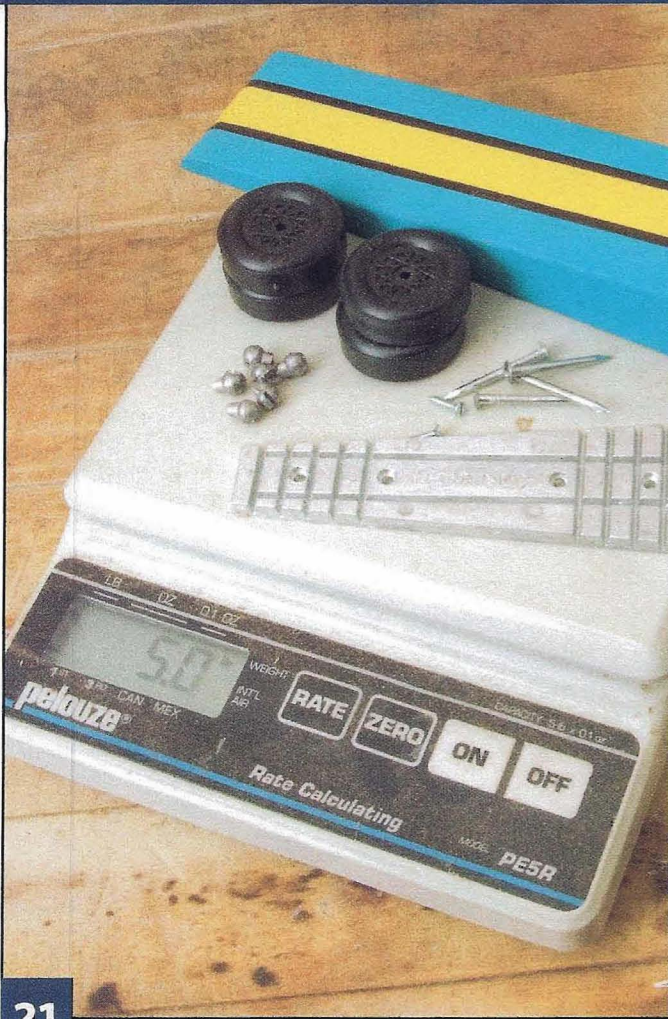
Remove the mold marks. Wet the sandpaper. Run the drill at a low speed. Apply only light pressure and sand until the wheel surface is flat and smooth. Repeat for the remaining three wheels.



19

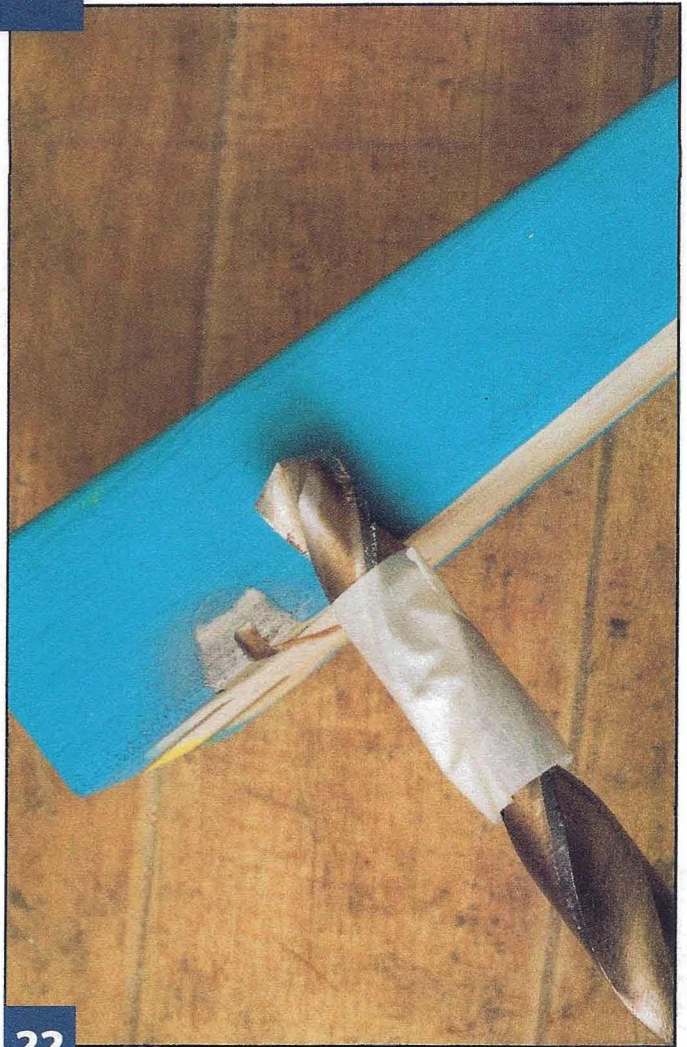
Prepare to smooth the wheels. Do not attempt this step without a wheel mandrel. Clamp a wheel mandrel into the drill. Attach a wheel to the mandrel, being careful not to over-tighten. Tape a piece of 400-grit sandpaper to a block of wood. (Use the flat side of the scrap from the original block.)

WEDGE CAR: ADDING THE WEIGHTS



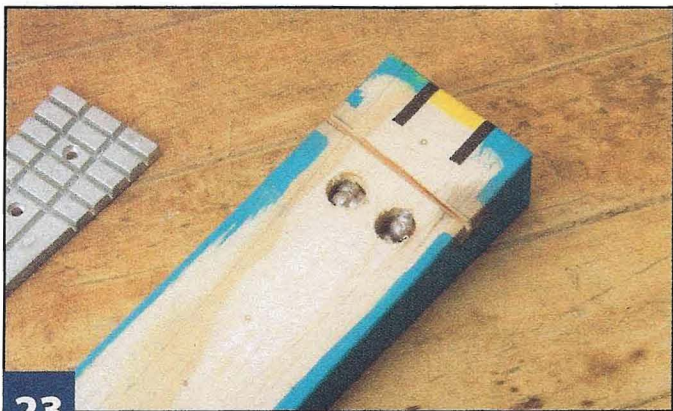
21

Measure the weight. For maximum performance, the car should weigh as close to five ounces as possible. Put the car, axles, and wheels on a scale. Add a tapered weight bar and its screws. If necessary, add split shot sinkers until the scale reads five ounces.



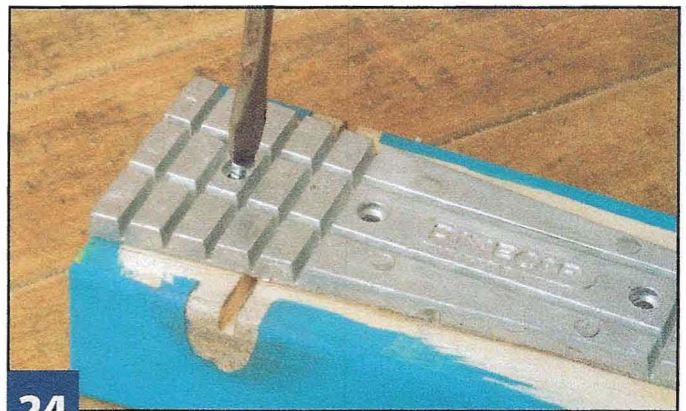
22

Drill holes for the split shot. Mark the depth of the holes by wrapping a piece of masking tape around the drill bit. This ensures you won't drill too deeply into the car. Drill two $\frac{3}{8}$ "-diameter holes into the bottom of the car, just in front of the rear axle slot.



23

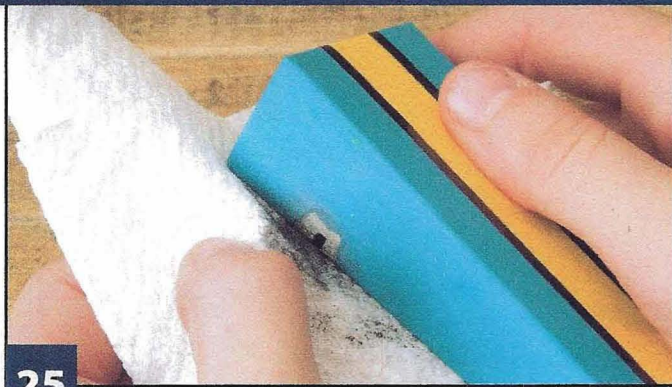
Put the split shot into the holes. Do not glue the split shot into the holes. If the car is overweight at the race's weigh-in, you can easily unscrew the weight bar and remove some split shot.



24

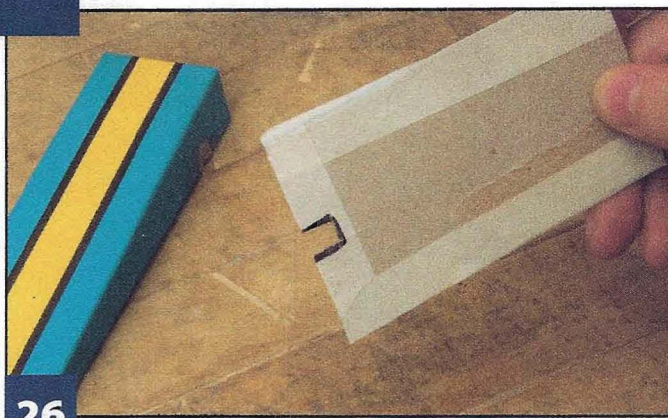
Attach the weight bar. Using the screws supplied, attach the tapered weight bar to the bottom of the car. Position the wide end of the bar as close to the back of the car as possible and make sure the bar covers the holes for the split shot.

WEDGE CAR: ATTACHING THE WHEELS



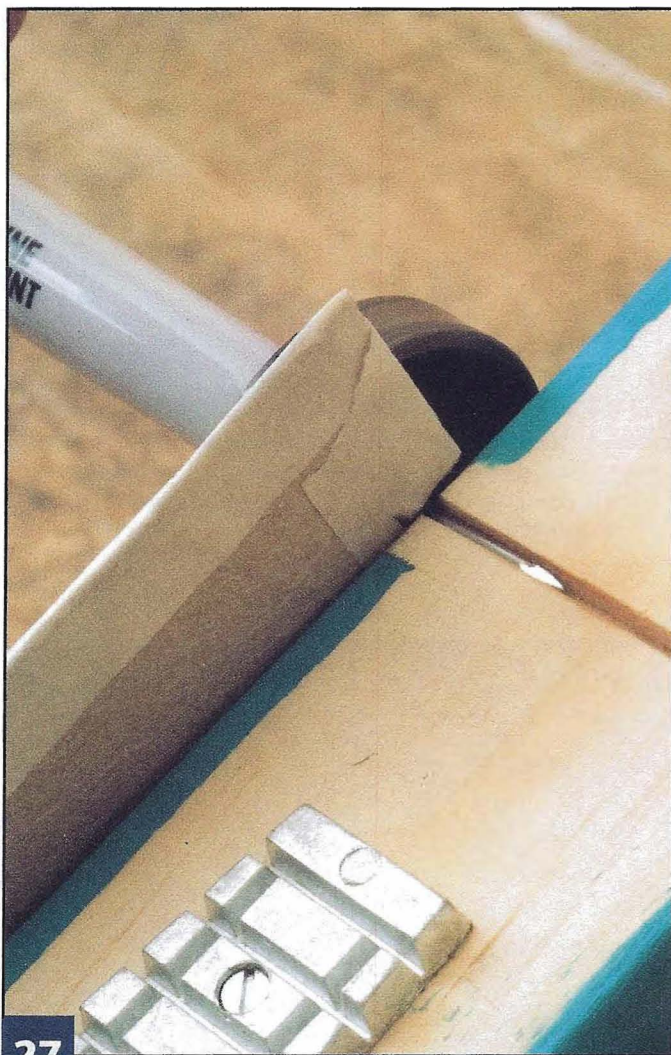
25

Lubricate the wheel wells. Squeeze a small amount of dry graphite lubricant onto a paper towel. Rub the graphite over the wheel slots where the axles attach on both sides of the car. This helps reduce friction where the wheels rub against the car.



26

Make a wheel spacer. Cut two small rectangles from a cereal box. Place the two rectangles together and tape them on three sides. On one side, cut a $\frac{1}{4}$ "-square notch in the center.



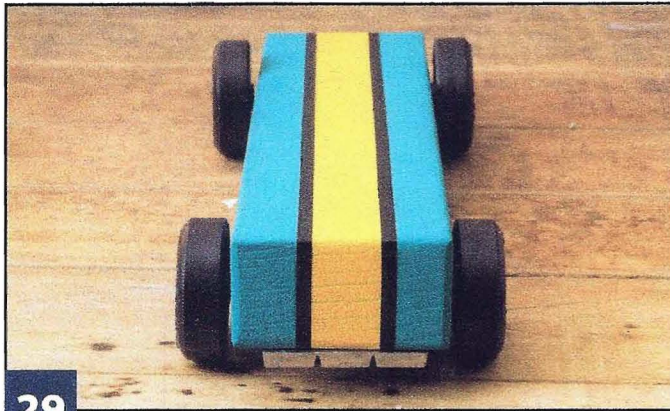
27

Attach the first wheel. Place the wheel spacer between the wheel and the car. Firmly press the axle into the axle slot. The bottom end of a Sharpie marker makes a good tool to push the axle into the slot. Remove the wheel spacer.



28

Attach the other wheels. Use the same technique to attach the other three wheels. All of the wheels should be spaced an even distance from the car. The cardboard spacer helps you obtain the correct spacing.



29

Balance the wheels. After you attach all four wheels, place the car on a flat surface. Position yourself so you can look directly underneath the car. If any of the wheels do not rest flat and square on the surface, adjust them until they do.



30

Lubricate the axles. Squeeze a small amount of lubricant onto each axle. Use your finger to spin each wheel several times to work the lubricant into the axles. Your car is ready to race!

materials & tools

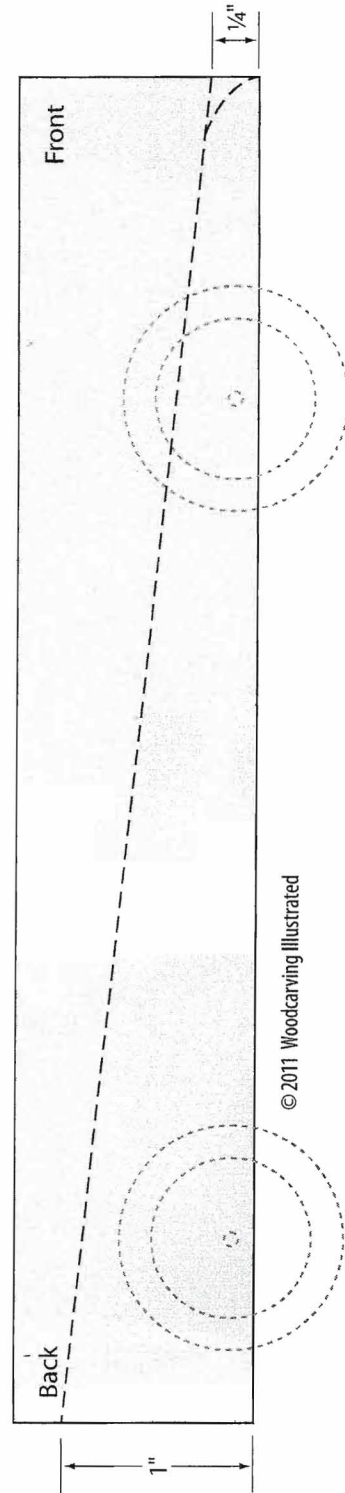
MATERIALS:

- Official BSA Pinewood Derby Kit (available at craft and Scout stores)
- 3/4"-wide masking tape
- Sandpaper: 150-grit; 400-grit wet/dry
- Acrylic paint, two colors of your choice
- 1/8" pin-striping tape (available at auto parts stores)
- 2 each craft sticks
- White glue
- Tapered weight bar (available at craft and Scout stores)
- Split shot sinkers (available at sporting goods stores)
- Dry graphite lubricant (available at craft and Scout stores)
- Paper towels
- Cereal box (wheel spacer)

TOOLS:

- Pencil
- Ruler
- Clamps
- Hand saw
- 3 each 1" foam brushes
- Scissors
- Power drill
- 3/8" drill bit
- Sharpie marker (inserting axles)
- Hair dryer (optional, to dry paint)
- Wheel mandrel (to smooth wheels; available at craft and Scout stores)

Wedge car pattern



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For more information on Troy Thorne, see page 8.