

THE GREEN CLUB PROJECT

How to make the ultimate recycled juggling club at home.

BY JONATHAN POPPELE

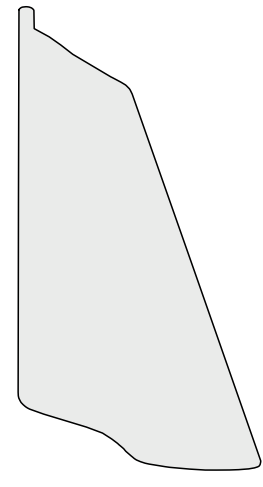
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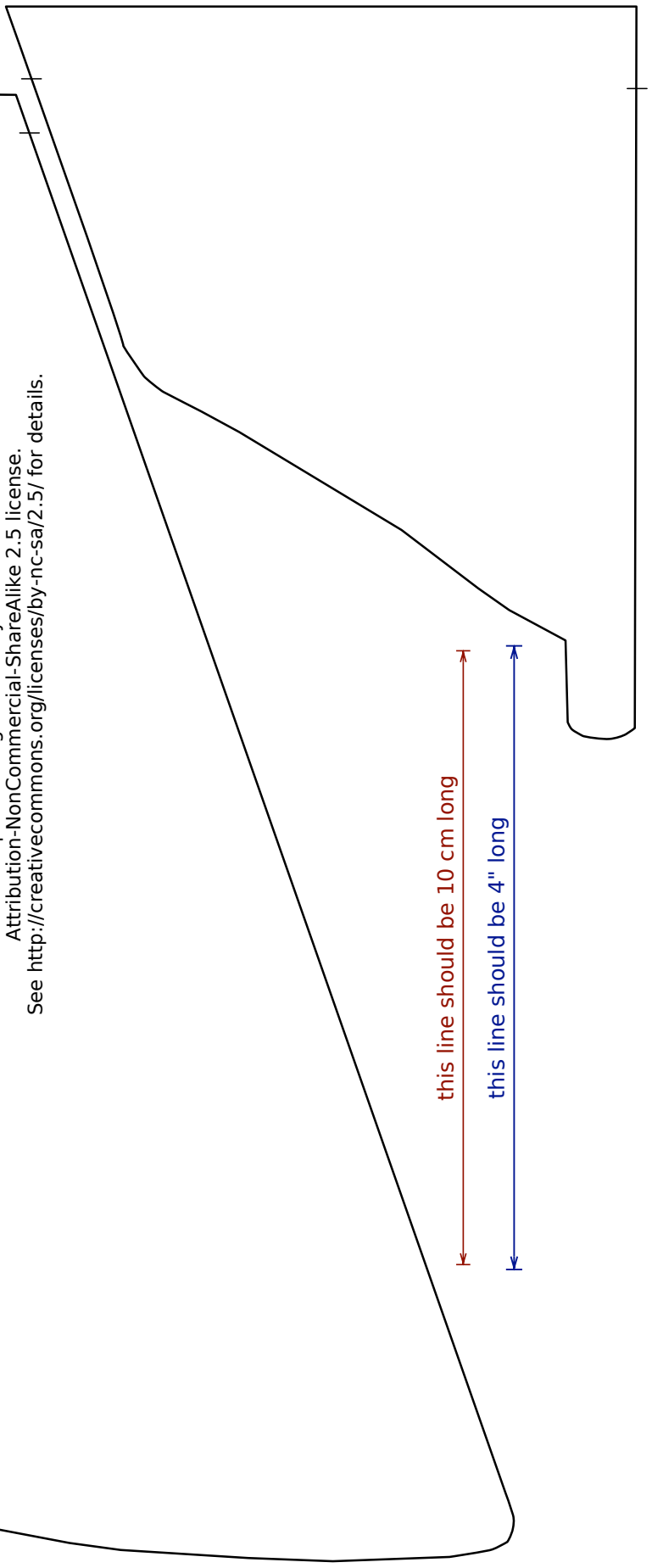
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Green Club Project handle wrap pattern.
 Cut handle material from a 2 litre pop bottle.
 Print at 100% scale; measure the lines below to confirm correct size.
 Cut out the two pieces and tape or glue together, matching the tick marks.
 Your final product should look like this:



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this line should be 10 cm long

this line should be 4" long

Tools, materials & supplies

There are a number of things you will need to have on hand to make Green Clubs. Read through the directions thoroughly and make sure you understand them before you rush out and buy anything, especially any tools. Please *do not* buy pop bottles or tennis balls for this project! Empty pop bottles are easy to find, and worn-out tennis balls can be freely had from any tennis club. Be sure to closely read the instructions on page 4 for printing the handle wrap pattern.

First of all you will need the following tools available to you:

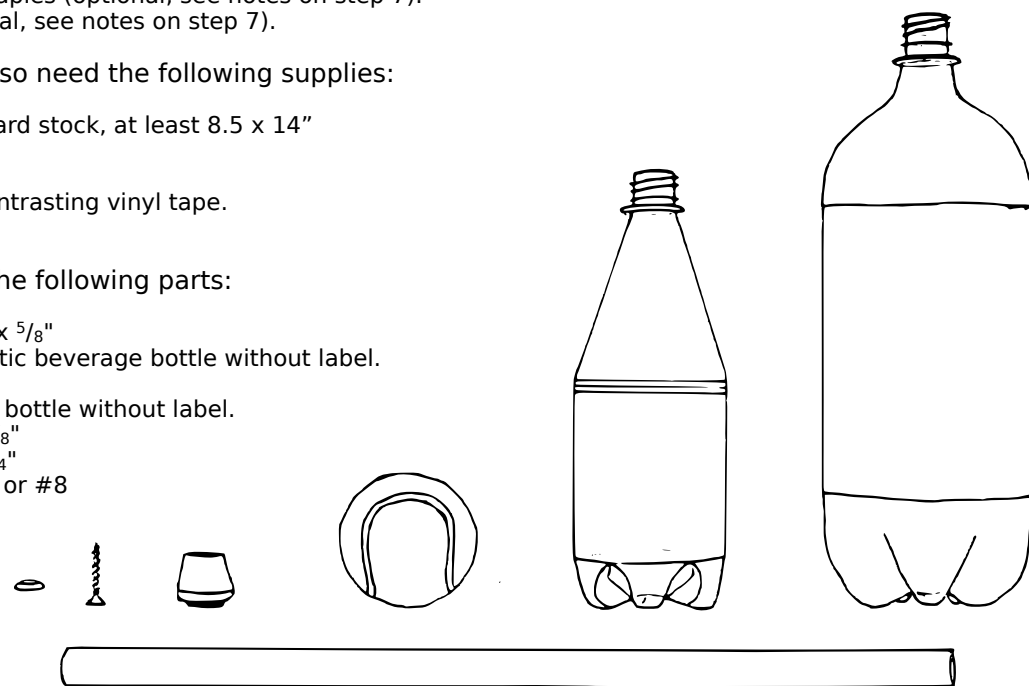
- A pencil and a pen.
- Wood saw (optional, see note on step one).
- Tape measure (optional, see note on step one).
- Drill with a $\frac{3}{32}$ " bit and a Phillips driver bit. A clutch type drill is preferable.
- Small sharp knife, like an X-acto. Small pocket knives can work if they are sharp.
- Good sharp scissors.
- A black permanent marker, such as a Sharpie.
- Staple gun with $\frac{3}{8}$ " staples (optional, see notes on step 7).
- Small hammer (optional, see notes on step 7).

In addition, you will also need the following supplies:

- Sheet of lightweight card stock, at least 8.5 x 14"
- Masking tape.
- White vinyl tape.
- Black or other dark contrasting vinyl tape.
- Duct tape.

Finally you will need the following parts:

- Hardwood dowel, 36" x $\frac{5}{8}$ "
- Clean 16 or 20 oz plastic beverage bottle without label.
- Tennis ball.
- Clean 2 litre beverage bottle without label.
- Rubber furniture tip, $\frac{5}{8}$ "
- Drywall screw, #6, $1\frac{1}{4}$ "
- Finishing washer, #10 or #8

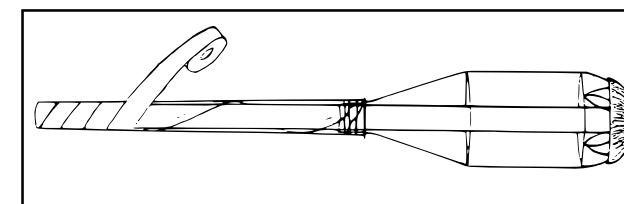


Notes about building Green Clubs

- The dowels and tennis balls used in this design each make two clubs. Rubber furniture tips come in packages of four. For these reasons, I suggest making four clubs at a time.
- I also recommend working on all of the clubs simultaneously and doing each step for all the clubs before moving on. Some of the steps are tricky and it is easier to find a technique that works for you if you do it four or more times in a row.
- If you are making Green Clubs as a group project I suggest using an assembly line approach. Having one or two people specialize on each step will make the process go faster and better. Many of the steps can be done simultaneously, so there is no need for anyone to be idle. Experiment. Find what works for your group.
- **A note to teachers:** Most of these steps, including the most time consuming, can be done by middle school children. If you do this with middle school kids, I suggest cutting the dowels, drilling the bottles and dowels and cutting the tennis balls (steps 1,2 & 3) before hand. I also suggest that you attach the end cap (step 6, a & b) and the handle wrap (step 7). These steps are tricky, are best done with dangerous tools, and go fast once you get the knack. With modest, hands-on help this design is well within reach of a 10 year old.

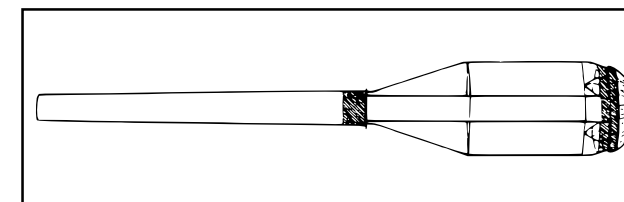
Part III: Finishing the club

8) Wrap the handle with white vinyl tape from the end to the center. Give the end an extra wrap before you begin to help keep the handle secure. Wrap in a spiral, overlapping the tape slightly ($\frac{1}{16}$ " is plenty, but you can go up to half the width of the tape if you want). Keep the tape stretched slightly as you go to get a smooth wrap. Finish with an extra wrap just below the collar.

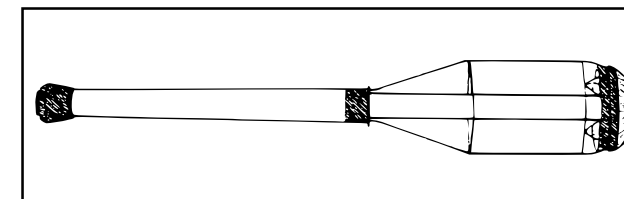


9) Finishing tape.

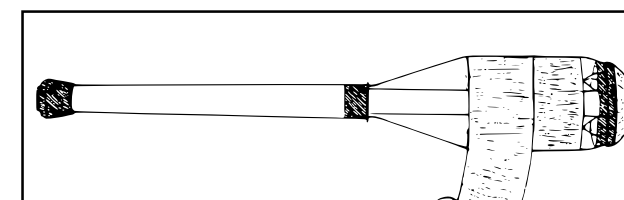
a) Put a single wrap of contrasting dark vinyl tape at the top of the handle just below the collar.



b) Put a wrap of dark vinyl tape around the junction between the bottle and the end cap.



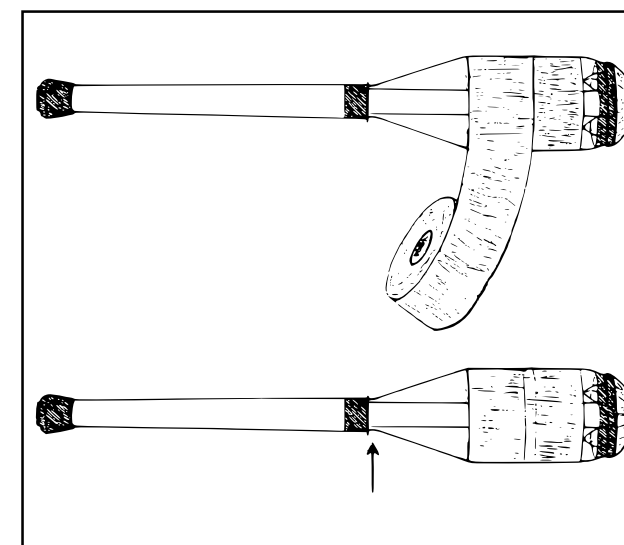
10) Fit the rubber tip onto the end of the club as a knob. It will be a very tight fit and does not need to be secured.



11) Wrap the smooth, cylindrical center portion of the bottle with duct tape. The duct tape here serves three purposes: it gives the body of the club some structural support; it provides a surface you can attach decorations to; and it balances the club, which will be handle heavy otherwise.

On most bottles you will need two separate wraps to cover whole center section. Use as much tape as you need to balance the club. The center of balance of the club should be just to the bottle side of the collar. One layer of tape for each of the two wraps should be just about right. You may wish to experiment to find the balance that is best for you.

You may wish to decorate your club with colored tape, stickers or other odds and ends. Be creative.



Congratulations! That's all there is to it!

Part I: Preparing the parts

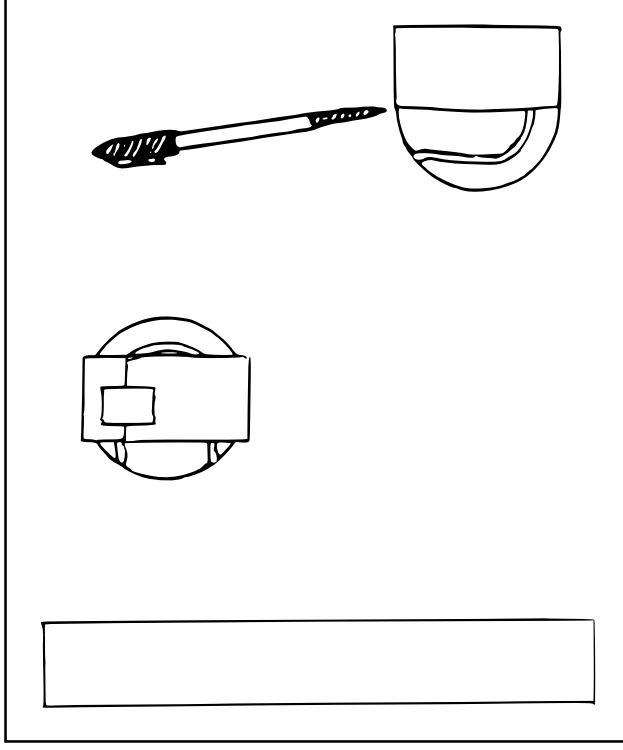
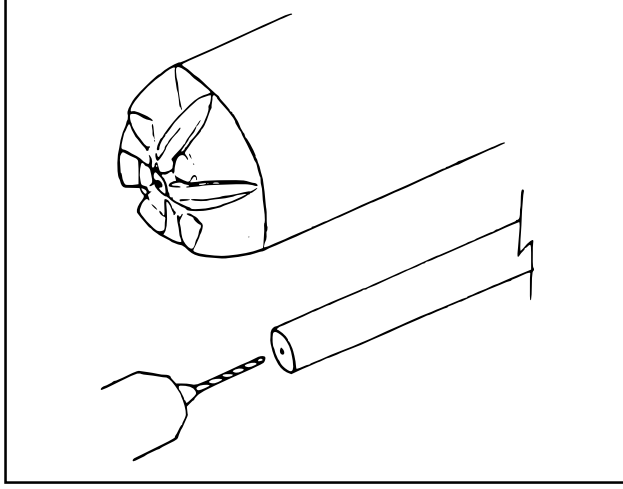
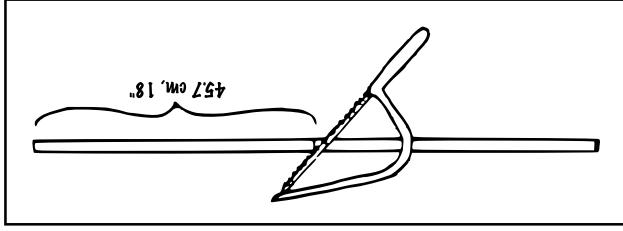
1) Mark each dowel 45.7 cm (18") from one end. Using a wood saw, cut each dowel in half to produce two 18" dowels.

Note: Many hardware stores will cut dowels to length free of charge at the time of purchase.

2) Drilling the parts.

a) Using a drill with a $\frac{3}{32}$ " bit, drill a hole as deep as your screw in the center of the smoothest end of each dowel.

b) Drill a hole through the exact center of the bottom of each 16 oz or 20oz. bottle.



a) Measure a strip of light card stock or stiff paper $1\frac{1}{4}$ " wide and at least 8" long. Wrap the strip around a tennis ball tightly and secure it with tape. The strip will now form a ring $2\frac{1}{2}$ " in diameter and $1\frac{1}{4}$ " tall. You may wish to reinforce the ring with duct tape. To do so, wrap the ring with tape and then trim the tape to the edge of the paper.

b) Place the ring on a smooth, firm surface and place a tennis ball down into it. The ring will come exactly halfway up the ball. Trace the top of the ring to draw the equator on the ball.

c) Using a small, sharp knife make a small incision along the equator.

d) Cut all the way around the ball along one of the circles you drew. Then cut around the other circle. **Tennis balls are hard to cut. Go slowly, be careful and always cut away from yourself.** You may need to experiment with techniques to find a comfortable and easy way to do this.

7) Attaching the handle wrap to the club. This may be the trickiest part of the whole process. It is also a part that will make a big difference in how nicely the clubs turn out. The objective is to wrap the handle around the neck of the bottle and the dowel very tightly to provide a good spring handle. There is more than one easy and goes pretty fast.

a) Line up the middle of the top curve of the handle wrap with the collar at the base of the threading on the neck of the bottle. Wrap the handle three-fourths of the way around the bottle neck, seated against the collar all the way around.

b) Place the club on a firm surface with the collar just off the edge and the handle wrap pinned against the surface below and wrapped over the threading on top.

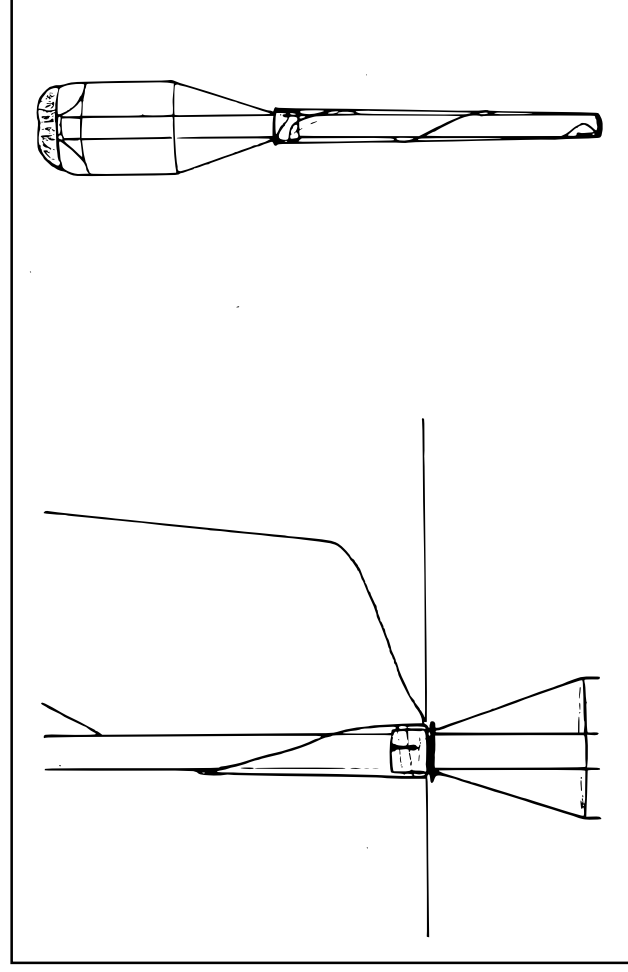
c) Using a staple gun with $\frac{3}{8}$ " staples, secure the top curve of the handle wrap to the bottle and dowel. Put the staple in parallel to the dowel and make sure the handle is seated against the collar on the bottle. Using a small hammer, finish seating the staple firmly into the dowel. The bottom prong on the staple may go off to one side and not set in the dowel. That is okay, it will still work fine.

d) Wrap the handle around the dowel getting it as tight as possible. The end of the wrap should just line up with the end of the dowel. Secure the bottom corner of the handle wrap with a staple or with vinyl tape. If you use tape, be a bit liberal with it and wrap it tightly. Make sure the handle wrap is as tight as you can get it. If it loosens up as you are securing it, re-wrap it at secure it again. For this reason you may prefer tape until you get the hang of it.

Notes:

- It is possible to secure the handle wrap using only tape. This is a bit trickier, but may be necessary if you do not have easy access to a staple gun.
- You can secure the top with a small nail or screw. If you do this make sure the fastener has a broad head so it doesn't pull through the handle wrap and drill a pilot hole so you don't crack the bottle neck or the dowel.
- You may prefer to use $\frac{1}{2}$ " staples for the top to secure farther into the dowel, or $\frac{1}{4}$ " staples for the bottom.

However you do it, just make sure that the top curve of the handle wrap is secure and flush against the collar on the neck of the bottle, the bottom edge of the wrap is even with the bottom of the dowel, and that the handle is wrapped as tight as you can get it.



Well, you're done with Part II. It's starting to look like a club now! All that is left is the finishing work.

4) Making the handle wrap from a 2 litre bottle.

a) Print out the handle wrap pattern from page 8 or page 9 of this booklet. The pattern on page 8 provided for letter or A4 size paper but is in two parts and requires assembly. The pattern on page 9 requires no assembly but must be printed on legal size paper, A3 paper or larger. Use *lightweight card stock if possible, and ensure that you print the pattern at 100% size.*

b) Wrap a pattern snugly around a 2 litre bottle as shown and secure the overlapping tab with tape. Trace the pattern using black permanent marker. The pattern may not lie flat at the top-most point where the bottle curves towards the neck. That is perfectly okay, just trace as close as you can in a smooth curve.

c) Using a good sharp pair of scissors cut out the handle wrap along the inside edge of the tracing. Cut cleanly to prevent nicks and burrs. This can be a bit tricky. The directions below are one method that works well. You may need to modify it, especially if you are left handed. Use the diagram to follow along. The arrows on the diagram indicate the direction you cut.

i) Make an incision along line 1. This is best done with a knife.

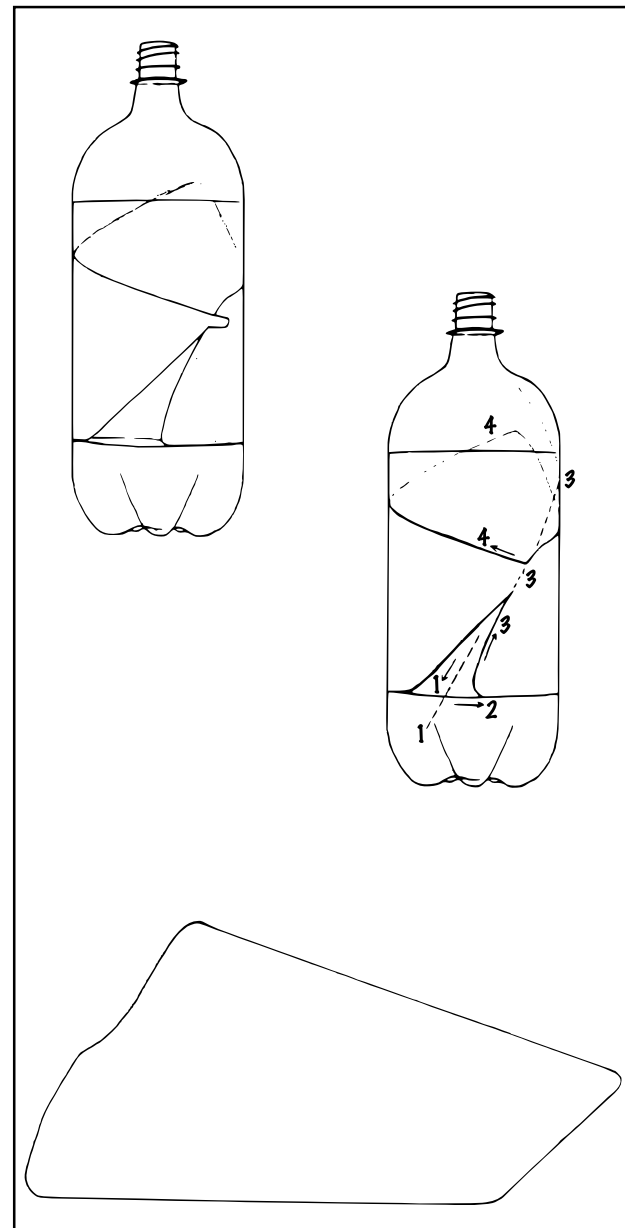
ii) Cut the bottom off the bottle by cutting along line 2, starting and ending at cut 1.

iii) Cut up along line 3 following the tracing to just past line 4, then cutting up towards the neck of the bottle.

iv) Cut the top off the bottle by cutting up line 4 and intersecting cut 3.

v) Trim off the excess material and round any sharp corners.

d) The final handle wrap will look like this.



Congratulations! You are done with Part I. You now have all of the parts you need to assemble your clubs.

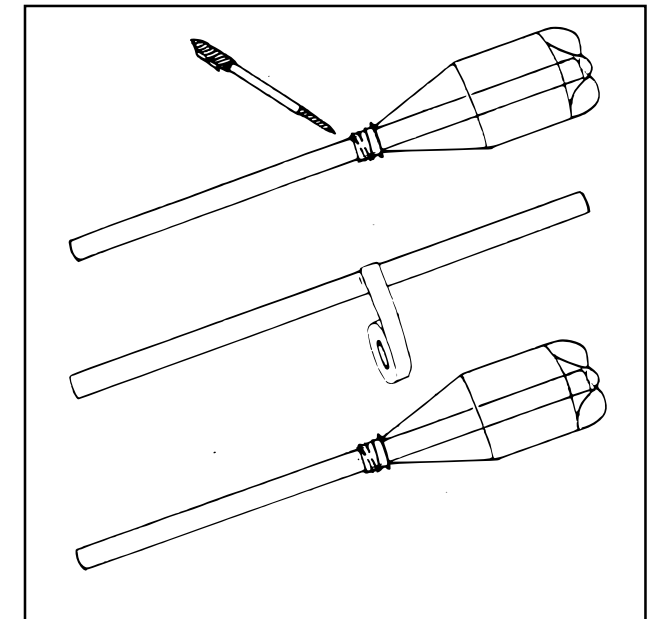
Part II: Assembling the club

5) Fitting the 16 oz or 20oz. bottle to the dowel.

a) Place the bottle over the dowel so the screw holes line up. Mark the dowel just below the bottle.

b) Wrap the dowel with masking tape just above the mark you made until the bottle fits tightly on the dowel.

c) Fit the bottle onto the dowel with the screw holes lined up.



6) Attaching the end cap.

a) Place a finishing washer onto one of the drywall screws. On a work surface, drive the screw through the top center of one of your tennis ball halves using a drill with a Phillips bit.

b) Invert the tennis ball half over the screw head. Place the screw into the hole on the bottom of the bottle. Make sure the screw holes in the bottle and dowel are lined up properly. Brace the bottom of the dowel against a hard, non-slip surface so the bottle bottom faces you. Holding the bottle by its neck with your bottom fingers around the dowel, drive the screw into the dowel. Make sure the screw is tight, but don't risk stripping the screw or the dowel. A medium-high setting on a clutch drill works great here.

c) Turn the end cap right-side out. It will look crater shaped and flare out away from the bottle bottom. Press the edge of the end cap down and in against each of the five "feet" on the bottom of the bottle. This will dent the bottle and provide a good surface for the end cap to seat against.

