

R2K Rocket Kit

User Guide



Cautionary and Warning Statements

- This kit is designed and intended for educational purposes only.
- Use only under the direct supervision of an adult who has read and understood the instructions provided in this user guide.
- Read warnings on packaging and in manual carefully.
- Always exercise caution when using sharp tools

Recycling At Its Best

Start by rescuing an empty 16-ounce, 20-ounce, or two-liter bottles made for carbonated beverages that was destined for the trash and use it to form the body of a rocket. All of the remaining parts needed to assemble a rocket are included in this kit. Two transition cone patterns are provided: one for 16- and 20-ounce bottles and one for two-liter bottles.

The following instructions show you how to build a rocket with a standard 20-ounce bottle.

The process may need to be varied for bottles of different sizes and shapes. For example, fin shape and placement might vary. We encourage you to experiment with different bottle shapes and variations in design (Figure 1). However, with any design, you should first ensure your rocket is flight worthy and safe before launch.



Figure 1

Some experimentation may be needed to achieve the optimum flight performance in bottles of different shapes and sizes.

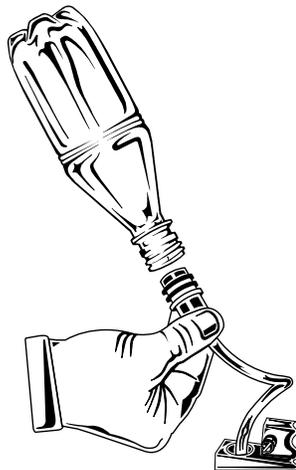


Figure 2

Before You Begin

Check your bottle. We know you're eager to get started, but this step is important because different soda brands have bottles that vary in size and shape. The bottle should be installed onto the launcher before it is used to ensure it will fit on the launcher. Without a proper fit, the completed rocket will not launch successfully.

Insert the pressure plug of the launcher in the mouth of the bottle (Figure 2). If the plug does not fit into the mouth of the bottle, the bottle should not be used.

Materials Included

- Paper body tube
- Ping-Pong™ ball
- Fin material
- String
- Sandpaper
- Transition Cone and Fin Pattern Sheet
- Two-liter Transition Cone Sheet
- 2 plastic inserts

Items Required (not included)

- 16-ounce, 20-ounce, or two-liter plastic soda bottle (do NOT use bottles for noncarbonated beverages such as water)
- Cool-melt glue gun and glue
- Permanent marker
- Transparent adhesive tape
- Scissors
- Paints
- Masking tape

Tip: Read all of the assembly instructions before beginning to build your rocket and then go back to the beginning and start the step-by-step instructions.

Assembling the Rocket Body

1. **Optional:** Pressurize the rocket body by pumping up the plastic bottle. Ask your instructor for the "fizz keeper" type bottle pressurizer (Figure 4). This ensures a rigid body surface while working on the rocket.
2. Cut out the paper measuring tape printed on the Transition Cone and Fin Pattern Sheet. You will use it to determine the placement of the fins. Place the measuring tape around the bottle, just above where the circumference tapers. Secure the measuring tape to the bottle with transparent adhesive tape.
3. Using a permanent marker, indicate placement for each fin by making a dot at the 3", 6", and 9" points (Figure 5). Then, remove the measuring tape.

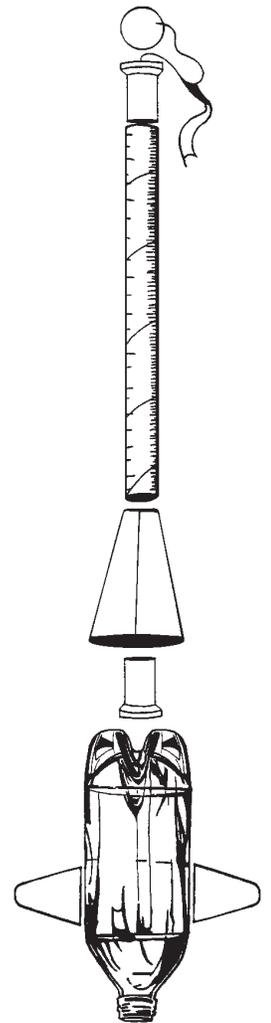


Figure 3

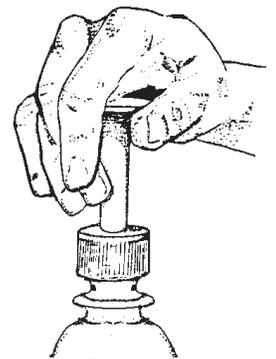


Figure 4

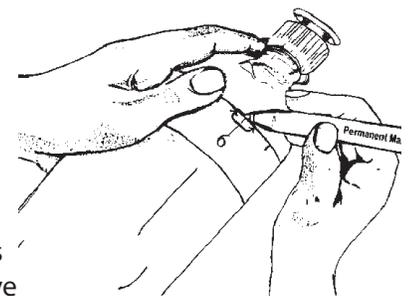


Figure 5

To make straight vertical lines for fin placement, hold the bottle against a door frame (Figure 6). Make 2" marks just below the taper of the bottle.

Note: Some bottles may vary in shape from the one pictured.

4. Sand the marked areas where the fins will be (Figure 7).
5. Lightly sand inside each of the bottle feet where the body tube will fit (Figure 8). The sanding is done in preparation for the attachment of the plastic insert and body tube.

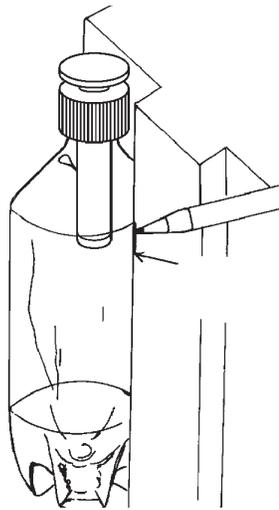


Figure 6

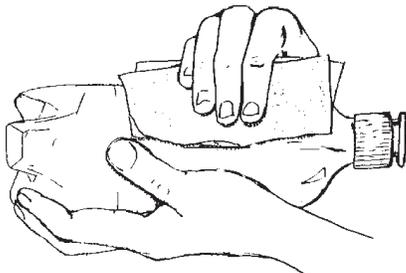


Figure 7

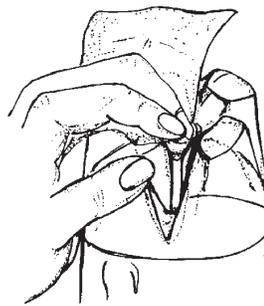


Figure 8

Adding the Fins

1. Cut out the fin pattern on the Transition Cone and Fin Pattern Sheet. Place the pattern on the fin material and trace around the edges of the pattern. Cut the fin from the material. It may be necessary to sand the edges where the fins will be attached to the bottle.
2. Using the cool-melt glue gun, run a thin bead of glue along the base of one of the fins. Press the fin into place along the mark on the R2K body. Make sure the fin is perfectly aligned along the mark. Let the glue set for a minute. Then run a bead of glue along both sides of the fin. Repeat this process for the other two fins.

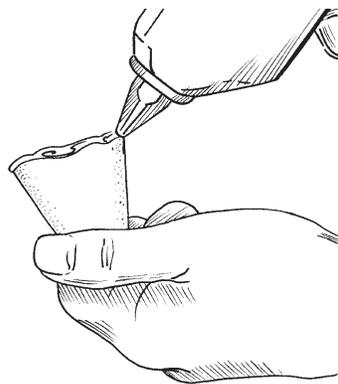


Figure 9

Note: While you are gluing the base of the fin, it may tend to move out of place if the bead of glue on the other side has not set.

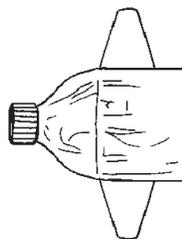


Figure 10

Final Assembly

1. Using the cool-melt glue gun, mount one of the plastic inserts between the bottle feet (Figure 11). Align the insert vertically with the bottle.

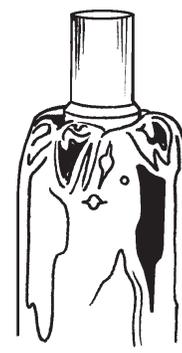


Figure 11

2. After the glue sets, slip the paper body tube onto the plastic insert (Figure 12).

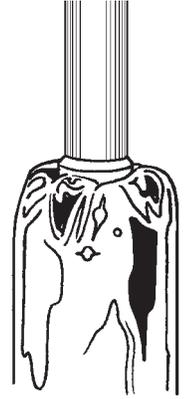


Figure 12

3. Cut out the transition cone from the Transition Cone and Fin Pattern Sheet. Crease the transition cone along the dotted line (Figure 13).

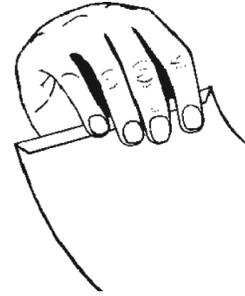


Figure 13

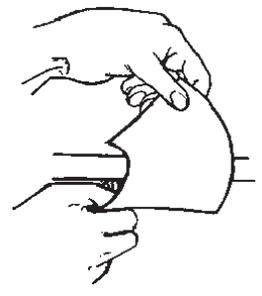


Figure 14

4. Roll the transition cone across the edge of a table or workbench (Figure 14).



5. Roll the transition cone somewhat tightly in your hand (Figure 15). Then carefully unroll it and align the dotted line to the opposite edge. The small opening will be 1" in diameter. Tape the cone along the seam with transparent adhesive tape.

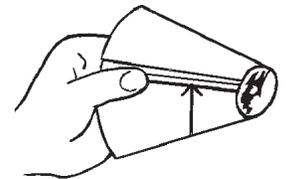


Figure 15

6. Slide the transition cone over the body tube that is connected to the bottle (Figure 16). It should fit snugly. If it does not fit snugly, spot glue the cone to the body tube using the low temp glue gun. Smooth the glue as much as possible. Allow the glue to cool before finishing the R2K.

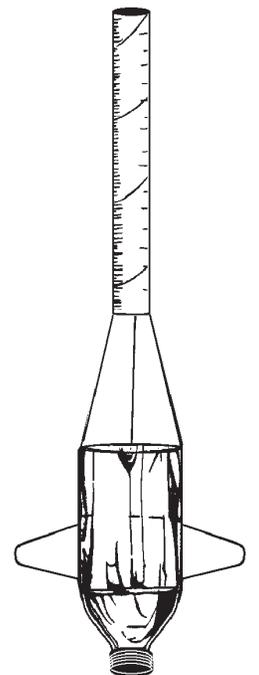


Figure 16

Adding Final Touches

1. Remove the pressurizer from the R2K. To spruce up your rocket, you can spray paint or brush it with acrylic paints. Pitsco sells decals that can also add pizzazz to your rocket. Protect the inside of the bottle neck by covering the end with masking tape.
2. The Ping-Pong ball is the nose cone for the R2K. Using the cool-melt glue gun, glue one end of the string to the ball (Figure 17).

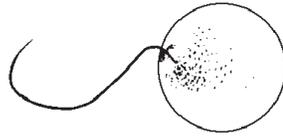


Figure 17

Why the Ping-Pong ball? Compared to other types of nose cones tested, the Ping-Pong ball has proven to provide the best overall performance for the flight of the R2K.

Also, the ball, with its attached string, functions as a recovery system. During the rocket's descent, the ball causes the rocket to tumble. This creates drag, which slows the rocket's descent and allows it to land intact.

3. Using a push pin, thumb tack, or other sharp point, enlarge the small hole in the closed end of the plastic insert. Thread about 1/2" of the string through the plastic insert (Figure 18). Use a spot of glue to secure the thread and seal the hole. Be sure the hole is completely sealed by the glue.

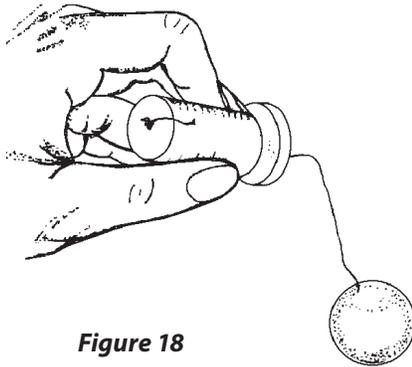


Figure 18

4. Carefully, ease the plastic insert into the end of the body tube (Figure 19). If the plastic insert fits loosely in the body tube, put some tape around the insert to make it snug.

Note: Do not paint the plastic insert.

5. Make sure that the string attached to the Ping-Pong ball is not tangled. It should hang free for several inches.

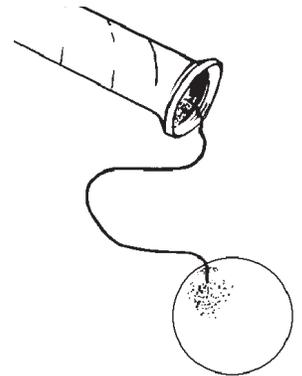


Figure 19

Launching the R2K

To launch your rocket, follow the instructions of your teacher and whichever launcher that is being used.

Before launching, fill the bottle of your rocket approximately half full of water. Make sure the Ping-Pong ball is on top of the body tube and insert before launching (Figure 20).

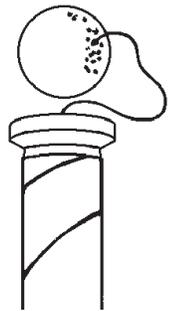


Figure 20

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