APPENDIX B – BUILDING THE SODA BOTTLE LAUNCHER

OBJECTIVE

Construct the Soda Bottle Launcher that will be used to launch the Food Transportation Devices (FTDs).

INTRODUCTION

Simple and easy to construct, the Soda Bottle Launcher is an integral part of the experiment. Like a balloon, air pressurizes the bottle rocket. When stomped or jumped on, air escapes the bottle, providing the energy needed to propel the rocket.

MATERIALS

- Pre-cut components for the Soda Bottle Launcher
  - » 2 - PVC tee connectors
  - » 2 - PVC slip caps
  - » 1 - PVC coupling
  - » 3 - 12” PVC pipes
  - » 2 - 5” PVC pipes
  - » 1 - 2” PVC pipe
  - » 10 - 4-H emblem stickers
  - » Eye protection for anyone near launcher

Not included in the kit:

- Several clean and empty 2L plastic soft drink bottles *(see Leader Note on the next page regarding type)*
- Duct tape

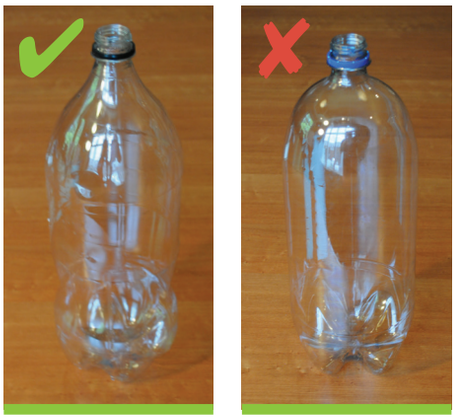
TAKE THE LEAD

- Plan on 5 minutes set-up time.
- Read through the assembly instructions to become familiar with each step.

LEADER NOTES

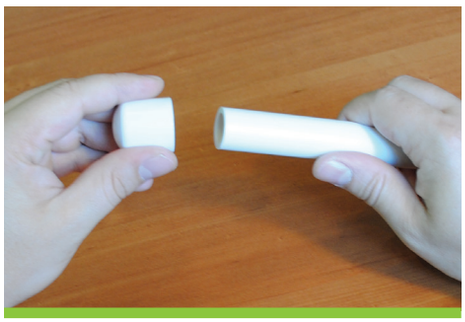
- **The PVC pieces will be held together using friction, not PVC cement.**
- **All plastic bottles will eventually split, crack or otherwise fail. To keep the activity moving, you may want to assemble additional bottles beforehand so that you can easily switch it out if one plastic bottle fails. Alternatively, each team can build their own bottle assembly and use it for their launches.**

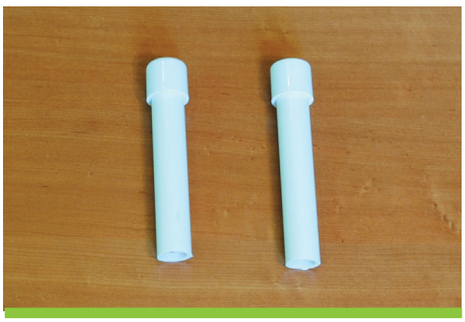
- **Important:** We recommend using 2L bottles used to package Coca-Cola© products (left image), as they have shown to be substantially more durable and able to withstand repeated stomping.



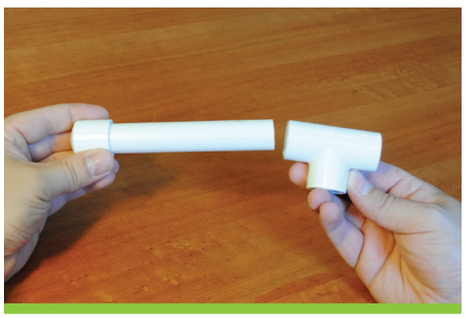
HOW TO ASSEMBLE

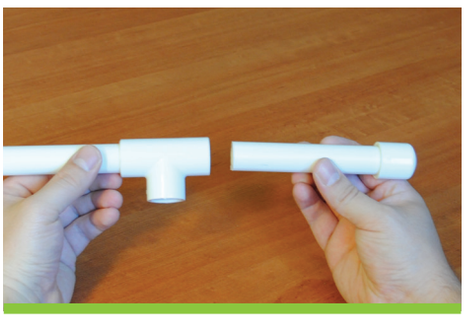
Step 1: Attach PVC caps to the end of the 5" pipe pieces.

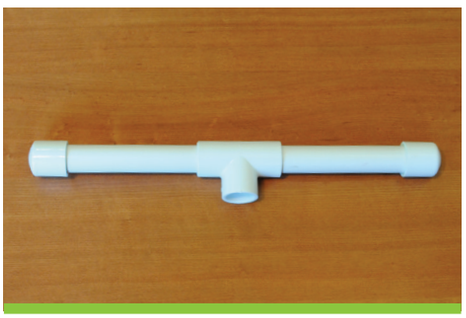




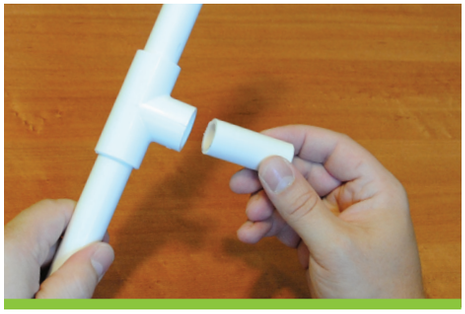
Step 2: Insert the two 5" pipe pieces with the caps into each end of a PVC tee connector.

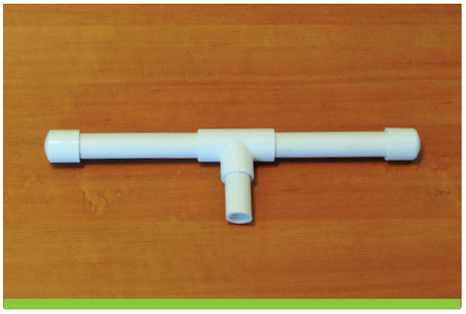




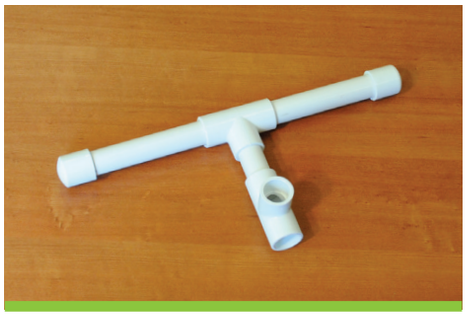


Step 3: Insert the 2" pipe piece into the open connection of PVC tee connector.

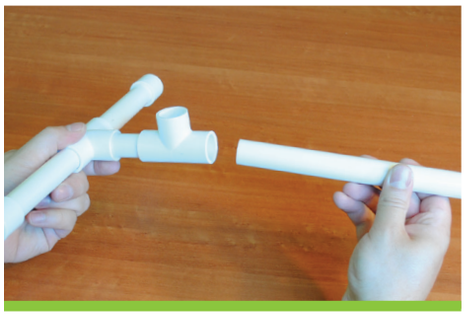
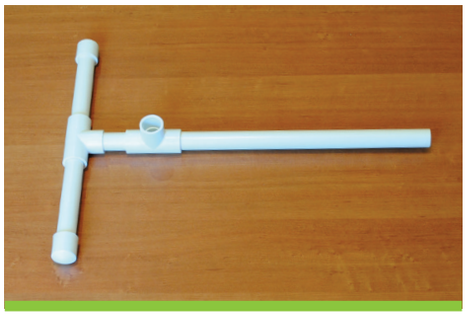




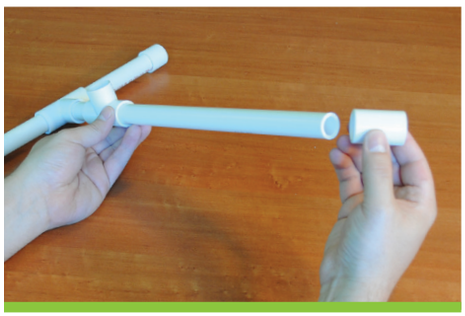
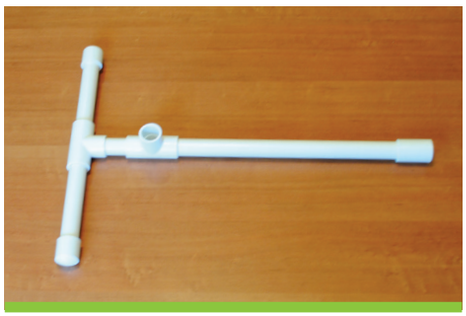
Step 4: Connect the second PVC tee connector to the other end of the 2" pipe piece.

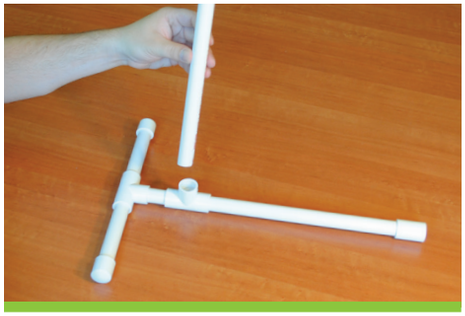
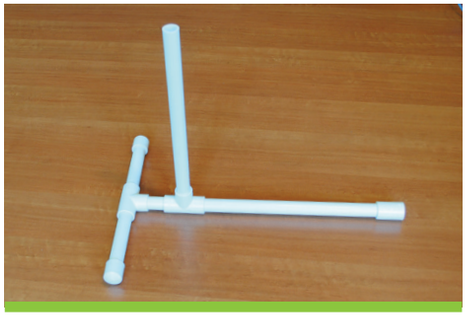
Step 5: Insert one end of a 12" pipe piece into the other end of the PVC tee connector.

Step 6: Attach the PVC coupling to the other end of the pipe piece.

Step 7: Insert a 12" pipe piece into the open connection of the PVC tee connector. This will be the launch tube.

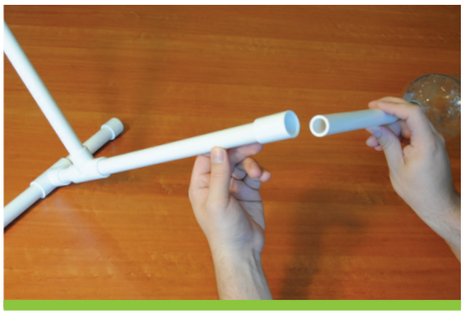



Step 8: Insert the 12” PVC pipe piece into the mouth of the two-liter bottle. It will be a snug fit.


Step 9: Secure the pipe to the bottle using a 4” long piece of duct tape.


Step 10: Place a 4-H sticker on the bottle. This will give the participants a target to jump on, as well as give some depth to the clear bottle.

Step 11: Insert other end of 12” pipe piece to the PVC coupling.




APPENDIX C – HOW TO LAUNCH YOUR FTD

3-2-1 LIFT OFF!

The launch can be performed outdoors in a large open parking lot or field. It may also be done indoors in a gym, large multipurpose room, or cafeteria, which maybe preferred, depending on the weather and wind. The target area should be 35 feet from the launch pad, so you will need approximately 50 feet of room.

Step 1: Place the launcher in an open space.

If the ground is soft, consider putting a solid object, such as a piece of plywood, under the bottle to create a solid surface.

Step 2: Tilt the launch tube in the direction you want the FTD to go.

The launch tube can be aimed at different angles by tilting to one side or another.

Step 3: Slide the rocket down the launch tube.

Step 4: Prepare for take off.

Make sure the landing zone is clear of people and that any participants involved in launching the rocket are wearing eye protection.

Step 5: Countdown to zero.

Stomp or jump on the bottle, using the sticker on the bottle as a target. This will force most of the air inside the bottle through the tubes and will launch the rocket.



Step 6: Re-inflate the bottle.

Separate the bottle from the launcher by pulling it from the connector. Wrap your hand around the pipe end to make a loose fist and blow through the opening into the pipe. Lips should not touch the tube. Use your other hand to help flex the bottle back into its original shape. Reconnect the bottle to the launcher. It is ready to go again.