

Straw Rocket Launcher

User Guide



PITSCO
EDUCATION

Materials Included

- Launcher base (preassembled)
- Angle plate (predrilled and slotted)
- 2 pan head screws (6-32 x 5/8")
- 2 knurled nuts (6-32 x 5/8")
- Piston assembly
- Spring
- Launch cylinder assembly (clear tube and enclosed graduated rod)
- Tube of silicone-based lubricant

Items Required (not included)

- Completed straw rocket
- Safety goggles (one pair per student near the launcher)
- Range paper (optional)
- Tape measure (optional)

Safety Tips

- Straw rockets should never be launched at people.
- Before launching a straw rocket, make sure that all people are clear of the rocket's anticipated flight path.
- Never attach sharp objects (needles, pins, and so forth) to a straw rocket.

Launcher Assembly

1. Locate the angle plate and slip the slot in the plate over the brass tube on the launcher base. Be sure the angle markings are visible from the front of the launcher and that the angle plate is on the front side of the two angle brackets of the launcher base (Figure 1).
2. Align the two predrilled holes in the angle plate with the hole of each angle bracket (Figure 2). From the front, insert one pan head screw through each hole in the angle plate and brackets. On the back side of the bracket, start one knurled nut onto each of the two protruding screws. Be sure that the smooth portion of each nut is toward the angle plate. Hand-tighten the nuts to secure the angle plate to the brackets. Do not overtighten.
3. Insert the spring into the tube support mount on the launcher base (Figure 3). Place the piston assembly over the top of the spring with the hollowed-out portion of the piston in the downward position.
4. Slide the bottom of the launch cylinder assembly over the piston assembly, spring, and the tube support mount (Figure 4). Be sure that the launch cylinder is seated completely onto the tube support mount.

The Straw Rocket Launcher is now ready for use. Be sure to test your launcher prior to classroom use by following the Making Straw Rockets instructions within this user guide.

Important Notes

- The Straw Rocket Launcher comes pre-lubricated. To keep your launcher in optimum working order, use a small amount of silicone-based lubricant (supplied with the launcher) to lightly lubricate the O-ring on the piston assembly at least once a year.
- It is not recommended that the launcher be disassembled under ordinary circumstances. If disassembly is necessary (for instance, to lubricate the O-ring), be sure to hold the launcher base firmly and pull straight up on the clear launch cylinder. Twisting the launch cylinder back and forth will stress the brass launch tube, causing premature failure. Be certain the spring and piston are correctly positioned when reassembling the launcher.
- Spare parts for the launcher are available through Pitsco Customer Service; call 800-358-4983 or email us at orders@pitsco.com.

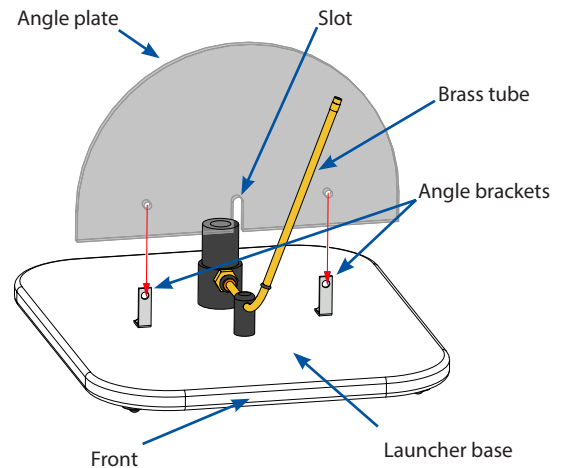


Figure 1

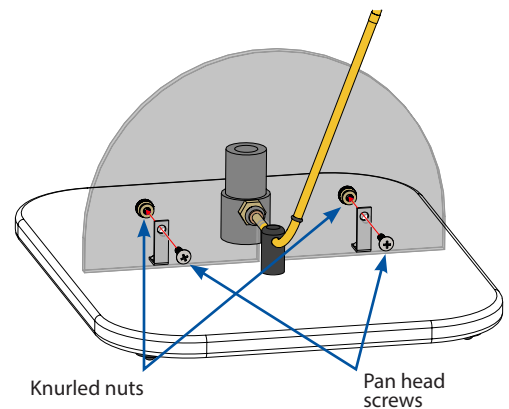


Figure 2

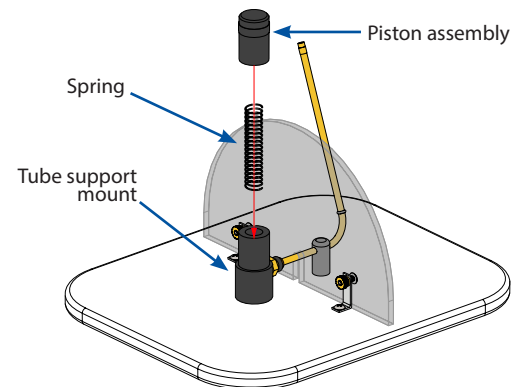


Figure 3

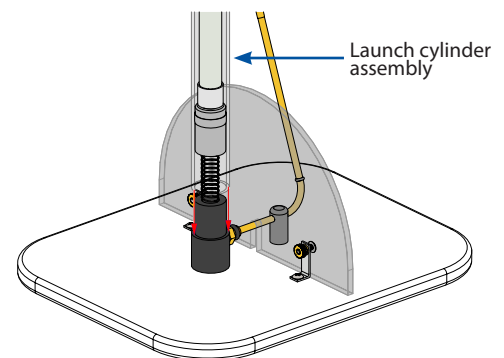


Figure 4

Caring for the Launcher

If the Straw Rocket Launcher has been stored without use for several months, or if the piston's movement becomes erratic, the O-ring inside the launch cylinder might need to be relubricated. To relubricate the seal, do the following:

1. Gently separate the launch cylinder from the base by pulling them apart so that the spring apparatus, including the piston, is exposed (Figure 5).
2. Rub a small amount of silicone-based lubricant around the O-ring (Figure 6).
3. Replace the launch cylinder in the launcher base (Figure 7).



Figure 5

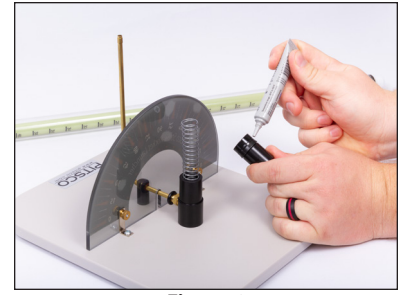


Figure 6

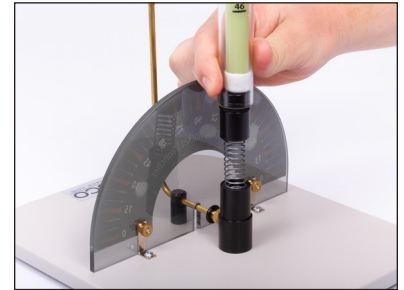


Figure 7

Making Straw Rockets

Straw rockets can be constructed easily and quickly from common items.

Note: Most of these items can be purchased together in the Straw Rocket Class Pack (35784):

- Precision Straws (or 7/32"-diameter drinking straws*)
- Transparent tape
- Heavy paper or lightweight card stock (such as index cards)
- Modeling clay or poster-mounting putty
- Scissors

* Straw packages don't usually list the diameter. We recommend testing the straw on the launcher before purchasing a large quantity.

1. The straw will form the body of the rocket. If you are not using Pitsco's Precision Straws, test the straw on the launcher to ensure that it is the right size. The straw should fit over the tube, but you should be able to slide it freely up and down. If the straw is too loose, air will leak between the straw and the tube, thereby decreasing the distance the rocket will fly. A properly fitting straw rocket can fly distances up to 50 feet.
2. On a piece of paper, design a straw rocket determining the fin shape, number of fins, rocket length, and nose cone shape/mass. You can experiment with rockets by varying the:
 - Shape, size, and number of fins.
 - Shape and mass of the nose cone.
 - Rocket's center of gravity.
 - Length of the rocket body.
3. Use the straw as is or cut the straw to the length you want (Figure 8).



Figure 8



Figure 9

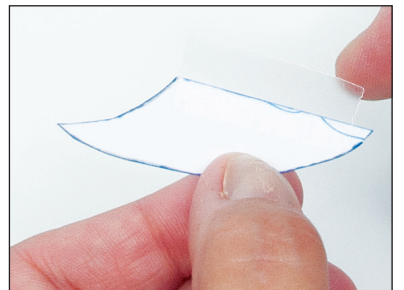


Figure 10a



Figure 10b

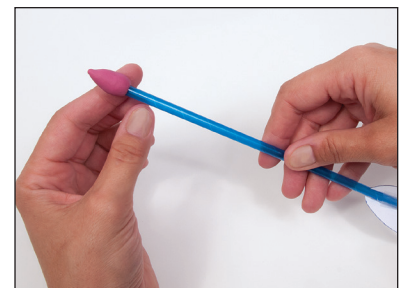


Figure 11

4. Cut the fins out of the paper or card stock (Figure 9). The fins should be all the same size and shape. Rockets should have at least three fins.
5. Attach the fins to the rocket body using transparent tape (Figures 10a and 10b).
6. Form the rocket nose cone from the modeling clay and attach it to the top end of the rocket body (Figure 11).

Launching Straw Rockets

The Straw Rocket Launcher features an adjustable launch tube. Simply adjust the angle by moving the launch tube to align with the desired degree mark, which is indicated on the angle plate (Figure 12).

1. Slip the straw rocket over the launch tube (Figure 13).
2. If the launch tube moves, carefully move it and the rocket back in line with the desired trajectory angle.
3. Raise the launch rod to the desired height (Figure 14). By varying the launch rod height, which is calibrated in centimeters, students can control the distance of the rocket's flight.
4. To launch, release the launch rod so that it falls to the bottom of the cylinder (Figure 15). This action compresses the volume of air in the cylinder and forces it out the launch tube, blasting the rocket away from the launcher. **Note:** When rockets are launched, simply release or drop the launch rod. Avoid forcing the rod into the cylinder.



Figure 12

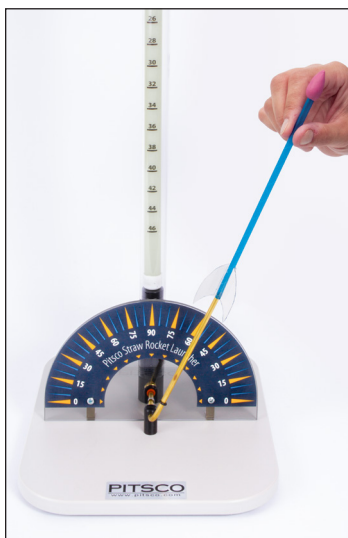


Figure 13



Figure 14



Figure 15

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