How did they get the rover from the Atlas 5 to the surface of Mars? They used a [Sky Crane,](https://astronomy.com/news/2021/02/skycrane-how-perseverance-will-land-on-mars) which was put into place by parachutes. While we don’t have the technology to create our own Sky Crane system, we are going to be testing both parachute launchers as well as design ideas for parachutes.

As you move through air, you actually have to push it out of the way, and the air pushes back, or resists. Parachutes depend on this air resistance. We are going to investigate different types of materials that our parachutes can be made of to optimize air resistance.

First, lets list some materials that our parachutes can be made out of.

1. sandwich bag
2. grocery bag
3. napkin
4. paper towel
5. newspaper

Next we need to attach something to it. You can use anything you want, but you should be consistent in weight or your experiments won’t be accurate.

Choose your parachute material and poke holes in 4 corners.

Attach your string.

Attach your soldier

Now test it out. If you want to use a launcher to get it higher, there are instructions on the next page.

How to Build Optional Launcher

**Option 1:**

**Instructions for foam boards:**

Supplies:

2 6” l x 2 ½” w foam boards 3 1” Brass Plated Fasteners

1 Rubber band (1/8” - 1/4” w) 1 parachute man (Can use alternate objects of choice) 

Directions:

1. Stack both boards on top of each other evenly so that the longer side points N to S.
2. Insert 1 brass fastener 1” from the *bottom* of a shorter side (push through both boards). On the back of the boards, bend fastener ends in opposite directions to secure in place.
3. Insert the other 2 brass fasteners in the *top* end of the boards on the shorter side. Place 1” from top and 1/4” from the sides of the board, making sure both are parallel (side-by-side) to one another. (Do **NOT** bend the fastener ends on the back yet!!!)
4. Next, take your rubber band and circle it around the top 2 fasteners. While keeping tension (by pulling slightly down towards the single brass fastener), push the fasteners down completely onto the rubber band (to anchor it in place).
5. On the backside of the boards, bend the ends of each fastener in opposite directions, making sure the rubber band stays securely in position.
6. Now, you should have a complete launcher!

**To Operate Launcher:**

1. Hold the launcher in the palm of your hand (long sides pointing N to S).
2. Pinch both sides of the rubber band in the middle (part lying between the top 2 fasteners), and pull back for tension.
3. Load the parachute man in the curve of your drawn rubber bands, and Aim!
4. 3-2-1 Blast off!

**Option 2:**

**Instructions for plastic corrugated board:**

Supplies:

1 6” l x 2 ½” w plastic corrugated board 2 1” brass plated fasteners

1 rubber band (1/8”-1/4” w) 1 parachute man (Can use alternate objects of choice)

Directions:

1. Hold board so that the longer sides point N to S.
2. Cut 1 hole in bottom of board on the shorter side. Place in the middle from sides and 1” from the bottom. (You may use a thumbtack or screw as a safe method for making the holes.)
3. Push 1 brass fastener through the hole and bend the ends in opposite directions (on the backside of your board).
4. Next, Cut 2 holes in top of board on the shorter side. Place 1” from top and 1/4” from the sides of the board, making sure both holes are parallel (side-by-side).
5. Push the two fasteners through the 2 holes, leaving just enough space to slide the rubber band under the fastener. (DoNOT bend ends yet!!!)
6. Circle the rubber band around both fasteners.
7. Hold on to middle of the rubber band (keeping a little tension) as you push each fastener down to anchor the rubber band in place.
8. Now, bend the ends of each fastener in opposite directions (on the backside of your board).
9. You should now have a complete launcher!

**To Operate Launcher:**

1. Hold the launcher in the palm of your hand (long sides pointing N to S).
2. Pinch both sides of the rubber band in the middle (part lying between the top 2 fasteners), and pull back for tension.
3. Load the parachute man in the curve of your drawn rubber bands, and Aim!
4. 3-2-1 Blast off!