

WORKSHOP 5

Rocket Science

ACTIVITY 1: How to Make a paper rocket?

1. THIRD LAW OF MOTION

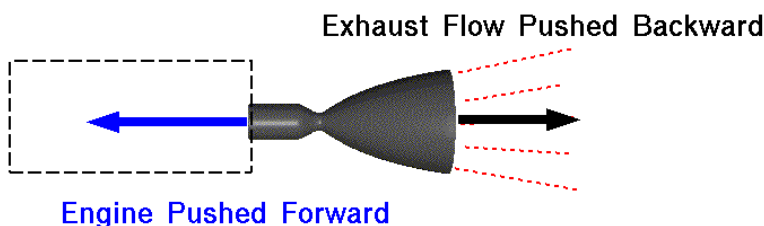
“For every action (force) in nature there is an equal and opposite reaction.”



Newton's Third Law



Rocket Engine Thrust



What is Force?

A force is an influence that can cause an object to change its velocity unless counterbalanced by other forces. Force is a push or a pull on something. Imagine when you push a swing, the harder you push, the higher it flies — that’s a force! Or you pull your dog on a leash when it tries to run to the other way. Forces can make things move, stop, or change direction. They can even change the shape of something, like when you squish a soft ball.

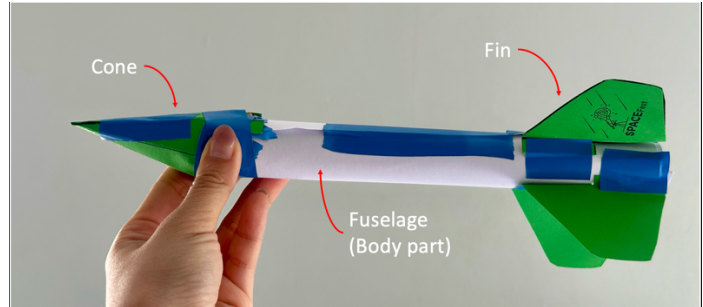
Can you think of any other examples of Force?



2. LET'S BUILD OUR PAPER ROCKETS!

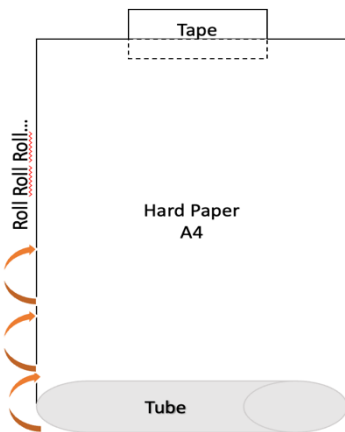
2.1. WHAT YOU WILL NEED!

- Design Papers
- A Scissor
- A Tape dispenser
- A Pipe



2.2. BUILDING STEPS!

1) THE FUSELAGE

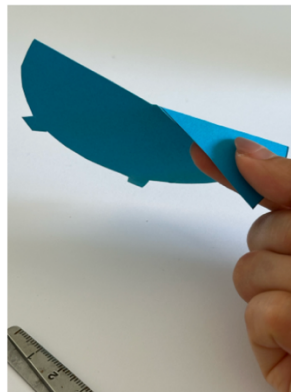
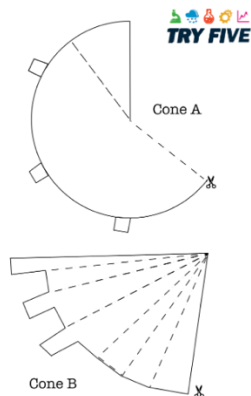


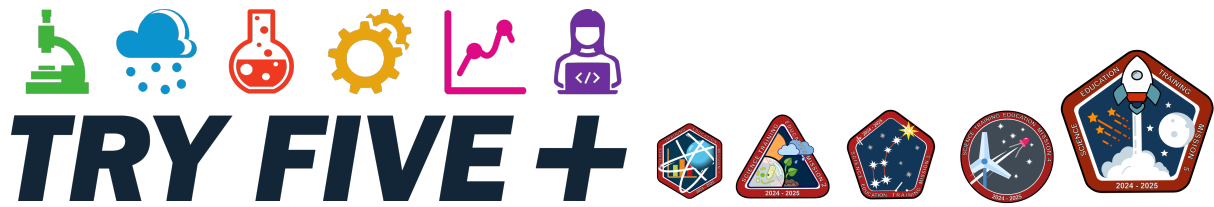
1. Put a piece of tape at the top of the A4 paper. Turn the paper back to Put the tube at the bottom.



2. Pull out the tube, around 1-2 cm to the top end of the paper cylinder. Use your thumb to press the top down. Use tapes to close it.

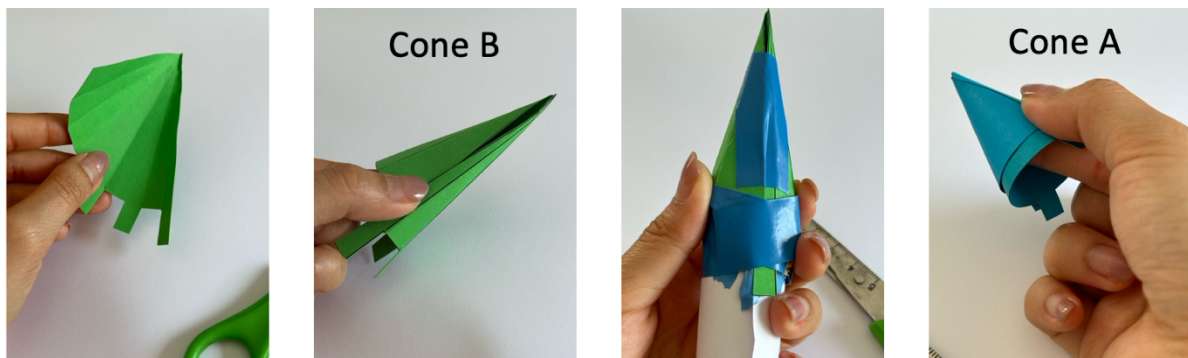
2) THE NOSE CONE





3. Choose your favorite design (A or B). Carefully cut along the outer curve. You'll get a sector (a "pizza slice" shape).

4. Fold the paper along the dashed/solid lines shown in the diagram. This line will help you form a sharp point. You can use the end of the scissor to make a curve along the line, which will help you fold it easier.



5. Roll the Sector into a Cone Shape

Bring the two straight edges together so that the paper curves into a cone shape. Overlap the edges slightly to make the tip pointy. This may take a little adjusting.

6. Attach the cone to the body

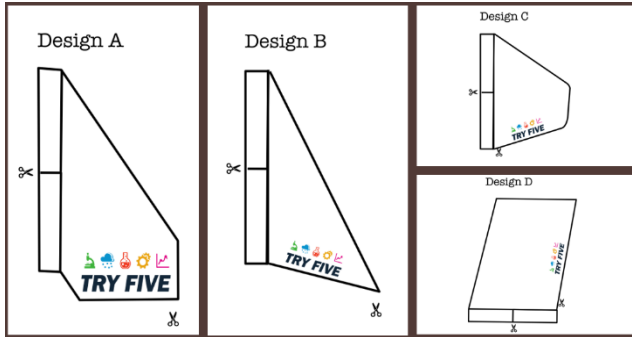
Put the cone on the top end of the body part. If the cone is too wide, roll tighter; if too narrow, loosen slightly. Once the desired shape is achieved, put tape along the overlapping edges to hold the cone in place. You might need your friend to help you hold the cone straight.

3) FINS





TRY FIVE +



7. Pick your favorite fin shape. Fold the paper twice! Then cut along the outer curve. You'll get 4 exactly the same fins.



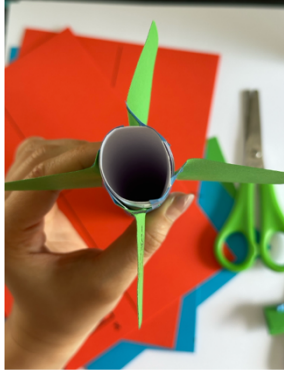
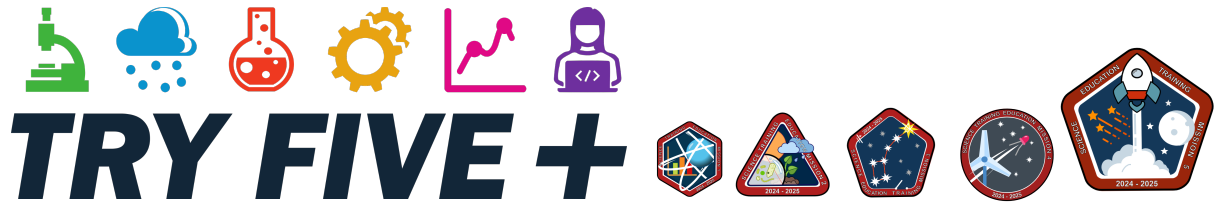
8. Hold the 4 fins together, cut along the short line but don't cut it through.

9. Fold piece 1 forward and piece 2 backward. Apply tapes on these pieces and attach the fins to the bottom of the body part.



Tip 1: It's easier to put the tapes first, then attach it to the body part.





Tips 2: Make sure the distance of the fins are even. For example, if you want 4 fins, you can put them as 12 o'clock, 3 o'clock, 6 o'clock and 9 o'clock.

Tip 3: Try your best to make the fins at the same height.

4) Now you can decorate it!

SAFETY NOTES!

1) Using Scissors

Always hold scissors by the handle, never by the blade. **Never run** with scissors. Pass scissors handle-first if you are sharing them.

2) Using Tape Dispensers

Use two hands if needed to keep it steady. Keep fingers **away from the cutting edge** — it's sharp! Ask for help if the tape is stuck or not cutting properly.

3) Paper Cuts

Be careful when handling paper — edges can be sharp! Don't slide your fingers quickly across paper or card. If you get a small cut, tell an adult straight away so it can be cleaned and covered.

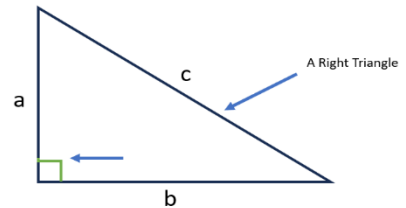


ACTIVITY 2: How high does my rocket go?

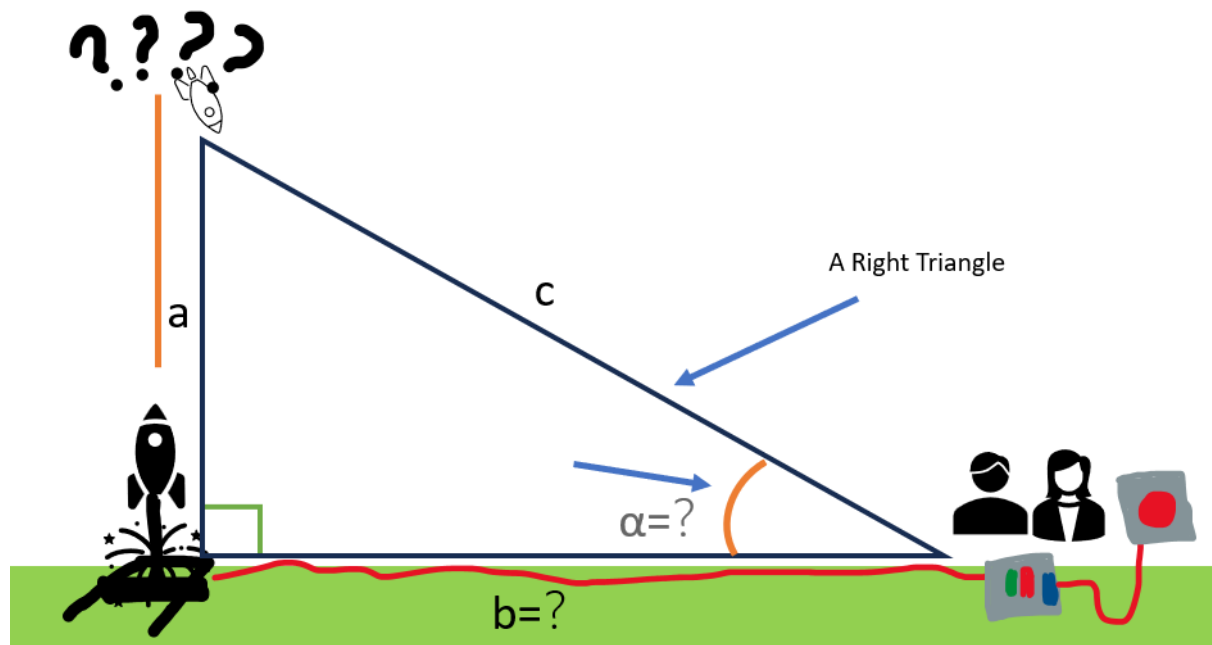
1. Pythagorean Theorem

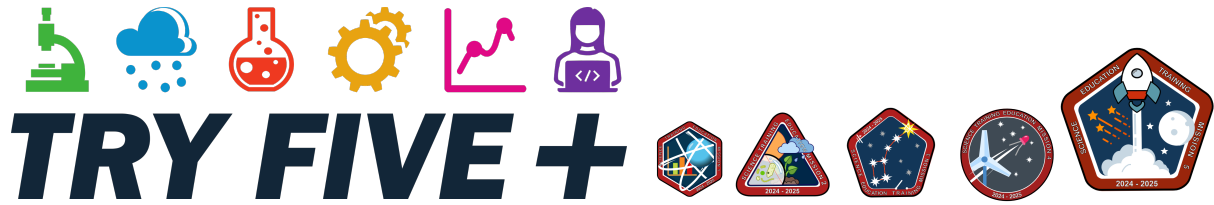
This is a right triangle. It has:

- One square corner (a right angle – 90°)
- Two short sides
- One long side across from the right angle (the hypotenuse)



If we can know the distance (side b) and the angle between side b and side c ($\angle \alpha$), we can draw the right triangle and know the height (side a).

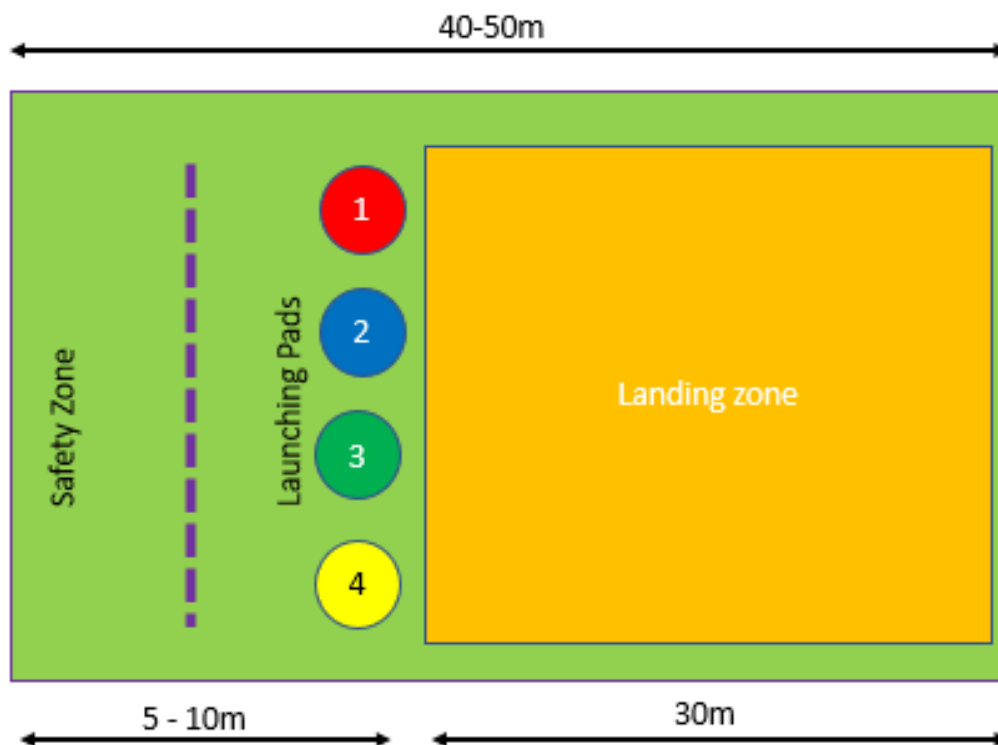


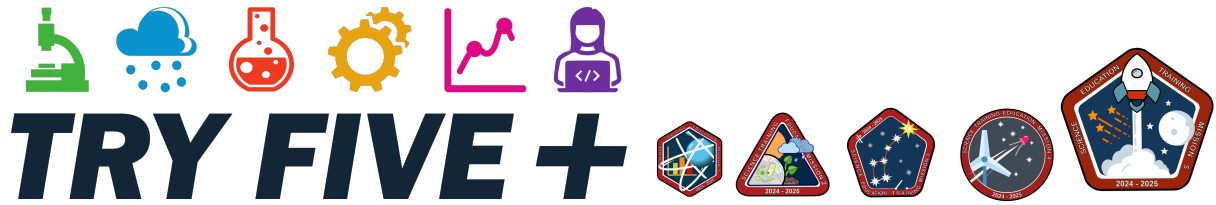


2. Measure and Record

SAFETY NOTES!

- **Launcher Failure:** Only adults should set up or launch. If it doesn't work, do not try to fix it yourself.
- **Pressurized Air:** Stand clear during pumping. Never tamper with the air system.
- **Getting hit by a Rocket:** Stand behind the safety line. No bystanders/people near the launch and landing areas. Never stand over the rocket or aim it at others.
- **Manual Handling:** Carry and load rockets carefully. Use both hands and avoid sudden movements.





Compare our results! What kinds of rocket flied highest/longest?

Rocket Code	Nose Cone	Fin	Height/Distance	Note
For example: Amy 202501	Cone B	Design B	36m	Good design
For example: Amy 202502	Cone A	Design B	20m	Cone A doesn't work as well as Cone B

You can also compare with your friends' result!

