Cub Scouts Pack 17
Rocket Assembly Instructions v.2019

Overview

The rockets are built entirely out of paper and card stock in about 2 hours for an average scout. All of the parts and tools required are supplied in the Launch Box provided to the den by Pack 17.

The rocket engines (C-3) are designed to propel the rocket from the launch stand at 300 mph to a height of about 1,200 ft. The penny adds enough weight to the top of the rocket to help with aerodynamic stability.

After a complete thrust burn, the rocket engine then produces a pressure inside the fuselage that forces the nosecone off the fuselage. This allows the rocket to become aerodynamically unstable and float back down to the ground relatively undamaged. If the nosecone fails to come off, the rocket will instead crash nose first. The string allows the nosecone, once ejected, to stay with the rocket for repositioning and possible relaunch.

Rocket Parts

Enough parts for 30-50 rockets should be present in the Launch Box provided by Pack 17

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1	Fuselage	Copy Paper (Rocket Body)
1	Nosecone	90# Card Stock (Sheet 1)
1	Nosecone Sleeve	90# Card Stock (Sheet 1)
1	Fin Sleeve	90# Card Stock (Sheet 1)
4	Fins	90# Card Stock (Sheets 1,2)
1	Nosecone cord	8" String
1	Nose Weight	Penny
1	Launch Guide	Drinking Straw
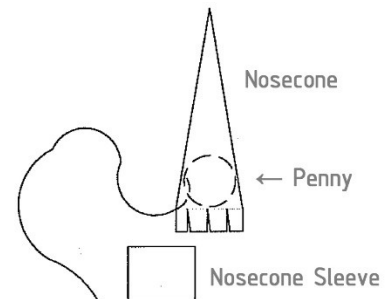
Tools

All tools needed should be present in the rocket box.
Tools are not part of the final rockets.
Tools should be returned to the box after assembly.

- Scissors.
- Hot glue gun, glue sticks and extension cord.
- Elmer's glue.
- ¾" Dowel, 12" or longer, smooth.
- Paper clips, rubber bands and tape.
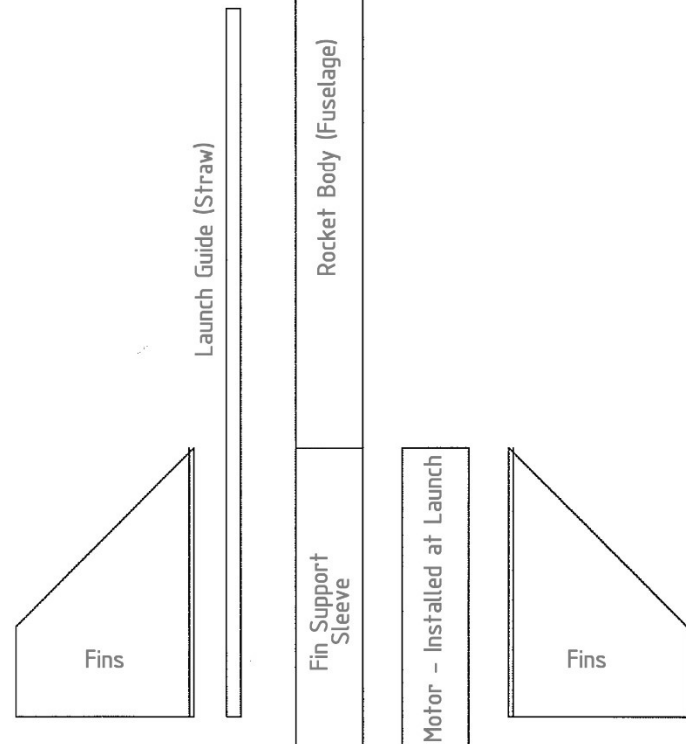
Instructions

Step 1: Gather

1) Gather all the required paper components. This includes 3 printed sheets.
2) Sheet 1 is card stock and contains the nosecone, fin support and 2 fins
3) Sheet 2 is ½ sheet of card stock and contains 2 more fins
4) Rocket Body is printed paper and will form the fuselage of the rocket

Step 2: Color

1) Color all the parts of the rocket you wish to color.
2) Do not color where the region is greyed out. You can color, but it won't show when assembled.
3) Try not to color over the fold and cut lines to the point that they are no longer visible
4) The Rocket Body sheet has only one small area to be colored. This will be the upper body of the rocket. The sheet indicates the direction that will be up in case that is important to the design.

Step 3: Cut

1) Cut out all the parts of the rocket from Sheet 1 and Sheet 2.
2) DO NOT CUT ANYTHING FROM THE ROCKET BODY SHEET (copy paper)!
3) You should now have 7 parts made from card stock and the rocket body.

Step 4: Fuselage

1) Using the provided ¾" dowel, roll the Rocket Body paper lengthwise to form an 11" long tube. The printed and colored portion will be on the outside of the roll.
2) As you begin the first roll, apply a tiny amount of glue to the corners of the edge where it is labeled "Small amount of glue here". This will help prevent the inside corners from curling in when the motor is inserted.
3) Continue rolling until you come to the end. Ensure the paper is rolled tightly. If the paper is too loose then the rocket motor will not stay in the body and the rocket can explode on the launch pad. If it wrapped too tightly you won't get it off the dowel, so make it tight but don't go crazy.
4) Glue the long edge. Be sparing in the amount of glue as too much will take a long time to dry. If it is too wet to hold together, you can use the rubber bands to hold it until it dries or even tape. However, do not tape in the "Glue Fin Support Sleeve Here" section.

Step 5: Fin Support Sleeve

1) Take the Fin Sleeve and wrap it around the bottom marked area of the fuselage to form a stiffened jacket around the bottom of the fuselage.
2) Glue to the fuselage and also to itself.
3) Use rubber bands if required to hold it in place
4) Remove the fuselage from the dowel.
5) Put the fuselage aside for later assembly.

Step 6: Fins

1) Take each of the 4 Fin parts and fold in half along the dotted line to create a triangular shape with the decorations on the outside.
2) Fold the patterned edges toward the decorations to create a surface for attachment to the Fin Sleeve.
3) After the folds are completed, glue the inside face of each fin to create a rigid piece.
4) Make sure the outside edges are tightly glued since this will affect the aerodynamics. The areas can be held together using paper clips while they dry.
5) The piece should look like the diagram below. Put aside for later assembly.
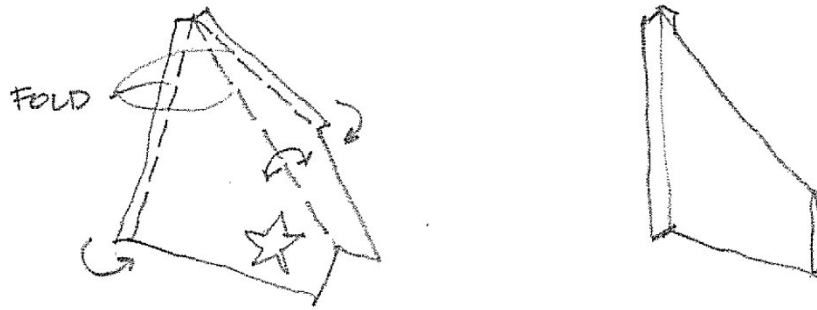
Step 7: Nosecone Sleeve
1) Take the <u>Nosecone Sleeve</u> and wrap it around the top of the fuselage and glue it to itself.
2) Take care **NOT** to glue it to the fuselage.
3) This part must be free to slide up and down the outside of the fuselage. If it is too tight then the nosecone will not come off. Too loose is better than too tight if you can't get it just right.
4) Do **NOT** use tape to hold it together. If you need to hold it, use a rubber band while the glue dries.

Step 7: Nosecone
1) This is the most difficult assembly because of the stiffness of the paper.
2) Take the <u>Nosecone</u> and using your fingers, curl and shape the paper into a cone with the tabs at the base of the cone (see diagram).
3) Once the rough form has been achieved, **dry fit** the cone to the <u>Nosecone Sleeve</u> with the tabs over the **outside** of the sleeve.
4) Glue the paper on the completed cone form to itself and hold until the glue has dried. You can use a little tape or rubber bands to hold it together if required.
5) Make sure that the cone will still fit over the sleeve.
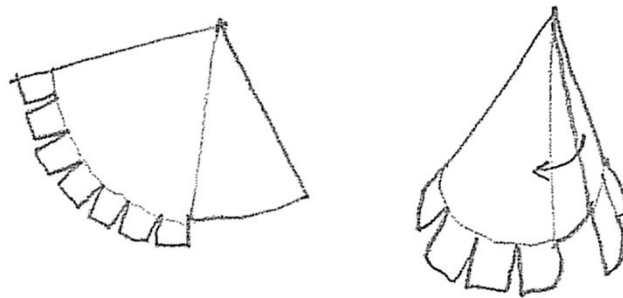
Step 8: Nosecone/Nosecone Sleeve Assembly
1) Take the Nosecone and glue the tabs over the outside of the Nosecone Sleeve ensuring it is in line with the rocket body or the rocket will not fly straight.
2) You can use tape or rubber bands to hold the tabs to the nosecone sleeve if required, but be sure not to get glue or tape on the rocket body.
3) After the glue has dried, use the glue gun to attach the penny to one end of the string.
4) Once that has cooled, carefully drop some hot glue down into the inside nosecone but be sure not to get any one the inside of the nosecone sleeve or the nosecone will not slide on the rocket body.
5) Immediately drop the penny attached to the string into the nosecone and make sure it is firmly in place. Don't press too hard or you will break the nosecone.

Step 9: Fuselage/Nosecone Connection

1) Check to make sure the Nosecone Sleeve Assembly will slide up and down the fuselage.
2) Take the loose end of the string and drape to the inside face of the fuselage about an inch down and glue in place.
3) Be careful not to glue the outside of the fuselage or the nosecone will not fit again.

Step 10: Fin Attachment

1) Take each of the 4 fins and apply a film of glue to the attachment edges and attach to the <u>Fin Support Sleeve</u> at 90º to each other around the sleeve and as vertical as possible.
2) The Fin Support Sleeve has indicator marks to help show where to attach the fins.
3) As each fin is being attached, be sure to check that they are straight as an angled attachment will result in an unpredictable flight.

Step 11: Launch Guide

1) Attach the drinking straw to the Fuselage running as vertically as possible using hot glue.
2) If the drinking straw is the bendy type, then cut the bendy portion off and use the remaining straight edge.
3) When positioned on the launcher, this straw fits over the guide rod and starts the rocket in a controlled vertical movement coming off the launch stand.

Step 12: Smile.

1) You're all done.
2) Don't lose it before the launch!