



Balloon Explorium

Tissue Paper Hot Air Balloon

This activity was written by Timothy Storey, a teacher at MICDS, who developed and uses these directions at the PEGASUS summer camp program for 4th through 6th graders.

Materials:

- 12 sheets 20" x 30" art tissue paper
- 5' length of butcher paper to make pattern
- glue stick
- 1' string
- about 30" of #16 bailing wire
- scissors
- 6 straight pins
- wire cutters
- cellophane tape

Estimated time for assembly: less than 4 hours

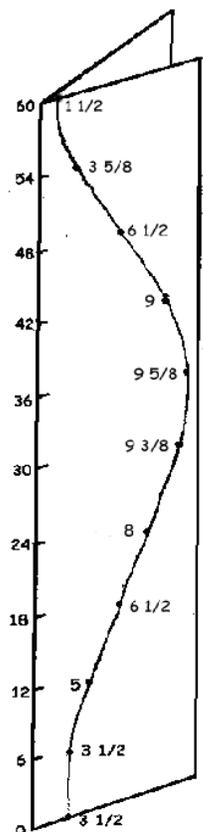
Targeted grade level: Grades 4 through 12 (ages 9 to adult)

Supervision: Older students can make the balloon on their own, but an adult should always be present at the launch.

Create the pattern:

1. Fold a 5' piece of butcher paper lengthwise.
2. Mark the fold at every six inches.
3. With the fold to your left, start at the very bottom (0 inches) make a mark $3\frac{1}{2}$ " from the fold. At 6" from the bottom, make a mark $3\frac{1}{2}$ " from the fold. At 12" from the bottom, make a mark 5" from the fold. Continue in this manner till all marks are made.
4. Use a smooth curved line to connect the marks.
5. With the pattern still folded, cut along the curved line.
6. Unfold pattern and set aside.

NOTE: If you want to save time gluing, you can alter the pattern and cut only straight lines instead of a curve. Leave a vertical section at the top and bottom about 4 inches each before drawing straight lines to the edge of the pattern. The widest part of the panel should be at about 40 inches from the base. This method will shorten the time required to assemble the balloon by about an hour.





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Create panels:

1. Take two sheets of tissue paper and carefully glue them short end to short end with a half-inch overlap. You now have a sheet approximately 20" wide by 60" long. (Fig. 1)
2. Do this five more times to create a total of six long pieces.

Gluing tip: You need to create a tight seal while using as little glue as possible. You don't want anything gluing together that shouldn't be glued. Also, less glue means a lighter balloon, and lighter balloons fly higher.

3. Neatly stack all six sheets directly on top of each other. Line up one end and the sides. Don't worry about the other end. It will be uneven, but that's okay. (Fig. 2)
4. Lay the unfolded pattern on top of the stack with the bottom (wider end) of the pattern at the even end. Now use two pins at the bottom, one on each side half way up, and two at the top to pin the pattern to all six sheets. This is done in the way a seamstress might pin down a pattern. Be careful to keep the bottom and sides lined up. (Fig. 3)
5. Now cut all six sheets at the same time around the pattern. Cut right next to the pattern but not into it. (Fig.4)
6. Unpin the pattern and save it for another balloon. Leave the panels piled together.



Figure 1



Figure 2



Figure 3

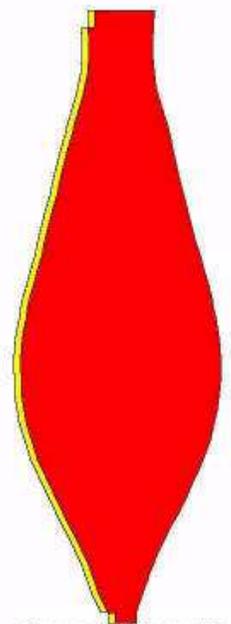


Figure 4

Glue panels together:

1. Take panel one off the top of the pile and lay it by itself.
2. Take panel two and lay it on top of panel one. Line up the bottoms, but slide panel two so 1/2" of panel one is showing all the way along one side.
3. Put glue along the edge of panel two where the 1/2" of panel one is showing. Tearing every three or four inches, fold the 1/2" of panel one onto the glue of panel two. Glue the bottom and top first, then the rest of the side. This will help to keep things lined up while you glue the rest. This is called a French seam. (Fig. 5 & 6)
4. Take panel three off of the pile and place it on top of panel two. Line up the bottoms and slide panel three so 1/2" of the unglued side of panel two is showing. This is like step 2. Now glue panel two to panel three the same way you glued panel one to two. (Fig. 7)
5. Repeat this process until all six panels are glued together. Be patient and take a break when you need one. This part takes the longest time.

Do not try to open the balloon until the directions tell you.



Tear and fold over the top and bottom first.



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6. Now turn the whole thing over. Gently lift what is now the top panel and you should see two seams (four panels) and then the bottom panel. Fold the middle panels in so that the bottom panel can be glued to the top panel making a French seam as you did in step 3. (Fig. 8 & 9)
7. Now put your hands inside through the bottom and gently work the balloon open. Tie the top 2" of the balloon closed with the string. Create a loop in the string for hanging the balloon. (Fig. 10)



Figure 5



Figure 6



Figure 7



Figure 8



Figure 9



Figure 10



Figure 11

Bottom ring:

1. Hang the balloon to make the bottom easy to work with.
2. Make a hoop of the bailing wire and size it to the bottom of the balloon. Putting it inside the bottom and expanding it till it fits works best. (Fig.11)
3. Cut off any extra wire with wire cutters but leave a 1 1/2" overlap. Wrap tape around the overlap to hold the ring's shape.
4. Put the balloon inside the ring one-inch from the bottom. Fold the bottom of the balloon up over the ring making a one-inch seam. Use three very small pieces of tape to hold the seam closed and use glue to completely close the seam.
5. Check the balloon for unglued seams and holes. Holes can be patched with a scrap of tissue paper and the glue stick. Open seams simply need to be glued shut.



YOUR BALLOON IS NOW READY TO FLY!



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Launching Your Balloon

Launching equipment:

- Weber type barbecue grill
 - broom handle with a nail in the end
 - Heavy duty or oven gloves
 - 6" x 24" stovepipe
 - 6" to 8" flange
 - 8" x 24" stovepipe
 - 8" to 10" flange
-

Launching the balloon:

Launching needs to be performed by an adult for safety!

Hot grills are always dangerous! Use caution!

1. Pick a calm day and a clear area for launching.
2. Connect the four pieces of stovepipe in the order listed above to form a chimney. (Fig. 13)
3. Light a small to medium pile of charcoal in the Weber. Put the grill in place, and put the chimney on top of the grill. Cover the open area of the grill (between the chimney and the edge) with aluminum foil. We want all of the hot air to be directed up through the chimney.
4. Make sure no flame or sparks are coming out of the chimney. If the fire seems too hot, slightly close the air intakes on the bottom of the Weber. If the balloon scorches, the fire is too hot.
5. Use the nail in the broom handle to lift the balloon by the string loop and lower the balloon over the chimney.
6. Wearing the gloves, hold the ring until the balloon inflates and you feel the balloon pulling up. Let go and watch your balloon sail into the sky. As the air inside cools it will gently float back to earth.



Figure 12



Figure 13



Figure 14



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Other ideas:

There are an endless number of patterns you can make, considering the variety of tissue colors available. I have never seen an ugly balloon.

If you don't have enough clear area or are afraid of losing your balloon to a balloon-eating tree, tie very light fishing line and reel to the ring. When it starts to get into danger just reel it back in.

Though I haven't tried it, I think a chimney could be formed by wiring together about six large coffee cans (with the bottoms and tops removed, of course).

Elmer's glue can be substituted for the glue sticks, but it becomes much easier to glue things together that aren't supposed to be. Very little glue must be used and drying time allowed between steps.

A Propane tank connected to a large burner (sometimes called fish fryers) can replace the Weber. Other kinds of grills, including propane, would probably also work.

Children like to catch the balloon on their heads. This is perfectly safe and fun!

HAPPY FLYING!