

Pop-up Paper House

Introduction

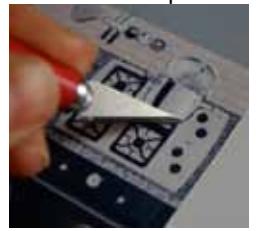
One day, as I was playing with paper with my then 6 year old son, he asked me to build him a house. I immediately thought of the origamic architecture cards by Masahiro Chatani. From a single sheet of paper Chatani could make staircases and buildings pop up then fold back to nothing. The idea of a house which could be closed flat and slipped into a bookshelf for storage was very appealing -- dust covered clutter accumulates like flotsam in my kids' room.

My first version, like Chatani's cards, was made of a single sheet of paper, but I realized that to be a useful toy the pop-ups needed reinforcement. I designed a second version using two interlocking pop-up cards for each room, and, hoping for mass production, I filled the house with 100% IKEA furnishings and decorations. I thought they would love a foldable paper house both as a toy and a marketing tool, but the only response I got was an unsigned form letter of rejection.

By then I had realized that half the fun was to make the house, so this final version was laid out with instructions so anybody could build it with a few simple tools and materials. It also costs less than a prefabricated house. Freed from the constraints of IKEA design I could now fill the rooms with artwork by my relatives: Alexi Worth is my brother in law, Mark Rothko was my great uncle, but there are also pieces by my children, some of my own pop-ups, and a sculpture by my great grandfather Meyer Sachar, an upholsterer by trade.

Tools and Materials

1. A scalpel knife (also known by the brand name Xacto knife)
2. A self-healing cutting mat from any art supply or drafting store is very useful to have, but a sheet of cardboard can work in a pinch. Just make sure to flip it around and replace it often so your blade does not get caught in any ruts as you are making your cuts.
3. A scoring tool has a blunt tip which will crush paper without cutting it. The ideal scoring tool is a ball point pen which no longer works. Unfortunately those pens have a nasty tendency to start working just when you don't want them to, so the moderately sharp edge of a plastic ruler, a knitting needle or a stylus pen (like those used for DS video game players), will do the job. Art supply stores also sell scoring tools made of bone.
4. A straight ruler is necessary for scoring. The lines must be perfectly straight and parallel so they should not be hand drawn.
5. Glue. For the prototype in these pictures I used a combination of rubber cement and white glue. Rubber cement is good because it is easier to glue paper flat without creating bumps and wrinkles, and it will allow minor adjustments. However, it is not quite as strong as white glue, so in a few key spots, whenever you are gluing small tabs for example, it is best to use white glue. Glue sticks will join paper flat but the bond is generally not strong or durable enough.
6. Self-adhesive mylar or plain aluminum foil will give a nice effect to the mirrors in the bathroom and kids' room.
7. One 2' by 3' sheet of 3/16" foam core (standard). This is the material used by framers for mounting artwork or by architects for making models. It is lightweight but rigid and beautifully flat. It is easy to find in any art supply store.



A scalpel is necessary for cutting fine detail

Pop-up Paper House
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All other photos by Katherine Belsey

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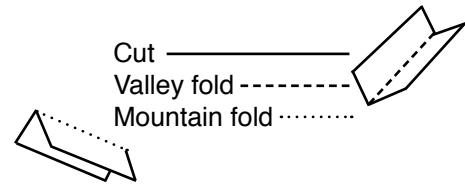
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General Instructions

Each room has a main pop-up card and a support pop-up card. Next to the full sized template you will find a small version of the pop-up with guides for cutting and folding. Cut along the straight lines and fold along the dotted lines and dashes.



Step 1: cut

Start by making the support because it is easier.

Cut the room and support with a sharp scalpel knife.

The straight red lines on the small figure on the right of your template will show you where to make your cuts. Do NOT cut where you see red dots or dashes.



Cut and fold lines are sometimes drawn on the full-sized templates if the marks will be invisible on the final pop-up card.

Some details in these photos might be slightly different than the images on the template.

Step 2: score

Use a ruler with your scoring tool to draw straight lines along your picture wherever you see either the dashed or dotted lines on the guide. Press down firmly enough to crush the paper, but be careful to avoid piercing it. Work on a surface which is absolutely smooth but has a little give: a large paperback book or magazine works perfectly. The board used for cutting will be too bumpy.



Step 3: fold

Generally the easiest way to fold these pop-ups is to work with the image facing you, to slip your fingers behind the elements which will pop up, and gently nudge them forward as you push the wall down. Once all the scored lines have been half folded in this manner, you can slowly ease the wall all the way down against the floor and press down on all the creases. The folded card should be flat and smooth. The pop-up should now open and close easily.

Step 4: glue

After you have cut and folded both support and room pop-ups you must glue them together.

Apply glue sparingly to the back side of the wall of the main card. Working on a flat surface, push the unglued floor against the floor support so the card and its support are perfectly aligned along the fold where floor meets wall. Precision is very important; the two cards must be pressed together without any gap at the crease or the pieces will not fit together properly. After the cards have been properly positioned, pinch the glued wall to its support near the crease to keep it in place, then flip it over and press the glued wall down on your flat surface.



Apply glue sparingly to the floor. Position the card by pressing lightly in one or two spots, then fold the card in two and smooth it down when it is closed. Unless otherwise specified, there is no need to glue the surfaces under the furniture which touch the support.



This is a little too much glue

Building the House Structure

Step 1: download the pattern

The easiest way to build the house structure is to download the full-sized pattern and print it on tabloid sized paper. If you do not have access to a large format printer, you can download the pattern formatted on standard letter-sized paper, but you will need to cut and paste the different parts together before cutting your foam core.

Step 2: glue pattern to foam core

Glue sides A of both walls and all the floor pieces to your 3' by 2' sheet of 3/16" foam core. The best type of glue is a spray, but any reasonably strong glue will work. If you use white glue, make sure you use it sparingly. ***Do NOT glue side B of walls to the foam core at this time.***

Step 3: cut the house structure

Using a sharp scalpel knife and a metal ruler, cut along the edges and remove all the cut-outs.

Step 4: glue side B

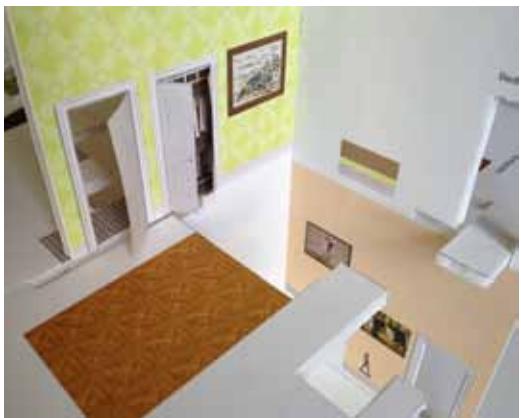
Cut out patterns of sides B and then glue them to the back of your pre-cut pieces of foam core.



Assembling the house

Step 1: walls

Slip the two walls together at a 90° angle exactly as shown in the photographs. Make sure the blue wall upstairs is facing the blue wall downstairs.



Step 2: top floor

Floor #1 and #2 slide into the slits on wall #1 and their tabs push through the doors and slot of wall #2.



Do not glue the pop-ups to the top floor

Step 3: Glue the rooms to the house structure

Upstairs rooms pop-up cards should only be glued to the walls, do NOT glue them to the floor or you will not be able to pull the house apart for flat storage.

Start with the upstairs hall, and glue it to the wall so the hole in the house structure matches the one on the card.

Downstairs room pop-up cards should be glued to the square foam core floors. Position the floors so the image matches the graphics on the pop-up card. Then, working on a flat surface, push the cards up against the house structure and glue the walls into place.

Step 4: Storage

To fold the house for storage, gently pull apart floor pieces #1 and #2, then carefully lift up wall #2

