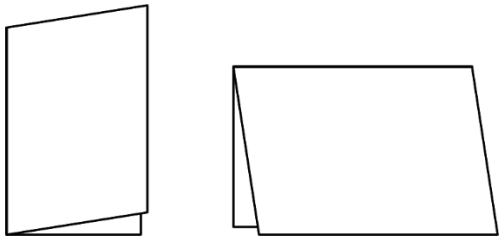
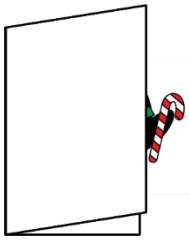
Pop-Up Cards and Sliceform Objects

Basics

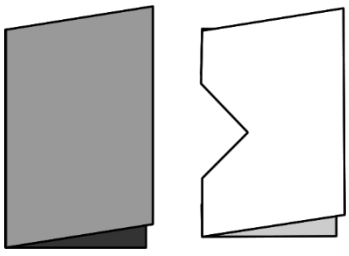
The most important element of a pop-up is the crease in the base layer. The direction of the crease determines the orientation of the pop-up. It is the engine that determines the movement itself. A graphic that does not involve a crease is a flat design.
Since a pop-up is by definition a 3D object, it must obey some basic rules of physics. It is possible to draw a design that is impossible to cut and pop up. I call these Escher designs, after the artist M. C. Escher, who drew compositions that looked real, but on closer inspection could never actually exist.
The first basic principle is orientation. A pop-up that unfolds side-to-side is built on a vertical crease. An element that unfolds bottom-to-top is built on a horizontal crease. Orientation will determine how one interacts with the card, the size and shape of the card, and how text will appear on the card.



The next basic principles are scale and position. It is desirable that the pop-up element fit within the card when it is shut. A pop-up that is too large, or mounted in the wrong position, will poke out of the card. Prototype designs typically are subject to these sorts of problems. Fortunately, they are easily corrected in a revised design.



Another decision is whether the pop-up should be cut from the card itself, or whether to use applied mounting platforms. When an element is cut from the card itself, the card must be mounted inside another layer to hide the cuts. An applied mounting support system allows use of a single-layer card.

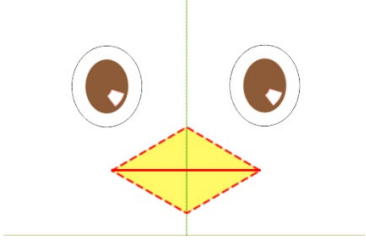


Finally, complexity will influence whether an element is cut from the card or applied to a support, and whether the design could be hand-cut or depends on use of a digital die cutter.

Types of Pop-Ups

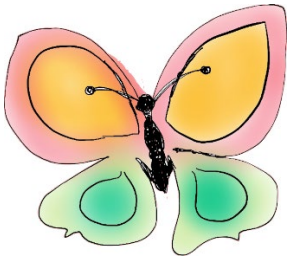
Shape cut into fold, symmetric

This is the simplest sort of pop-up. It can be produced with just a piece of cardstock and a pair of scissors. It is usually used with a vertical crease. The folds and cuts can be made first, then images can be hand drawn to make a bird or dinosaur or whatever the pop-up shape inspires in your imagination.
It can also be the foundation of a die-cut design with more elaborate graphics.



Applied shape to fold-cut

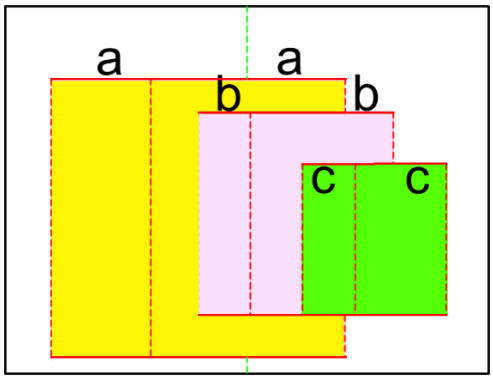
The fold cut method above can be used as the foundation of an applied pop-up element.



Make a simple cut as for the bird above, cut out a shape (like a butterfly), and attach it to the center of the pop-out (either with glue or tape on the undersides).

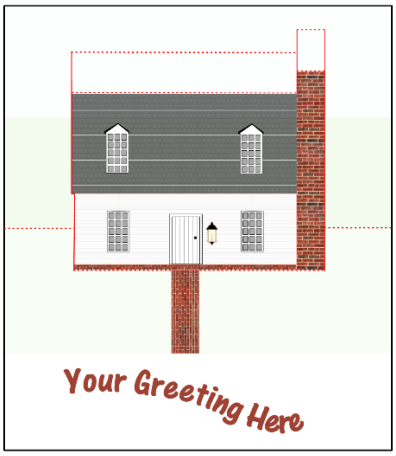
Shape cut into fold, asymmetric

This style can be cut with scissors, but gets a bit trickier. In fact, it is very easy to design a card impossible to construct! In this example the horizontal cuts with matching letters (defined by the piece of line between two folds) are equal. Also, each succeeding layer must be no lower vertically than the layer beneath it.



Complex shapes on fold

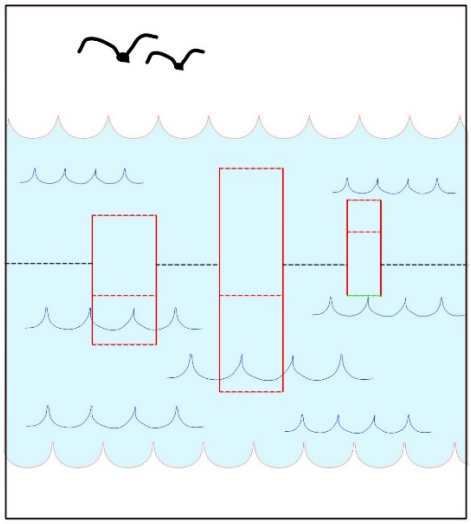
Shapes that are geometric, like houses, make good elements for a horizontally oriented card. In this example, to keep the house at a 90 degree angle to its base, the pop out is located so that the distance from the base of the house to the card crease is equal to the amount at the top of the house (roof to upper fold).



Familiar city skylines are also popular elements.

Applied shapes to supports

This is a very versatile popup design. Once you have made the basic card file with its pop-up supports, you can cut out different shapes to apply. For instance, if a student has made a set of sea life drawings, they can be scanned and made into applied elements.



Cut out figures from vacation photographs are also popular or images found on the web can be used.

Sliceform

Sliceforms were invented by mathematician Olaus Henrici. There are many websites made by people fascinated by sliceforms. One with a nice description of the origins is:

https://sliceforms.wordpress.com/2010/11/22/111/

A sliceform can be simple or very complex. Once a sliceform object is built, it can be collapsed, which makes it a good candidate for a pop up card. However, it is not a project for a beginner since the positioning can be very tricky. When beginning, limit yourself to as few elements as you can, at least until you get some experience.

The weight of the paper used for the sliceform can affect how it fits together and moves. It has been suggested that a 65-pound cardstock (lighter than usual) is a good choice. Also, glue dots rather than unmovable glue could be more forgiving when the element has to twist and pop up from the card base. Like any applied element, a sliceform must fit within the card outline. Unlike other methods, you must consider the placement on a 45 degree angle from the central crease.