

**Scope** This handout deals with techniques relevant to the creation of two dimensional projects using materials like paper, card stock, illustration board, and foamcore. While some of these materials can be used to create three dimensional structures, techniques for doing so are beyond the scope of this document.

**Tools** The most useful tools for measuring and cutting paper are described below.

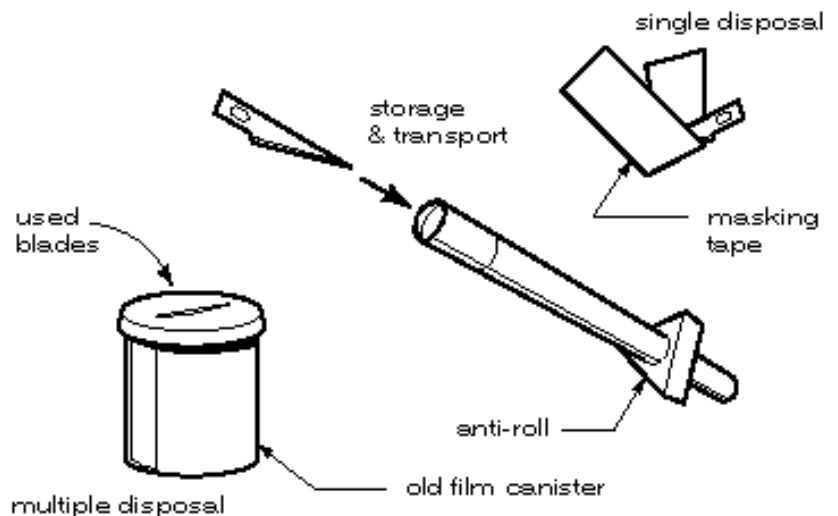
### Steel Rule

8" long is essential for working with paper. Most projects are larger than the standard 8.5" x 11" size so a 12" rule is simply too small for measuring accurately or making long cuts. In fact, because fine papers and cardstock are generally sold in sizes of at least 18" x 24" a 24" or 36" rule can be very useful. However, the longer rules are unwieldy for making short cuts so if you are only buying one, 18" is the best compromise.

Buy a rule made of steel. The blade of your knife will catch along the edge of a plastic or aluminum rule destroying the rule, ruining your work and possibly cutting you. A cork backing on the rule helps prevent it from sliding as you draw or cut.

### X-acto knife

This will be your primary cutting tool. Choose a handle that is designed for a number 11 blade. While bulkier handles offer an improved grip in some circumstances, you will most often be holding the knife as you would a pencil so opt for a slim handle. A nice trick to prevent the knife from rolling off the desk when you set it down is to cut a small piece off the rubber pencil grips designed to prevent callouses and put it on the end of the knife handle.



### **Utility knife**

This is a larger knife than a number 11 x-acto. It is very useful for cutting through thicker cardstock. It is best to buy the kind that has a blade which is scored so that the tip may be snapped off as it dulls. Again, be responsible in disposing of these blade pieces.

Although I prefer an x-acto for fine work, many people use a smaller utility knife, such as the one made by Olfa as their primary paper cutting tool.

### **Scissor**

Scissors do not allow for very precise cuts. For this reason they are only useful in the context of paper construction for cutting something roughly to size. Their main advantage is that you can make cuts without a cutting surface.

### **Cutting Mat**

The best surface for cutting is a self-healing mat. These have a slightly matte surface to prevent paper from sliding as you cut. The plastic from which they are made does not dull blades and the self-healing feature means that the mat can be used for years before the marks from old cuts begin to degrade the surface. Translucent mats can be used in conjunction with a light table which can be quite handy. The only downside of these mats is that they are quite expensive.

A cheaper alternative is cardboard. The principal disadvantages of using cardboard are that one, it dulls your blades, and two, the marks from previous cuts can catch and deflect your knife. Corrugated cardboard should only be used as a last resort because the “grain” of the middle layer interferes with your cuts. If you must use corrugated, be sure to align your cuts perpendicular to or across the “grain.”

### **Light Table**

A light table can be very helpful for working with paper because it allows you to follow a pattern without having to transfer that pattern to the piece you are cutting. When a light table is not available, a piece of white paper underneath your work can sometimes reflect enough light to allow you to see the edges of your pattern.

## **Adhesives**

While paper can be joined by mechanical means, the production of flat work generally involves the use of adhesives. The use and properties of some most common adhesives and tapes are presented here.

### **White Glue**

Aliphatic resin glues, created for bonding wood, also bond paper for obvious reasons. This glue is non-toxic, permanent and strong. However, in the production of paper art, neither strength nor longevity are generally the primary considerations. Therefore, the disadvantages of white glue, namely messiness, long drying time, and brittleness mean that it is seldom the best choice.

### **Rubber Cement**

This type of glue, particularly in the spray form discussed below, is the adhesive of choice for paper art. It is quick drying, reasonably non-toxic, easy to remove once dry and, depending on how it is used, it can be repositionable/temporary or semi-permanent.

The different levels of adhesion are achieved as follows. For the repositionable/temporary use, paint rubber cement only on one of the pieces to be joined. You can then place it down.

cement is dry, the piece can't be repositioned, but it can easily be peeled up without damage. This bond is not very permanent, and after a week or so it may fall apart.

If you want a more permanent bond you can carefully mark the position of the piece and then peel it off the base piece. Using a rubber cement pickup, an eraser, or your finger rub off any cement fragments that are stuck to the base piece and then apply a coat of rubber cement to the base piece. Spread the glue slightly beyond the border of area to be covered. This assures that the edges of the smaller piece will be completely glued down. Later, you can remove the excess cement using a rubber cement pickup.

Touch up the coating of rubber cement on the other piece and let both dry completely. Once the glue is dry carefully place the first piece down on the base piece. As soon as the two surfaces touch they will bond and cannot be repositioned. This bond is much more permanent than the single sided bond and can last for years. Be sure to keep your work out of direct sunlight because even a short exposure to the sun will destroy rubber cement.

Even if kept in a tightly sealed can, rubber cement will degrade with time. Up to a point old cement can be rescued by adding Bestine (xylene).

### **Spray Adhesive**

Spray adhesive is essentially rubber cement in spray form. Obviously the spray delivery makes it much easier to cover large areas and conversely harder to cover small ones. However, most spray adhesives come with two spray heads, one for large coverage and one for contained; read the can and use the appropriate head for the job you are doing.

Because the adhesive is atomized, even with careful use it can cover a larger area than you intend. It is best to use the adhesive under a fume hood or in a spray booth. When these are not available provide for adequate ventilation and take care that things you do not wish to be covered with glue are either removed or protected. Soft things such as sweaters become particularly nasty and difficult to clean after receiving a misting of spray glue. In a studio situation it is imperative to get the permission of close neighbors before you spray.

A simple technique for creating a continuously clean zone for applying adhesive is to set the pieces to be coated on an open newspaper. After each spray session simply turn the page to expose a fresh, clean surface.

Finally, a number of spray adhesive products are available, each with different adhesive characteristics. While the description on the cans is generally accurate, keep in mind that a very light misting of a strong adhesive will provide a weak bond, while a heavy coating of a weak adhesive will just create a mess.

### **Tape**

Tapes come in single and double sided types. Single-sided tapes are not that useful for flat paper art because they are visible, though matte tapes like Scotch Magic Tape tend to disappear visually. Double-sided tapes, however, are great.

Double-sided tapes come in different widths and a combinations of adhesive strengths. Because these tapes are expensive, unless you have a specific situation in mind, I would recommend as a compromise buying a 1" wide permanent-removable tape. This allows you to reposition things and yet the removable adhesive sticks quite well if undisturbed.

The basic rule of thumb for deciding between tape or spray mount is spray for large areas, tape for small things. The best way to use tape on small to medium-sized pieces is to put the tape on the back of the piece before you cut to its final size. Once the piece is cut down the tape will go all the way to the edges.

**Forming** In this context, forming basically consists of cutting. Topics like folding, scoring, or weaving paper are beyond the scope of this discussion, though they may be touched upon in a later handout.

### Tearing

Before discussing cutting, I should note that sometimes it is simpler just to tear paper to the shape you desire. Clean, neat rips can be achieved in two ways. The first is to fold the paper several times back and forth and then tear along the fold. Wetting the crease often makes the separation cleaner. In fact, some papers like rice paper are best divided by using a brush dipped in water to make a line and then pulling the paper apart along the line. The resulting frayed edge can be more in keeping with the aesthetic of the paper than a knife cut.

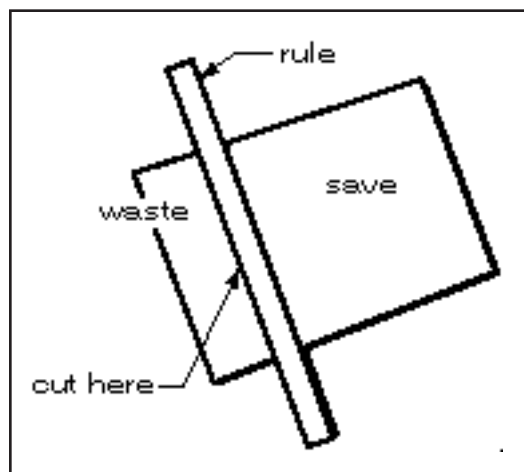
The second way to rip paper is to place the sheet on a hard surface and press a straight edge along the line of the desired separation. If you are using your steel rule, place it cork side up. Grab the edge of the paper furthest away and pull it smoothly up, towards you and against the straight edge at the same time. The higher quality the paper, the nicer the resulting edge will be. Again, while never as clean as a knife cut, the frayed edge is sometimes a more appropriate treatment.

### Cutting

Before making any cuts you need room to work. This means clearing a large enough area on your desk so you can move the paper freely and re-position the rule anyway you wish. Continually having to stop and move things so that you can place the rule down gets annoying very quickly. Take the time to make space before you begin.

The next thing to be concerned with is your body position. Although it may seem that because cutting paper is such a trivial activity body position is unimportant, in fact, it can matter a great deal. If you are unbalanced you cannot easily control the force you apply to the knife. You will also often need to make minute adjustments of the rule before you make a cut and this is very difficult to do if your weight is too far forward. Finally, as design projects have a way of continuing into the wee hours of the night, it pays off in reduced fatigue and frustration to keep yourself as relaxed and comfortable as possible.

Before making your cut set up your cut such that the rule is covering the edge of the



piece you wish to retain and the knife will be moving along the edge of the piece that is intended to be waste. Doing this means that if the knife blade wanders it will move into the material you don't need and not harm the part that matters. You can then simply make another pass with the knife to clean up the edge of the good piece.

Before making each cut you must check that the hand holding the rule is not in the path of the blade. This sounds incredibly obvious, but I don't know a single designer that hasn't cut himself at least once with an x-acto knife.

While seldom fatal, these cuts negatively impact your mood, your schedule, and can drip blood on your hours of hard work. Check your hand position before every cut. No matter what kind of hurry you are in, never make a knife pass that could potential cut you, even if you have to re-position the

entire project to get your hand out of the way.

The final trick to cutting is a firm, but light touch. This applies to both the hand holding the rule and the knife. If you find yourself pressing hard with either hand you need to reposition yourself or take a break. The x-acto blades are very sharp and when new will easily cut through one or two plies of paper. The key to cutting through thicker stock is not to press harder, but to make multiple light passes.

## Production

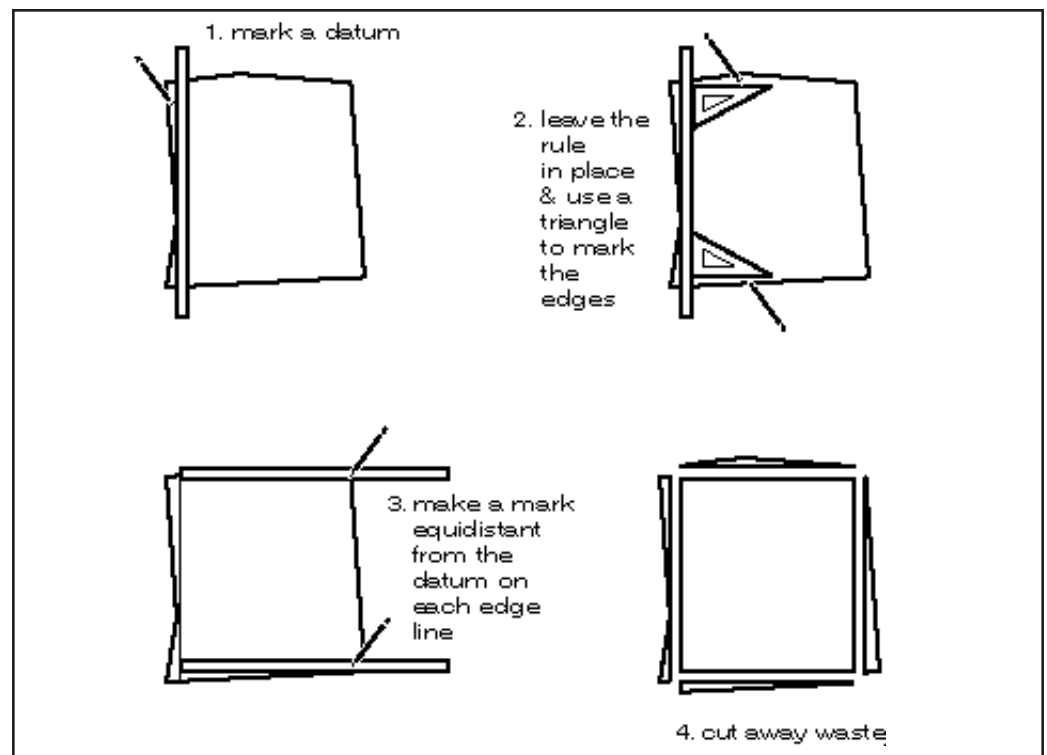
Although generally inexpensive and easily worked, paper should be treated with the same respect as any other building material. This means learning to conserve it, trying to understand how it behaves in different situations, and developing techniques that lead to success rather than frustration. The following mixed collection of tips can help you begin that process.

### Measure Twice, Cut Once

This aphorism applies across the board to any work you do in any material. Check your measurements at least twice before proceeding with any irrevocable process. This may sound tedious, but in the end it will save you time and tears.

### Squaring Up

Even when your final result is not intended to be rectilinear, it is important to begin construction with materials that are square. In this context square means a piece with  $90^\circ$  between each edge. When you buy paper materials they will generally be as close to square as you will need. So the first technique for squaring up is to cut your materials so that they stay square. This will be discussed in more detail below. However, you often find yourself starting with an oddball leftover piece. The diagram below demonstrates how to square up such a piece. The key is to establish a reference datum and to make all subsequent measurements and cuts relative to that datum.

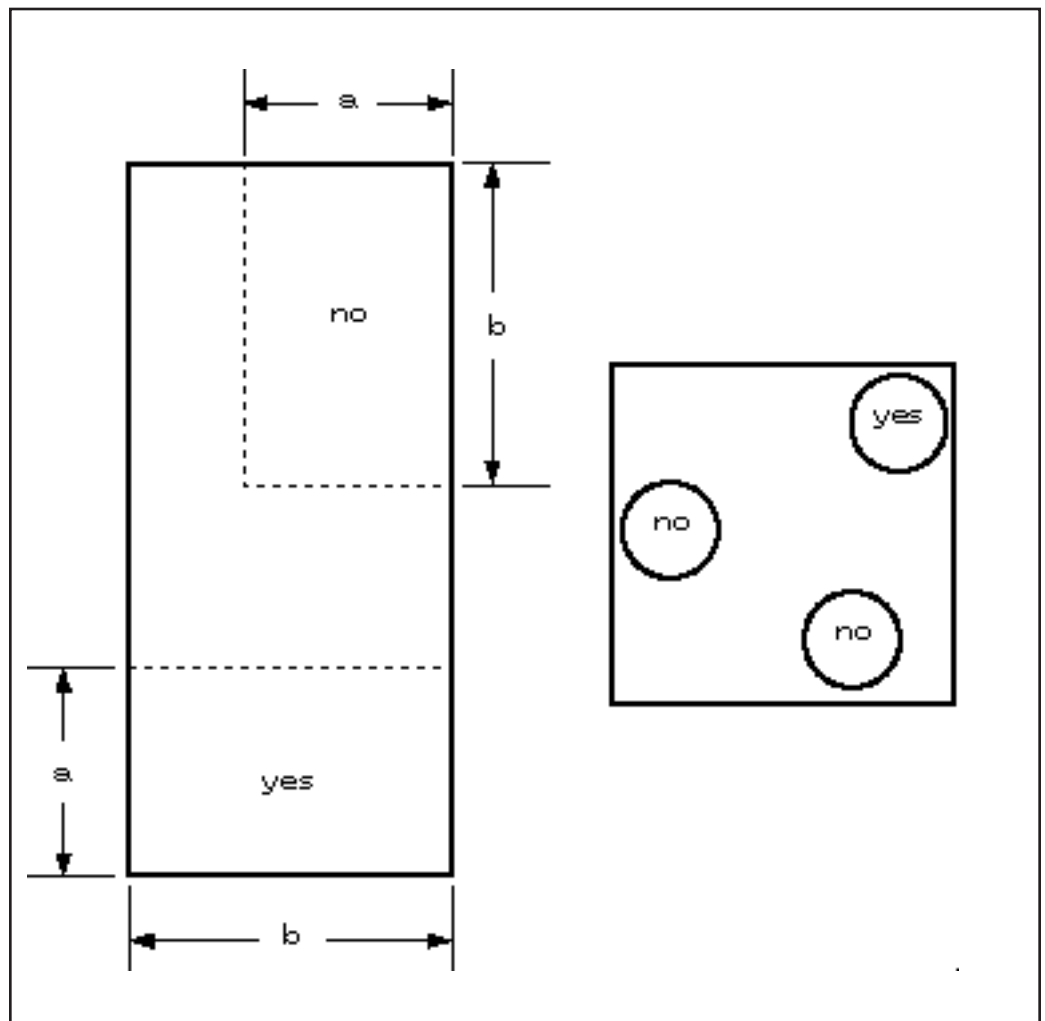


### Material Conservation

Making efficient use of materials indirectly benefits society and directly benefits you. At the same time, it is impossible to build anything without generating a certain amount of waste. Therefore, you needn't feel guilty about throwing material away at the end of a project, but you should be concerned about wasting material. There are two major ways to reduce waste.

The first is to recognize that materials come in standard sizes. Learn what those sizes are and, whenever possible, dimension your work to be even multiples of those sizes. Obviously, you do not want to compromise your design to fit a standard size, but then again, if you are going to specify an dimension that will result in a great deal of material waste, you should have a good reason for so doing. We will revisit the issue of standard sizes in this class and during your career as a designer you will run into it over and over again. You might as well get comfortable with it now.

The second path to good material use is to cut your materials so as to maximize the utility of the cutoffs. In the context of paper that means making cuts so that the leftover piece is as large and square as possible. A good rule of thumb to help you determine the best way to cut something is that if you can cut a piece to size in several different ways, the way that involves the least number of cuts will generally result in the most efficient use of materials. Also, remove material from corners rather than in the middle of edges. The diagram below demonstrates a few obvious examples. The key here is to use your head before you use your knife.



### **Even Borders**

In mounting a piece of flat art on a board you will usually want to control the width of the borders surrounding the mounted piece. No matter how carefully you measure and mark the board, it is almost impossible to position the glue-covered piece accurately. The way to avoid this hassle is to use an oversized piece of board and then use the edges of your work as datums to mark and cut the board to size. The more oversized the board the easier the process, but of course you want to avoid excessive waste. To mount a piece that is 11" x 14" you should start with a board that is at least 1" per side larger than the dimensions you want to end up with. As the size of your work increases allow for larger tolerances on the board.

### **Inside Corners**

Cutting an inside corner in a piece of board (as when making a frame) requires that your two orthogonal cuts end at exactly the same point. This is hard to do and if you miss, your corners will look like little cross hairs. You can avoid this problem with the following trick.

Mark your corners with pencil. Take a push pin and push it through the board at the apex of each corner. Then use your rule and knife to make the cuts. Just as you reach the corner you will feel the blade break free into the pin hole and you will have time to stop your cut. Admittedly, this is a trick for the ultra-anal, but it really can make a difference when making mats for mounting photos.