

Mechanical Color Separation for Reproduction



Introduction

This activity package deals with the art preparation for **multiple color printing**. When the design for a printed product contains more than one color, **final art** needs to be prepared so that the printer can reproduce the design on a printing press. When more than one color is needed, the colors in the design need to be separated so that each color can be applied to the printed sheet. A press can only place one color on a sheet at a time. Even with a "multiple color" press, which may have a printing head for each color to be applied, the individual colors are applied to the sheet one at a time.

There are two classifications of color printing. They are: **spot color**, which is placing a single solid or tint on a sheet one color at a time; and **process color**, which is usually done when the design contains a color photograph. Process color is much more difficult to do, and requires exacting registration. **Registration** is the process of lining up the colors so that they are placed in the proper position. If you have ever noticed a comic strip that appeared "fuzzy", it was because the colors didn't line up correctly. The colors were out of position, or out of register.

The process of separating colors is called **color separation**. When you are using spot colors, the process is usually done by hand and is called **mechanical color separation**. Graphic designers and paste-up artists can usually provide a printer with mechanical color separations. Process color is done photographically, using a series of colored filters to separate the colors in a photograph, and is referred to as **color separation photography**.

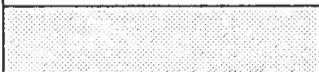
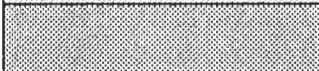




Since registration is critical in color reproduction, graphic artists have to be careful, neat, and

accurate. They need a good understanding of the reproduction process, as well as a knowledge of color theory, screen tints, registration methods, and the production sequence. This usually requires some formal commercial art training.

Job Description

You are going to be a graphic artist. You will create a cartoon character, place color in your figure, and then prepare the **final art** which would be used to reproduce your design. You will be learning some basic drawing techniques to develop your "character", as well as the steps that the graphic artist would do to prepare final art. For each color you plan to include in your design, you will have to create a mechanical color separation. You will learn the technique of registration and how the artist communicates with the camera operator to create tints of colors. You will be using a variety of commercial art techniques and materials in the same manner that professional graphic artists use them. While you will not actually reproduce your design in this assignment, you may decide to use your final art in later assignments in silk screen or offset printing.

Sample Tints

	10% Screen Tint
	20% Screen Tint
	40% Screen Tint
	50% Screen Tint
	60% Screen Tint
	80% Screen Tint

Materials and Supplies

To complete this activity, you will need the following materials:

1/4" grid graph paper, 8 1/2" x 11"
illustration board, 9" x 12"
several sheets of tracing paper, 9" x 12"
photographer's masking tape
press-on "register marks"
technical drawing pen with India ink #1 point
(or an Alvin "penstik" with 0.5 & 0.7 mm tips)
T-square
30-60 triangle
colored pencils

Optional:

acetate, 9" x 12" sheets
Rubylith, 9" x 12" sheets
X-acto knife
technical drawing pen with acetate ink

Creating Your Character

1. The first thing you need to do is to create your own cartoon character, or select a cartoon character from a comic strip or comic book.

NOTE: If you plan to reproduce your design later on a T-shirt, notepad, or other printed product, you will have to create your own character. Cartoon characters are **copyrighted**. This means it is illegal to use the design or character someone else has created without their permission. If you have access to a clip art book or clip art on a computer file, and your school has purchased the right to use it, then you can use the designs or characters in that source and reproduce them.

2. If you are creating your own character, you may want to use the "cartoon character" development sheet included with this package. It contains drawing techniques you can use to create your own cartoon character. Follow the instructions on the sheet, and see if you can come up with your own original character.

3. After you have tried drawing your own cartoon character, you may decide to select a character from a comic strip or comic book. If the design is smaller than 8" tall, you are going to

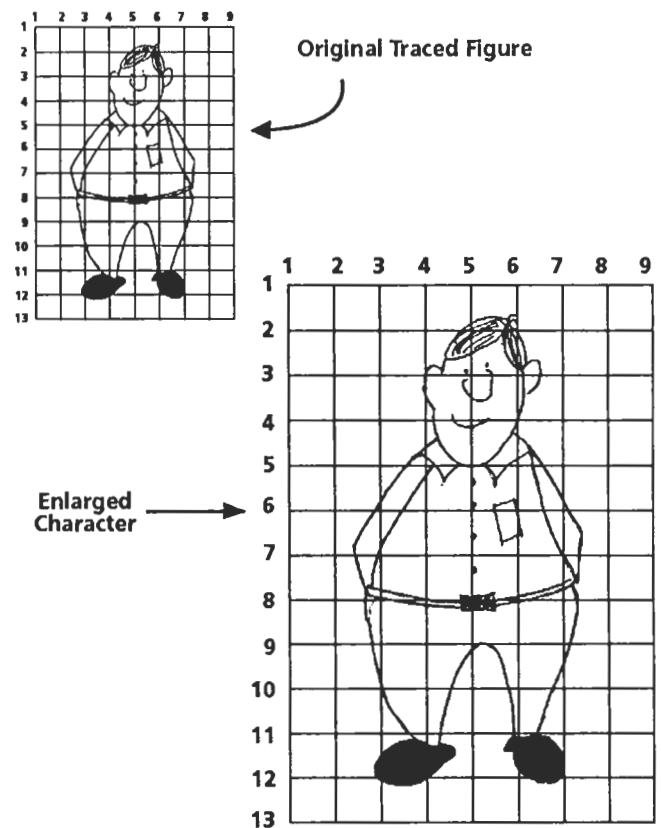


Figure 1 - Grid Drawing

need to enlarge it. This can be done simply using the **graph** drawing technique.

4. Place a sheet of 1/4" square graph paper over your cartoon character. Use a light table so you can see through the graph, and trace the figure onto the graph paper.

5. On a sheet of drawing paper, use your T-square and triangle to lay out a graph with squares 1/2", 3/4", or 1" square. The size you need will depend on how small your original is. Count the number of 1/4" squares on the graph paper from the top of your character to the bottom of your character. If you have 16 grids, you can make an 8" tall figure by using 1/2" grids on your paper ($16 \times 1/2" = 8"$). Using 3/4" grids would give you a figure 12" tall ($16 \times 3/4" = 12"$).

6. Number the grids on your 1/4" graph paper and on your larger graph. (See Figure 1.)

7. Begin drawing your character, one box at a time. Copy the contents you see in grid 1-1 on your 1/4" graph into the 1-1 grid on your larger graph. Do a single box at a time. When you are

finished copying the contents of all the boxes, you will have enlarged your character!

Note: Another way of enlarging copies is by using a photocopy machine that is capable of enlarging. However, this may not be available to you. The figures can also be enlarged photographically in a process camera, if available in your laboratory, using PMT material.

Preparing a Comprehensive

1. After you have a cartoon character large enough to work with (at least 8" tall), your next step is to prepare a **full color comprehensive**. You may want to use a sheet of tracing paper for this step. Lightly trace the character with a 4H pencil onto the tracing paper.

2. You now must plan what colors you are going to use. Select three or four colors from your pencil set. Place small "dots" of color on the character for each area you want a "color". Do not begin coloring yet!

3. **Spot colors** can be applied to a printed sheet as a **solid** or a **tint**, thus allowing you to use a single "color" to create several **shades**. For example, if you want a "red" and a "pink", you can use the red pencil as it is, or 100% red. The same color combined with 1/2 white will appear pink. This tint would be a 50% red. Use your colored pencil to color the character as you wish to have it, remembering you can "tint" each solid color by a percentage to achieve "shades" of color.

4. After you have all the color applied to your character, ink the solid black lines and areas with your ink pen. Notice the black is done last, so that it will cover the pencil edges, making a "clean" looking job!

Preparing the Mechanical Color Separations

Before you begin this section, consult with your teacher. Mechanicals can be done in a variety of ways, using various materials. A simple method is to create the separations using tracing paper and ink. However, this can also be done on acetate (mylar film) or by using Rubylith. Which method you use will depend on what materials

you have available to you, and on the complexity of your design. Often a combination of methods is used. Your teacher will suggest which materials you are to use.

1. Place your completed comprehensive on a drawing board. Cover the "comp" with a sheet of tracing paper. Adhere the sheet of tracing paper along the top edge with masking tape. Fold the sheet along the top edge, so you can work "under it".

2. Place three **register marks** on the **base art**. Two marks should be located at the center of the left and right image areas, and the third mark at the center of the bottom. (See Figure 2.) On the tracing paper, trace the 100% black lines, detail work, and solid areas first. Label this sheet 100% BLACK PRINTER.

3. After you have traced the black lines and areas, place register marks on the tracing paper on top of the register marks on the base art. This is a critical step, as register marks must line up exactly if the separated parts are to later line up to reproduce the original.

4. Attach a second sheet of tracing paper along the left side of your base art, adhering it with masking tape. Lift up the black printer, and fold it out of your way. Allow the second sheet to cover the original design.

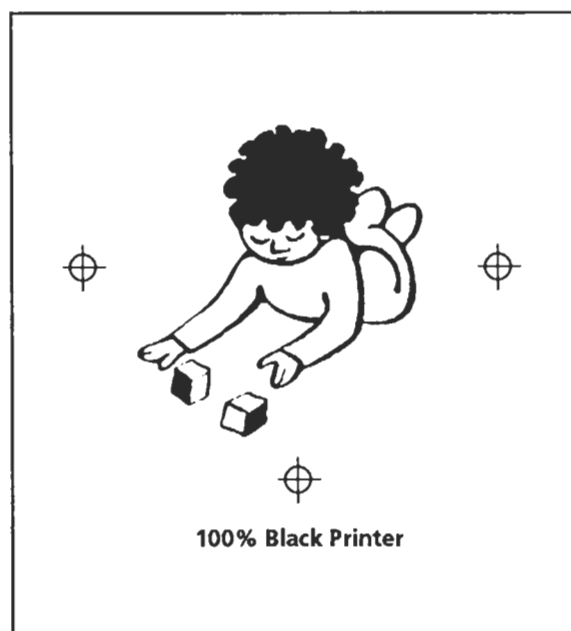


Figure 2 - Base Art with Register Marks

5. Trace all of the areas that appear on the comprehensive as a second solid 100% color onto this sheet. For example, if there are 100% RED areas on the comprehensive, you will trace all of the 100% RED lines and areas on this sheet with your ink pen, filling them in with a solid black. If you have other %'s of red areas, these will be handled as separate colors. When you have all the 100% RED areas filled in, label this sheet 100% RED. Now place register marks on this overlay.

6. You will now need to complete an overlay for each color on your comprehensive. Treat each % of a color as a separate color. You might have more than three or four overlays depending on the complexity of your design. Confer with your teacher if you have a question about any portion of the "separations". Make sure you label each overlay with the color and the percentage.

7. The completed separations are referred to as *final art*. They would be used to produce negatives for each color that was to be applied to the printing plate. Each "color", regardless of percentage, requires a separate plate. If the design includes screen tints, all the percentages of a color are burned on one plate. For example, if you had two percentages of a color, a 100% red and a 50% red, both of these images would be burned onto a single plate. You will learn more about this process later.

Making Color Key Proofs

In industry and in commercial art studios, the artist will often make *color key proofs* of the separations before sending them to the printer. Color keys are clear acetate sheets that contain the exact colors as prescribed by the artist for each separation. The completed color key proofs can be overlaid, one above the other, to "check" the registration and the quality of the separations. If you have color key materials in your lab, you might want to do this to check your

work. Once all the "keys" are assembled, the completed design will appear like the finished product.

Safety

Be careful when you are using an X-acto knife, as the blades are very sharp. Always cut away from hands and fingers. When using art materials of any kind, read the labels and follow the directions for use and disposal.

Vocabulary

multiple color	final art
color separation	register marks
registration	solid color
spot color	screen tint
process color	color key
clip art	copyright
proof	PMT
acetate	Rubylith

On Your Own

1. Collect examples of printed materials that contain color. Identify the colors as spot color, screen tints, solid, or process color.
2. Examine a process color print under a "loupe" or magnifying glass. Can you identify the four color "dots" that make up the color photograph?
3. Examine a Pantone Ink Sample Chart. Look at the many shades that can be obtained by tinting various ink colors.
4. Create a color wheel. Identify primary and secondary colors. Create complimentary, monochromatic, analogous, and triadic color combinations.
5. Describe the difference between tint and shade.



TEACHER GUIDE

MECHANICAL COLOR SEPARATION FOR REPRODUCTION

Objectives: Upon completion of this assignment, students will be able to:

- Describe what final art is used for.
- Define process color, spot color, and screen tint.
- Use commercial art techniques to create a cartoon character.
- Complete a comprehensive of the character.
- Complete mechanical color separations for reproduction in multiple color.

Helpful Hints:

1. Collect the Sunday comics for several weeks prior to this assignment for use in the lab.
2. Find several examples of "copyrighted" designs of cartoon characters that have been reproduced on shirts or other products. Show the register mark, and explain copyright law to your students.
3. Use your art teacher as a resource person. You might even "team teach" this assignment. The art teacher could help with the cartoon character creation for both classes, and you can teach the separation process!
4. When students get to the point where they are ready to begin the mechanical color separation, consider the methods you might wish them to use:
 - Tracing paper overlay, using ink pens for making the mechanical. This is the least expensive method; however, it is more time consuming. Also, while the concept will work, this is not a very professional approach.
 - Mylar acetate overlay, with ink pen. This a lot more expensive; however, it is somewhat faster, and it is easier for students to "see" through the mylar. It also makes a more professional presentation.
 - Rubylith masking film and X-acto knives or line cutters. This is the fastest way to create mechanicals. They can even be done in negative format and used as mechanical negatives. This is especially good if you don't have a darkroom. Most professional jobs are done with this method; however, it is the most expensive method.
5. Get a Pantone ink chart and a package of screen tints. Screen tint manufacturers also can provide "sample" tint charts, so students can have a look at what the difference is between the various percentage tints.
6. Obtain a good "loupe" or magnifier. Obtain some quality process color plates, negatives, and prints, so that students can see process color patterns.

TEACHER GUIDE
MECHANICAL COLOR SEPARATION FOR REPRODUCTION (Cont'd.)

7. Contact a local printer and obtain some press samples of process and spot color applications. Ask for press proof sheets; these will show the progression of process color application.
8. Clipper Brand creative art service has some readymade "separations" that will make good examples of mechanical separation art.
9. Encourage students to develop their own characters; these can be used later as art for silk screen mirrors, T-shirt appliques, and other projects.
10. Visit the art section of the library or an art supply store; you may find additional material on cartooning, figure drawing, etc. that can be used to help students develop their own cartoon characters.
11. An overhead projector is a great way to "proof" separations on mylar, rubylith, or color keys. The images can be projected for the entire class to see.
12. This is a good assignment to work on color theory as well. Topics such as color wheels, ink mixing and formulation, and process color theory can be brought into this assignment.

**LANGUAGE ARTS APPLICATION
MECHANICAL COLOR SEPARATION FOR REPRODUCTION**

Student Name

In all types of jobs you will find that you need the ability to communicate your ideas effectively. Writing skills are necessary in all occupations. Here are a few examples of how writing skills are related to this activity.

Being able to use the library is an important skill that any business person, professional, or student must possess. This assignment will require you to visit the library and do some research on a career in graphic design.

Use the resources available in your school library to do your research. Ask the media specialist for help. You might find information in the card catalog, career file, occupational catalogs, college catalogs, or other sources to answer the following questions:

1. What local colleges, community colleges, and universities (in Florida) offer courses or programs in Graphic Design?

2. What education is required for a career in Graphic Design?

**LANGUAGE ARTS APPLICATION
MECHANICAL COLOR SEPARATION FOR REPRODUCTION (Cont'd.)**

3. What kind(s) of businesses hire graphic designers?

4. What kinds of skills do graphic designers need to possess?

5. What is the pay scale for graphic designers? How much can one expect to earn in this occupation?

6. For a career in graphic design, what types of high school courses are recommended?

MATH APPLICATION MECHANICAL COLOR SEPARATION FOR REPRODUCTION

 Student Name

In all types of jobs and occupations you will need the ability to apply mathematics effectively. Here are a few examples of how math skills are used in relation to this activity. Printers use screen tints to achieve different shades of color. These tint screens are measured in percentages.

Percentages are used in everyday life as discounts and mark-ups, taxes, and paycheck deductions. With percentage, 100 percent (%) is used to describe one whole unit.

In this exercise you will be asked to find the percentage of a number. Simply change the percentage to its decimal equivalent and multiply.

Example 1: 23% of 63 is _____

$$\begin{array}{r} 63 \\ \times .23 \\ \hline 14.49 \end{array}$$

Try these: Find the percentage of the following problems.

1. 80% of 50 = _____
2. 150% of 72 = _____
3. 4% of 35 = _____
4. 6% of 90 = _____
5. 22% of 53 = _____
6. 25% of 10 = _____
7. 61% of 38 = _____
8. 35% of 215 = _____
9. 75% of 85 = _____
10. 15% of 180 = _____

QUIZ
MECHANICAL COLOR SEPARATION FOR REPRODUCTION

Student Name

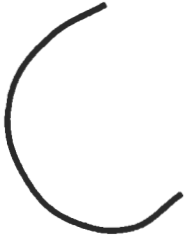
True or False:

- _____ 1. A printing press can place more than one color on a sheet at a time.
- _____ 2. Registration is not important when reproducing multiple colors.
- _____ 3. Clip art can be used when reproducing a design.
- _____ 4. It is illegal to use a copyrighted design on a T-shirt or other printed material without permission.
- _____ 5. Process color is the process used to reproduce color photographs.
- _____ 6. Spot color can be applied in more than one place on a sheet.
- _____ 7. A screen tint is identified by a percentage (%) number.
- _____ 8. Register marks are used to locate page numbers.
- _____ 9. A solid color would be referred to as 100%.
- _____ 10. The sheet containing a separation is called an overlay.

Preparing a Cartoon Character for Mechanical Color Separation

Name: _____ Date: _____ Per: _____

Four basic steps to create a cartoon face:



Step 1

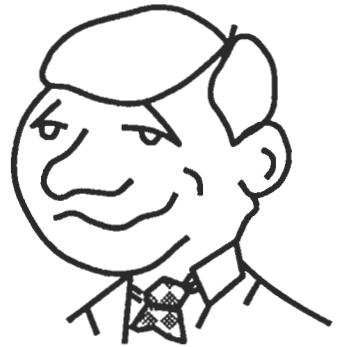
Now you try it:



Step 2



Step 3



Step 4

Step 1

Step 2

Step 3

Step 4

Step 1

Step 2

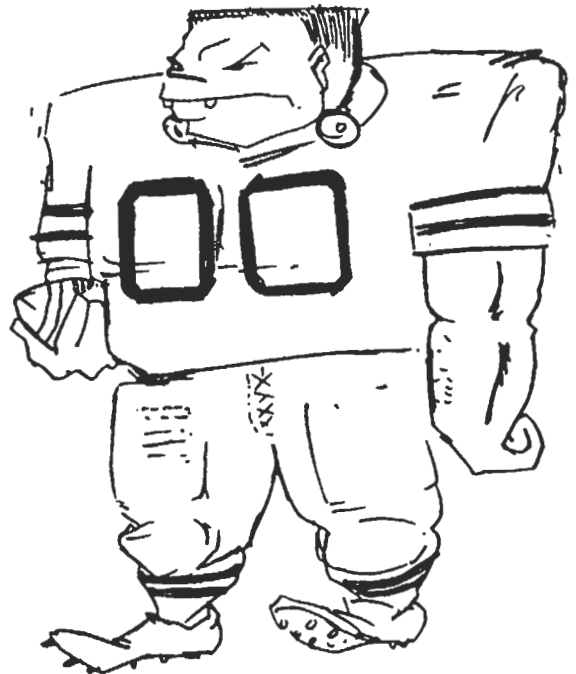
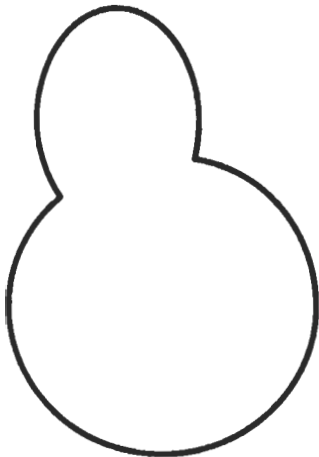
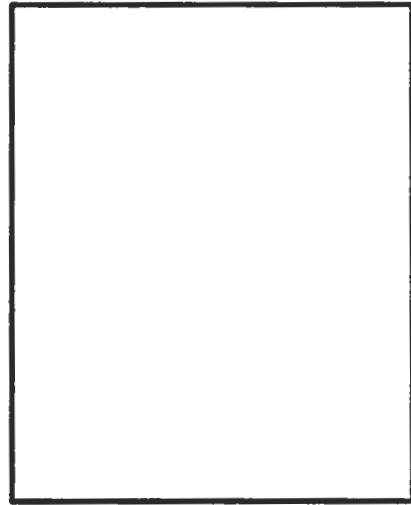
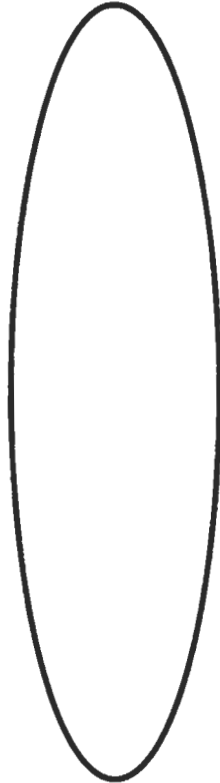
Step 3

Step 4

Preparing a Cartoon Character for Mechanical Color Separation

Name: _____ Date: _____ Per: _____

Cartoon characters begin as basic shapes:



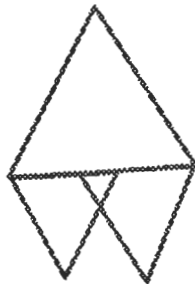
Preparing a Cartoon Character for Mechanical Color Separation

Name: _____ Date: _____ Per: _____

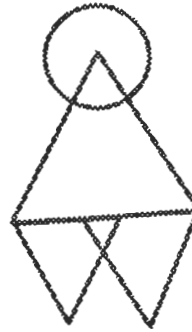
Begin by drawing very lightly (construction lines):



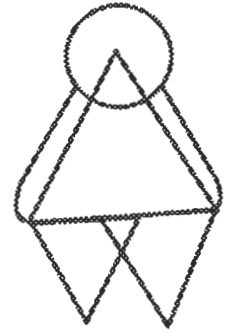
Step 1



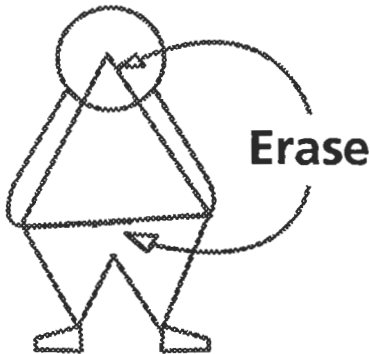
Step 2



Step 3



Step 4



Step 5



Step 6

Begin to darken the lines needed for the character



Add necessary detail

Step 7



Step 8

Darken shoes, add tie, pocket, and buttons, erase unwanted lines

Draw your character here:

