Math formulas for Graphic Arts

by Paul Davis

Formulas & information to assist in Printing & Graphic Arts production planning.

Developed by the Graphic Design & Communications Academy

This booklet is designed as an instructional aid for the Graphic Design & Communications Academy Training Series.

Special thanks to :

Stuart Christian
Danny Bowman
Lynn Sherman
Dan Still & Tom Feick
All former & current students of DeKalb Technical College

This training booklet is concerned with the math formulas necessary for the printing and design industry. It is designed to be used with other training textbooks and lectures that provide more in-depth information. Some of the books that may prove helpful are:

Avoiding the Output Blues
by Taz Tally, Phd.
published by Prentice Hall
ISBN 0-13-084876-X

GATF Imaging Skills Training Program Workbook
by Hal Hinderliter with Joe Marin & Daniel G. Wilson
published by GATFpress
catalog number 9141 (call 800-662-3916 for more info)

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Fractions & Decimals

1. Conversion of a fraction to a decimal:

Numerator divided by denominator, (divide bottom into top).

$$\frac{N}{D}$$

Example; $^1/_2$" - $2\overline{)1.0}$ = .5

Example; $^1/_4$" - $4\overline{)1.0}$ = .25

2. Conversion of a percentage to a decimal.

Replace % with a decimal and move decimal to the left 2 places (only).

Example; 100% - 100.- 1.00 = 1.

Example; 125% - 125.- 1.25 = 1.25

Example; 75% - 75. - .75 = .75

3. Conversion of a decimal to a percentage.

Move decimal to the **RIGHT** two places, then replace with a % sign.

Example; 1.50 - 150. - 150% = 150%

Example; .45 - 45. - 45% = 45%

4. Complete the following for practice:

4-1. 3/4" as a decimal = ?

4-2. 1/8" as a decimal = ?

4-3. 1/16" as a decimal = ?

4-4. 1 1/4" as a decimal = ?

4-5. 2 3/8" as a decimal = ?

4-6. 1125% as a decimal = ?

4-7. .65 as a percentage = ?

4-8. 1.75 as a percentage = ?

4-9. 5% as a decimal = ?

4-10. 85% as a decimal = ?

4-11. Add the following; 1/16", 7/8", 3/4"

4-12. Add the following; 2 3/16", 3/8", 1/2"

4-13. Add the following; 1/16", 7/8", 3/4", 9/32"

4-14. Subtract 3/16" from 4 1/4"

4-15. Subtract 3/8" from 8 1/2"

5. The formula to find reproduction percentage.

Scaling for enlargements or reductions, if original size and reproduction size are known. This formula is used to find the needed reproduction %.

$$\frac{\mathbf{I}}{\mathbf{O}} = \mathbf{P}$$

I = Image size (size needed), when reproduced, output.
O = Object, (original size), input.
P = Percentage needed, (in decimal form, convert to % as needed).

Substitute the letter with the correct measurement and divide the bottom (original) into the top (image).

Example #1: An 11″ object needs to be sized to 5 1/2″

11" = Object

5 1/2" = Image size needed

? = Percentage needed

$\frac{5.5}{11}$ = Divide 11 into 5.5 = .5 move decimal two spaces to the right to get the percentage, or 50%

Example #2: A 3″ object reproduced so that 3″ will be 7 1/2″

3″ = Object

7 1/2 = Image needed

? = %

$\frac{7.5}{3}$ = 7.5 divided by 3 = 2.5 or 250%

5. Complete the following enlargement or reduction exercises:

5-1. 8.5" sized to 4.25" = ? %

5-2. 14" sized to 11" = ? %

5-3. 1 1/2" sized to 4" = ? %

5-4. 4.25" sized to 1" = ? %

5-5. 3" sized to 5.5" = ? %

5-6. 8.25" sized to 4 1/2" = ? %

5-7. 3/4" sized to 2.25" = ? %

5-8. 8" sized to 4 1/8" = ? %

5-9. 3 1/8" sized to 17" = ? %

5-10. 4 1/8" sized to 22 1/2" = ? %

6. Formula used to find new reproduced image size if object and percentage are known.

This formula may also be used to check your work to verify the new image size if enlarging or reducing.
Use this formula to find the new size of an object if the percentage (%) and original size are known.

(O X P) X .01 = I

O = Original object

P = Percentage (as a percentage)

I = Image

Example #1: An 8" object reproduced at 75%

(8 X 75) X .01 = I
(600) X.01 = I
6.00 = I (6 inches is the new image size upon reproduction)

Shortcut; Use percentage in decimal form (.P) from the beginning- O X .P = I

Using Shortcut:
8 X .75 = I (% changed to decimal from the beginning)
6.00 = I

Example #2: A 5" object reproduced at 150%
5 X 1.50 = I (remember move the decimal only 2 spaces)
7.5 = I (7 1/2 inches is the new size for the 5" original)

6. Complete the following resizing problems;

6-1. a 12" original sized at 75%, the new size = ?

6-2. a 5" original sized at 125%, the new size = ?

6-3. a 4.125" original sized at 105%, the new size = ?

6-4. a 2 1/2" original sized at 85%, the new size = ?

6-5. a 5.75" original sized at 160%, the new size = ?

6-6. a 2 1/4" original sized at 225%, the new size = ?

6-7. a 12" original sized at 75%, the new size = ?

6-8. a 2" X 3" original sized at 125%, the new sizes = ? (calculate both dimensions)

6-9. a 8 1/2" X 14" original sized at 77%, the new sizes = ?

6-10. a 4 1/4" x 6" original sized @ 135%, the new size is ?

7. Using the previous formulas, complete the following:

7-1. 8 1/2" x 11" original sized so that 8 1/2" = 3.75

A. What % is needed?

B. What is the new size for 11?

7-2. A 5" x 7" original carries the notation reproduce at 75%.

A. What are the new dimensions for this job?

7-3. A 3.5" x 5" object is to be sized so that 3.5 will be 6 1/4.

A. What % is needed?

B. What is the new size for 5?

7-4. A 5.5" x 7 1/4" object is to be reproduced at 67%.

A. What are the new dimensions?

7-5. An 8" x 10" object is to be shot so that 8 = 6, and 10 = 7.

A. What percentages are needed, and which % is used to insure that the art will fit within the box?

8. Fill in the blanks for the correct amounts.

?	**ounces =**	**pint.**
?	**ounces =**	**quart**
?	**ounces =**	**gallon**
?	**quarts =**	**gallon**

8-1. 5 gallons = ? ounces

8-2. 4 gallons = ? quarts ? ounces

8-3. $3\frac{1}{2}$ gallons = ? quarts ? ounces

8-4. 704 ounces = ? gallons ? quarts

8-5. 64 ounces = ? gallons ? quarts

9. Calculate the following chemical mixture. 5 gallons of Developer @ 3:1 (3 parts water/ 1 part chemistry).

If a brand of chemistry carries the notation 2:1 Water / Chemistry it means that 2 parts of water should be added to 1 part of chemistry. Read carefully as sometimes the notations could mean 2 parts chemistry to 1 part water. Always add water first then chemistry. Always read directions.

9-1. How many parts are there in the total mixture?

9-2. If there is 5 gallons total, how much is each part equal to?

9-3. If the water mixture is three parts how much water is needed? (It may be easier to convert the entire mixture to ounces)

9-4. How much of the chemical mixture is needed?

10. Type measurements:

The printing industry uses it's own measurement system based on the points system. In this system type size, spacing and other elements can be measured. It will be necessary to acquire a ruler that can measure inches, pica, and points to be productive in the graphics industry. Other systems such as ciceros, used in Europe, are used and are available with most software. It will be necessary to be familiar with points and how they equate to inches and fractions. The advantage of points is that they are so small that there is hardly a need for fractions. Also, with most software you can set a page up in inches and then convert it to points/pica or vice versa.

12 points = 1 pica
72 points = 6 picas or 1 inch

Calculate the following inches/point conversions.

10-1. 2" to points

10-2. 2" to pica

10-3. $8\frac{1}{2}$" to points

10-4. $8\frac{1}{2}$" to pica

10-5. 11" to pica

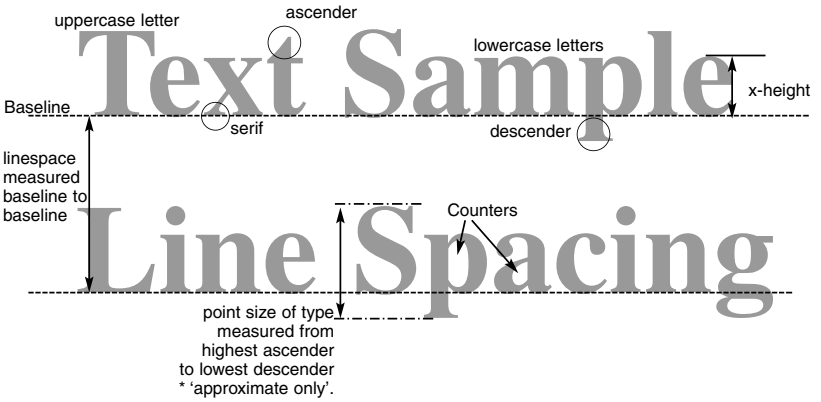
10.6. 11" to points

10-7. 33 pica to inches

10-8. 504 points to inches

10-9. 2" x $3\frac{1}{2}$" to pica

10-10. 144 points x 252 points converts to what inch dimensions?



11. Type terms:

Type is specified in points but this does not reflect its visible size. Type is measured from the highest ascender character to its lowest descender character. A common tool to measure type size is an 'E' scale. One has been provided with this booklet for your use. If the type is too large to be measured with an e-scale then it can be measured with a ruler that has point increments (from ascender to descender). This may not be exact but it is an effective beginning.

Leading is the space between lines of type measured from baseline to baseline. 'Standard' leading is two points more than the type size, but this is by no means a rule. The use of a numerical leading setting is known as absolute leading as the leading will stay the same no matter what point size is used. Auto leading should be avoided as the leading will change depending upon the point size used. This can pose problems if one letter on a line is larger than the rest of the line.
If extra space is needed the leading should be increased to a higher number not by simply adding multiple returns.

This is an example of a paragraph with standard, absolute leading. Standard leading is when the space is 2 points over the point size. In this case the point size is 8 and the leading is 10. Since a number is used for the leading it is considered absolute.

This is an example of a paragraph with auto leading. In most cases there is little if any difference. But, if a larger character is used on a line the next line compensates for the space and creates a gap between the first and second lines.

11. What are the point sizes of the following:

measure with supplied E-scale

11-1. Sample # 1

11-2. Sample # 2

11-3. Sample # 3

11-4. Sample # 4

11-5. Type

11-6. Sample # 6

11-7. Sample # 7

11-8. Sample # 8

11-9. Sample # 9

11-10. Type

Note: Not all fonts measure the same when using an E-scale. Several samples may be needed to get a match.

12. Calculate the leading of the following paragraphs.

12-1. Measure the distance between lines of type to determine the linespacing or leading that has been used. Remember that this space assists in legibility.

12-2. Measure the distance between lines of type to determine the linespacing or leading that has been used. Remember that this space assists in legibility. It prevents descending type from interfering with ascending characters.

12-3. Measure the distance between lines of type to determine the linespacing or leading that has been used. Remember that this space assists in legibility. It prevents descending type from interfering with ascending characters.

12-4. Measure the distance between lines of type to determine the linespacing or leading that has been used. Remember that this space assists in legibility. It prevents descending type from interfering with ascending characters.

12-5. Measure the distance between lines of type to determine the linespacing or leading that has been used. Remember that this space assists in legibility. It prevents descending type from interfering with ascending characters.

12-6. Measure the distance between lines of type to determine the linespacing or leading that has been used. Remember that this space assists in legibility.

13. Measure the thickness of the following rules & borders.

In the case of borders and/or rules the thickness is also measured in points. The amount should be a specific number and not a term such as "Hairline".
A hairline rule may be much too thin to hold on press and can appear broken. Also, hairline rules may vary in thickness from one software to another. In fact, hairline thicknesses have been known to change from one version of the software to another.

13-1

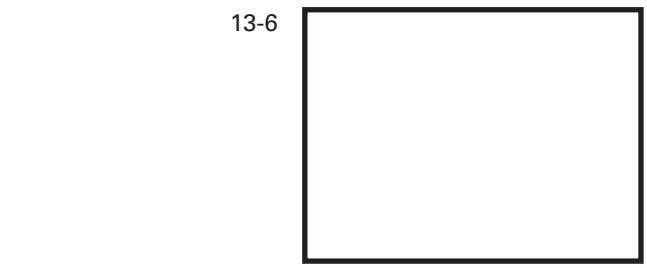
13-2

13-3

13-4

13-5

13-6



Effective / Affordable

ning tions

Learn the necessary technical software and print production skills to create correct digital files.

- Font handling
- Color & Trap
- Preflighting
- Imposition
- Color Correction
- Photo Editing
- PDF creation

Create the complete file utilizing software such as:

- QuarkXpress
- Photoshop
- Illustrator
- Flightcheck
- Acrobat
- Indesign

This booklet is a small sample of the knowledge necessary to create and develop an efficient digital design.

Working with text

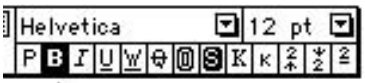
When working with text there are certain elements that need to be remembered in order to make the transition from standard typing to typesetting/design.
The first element is the type itself. In the past type characters were all the same size, same weight and same sized. This was know as mono-spaced, mono-weight, mono-sized. In this the letter 'i' takes up the same space as a letter M. With most computers now the text is proportionally spaced. In this each letter has its own spacing. Certain fonts used on the computer, however, still have mono-spacing. Examples of these fonts include Monaco and Courier. Normally these fonts are rarely used unless the typewriter effect is intended as part of the design.
Different styles of type are known as fonts. A font is a complete set of characters in a given style. There are thousands of different fonts from many manufacturers and many designs depend on just the right font to convey their message. There are many other issues that effect font use both technically and artistically and more experience will be needed for proper font usage.
When working with typesetting there are more issues that determine professional technique. Many of these conflict with traditional typing rules and there can be some conflict in changing peoples mindset.

1. There are two primary brands of fonts, **Adobe Type 1** and **Truetype.** Type 1 fonts are made up of two files, the screen and the printer. Truetype fonts have only one file. Truetype icons show as three A's stacked behind one another, Type 1's as a single A. Most printers prefer Type 1 fonts and discourage the mixing of the two types. If there is doubt, a sample sheet should be prepared and output to avoid problems later. The earlier a problem is found the quicker a solution can be found. Missing fonts or partial font files are still the number one problem with electronic files among printers.
   The computer itself uses what have been called '**City**' or **System** fonts. These are not recommended for use with files that are to be professionally output and printed.

2. The first technique that should be learned is that there should be only one space after a period. Indeed, there should be only one space after any punctuation. This will involve retraining for many clients but remember that computer fonts now are proportionally spaced. In most page programs it is possible to see the invisible key-strokes used by the original typist and unfortunately time is sometimes spent undoing all the extra keystrokes.

3. Another issue is line spacing and the return key. The standard return key is used, of course, to move to the next line. On the computer the text will flow to the next line as it is typed. If a new paragraph is desired the return key is struck. This is known as a **hard return.** A hard return also controls certain computer functions. When the return key is struck whatever commands are in place are stopped. Another method to return and not change commands is the soft return. A **soft return** is done by holding the shift key while striking the return key. This returns the type but leaves the computer instructions in place. Many users also use multiple returns to add space between lines of type.

4. An important issue when working with fonts is the use of **font effects.** Most software allows one to make text bold by selecting a bold key of italic by selecting an italic key. These are known as font effects and are artificial. This procedure is not recommended in the industry due to the fact that the actual printer font to make the bold or italic may not exist and will output incorrectly. Use the actual font (Helvetica Bold or Helvetica Bold Italic) not its effect.



avoid the font effects

5. Quote marks or **"true quotes"** should be used whenever quotes are used. In most case operators will use the key to the right of the semi-colon. This is also the key to provide the marks for feet' and inches". These are not the same characters. Some software allow for a preference to be set that will allow for "smart quotes". There are keyboard methods to create a correct open and closed single or double quote. For a double open quote "use; option and the open bracket key (to the right of the P key). For the close double quote" use shift-option open bracket. For the single open quote use option and close bracket. To close single quote, shift-option and close bracket.

6. A **Bleed** is created when a image extends to the edge of the sheet. In order to insure that the image meet the edge after bindery the image is created to extend off the sheet by **1/8"**. This allows a certain leeway for the bindery department. A full bleed is when the image extends off all four sides of the sheet. Therefore, the bleed is considered as part of the job and the sheet size may need to be increased. Only after the job has been trimmed in the bindery department does the customer receive the correct finished size.

See Taz Tally's Avoiding the Output Blues for complete explanations of this and many other output procedures!

14. Fun with fonts test.

14-1. Define, FONT

14-2. Define, LEADING

14-3. List the two(2) primary brands of fonts.

14-4. Which brand of fonts is characterized by having two files?

14-5. Which brand of fonts is characterized by having only one file?

14-6. What are "city" fonts?

14-7. What are font effects?

14-8. What is the concern for using font effects?

14-9. What is a common or standard amount of leading?

14-10. What is meant by absolute leading, and its advantage?

15. Type and measure.

15-1. Point size is measured from what area to what area on a piece of type?

15-2. What is a Bleed and how is it indicated ?

15-3. What is a Full Bleed?

15-4. How many points equal 1 pica ?

15-5. 1 inch equals points?

15-6 1 inch equals picas ?

15-7. 8 1/2 inches equals how many picas ?

15-8. 8 1/2 inches equals how many points ?

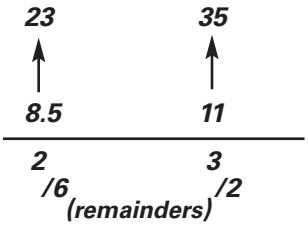
15-9. Convert these dimensions to inches; 30 picas X 504 points

15-10. What are true quotes and their advantages?

16. Page calculation

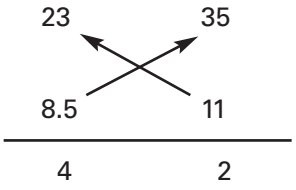
To calculate how many pages will fit on a sheet (or how many out) a bit of math is involved. Most paper is manufactured in common sizes to allow for these types of calculations.
An element of paper that is necessary to consider is the **paper's grain.** Much like wood, paper has a grain and folds much easier with the grain than against it. Grain allows a brochure to remain upright in a rack instead of drooping over. When a job is folded the spine may crack as the fibers break. If an image is along the fold when it cracks the image will be damaged and may cause the job to be rejected. Imagine all the work wasted at the very last step of folding.
Paper may be purchased either grain long or grain short and again planning is important to insure the correct purchase. As mentioned earlier these issues can typically be solved once and remembered for most future jobs. But, people or companies new to this type of work should beware the minor error that can erupt into a major problem later.
A common sheetsize (or basis size) is 23 X 35, and a common page size is 8 1/2 X 11. To plan the signature it is necessary to calculate how many pages can be cut from the press sheet. It can be figured two ways 8 1/2 from 23 or from 35 and likewise 11 from 23 or 35.
The best plan is to accept the method that allows the most pages out, in this case 8.

A **signature** is a completed press sheet printed on the front and back that may contain multiple pages.



2 X 3= 6 out

The above calculation allows for 6 out with significant paper remaining after each cut.



4 X 2= 8 out

The above calculation allows for 8 out with just enough paper remaining after each cut to allow for gripper, marks, and color bars, etc.

16. Worksheet - Imposition Basics

What is the most cut pages one will get from basis size of the following: Note: if the remainder is equal to one of the dimensions then more sheets may be cut from the "scrap". This is known as a combination cut. While economical it is sometimes avoided due to grain and folding issues.

16-1. 8 1/2" X 11" from 23" X 35"

16-2. 8 1/2" X 11" from 17 1/2" X 22 1/2"

16-3. 5 1/2" X 8 1/2" from 23" X 35"

16-4. 5 1/2" X 8 1/2" from 17 1/2" X 22 1/2"

16-5. 4 1/4" X 5 1/2" from 17 1/2" X 22 1/2"

16-6. 10" X 12" from 25" X 38"

16-7. 8 1/2" X 14" from 23" X 35"

16-8. How and why is grain direction of a sheet important?

16-9. List important press factors that influence imposition.

16-10. What is a signature?

17. Worksheet - Imposition Basics Part II

#1. 8 x 10 from 23 x 35 basis size

17-1. How many sheets can be most economically cut ?

17-2. If the press run is to be 60,000 finished sheets, how much paper should be ordered for this job?

17-3. To allow for press & bindery set-up and waste, an extra 5% paper will be added to the order, how many additional basis sheets is this?

17-4. Considering how many sheets out of the basis size and the additional 5%, what is the total paper order for this job?

#2. 8 x 10 from 17 1/2 x 22 1/2

17-5. How many sheets can be most economically cut ?

17-6. If the press run is to be 20,000 finished sheets, one color, printed front and back. How much paper should be ordered for this job?

17-7. To allow for press & bindery set-up and waste, an extra 5% paper will be added to the order, how many additional sheets is this?

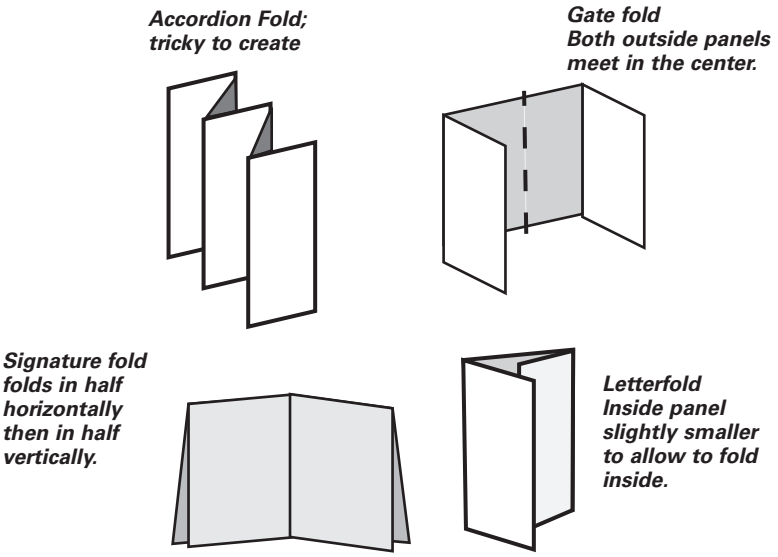
17-8. Considering how many sheets out of the basis size and the additional 5%, what is the total paper order for this job?

17-9. The job will be printed front & back, how many impressions (passes through the press) will there be total?

17-10. The press can print 5000 impressions per hour, how many hours will this job take to print?

Folding dummy

The folding dummy acts as a mock-up for the job and is a valuable visual aid. By looking at the folding dummy the page (folio) assignments can be correctly made (paginated).
The first step when planning a job is to determine how many finished pages can be cut from the basis (press) sheet. It is important to consider the extra amount needed for trims, bleeds, and bindery items. Room must be left for the gripper margin of the press as no printing can be done in this region. Space should be left for press marks to insure registration between colors. The folding dummy will allow for planning of these items.
If the job requires folding then the types of folds need to be considered. There are many types of folds but they may be divided into two main categories; parallel and right angle. Other common folds are; accordion, gate, letter and french. These are simply variations of the two basic folds, but it is important to make sure that the equipment is capable of these more complex folds. Again, a bad choice can impact labor time and waste.



For more information on imposition planning procedures, please see the Imposition Planning booklet of this series.

18. Scanning & DPI

LPI = lines per inch, printed halftone dots; screen ruling when printed.

PPI (DPI) = pixels per inch, 'dots' per inch (should not per confused with a printing dot).
Refers to the fineness of detail in a bitmapped/computer (scanned) image.

Scanning formula for factoring PPI and % and quality level.

PPI = (LPI x 2*) x %

Quality levels	x 2	= High quality (high detail)
	x 1.5	= Medium quality (most common setting)
	x 1	= Average quality (usable in many instances)

The quality level may vary from task to task or from original to original. It is a good idea to maintain the same level throughout a given job regardless of copy for organizational ease. Test to find which yields the best results. Higher scanning PPI means a larger file, and slower processing time, sometimes with no increase in quality.

Example:

133 line screen, medium quality, 100%
(133 x 1.5) x 1. = PPI setting needed
199.5 x 1. = 199.5 (200) PP

133 line screen, medium quality, 200%
(133 x 1.5) x 2. = PPI setting needed
199.5 x 2. = 399 (400) PPI

150 line screen, high quality, 175%
(150 x 2) x 1.75 = PPI needed
300 x 1.75 = 525 PPI

150 line screen, high quality, 65%
(150 x 2) x .65 = PPI needed
300 x .65 = 195 PPI

To Calculate %: I/O = P; Divide bottom (Original) into top (Image needed) to find percentage needed.

18. Determining proper PPI settings

Using the formula on the previous page and the formulas from earlier in this book to calculate the necessary scanning resolution.

18-1. 133 line @ high quality reproduced at 150% = ? PPI

18-2. 133 line @ high quality reproduced at 325% = ? PPI

18-3. 100 line @ average quality reproduced at 75% = ? PPI

18-4. 150 line @ high quality reproduced at 75% = ? PPI

Using these and earlier formulas. complete the following;

An 8" x 10" original is to be sized so that 8" will be 6".

18.5. What % is needed ?

18.6. What is the new size of 10" ?

18.7 What PPI is needed if 150 line, high quality is used?

A 4" x 6" original is sized so that 4 will equal 5"

18-8. What % is needed ?

18-9. What is the new size for 6" ?

18-10. What PPI setting is needed if 150 line, medium quality are used ?

To calculate the levels of grey reproducible:

To achieve the 256 levels of grey the computer creates 2^8, or two to the eight power. Therefore; 2x2x2x2x2x2x2x2 = 256 levels of grey.

When you know the LPI and want to know what RIP output DPI is needed; lpi screen X 15.97 = minimum dpi output

When you know RIP output DPI and LPI and want to know how many levels of grey are possible; (dpi / lpi) 2 + 1 = # of levels of grey

PPI input vs. Quality

Four examples of DPI settings for line or bitmapped objects.

Artwork #**1** was scanned at 72 DPI note the loss of detail regardless of the DPI of the output device. The old saying of garbage in garbage out holds true here.

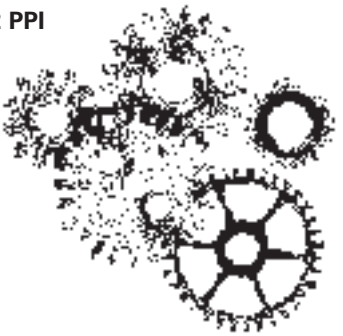
Artwork #**2** is the graphic scanned at 150 DPI. Note the loss of detail but for some graphics this may be enough, plus the file size is smaller.

Artwork #**3** was scanned at 400 DPI, note the better detail. Even higher DPI would might improve the roundness of the edges, but remember that increased DPI increases file size. If the image is sized up more detail is needed. If sized down the extra resolution may be discarded.

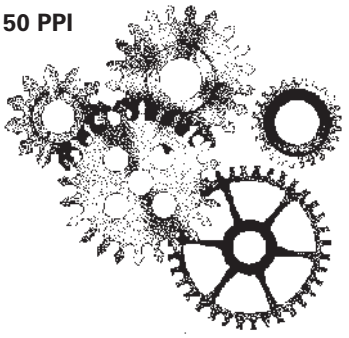
Artwork #**4** is a image scanned at 72 DPI but then re-sampled up to 400 DPI. Note that adding DPI after the fact does not retrieve detail.

The adjusting of resolution due to increasing or decreasing size is known as **resampling.** Resampling down is acceptable as it effects excess DPI that can be discarded, but resampling up should be avoided (unless the necessary DPI is present). Resampling up simply adds pixels by averaging it does not add detail.

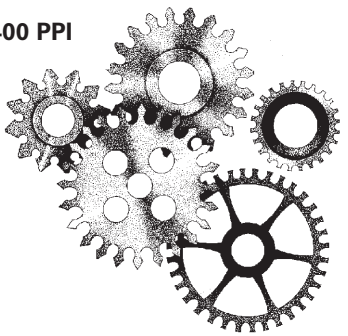
1 **72 PPI**



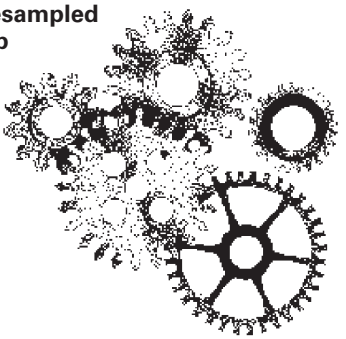
2 **150 PPI**



3 **400 PPI**



4 **resampled up**



19. Converting Inches to metric:

Some scanners and presses utilize the metric system when setting adjustments. The formula to convert inches to millimeters is to

inch X 25.4 = millimeters

inch X 2.54 = centimeters

The formula to convert metric to inches is:

millimeters X .03937 = inches

centimeters X .3937 = inches

Calculate the following inches/metric conversions.

19-1. 2" to millimeters

19-2. 8.5" to millimeters

19-3. 11" to millimeters

19-4. 17 1/2" to centimeters

19-5. 127 millimeters to inches

19.6. 139.7 millimeters to inches

19-7. 85 millimeters to inches

19-8. 25.4 centimeters to inches

19-9. 612 points to inches and then to millimeters.

19-10. 144 points x 252 points converts to what metric dimensions?

Four color process printing

In color printing just four inks are used to create the illusion of full color. These colors are **Cyan, Magenta, Yellow, and Black.** To create the illusion of lights and darks, different sized printing dots, called halftone dots, are used. The dots are created when the file is output. If the dots all printed on top of one another the black ink dot would overpower the other colors. Therefore, the dots are printed at different angles so that only portions touch each other. Thus, when a portion of cyan dots touch a yellow dot, green is created and so on.

The size and spacing of the dots is controlled by feature known as Line spacing (even though they aren't lines). Lines per inch or **LPI** is the fineness of the printing dots measured along a diagonal inch. Newspapers use a coarser line screen such as 85 LPI, while books and magazines can use 150 or 175. The finer the dots the more detail.

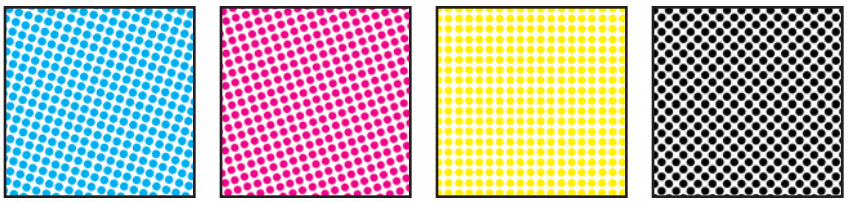
Be careful not to confuse LPI, the printing dots, with DPI which are the pixels in the computer file.

For more on LPI and DPI resolution issues please see the Halftone handout in this series as well as Taz Tally's Avoiding the Output Blues.

'Common' screen angles;

Cyan-105 Magenta-75 Yellow-90 Black-45

Note; these may alter due to certain computer output requirements



Common Preflight Problems:

1. Missing Fonts
   a. mixing font brands
   b. screen but no printer

2. Using font 'effects'
   a. applying bold, italic, etc., effect
   b. font does not have a bold version

3. Missing (unlinked) Graphics
   a. check picture usage
   b. send all graphics files with job

4. Bleeds not set or incorrect
   a. extend off page by 1/8"
   b. create new textbox if needed

5. Colors in wrong model
   a. RGB does not print
   b. Spot or Process ?
   c. Converted spot does not match

6. Trap ? ?
   a. Who should set
   b. consider amount needed
   c. set manually if needed

7. Wrong info in linked file
   a. check settings in imported files
   b. color settings and naming

8. Beware of 'Nesting'
   a. imported file within an imported file
   b. may not output and may not be linked

9. Vector/clipping paths too complex
   a. simplify paths
   b. tolerance/flatness settings

10. Resolution set too high (or too low)
    a. resolution + %
    b. screen res 72 dpi
    c. many things look O.K. on screen

GATF

And if that's not enough ...

auto leading
kerning tracking
wrong quotes
spaces instead of tabs
indent here command
style sheets for repeating info
master pages
blends / banding
alignment / guides
step and repeat
key caps - zapf dingbats
caps lock on
CAPS LOCK ON

GRAPHICS :
transfer functions
screen angles
dot size

For training solutions for these and other digital challenges in:

Quark
Photoshop
Scanning
Color Correction
Illustrator
Flightcheck
Acrobat
Pagination
InDesign

call:

Paul Davis
DeKalb Technical College @
404-297-9522 ext. 1101

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