

Calculating Ink Coverage

Using area to calculate ink coverage and estimate ink pricing

Learning Goals

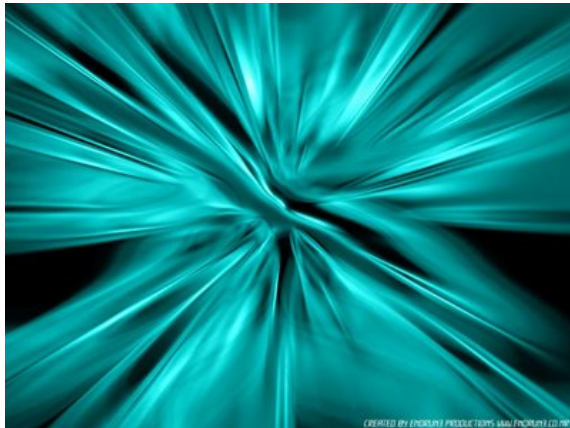
After completing the activities in this slideshow lecture you should be able to...

1. Define ink coverage
2. Understand how ink coverage is calculated
3. Estimate the quantity of ink required for a printing job
4. Estimate the price for quantities of ink based on ink coverage

What is Ink Coverage?

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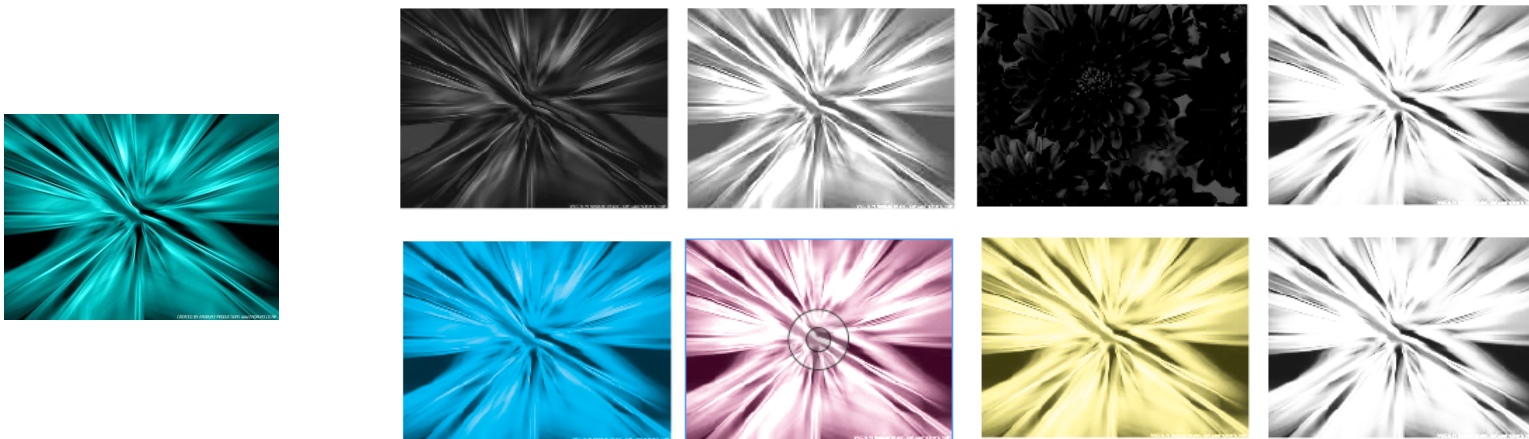
Ink Coverage is the amount of paper that is covered in ink. Each color that we print with will have its own ***ink coverage percentage***. We can see by just looking at the two examples below that the one on the left has a lot of CYAN in it where as the one on the right has a lot of yellow in it. If we were purchasing ink to print these images we could guesstimate that we'd need to purchase a lot of yellow ink to reproduce the second image.



What is Ink Coverage?

What is Ink Coverage?

Here is a breakdown of what the printing plates for example 1 would look like. Notice that CYAN and YELLOW representations are much heavier in saturation than MAGENTA and BLACK. These ink coverage may look something like: C=93%, M=18%, Y=98%, K=17%.



Every time we print this image we will be using a lot more CYAN and YELLOW ink to reproduce the image than BLACK AND MAGENTA.

What is Ink Coverage?

What is Ink Coverage?

Here is a breakdown of what the printing plates for example 2 would look like. Notice that MAGENTA and YELLOW are much heavier in saturation than CYAN and BLACK. These ink coverage may look something like: C=10%, M=80%, Y=99%, K=14%.



Every time we print this image we will be using a lot more MAGENTA and YELLOW ink to reproduce the image than BLACK AND CYAN.

What is Ink Coverage?

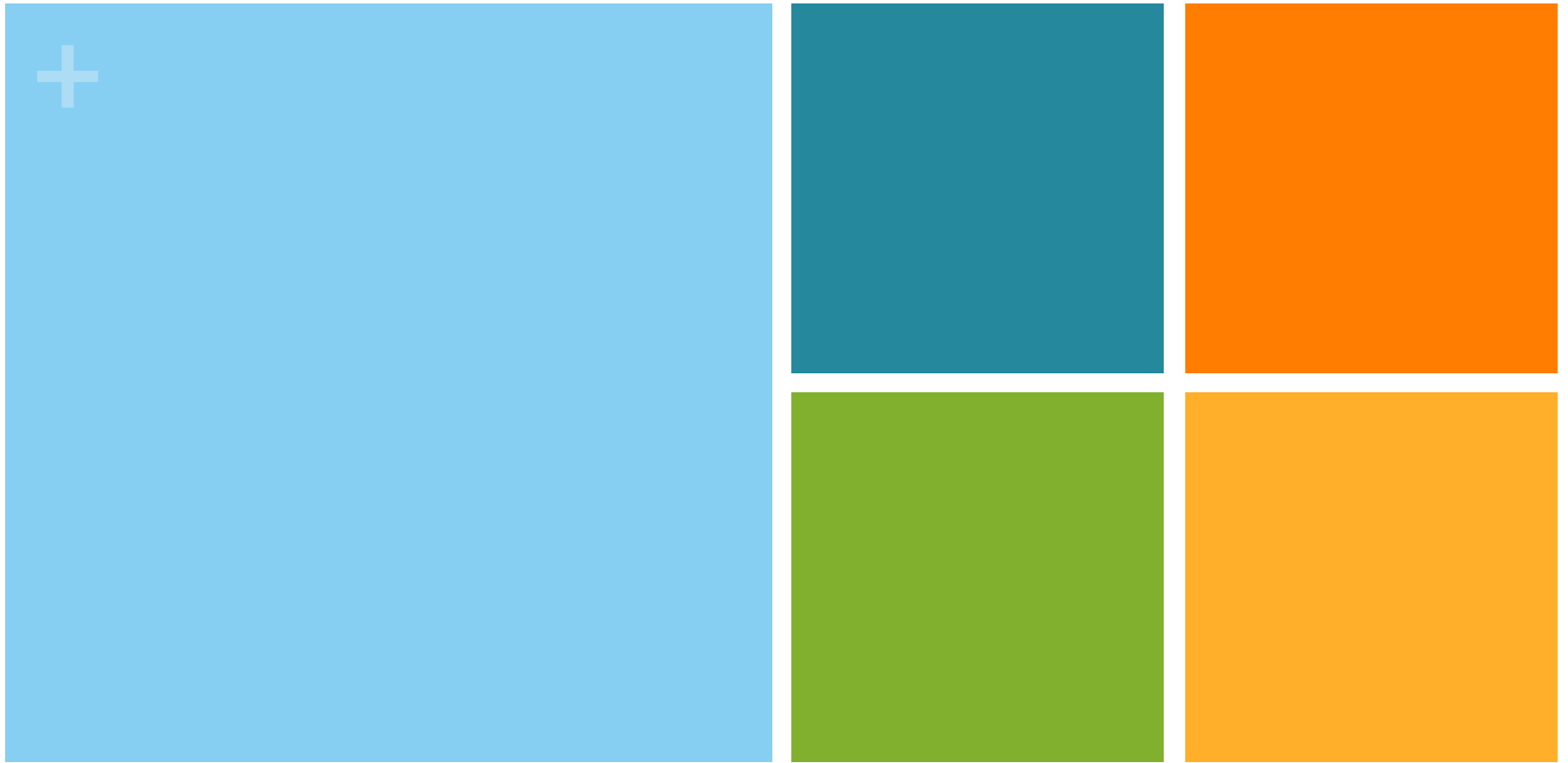
Two important factors must be taken in to consideration when calculating ink coverage.

1. What percentage of the sheet of paper is covered in ink? (ie- the last 2 slides)

Commercial printing is done through the use of halftones. All colors are broken down in to Cyan, Magenta, Yellow, and Black for printing (plus any 'SPOT' colors if they are being used). The colors are then applied to paper using various patterns of CMYK dots. These dots are used to calculate the exact percentage of ink coverage used in a job. Graphic arts programs can be used to get these exact numbers. I will give you the values for all of the examples in this class.

2. How much ink does it take to cover the page?

Viscosity of ink and type of substrate can determine how much ink it takes to cover an entire page. This value is reported as a poundage (lbs.) of ink required to cover a square inch (sq. in.) of paper. For example, 1 lb of Sun Chemical Low Tack Cyan may cover 10,000 sq. in. of paper. Knowing this information allows us to figure out how many lbs. are needed for an entire job. For example, if we need to cover 1,000,000 sq. in. of paper we can divide that by 10,000 sq. in. to figure out we will need 100lbs of ink.



**Estimate the quantity of ink
required for a printing job**

Steps for Calculating Ink Needed

1. **Calculate the area of paper being used.** Are you printing on 8.5in x 11in sheets? 24in x 36in sheets?) [Area= Length x Width]
2. **Multiply the paper area (from step 1) by the ink coverage percentage (this value will always be given to you) to find the total area ink coverage area of ONE SHEET OF PAPER**
3. **Multiply the coverage area in square inches (from step 2) by the number of sheets being printed.**
This gives you the total number of square inches being printed for the entire job.
4. **Divide the total ink coverage area (from step 3) by the coverage area of 1 pound of the ink.** You can not calculate the coverage area for 1lb. of ink. This value will ALWAYS be given to you.
5. **The result is the total number of pounds of ink required to print a job.** You must repeat this step for each color being printed. Pounds of ink required should be rounded to the next whole pound (do not round down). We can't buy a portion of a pound. So, if you need 23.2lbs you will need to purchase 24lbs.

Calculating Ink Needed: Example 1

How much ink is needed to print 125,000 8.5 x 11 flyers. Ink coverage values have been determined by ABC Printing company to be C= 23%, M=87%, Y= 17%, K=56%. Sun Chemical has provided the following ink coverage information. All inks (CMYK)= 50,000 sq. in. per 1lb. of ink.

1. Calculate the area of paper being used. Are you printing on 8.5in x 11in sheets? 24in x 36in sheets?) [Area= Length x Width]

8.5 in x 11 in = 93.5 in. sq.

**This is the coverage area for 1 flyer if
100% of it was covered in ink.**

Calculating Ink Needed: Example 1

2. Multiply the paper area (from step 1) by the ink coverage percentage (this value will always be given to you) to find the total area ink coverage area of ONE SHEET OF PAPER

$$C = 93.5 \text{ in. sq.} \times .23 = 21.505 \text{ in. sq.}$$

$$M = 93.5 \text{ in. sq.} \times .87 = 81.345 \text{ in. sq.}$$

$$Y = 93.5 \text{ in. sq.} \times .17 = 15.895 \text{ in. sq.}$$

$$K = 93.5 \text{ in. sq.} \times .56 = 52.36 \text{ in. sq.}$$

We can not multiply by a percentage. We must first convert all percentages to decimals by dividing by 100. These values represent the total ink coverage of each separate ink color (C, M, Y & K) on 1 flyer.

DO NOT ROUND ANY OF YOUR ANSWERS. Rounding, even slightly, can drastically affect the overall ink coverage. These values only represent 1 flyer. Imagine if we were printing 18 million flyers. The end value would be significantly different.

Calculating Ink Needed: Example 1

3. Multiply the coverage area in square inches (from step 2) by the number of sheets being printed.

This gives you the total number of square inches being printed for the entire job.

C= 21.505 in. sq. x 125,000 sheets= 2,688,125 sq. in.

M= 81.345 in. sq. x 125,000 sheets= 10,168,125 sq. in.

Y= 15.895 in. sq. x 125,000 sheets= 1,986,875 sq. in.

K= 52.36 in. sq. x 125,000 sheets= 6,545,000 sq. in.

INK COVERAGE FOR 1 FLYER
(or 1 sheet of paper)

of SHEETS BEING PRINTED

TOTAL NUMBER OF SQ. IN. OF INK
COVERAGE REQUIRED FOR EACH
COLOR OF INK

Calculating Ink Needed: Example 1

4. Divide the total ink coverage area (from step 3) by the coverage area of 1 pound of the ink. You can not calculate the coverage area for 1lb. of ink. This value will ALWAYS be given to you.

C = 2,688,125 sq. in. ÷ 50,000 sq. in per lb. = 53.76 lbs.

M = 10,168,125 sq. in. ÷ 50,000 sq. in per lb. = 203.36 lbs.

Y = 1,986,875 sq. in. ÷ 50,000 sq. in per lb. = 39.74 lbs.

K = 6,545,000 sq. in. ÷ 50,000 sq. in per lb. = 130.9 lbs.

INK COVERAGE FOR ALL
FLYERS (or all sheets of paper)

INK COVERAGE OF 1 LB. of INK

TOTAL NUMBER OF LBS. OF INK REQUIRED
FOR EACH COLOR BEING PRINTED
We can not purchase a partial pound of ink. No
matter what these answers come out to we MUST
round up to the next whole number.

Calculating Ink Needed: Example 1

5. The result is the total number of pounds of ink required to print a job. You must repeat this step for each color being printed. Pounds of ink required should be rounded to the next whole pound (do not round down). We can't buy a portion of a pound. So, if you need 23.2lbs you will need to purchase 24lbs.

C= 53.76 lbs. = 54 lbs.

M= 203.36 lbs. = 204 lbs.

Y= 39.74 lbs. = 40 lbs.

K= 130.9 lbs. = 131 lbs.

TOTAL NUMBER OF LBS. OF
INK REQUIRED FOR EACH
COLOR BEING PRINTED

We can not purchase a partial
pound of ink. No matter what
these answers come out to we
MUST round up to the next whole
number.

Calculating Ink Needed: Example 2

Try this next one on your own:

How much ink is needed to print 75,000 11in x 17in posters.

Ink coverage values have been determined by Ramsey Printing Company to be C= 9%, M=28%, Y= 31%, K=12%.

Sun Chemical has provided the following ink coverage information. All inks (CMYK)= 65,000 sq. in. per 1lb. of ink.

Calculating Ink Needed: Example 1

How much ink is needed to print 75,000 11in x 17in posters. Ink coverage values have been determined by Ramsey Printing Company to be C= 9%, M=28%, Y= 31%, K=12%. Sun Chemical has provided the following ink coverage information. All inks (CMYK)= 65,000 sq. in. per 1lb. of ink.

1. Calculate the area of paper being used. Are you printing on 8.5in x 11in sheets? 24in x 36in sheets?) [Area= Length x Width]

11 in x 17 in= 187 in. sq.

**This is the coverage area for 1 poster
if 100% of it was covered in ink.**

Calculating Ink Needed: Example 1

2. Multiply the paper area (from step 1) by the ink coverage percentage (this value will always be given to you) to find the total area ink coverage area of ONE SHEET OF PAPER

$$C = 187 \text{ in. sq.} \times .09 = 16.83 \text{ in. sq.}$$

$$M = 187 \text{ in. sq.} \times .28 = 52.36 \text{ in. sq.}$$

$$Y = 187 \text{ in. sq.} \times .31 = 57.97 \text{ in. sq.}$$

$$K = 187 \text{ in. sq.} \times .12 = 22.44 \text{ in. sq.}$$

We can not multiply by a percentage. We must first convert all percentages to decimals by dividing by 100. These values represent the total ink coverage of each separate ink color (C, M, Y & K) on 1 flyer.

DO NOT ROUND ANY OF YOUR ANSWERS. Rounding, even slightly, can drastically affect the overall ink coverage. These values only represent 1 flyer. Imagine if we were printing 18 million flyers. The end value would be significantly different.

Calculating Ink Needed: Example 1

3. Multiply the coverage area in square inches (from step 2) by the number of sheets being printed.

This gives you the total number of square inches being printed for the entire job.

C= 16.83 in. sq. x 75,000 sheets= 1,262,250 sq. in.

M= 52.36 in. sq. x 75,000 sheets= 3,927,000 sq. in.

Y= 57.97 in. sq. x 75,000 sheets= 4,347,750 sq. in.

K= 22.44 in. sq. x 75,000 sheets= 1,683,000 sq. in.

INK COVERAGE FOR 1 FLYER
(or 1 sheet of paper)

of SHEETS BEING PRINTED

TOTAL NUMBER OF SQ. IN. OF INK
COVERAGE REQUIRED FOR EACH
COLOR OF INK

Calculating Ink Needed: Example 1

4. Divide the total ink coverage area (from step 3) by the coverage area of 1 pound of the ink. You can not calculate the coverage area for 1lb. of ink. This value will ALWAYS be given to you.

C = 1,262,250 sq. in. ÷ 65,000 sq. in per lb. = 19.42 lbs.

M = 3,927,000 sq. in. ÷ 65,000 sq. in per lb. = 60.42 lbs.

Y = 4,347,750 sq. in. ÷ 65,000 sq. in per lb. = 66.89 lbs.

K = 1,683,000 sq. in. ÷ 65,000 sq. in per lb. = 25.89 lbs.

INK COVERAGE FOR ALL
FLYERS (or all sheets of paper)

INK COVERAGE OF 1 LB. of INK

TOTAL NUMBER OF LBS. OF INK REQUIRED
FOR EACH COLOR BEING PRINTED
We can not purchase a partial pound of ink. No
matter what these answers come out to we MUST
round up to the next whole number.

Calculating Ink Needed: Example 1

5. The result is the total number of pounds of ink required to print a job. You must repeat this step for each color being printed. Pounds of ink required should be rounded to the next whole pound (do not round down). We can't buy a portion of a pound. So, if you need 23.2lbs you will need to purchase 24lbs.

C= 19.42 lbs.= 20 lbs.

M= 60.42 lbs. = 61 lbs.

Y= 66.89 lbs. = 67 lbs.

K= 25.89 lbs. = 26 lbs.

↑
TOTAL NUMBER OF LBS. OF
INK REQUIRED FOR EACH
COLOR BEING PRINTED

↑
We can not purchase a partial
pound of ink. No matter what
these answers come out to we
MUST round up to the next whole
number.

Calculating Ink Needed: Example 2

Let's Try One More Examples Before Moving On:

How much ink is needed to print 2,000,000 4in x 6in envelopes.

Ink coverage values have been determined by American Printing Company to be C= 0%, M=3%, Y= 6%, K=10%.

Sun Chemical has provided the following ink coverage information. All inks (CMYK)= 85,000 sq. in. per 1lb. of ink.

Calculating Ink Needed: Example 1

How much ink is needed to print 2,000,000 4in x 6in envelopes. Ink coverage values have been determined by American Printing Company to be C= 0%, M=3%, Y= 6%, K=10%. Sun Chemical has provided the following ink coverage information. All inks (CMYK)= 85,000 sq. in. per 1lb. of ink.

1. Calculate the area of paper being used. Are you printing on 8.5in x 11in sheets? 24in x 36in sheets?) [Area= Length x Width]

4 in x 6 in= 24 in. sq.

This is the coverage area for 1 post card if 100% of it was covered in ink.

Calculating Ink Needed: Example 1

2. Multiply the paper area (from step 1) by the ink coverage percentage (this value will always be given to you) to find the total area ink coverage area of ONE SHEET OF PAPER

$$C = 24 \text{ in. sq.} \times .00 = 0.00 \text{ in. sq.}$$

$$M = 24 \text{ in. sq.} \times .03 = .72 \text{ in. sq.}$$

$$Y = 24 \text{ in. sq.} \times .06 = 1.44 \text{ in. sq.}$$

$$K = 24 \text{ in. sq.} \times .10 = 2.4 \text{ in. sq.}$$

We can not multiply by a percentage. We must first convert all percentages to decimals by dividing by 100. These values represent the total ink coverage of each separate ink color (C, M, Y & K) on 1 flyer.

DO NOT ROUND ANY OF YOUR ANSWERS. Rounding, even slightly, can drastically affect the overall ink coverage. These values only represent 1 flyer. Imagine if we were printing 18 million flyers. The end value would be significantly different.

Calculating Ink Needed: Example 1

3. Multiply the coverage area in square inches (from step 2) by the number of sheets being printed.

This gives you the total number of square inches being printed for the entire job.

C = 0.00 in. sq. x 2,000,000 envelopes = 0 sq. in.

M = .72 in. sq. x 2,000,000 envelopes = 1,440,000 sq. in.

Y = 1.44 in. sq. x 2,000,000 envelopes = 2,880,000 sq. in.

K = 2.4 in. sq. x 2,000,000 envelopes = 4,800,000 sq. in.

INK COVERAGE FOR 1 FLYER
(or 1 sheet of paper)

of SHEETS BEING PRINTED

TOTAL NUMBER OF SQ. IN. OF INK
COVERAGE REQUIRED FOR EACH
COLOR OF INK

Calculating Ink Needed: Example 1

4. Divide the total ink coverage area (from step 3) by the coverage area of 1 pound of the ink. You can not calculate the coverage area for 1lb. of ink. This value will ALWAYS be given to you.

$$C = 0 \text{ sq. in.} \div 85,000 \text{ sq. in per lb.} = 0.00 \text{ lbs.}$$

$$M = 1,440,000 \text{ sq. in.} \div 85,000 \text{ sq. in per lb.} = 16.94 \text{ lbs.}$$

$$Y = 2,880,000 \text{ sq. in.} \div 85,000 \text{ sq. in per lb.} = 33.88 \text{ lbs.}$$


$$K = 4,800,000 \text{ sq. in.} \div 85,000 \text{ sq. in per lb.} = 56.47 \text{ lbs.}$$



INK COVERAGE FOR ALL
FLYERS (or all sheets of paper)



INK COVERAGE OF 1 LB. of INK



TOTAL NUMBER OF LBS. OF INK REQUIRED
FOR EACH COLOR BEING PRINTED
We can not purchase a partial pound of ink. No
matter what these answers come out to we MUST
round up to the next whole number.

Calculating Ink Needed: Example 1

5. The result is the total number of pounds of ink required to print a job. You must repeat this step for each color being printed. Pounds of ink required should be rounded to the next whole pound (do not round down). We can't buy a portion of a pound. So, if you need 23.2lbs you will need to purchase 24lbs.

C= 0.00 lbs.= 0 lbs.

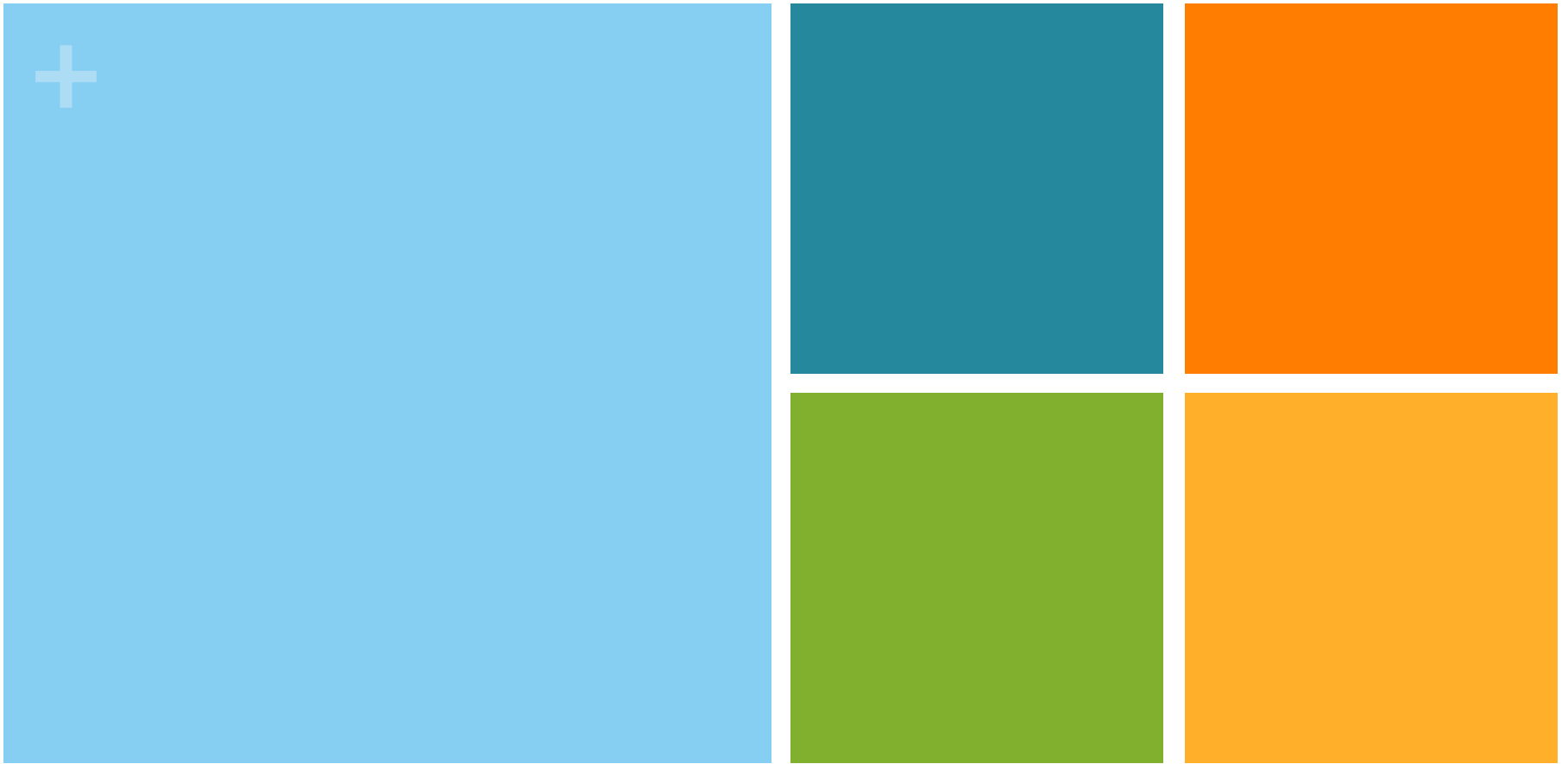
M= 16.94 lbs. = 17 lbs.

Y= 33.88 lbs. = 34 lbs.

K= 56.47 lbs. = 57 lbs.

↑
TOTAL NUMBER OF LBS. OF
INK REQUIRED FOR EACH
COLOR BEING PRINTED

↑
We can not purchase a partial
pound of ink. No matter what
these answers come out to we
MUST round up to the next whole
number.



**Estimate the price for quantities
of ink based on ink coverage**

Formula for Calculating Ink Cost

Once you have calculated the total amount of ink needed (in pounds) use the following formula to put a cost to the ink. You will need to repeat this for each color of ink being used.

$$(\text{Pounds of Ink}) \times (\text{Price of Ink Per Pound}) = \text{Total cost of ink}$$

[only use whole pounds]

Calculating Ink Cost Example 1

How much will the following ink cost?

C= 20 lbs. at \$1.80 per lb.

M= 61 lbs. at \$2.11 per lb.

Y= 67 lbs. at \$1.74 per lb.

K= 26 lbs. at \$0.65 per lb.

Calculating Ink Cost Example 1

How much will the following ink cost?

$$C = 20 \text{ lbs.} \times \$1.80 \text{ per lb.} = \$36.00$$

$$M = 61 \text{ lbs.} \times \$2.11 \text{ per lb.} = \$128.71$$

$$Y = 67 \text{ lbs.} \times \$1.74 \text{ per lb.} = \$116.58$$

$$K = 26 \text{ lbs.} \times \$0.65 \text{ per lb.} = \$16.90$$

\$298.19

Calculating Ink Cost Example 1

How much will the following ink cost?

C= 0 lbs. at \$1.90 per lb.

M= 17 lbs. at \$2.05 per lb.

Y= 34 lbs. at \$1.85 per lb.

K= 57 lbs. at \$0.98 per lb.

Calculating Ink Cost Example 1

How much will the following ink cost?

$$C = 0 \text{ lbs.} \times \$1.90 \text{ per lb.} = \$0.00$$

$$M = 17 \text{ lbs.} \times \$2.05 \text{ per lb.} = \$34.85$$

$$Y = 34 \text{ lbs.} \times \$1.85 \text{ per lb.} = \$62.90$$

$$K = 57 \text{ lbs.} \times \$0.98 \text{ per lb.} = \$55.86$$

\$153.61



What's Next?

HW: Calculating Ink Coverage

Q1: Calculating Ink Coverage