

# Graphic Communications

## Sections

11.1 Printing Processes

11.2 Producing a Graphic Message

## What You'll Learn

- **Identify** common printing processes.
- **Explain** the difference between dynamic digital printing and traditional printing.
- **Describe** the process of producing a graphic message.
- **Compare** photographs and line art.

### Explore the Photo



**Printing Technology** Ink dots make up the different color graphics of a printed picture, such as a magazine advertisement. *Do you think a home computer printer operates like a regular printing press? Why or why not?*





## Launch the TECHNOLOGY LAB

### Create a Graphic Communication Product

At the end of this chapter, you will be asked to design and produce a graphic communication product like buttons, rubber stamps, or other products. Get a head start by using this checklist to prepare for the Technology Lab.

#### PROJECT CHECKLIST

- ✓ Identify the graphic communication products that can be made in class.
- ✓ Find out if you need to pass a safety test.
- ✓ Decide whether to organize a fund raiser or take advance orders to pay for materials.

# Printing Processes

## Reading Guide

### Before You Read

**Connect** Do you think a copy machine is a type of printer? Why?

### Content Vocabulary

- letterpress printing
- flexography
- gravure printing
- lithography
- serigraphy
- dynamic digital printing
- xerography
- ink-jet printing

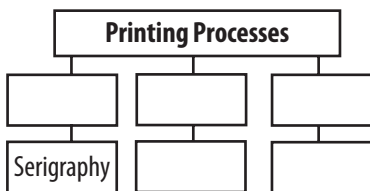
### Academic Vocabulary

You will see these words in your reading and on your tests. Find their meanings at the back of this book.

- journal
- purpose

### Graphic Organizer

Draw the section diagram. Use it to organize and write down information as you read.



Go to [glencoe.com](http://glencoe.com) to this book's OLC for a downloadable graphic organizer and more.

### TECHNOLOGY STANDARDS

- STL 5** Environmental Effects
- STL 12** Use & Maintenance
- STL 17** Information & Communication Technologies

### ACADEMIC STANDARDS

#### Social Studies

**NCSS 2** Time, continuity, and change

#### English Language Arts

**NCTE 11** Participate as members of literacy communities.

**STL** *National Standards for Technological Literacy*

**NCTM** *National Council of Teachers of Mathematics*

**NCTE** *National Council of Teachers of English*

**NSES** *National Science Education Standards*

**NCSS** *National Council for the Social Studies*

## Importance of Printing

### Why is printing so important to society?

If all forms of printing suddenly disappeared, there would be no books, magazines, **journals**, or newspapers to read. A supermarket would have thousands of items without labels. There would be no paper money and no circuit boards for computers and televisions. Electronic formats would also disappear since graphic communication processes are used to create CDs, DVDs, e-books, and Internet pages.

There are many types of printing. This chapter discusses these types of printing: letterpress, gravure, lithography, photographic, serigraphy, and dynamic digital printing processes.

### As You Read

**Identify** What types of printing are used for what purposes?

# Letterpress Printing

## What part of a letterpress printing plate does the printing?

Letterpress printing uses metal type that is very similar to the type created by Johannes Gutenberg in the 15<sup>th</sup> century. In **letterpress printing**, the printing surface is a mirror image that is raised above the rest of the printing plate. (See **Figure 11.1**.) Another term for letterpress printing is *relief printing*. Letterpress printing plates can also be made of plastic and rubber, which is becoming more common.

Increased demand for printed materials continues to spur the development of newer, faster specialized equipment. Letterpress improvements did not match the improvement in speed and function of other printing technologies, and so its use has diminished. Letterpress still holds on to a small market share in areas where other printing technologies cannot match the printing characteristics of its metal, rubber, and plastic plates.

## Flexography

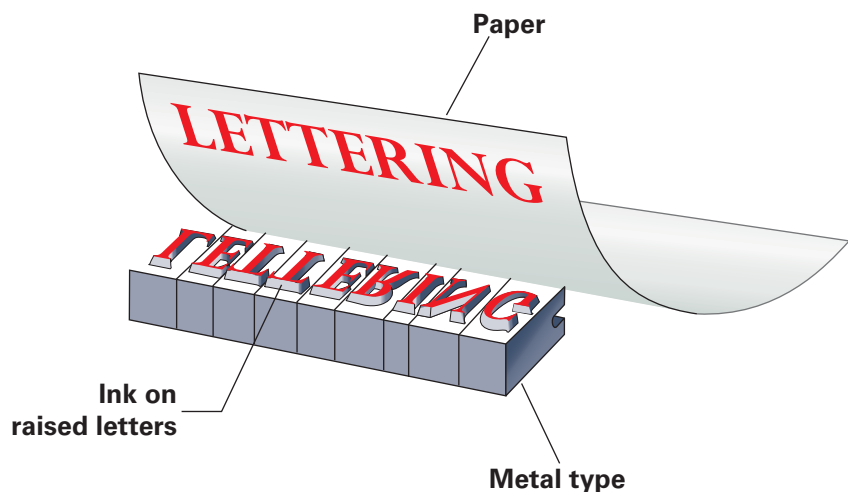
When the printing plates are made of rubber, the process is called **flexography**. This form of letterpress printing is still popular. For example, rubber stamps can print on corrugated boxes, wallpaper, food packaging, paper bags, and several other flexible materials.



Reading Check

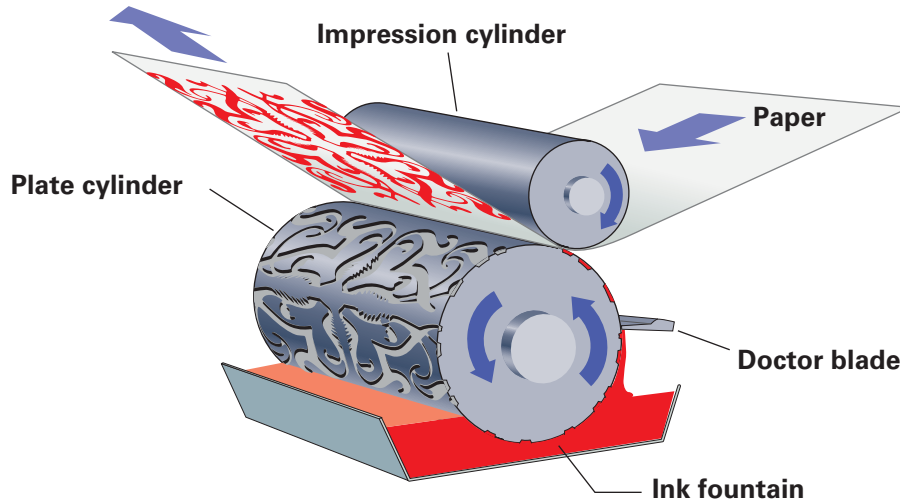
**Identify** What is one type of letterpress printing?

**Figure 11.1** Letterpress Printing Process



**Letterpress Style** In letterpress printing, the printing surface is raised above the rest of the printing plate. *What is a common form of letterpress printing that is used in crime investigations?*

**Figure 11.2** Gravure Printing Process



**Printing with Etched Plates** A gravure printing plate has inkwells etched or carved into its surface. *How might the number of ink wells and the depth of these wells affect the quality of printing?*

## Gravure Printing

*What part of a gravure printing plate does the printing?*

In **gravure printing**, the printing plate is usually made of metal and has depressions, or pits, in its surface. (See **Figure 11.2**.) The pits vary in depth and thickness and function like miniature inkwells. The deeper the inkwell, the more ink it will hold, and the darker it will print. Gravure printing is also called “intaglio printing.” It is used for printing magazines, paper money, and postage stamps.

## Lithography

*What is the difference between stone lithography and offset lithography?*

Lithography is sometimes called “planographic printing” because the printing surface of the printing plate is perfectly flat. **Lithography** is a printing process based on the scientific principle that oil and water do not mix.


## The Process of Lithography

Artists perform the entire process by hand with a limestone slab or other flat printing plate. They create an image on their plate with an oily medium. Water is applied to the plate, and then ink is applied. Ink sticks only to the oily image and is repelled by the water from the rest of the plate. Paper is pressed against the plate, and the ink transfers to the paper.

### E-Textbooks

An e-book can be downloaded to your computer or a hand-held reading device. Instead of reading a paper book, you read text on a screen. E-books have been available, but consumers have not been buying them. In the future, instead of carrying heavy schoolbooks, students might prefer to keep their “text-books” in a small device like an Apple iPhone®.

*Would you switch to e-textbooks if the reading device allowed you to text-message, surf the Internet, and make phone calls? Why or why not?*

 Go to [glencoe.com](http://glencoe.com) to this book’s OLC for answers and to learn more about e-books and technology.

## Offset Lithography

In offset lithography, the image is usually placed on a thin metal plate through a photographic process. The plate is mounted on an offset press, which prints the image to a rubber blanket. Then the blanket transfers the image to the paper. (See Figure 11.3.)

Offset printing is currently the fastest, most popular, and most economical method of printing. A Web offset press prints from a roll of paper. The fastest Web-feed press can print more than 100,000 copies per hour. This textbook was printed on an offset lithography press.

This kind of press produces a variety of print products. Its main **purpose** is to print:

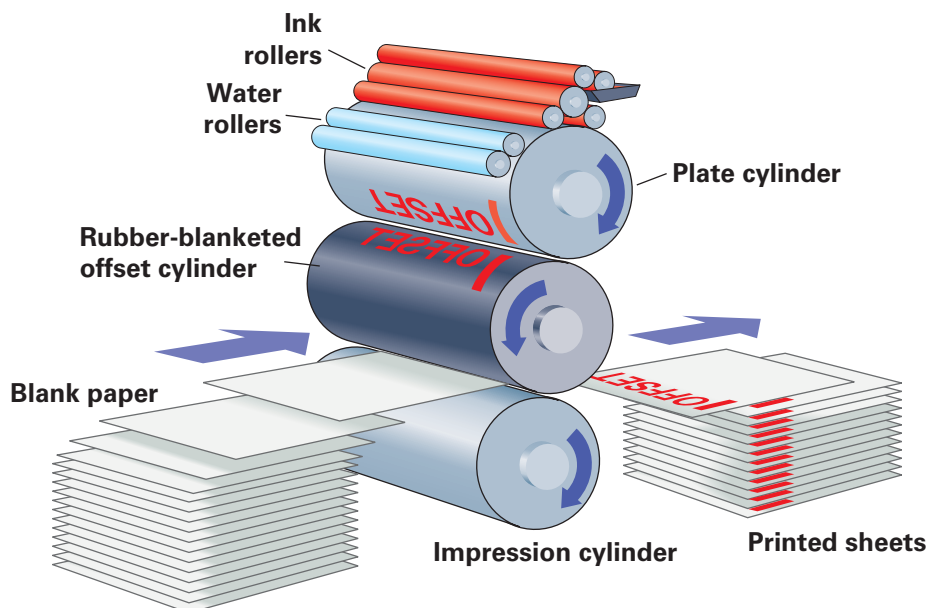
- Business forms
- Magazines
- Newspapers
- Books


## Photographic Printing

*What is the plate used in photographic printing?*

Photography is considered to be a printing technique. Basically, when you make a photographic print of a picture you have taken, light is projected through a plate that is called a “negative.” The light is projected onto a light-sensitive material, such as special photographic paper. After processing, the image appears. Chapter 12 discusses more about photography.

**Figure 11.3** Lithography Printing Process



 **Offset Printing** In offset lithography, the flat printing plate transfers the image to a rubber blanket. The rubber blanket then prints the image onto paper. *Why is the image on an offset-lithography printing plate not reversed like a mirror image?*



Michael Newman/Photo Edit

 **T-Shirt Art** In this production shop, workers are screen printing logos and art on many T-shirts. *How is ink transferred from a serigraphy printing plate to the printed object?*

## Serigraphy

*Why are designs and sayings printed on shirts usually by serigraphy?*

In **serigraphy**, or screen process printing, the printing plate is an open screen of silk, nylon, or metal mesh. The openings in the screen are sealed in the non-printing areas. Ink is then forced through the open areas of the screen by the movement of a tool called a squeegee. Serigraphy is used to print designs on shirts, patterns on fabrics, labels on glass and plastic bottles, and details on plastic and wood toys.



**Contrast** What is the difference between serigraphy and lithography?

## Dynamic Digital Printing

*How does dynamic digital printing differ from the other printing processes?*

The newest type of commercial printing is called **dynamic digital printing**. A machine prints directly from a computer file without using a traditional printing plate. (See Figure 11.4.) You perform dynamic digital printing every time you send a document from your computer to your printer.

All digital printing machines need to refresh the image before each page is printed. This means that every page in a continuous printing run can be different. This is a perfect printing technology for people who want to place personalized information in each document that they print and mail in bulk. This technology also allows an entire book to be printed one copy at a time. Your local library might soon have an Espresso Book Machine to print books on demand. Type “Espresso Book Machine” into your favorite search engine to find out more.

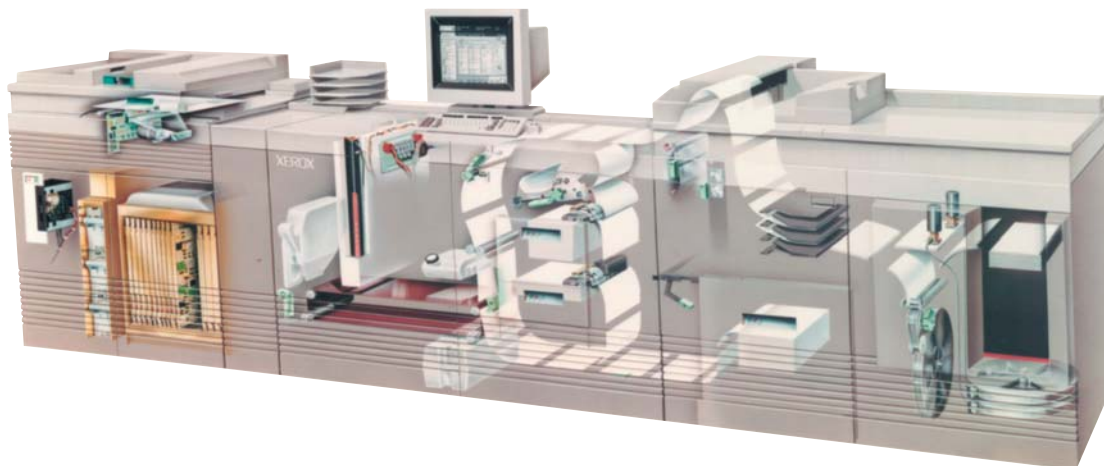
As dynamic digital printing gains in speed and efficiency, it will replace many of the more traditional methods of printing. These changes may cause some workers to retrain or lose their jobs. They will need to learn new skills. Dynamic digital printing processes include:


- Xerography
- Electron beam imaging
- Electrophotography
- Magnetography
- Ink-jet printing

## Xerography

You use xerography, or electrostatic printing, whenever you use a laser printer or a basic copy machine at school, at a library, or at a copy shop. This process uses a special metal plate in the shape of a cylindrical drum, static electric charges, and a powder that is called a “toner.” **Xerography** is the printing process that transfers negatively charged toner to positively charged paper.

**Figure 11.4** Dynamic Digital Printing



 **All in One** This dynamic digital printing press prints, collates, and binds a book in one operation. *How may this technology affect employment?*



## Chester Carlson

### *Inventor of Xerographic Process*

Chester Carlson (1906–1968) invented the photocopier. As a young man, he worked as a patent analyzer for an electrical component maker. This job required reviewing and preparing many drawings and documents, all of which he had to copy by hand. Being near-sighted and arthritic, this proved difficult for him. Carlson decided to come up with a better way.

He worked at his home on an idea for a reproduction technique based on photoconductivity. Carlson developed a process in which some materials changed their electric properties when exposed to light. In 1942, he patented this process and called it “electric photography.”

**Patent Patience** It took years of trying to sell his new patented technology. In 1960, the Haloid Company, later known as *Xerox*, bought Carlson’s idea. The Xerox copy machine was born.

**English Language Arts/Writing** Write a few paragraphs on the importance of the photocopier in your everyday life.



Go to [glencoe.com](http://glencoe.com) to this book’s OLC to learn about young innovators in technology.



## Parts of Xerographic Printers

The drum, or printing plate, conducts electricity when exposed to light, but it acts as an insulator when the light is off. The machine projects an image onto the statically charged drum. The lit area of the drum conducts electricity and loses its static charge. The image area remains dark and is, therefore, still charged. The image becomes visible when the negatively charged toner sticks to the drum. A static charge causes the toner to transfer to the paper. Then the paper travels through a heater. The heat causes the powder to melt onto the page and become permanent. Finally, the image on the drum is refreshed for the next print. Xerography, or electrostatic printing, allows you to print or duplicate a large quantity of material very quickly.

## Color Xerography

A color electrostatic printer separates the original image into four images or four layers. These images each receive their own color toner in perfect alignment on the same piece of paper. When the different layers of colors are fused to the paper, they work together to produce all the colors of the original as one image. Electrostatic printing allows for quick printing of newsletters, advertisements, and business forms.

## Electron Beam Imaging (EBI)

Electron beam imaging uses an electron beam instead of a laser to create the image on the drum. Streams of electrons carry toner to the drum, instantly forming the image. The rest of the process is very similar to laser printing. Currently electron beam imaging is the fastest dynamic digital printing process, with press runs capable of producing a 400-page book every ten seconds.

## Electrophotography and Magnetography

Electrophotography machines use tiny light-emitting devices to expose a light-sensitive, rotating electronic film. The entire page is transferred to the printing drum in a single flash of light.

Magnetography machines have special drums that allow individual points on the drum's surface to be instantly magnetized. In a thousandth of a second, a complete magnetized image is transferred to the drum for printing. Magnetography uses a magnetized toner. The fusing of this toner to paper is very similar to laser printing.

## Ink-Jet Printing

In **ink-jet printing**, there are no printing plates or drums. The printer actually has very tiny spray guns that shoot their ink to the printing surface. Since the spray guns do not touch the material being printed, this method can be used to print on uneven or fragile surfaces.

In multicolor ink-jet printing, a separate ink gun is used to apply each color ink. With this process, many colors can be printed at the same time.

### In Living Color

With the development of graphics programs and color ink-jet printers, many people can afford to print color images for newsletters, reports, photos, greeting cards, and other materials. *How does an ink-jet printer operate?*





### Recycling Billboards

Billboards are a form of advertisement. However, some people see them as eyesores. Some can even hurt the environment. After being used, the toxic PVC vinyl “posters” that are pasted on billboards are dumped in landfills. In response, one Los Angeles art gallery is reusing them as canvases for artists.

**Try This** Think of one new and creative way to reuse a non-recyclable item that gets thrown away. Share this idea with your class and try it at home if possible.

Do you think ink-jet printers are slow? Then do an Internet search for “Kodak Stream” and learn about a color ink-jet printer that spits ink like a machine gun on paper that is moving 24 miles an hour.

## Impacts of Graphic Communication

*What are some positive and negative impacts of printing technologies?*

For more than 500 years, printing has helped distribute knowledge to every corner of our world. Every aspect of our society, every business, every workplace, and every government agency needs graphic communication to function. These are positive impacts of graphic communication.

However, some changes due to graphic communication technologies have not been positive. Economic factors and environmental concerns are sometimes opposed. Waste products from paper mills and printing facilities have polluted rivers and streams. Many of the substances once used in these industries have been linked to cancer and other debilitating diseases.

The undesired effects of past technology can motivate inventors to develop new technologies that can solve past problems. For example, new technologies have been developed to break down wastes from graphic communication industries in order to protect local communities and waterways.

### section 11.1 assessment

#### After You Read

#### Self-Check

1. Explain letterpress printing.
2. Explain gravure printing.
3. Discuss characteristics of lithography.

#### Think

4. Identify the difference between dynamic digital printing and traditional methods.

#### Practice Academic Skills



#### English Language Arts/Writing

5. Using the Internet and the library, do research about the positive and negative impacts of graphic communication on society or on the environment. Write a one-page report and present it to the class.



#### Mathematics

6. An offset printing press is set up with four plates, one for each of the four colors used in a brochure. If the press can produce 42,000 brochures in one hour, how many can it produce in one minute?



#### Problem Solving

Sometimes a word problem contains information that is not needed to solve it.

1. Think about the question asked in the problem.
2. Be sure to eliminate any information that is given but not needed.



For help, go to [glencoe.com](http://glencoe.com) to this book’s OLC and find the Math Handbook.

# Producing a Graphic Message

## Reading Guide

### Before You Read

**Preview** Which colors do you think are used in four-color process printing? Why?

### Content Vocabulary

- copy
- print
- layout
- line art
- halftone
- four-color process printing
- desktop publishing

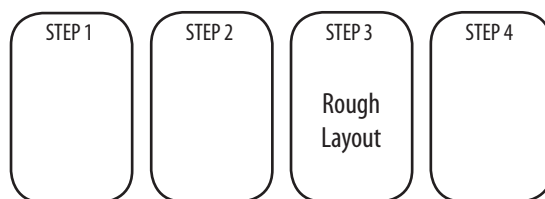
### Academic Vocabulary

- identify
- publication

### Graphic Organizer

Draw the section diagram. Use it to organize and write down information as you read.

#### Producing a Graphic Message



Go to [glencoe.com](http://glencoe.com) to this book's OLC for a downloadable graphic organizer and more.

### TECHNOLOGY STANDARDS

- STL 4** Cultural, Social, Economic & Political Effects
- STL 8** Attributes of Design
- STL 17** Information & Communication Technologies

### ACADEMIC STANDARDS

#### Science

**NSES Content Standard E** Abilities of Technological Design

#### English Language Arts

**NCTE 9** Develop an understanding of diversity in language use across cultures.

- STL** *National Standards for Technological Literacy*
- NCTM** *National Council of Teachers of Mathematics*
- NCTE** *National Council of Teachers of English*
- NSES** *National Science Education Standards*
- NCSS** *National Council for the Social Studies*

## Producing a Graphic Message

*In graphic communication, what is the difference between copy and prints?*

Before being printed, every graphic message, such as an advertisement, poster, or announcement, must be designed by a designer. After the message is designed, there are steps to take for preparing it for printing. These steps are called “prepress operations.” At this stage before printing, the message is called **copy**. After printing, the copies of the message are called **prints**. This section will discuss how pages are designed and illustrations are prepared for printing.



### As You Read

**Compare** What is more important in a graphic message—words or pictures?

**Making Things Fit**

Pictures often have to be reduced or enlarged to fit the space in a layout. When one dimension (measurement) changes for fitting, the other dimension changes proportionately. If you change the first dimension of a  $3 \times 5$  photo to 6 inches, the second dimension must then become 10 inches.

**Apply** Calculate the missing number in these photo sizes:  
 $4 \times 5 = 6 \times ?$ ;  $5 \times 7 = 7.5 \times ?$ ;  $11 \times 14 = 1.57 \times ?$



# Message Design

*How do graphic designers develop their ideas?*

The first step of developing a message design is to **identify** the message and decide how to convey it to your audience. The arrangement of type, artwork, and photographs on a page is called a **layout**. Designers often create a number of sketches of possible layouts. (See **Figure 11.5**.) In the second step, the designers select the best layout or brainstorm improvements. In the third step, they create a comprehensive layout of all the details. The fourth and last step is the creation of camera-ready copy, which is a replica of how the item will appear. Today almost all prepress operations are done on computers.



**List** What are the typical steps of the message design process?

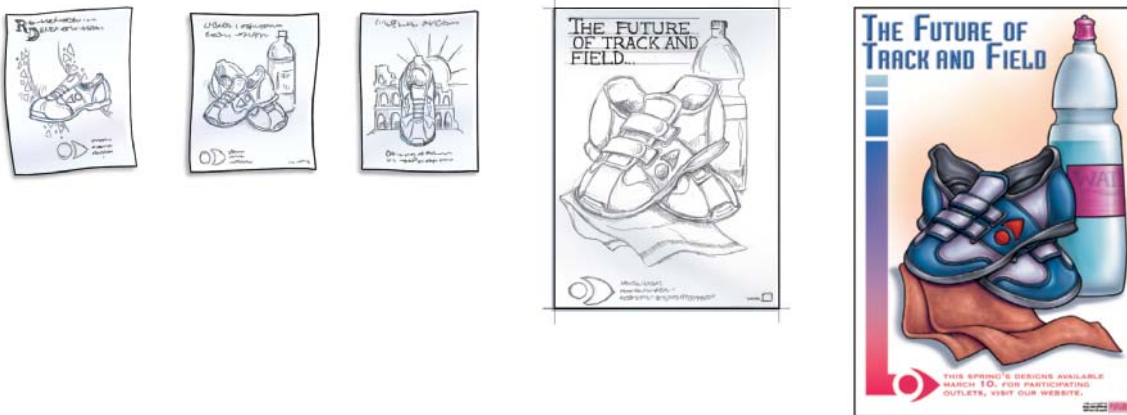
## Illustrations

*What is the difference between photographs and line art?*

When drawings are made of solid lines and shapes, they are called **line art**. However, a photograph has shades of color which are referred to as *gradation of tones*, which include black areas, white areas, and other areas that are light to dark shades of gray.

To print a photograph, you need to create a **halftone**, which converts the tones into a series of dots. The spacing and size of the dots determine if you see black, white, or gray. You can create a halftone by scanning the photograph into a computer file or by re-photographing it through a halftone screen. Digital cameras shoot all photographs as halftones.

**Figure 11.5** Message Design



**Planning the Design** Many designers use hand-drawn sketching for preliminary drawings, while others use computers to create artwork. *Why would a designer prepare many drafts or sketches?*



Black



Magenta



Cyan



Full-color image



Yellow

## Reproducing Colors

### How are colors produced?

All colors in nature can be reproduced through the printing of three primary ink colors plus black. **Four-color process printing** combines black, magenta (similar to red), cyan (blue), and yellow to print the colors of a rainbow.

When you see a color-printed object, you see the image in full color because light is reflected from the inks. White light contains the wavelengths of all colors. The inks absorb (subtract) some of the wavelengths of white light and reflect the color wavelengths. So, the inks are called “subtractive” colors.

To create color images, a process called “color separation” is used. In the past, halftones were printed on top of one another to produce the illusion of all colors. Today most color separations are created by using computer programs and scanners.

 **Four Colors of the Spectrum** All the colors of the rainbow can be reproduced on a printing press by using ink in four colors—magenta, cyan (blue), yellow, and black. *How does reflected light change these colors into every color of the rainbow?*



**Explain** What is four-color process printing?

## Desktop Publishing

### What is the purpose of desktop publishing software?

When you use a computer to design and produce a **publication**, you are doing **desktop publishing**. Desktop publishing software is also used to convert electronic images into the formats for publishing CDs, DVDs, e-books, and Internet pages.



**Define** What is desktop publishing?

## The Right to Copy

Have you ever seen a funny story or joke on an Internet Web site and wanted to copy it? The Internet makes it easy to copy and transmit material. However, when material is copyrighted, it should not be reproduced without permission from the owner of the material.

**Copyright Protection** You must assume that everything you see on the Internet is copyrighted. Using copyrighted material without permission is considered stealing. Lawmakers are working on new laws to regulate copying material found on the Internet.

## English Language Arts/Writing

**Changing Laws** Research the laws that protect any material found on the Internet. Find out if there are any exceptions to the laws.

1. Use the library or the Internet to research current and future copyright laws related to writing, music, and films or television shows.
2. Write about a writer or company using material you have created and why you would or would not be protected. The material can be a story, a song, or a film.

## Teamwork and Desktop Publishing

Students can use desktop publishing software to set up school newspaper pages exactly the way they will look when the pages are printed. Time is limited, so a team must work efficiently. The member of the team who is the best typist could do the typing, and the best artist might create the layout. The student who is most computer literate might take care of routine hardware and software problems, system management, and file backup. Most school newspapers are team efforts with students from different grades working together, enhancing each other's skills.

section

11.2

assessment

### After You Read

1. Define a layout.
2. Explain line art.
3. Describe a halftone.

### Think

4. Explain why film photographs and digital photographs are handled differently for printing.

### Practice Academic Skills



#### English Language Arts

5. Use the Internet and the library to do research on the history or evolution of the basic printing processes. Make a poster or presentation slides to illustrate your research. Write a one-page report on how people's needs and wants changed with that evolution.



#### Science

6. Magenta, yellow, cyan, and black inks are used as primary colors in the printing process to create all other colors. Find a color wheel in a science textbook or a book about painting. Use it to help figure out which of the four primary colors are used to make each of these colors:
  - Green
  - Orange
  - Dark blue
  - Purple
  - Olive green

# Exploring Careers

# in Technology

## Audrey Yamada

### SCREEN PRINTER

**Q:** *What do you do?*

**A:** I own a screen-printing business. We're not limited to printing on T-shirts and sweatshirts. We also provide printed promotional items such as totes, caps, mugs, and other items. Whatever our customers would like to embellish, we try our best to fulfill.

**Q:** *How did you become interested in your field?*

**A:** My brother started the company, and I inherited the position of owner/operator. He had a good crew already, which made the transition and learning process quite easy for me. Once I started, I liked the business immediately.

**Q:** *What do you enjoy most about your job?*

**A:** The most rewarding part of my job is when customers are happy and excited about a job that we did for them. We tend to work with creative people, which is just great! Bands sell apparel on tour; artists make shirts to commemorate exhibitions; and magazines make them for readers. We can help them. Keeping them happy is important since most of my new business comes from word of mouth.

**Q:** *What do you do to keep up with the industry?*

**A:** We go to trade shows where we can talk to our peers. Knowing the latest screen-printing processes, software, and trends is essential. This allows us to offer the best quality, speed, and products.



### English Language Arts/Writing

**Write a Proposal** Write a proposal to a possible client explaining how you can help his or her business.

1. Using a word-processing document, describe your services as well as the technology you offer.
2. On paper or with an illustration program, depict possible promotional items that you can make for the client.
3. Using a spreadsheet program, create a table listing your services and their prices.



Go to [glencoe.com](http://glencoe.com) to this book's OLC to learn more about this career.

### Real-World Skills

Speaking, listening, problem-solving

### Academics and Education

Mathematics, English language arts, marketing

### Career Outlook

Growth slower than average for the next ten years

**Source:** *Occupational Outlook Handbook*



## Chapter Summary

**Section 11.1** Graphic communication is also called “printing.” It includes printing with ink on paper and publishing CDs, DVDs, e-books, and Web pages. The type of printing process used is determined by the part of the printing plate that prints. Letterpress prints from the raised part of the plate. Gravure prints from inkwells etched into the plate. Lithography prints from a

plate that is flat. Photographic printing uses light. Serigraphy prints through little holes in the plate. Dynamic digital printing prints directly from a computer file. Electron beam imaging uses an electron beam to create an image. Electrostatic printing prints from a plate charged with static electricity. Ink-jet printing sprays ink directly on the material being printed.

**Section 11.2** Desktop publishing is used to print newspapers, stationery, booklets, and other items. Computers and electrostatic printers have made this type of printing possible.

## Review Content Vocabulary and Academic Vocabulary

1. On a sheet of paper, use each of these terms and words in a written sentence.

**Content Vocabulary**

- letterpress printing
- flexography
- gravure printing
- lithography
- serigraphy
- dynamic digital printing
- xerography
- ink-jet printing
- copy
- print
- layout
- line art
- halftone
- four-color process printing
- desktop publishing

**Academic Vocabulary**

- journal
- purpose
- identify
- publication

## Review Key Concepts

2. **Explain** the importance of printing to society.
3. **Contrast** letterpress, gravure, offset lithography, and serigraphy processes.
4. **Discuss** the impact of dynamic digital printing.
5. **Identify** the positive and negative impacts of printing technologies.
6. **Describe** the steps in prepress operations.
7. **Explain** how to produce a graphic message.
8. **Identify** the difference between photographs and line art.
9. **Define** color separation.
10. **Discuss** a situation in which desktop publishing is useful.



## Real-World Skills

- 11. Understanding Printing Costs** Produce a one-page flyer advertising a charity event such as a fun run or golf outing. Contact local graphic designers, paper retailers, and copy stores to obtain bids from each. Create a budget for producing 1,000, 5,000, and 10,000 flyers. Include in your budget fixed costs and costs that vary.

### **STEM** Technology Skill

- 12. Create a Layout** Design a half-page public service ad to promote a club or organization. Include a headline, some copy, and an illustration or photograph.
- Create a layout for your ad on paper.
  - Use art or drawing software to create a layout for the same ad. Compare the approaches in a paragraph.



## WINNING EVENTS

### Graphic Designer

**Situation** Your principal has asked you to design a new letterhead for the school, business cards for the teachers, and a new layout and design for the school's newsletter.

**Activity** With a team, develop several different sketches. Use computer graphic design tools to develop possible designs. Select a design and have the new business cards and letterhead printed. Incorporate the design in your newsletter.

**Evaluation** The project will be evaluated by the following criteria:

- Originality
- Appearance
- Communication



Go to [glencoe.com](http://glencoe.com) to this book's OLC for information about TSA events.

## Academic Skills



### Social Studies

- 13.** Write a one or two-page report about the history of printed money and the steps printers take to discourage counterfeiting. Discuss the problems and solutions that have improved digital technology. Examples include changing the look of paper money.



### Mathematics

- 14.** April found that she could produce 1,000 copies of an advertising brochure for \$550. If she produces 2,500 copies, the cost per copy will be 10 percent less. What is the cost per copy if she prints 1,000 copies? What is the cost per copy if she prints 2,500?



### Math Concept Percents and Decimals

To change a percent to a decimal, drop the percent sign and divide by 100 by moving the decimal point two places left.



## Standardized Test Practice

**Directions** Choose the letter of the best answer. Write the letter on a separate piece of paper.

- Which phrase best describes a halftone?  
**A** camera-ready copy  
**B** a layout of lines and shapes  
**C** a pattern of dots  
**D** electronic imaging
- Ink-jet printing technology uses a system of revolving drums with plates attached.  
**T** **F**

**Test-Taking Tip** If each item on a test is worth the same number of points, do not spend too much time on questions that are confusing.

## Create a Graphic Communication Product

You can use graphic communication processes to develop many different products to keep, sell, or share. Companies and organizations use these kinds of products for advertising, promotions, and good public relations. Can you think of some products that have logos or product names printed on them?

### Tools and Materials

- ✓ Button machine
- ✓ Button parts
- ✓ Button print cutter
- ✓ Computer/printer
- ✓ Shirt transfers
- ✓ Heat transfer press or electric iron
- ✓ Shirts
- ✓ Linoleum blocks
- ✓ Linoleum block cutters
- ✓ Proof press
- ✓ Printer's ink
- ✓ Bench hook
- ✓ Paper
- ✓ Padding cement
- ✓ Paper cutter
- ✓ Spiral binding machine
- ✓ Spirals
- ✓ Engraver

### Set Your Goal

Your goal is to create a product by using graphic communication processes. Buttons, logos on shirts, and notebook covers are only a few of the possibilities. Buttons can be designed with funny sayings or images on them. Notebooks with covers in school colors are always popular.

### Know the Criteria and Constraints

In this lab, you will:

1. Choose a product to manufacture. Your team will make enough of your product to share.
2. Brainstorm ways to organize the tasks for maximum efficiency.
3. Establish a method for checking product quality.



## Design Your Project

Choose one of the following projects and follow the steps for that project.

### Buttons

1. Draw or use a graphics program to create designs; for example, a school emblem.
2. Collect photos from friends or family, and transform the photos into buttons. Take orders for photographic buttons.
3. Let people design their own buttons. Make a form as a circle the size of the button.
4. Cut the design out using the button print cutter.
5. Place the design and button materials into the machine and press the button.
6. Remove the button.

### Notebooks or Pads of Paper

1. Draw a linoleum block design for the cover of a small assignment pad or spiral notebook.

2. Transfer the design to the block. Carve it out using linoleum block cutters and a bench hook.
3. Print the design on cover stock at the proof press.
4. Cut paper at the paper cutter.
5. Attach cover and paper together to make a pad or a spiral notebook.

### Print Logo on Shirts

1. Create your design on a computer.
2. Print your design using transfer instructions.
3. Design your transfer for printing as a mirror image.
4. Apply the transfer to the shirt following instructions.

## SAFETY

### Reminder

You must pass a safety test before you use the tools and machines needed for this activity. Be sure to follow appropriate safety procedures and rules so you and your classmates do not get hurt.

## Evaluate Your Results

After you complete the lab, answer these questions on a separate piece of paper.

1. What safety rules did you follow?
2. What project did you enjoy the most? Why?
3. What would you do differently?

Academic Skills Required to Complete Lab				
Tasks	English Language Arts	Math	Science	Social Studies
Brainstorm efficiency procedures.	✓			✓
Design image to be printed.			✓	
Learn to use graphics equipment.	✓		✓	
Print image.			✓	