# Output

**Discovering Computers 2012**

Your Interactive Guide
to the Digital World

# Objectives Overview

Describe the types of output

Explain the characteristics of various display devices

Describe the factors that affect the quality of an LCD monitor or LCD screen

Describe various ways to print

Differentiate between a nonimpact printer and an impact printer

# Objectives Overview

Summarize the characteristics of ink-jet printers, photo printers, laser printers, multifunction peripherals, thermal printers, mobile printers, label and postage printers, and plotters and large-format printers

Describe the uses and characteristics of speakers, headphones, and earbuds

Identify the purpose and features of data projectors, interactive whiteboards, and force-feedback game controllers and tactile output

Identify output options for physically challenged users

# What Is Output?

- **Output** is data that has been processed into a useful form



TEXT    GRAPHICS

AUDIO    VIDEO

# What Is Output?

- An **output device** is any type of hardware component that conveys information to one or more people

Display devices

Printers

Speakers, headphones, and earbuds

Data projectors

Interactive whiteboards

Force-feedback game controllers

Tactile output

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# Display Devices

- A **display device** visually conveys text, graphics, and video information

- A **monitor** is packaged as a separate peripheral

  - **LCD monitor**
  - Widescreen

# Display Devices

- **Liquid crystal display** (**LCD**) uses a liquid compound to present information on a display device

Active-matrix display

Passive-matrix display

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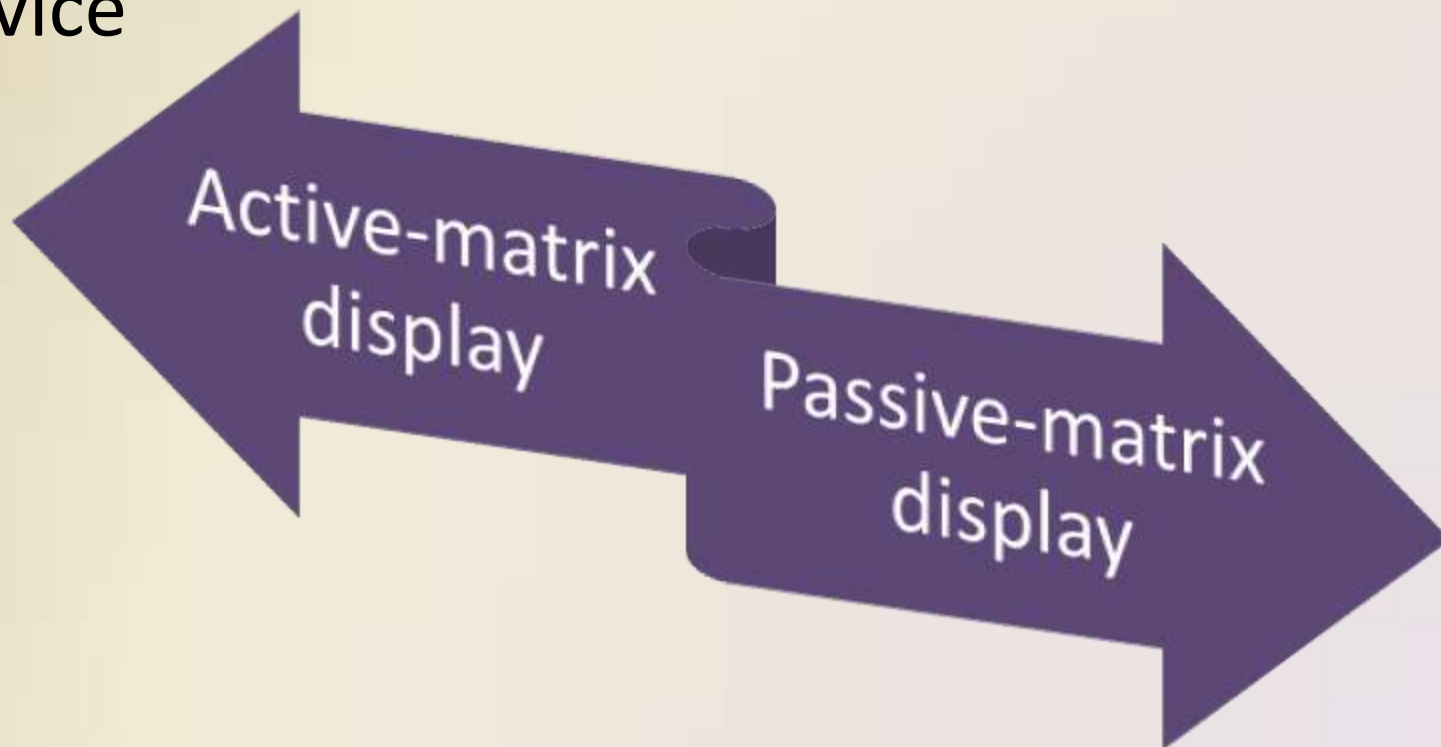
# Display Devices

- The quality of an LCD monitor or LCD screen depends primarily on:
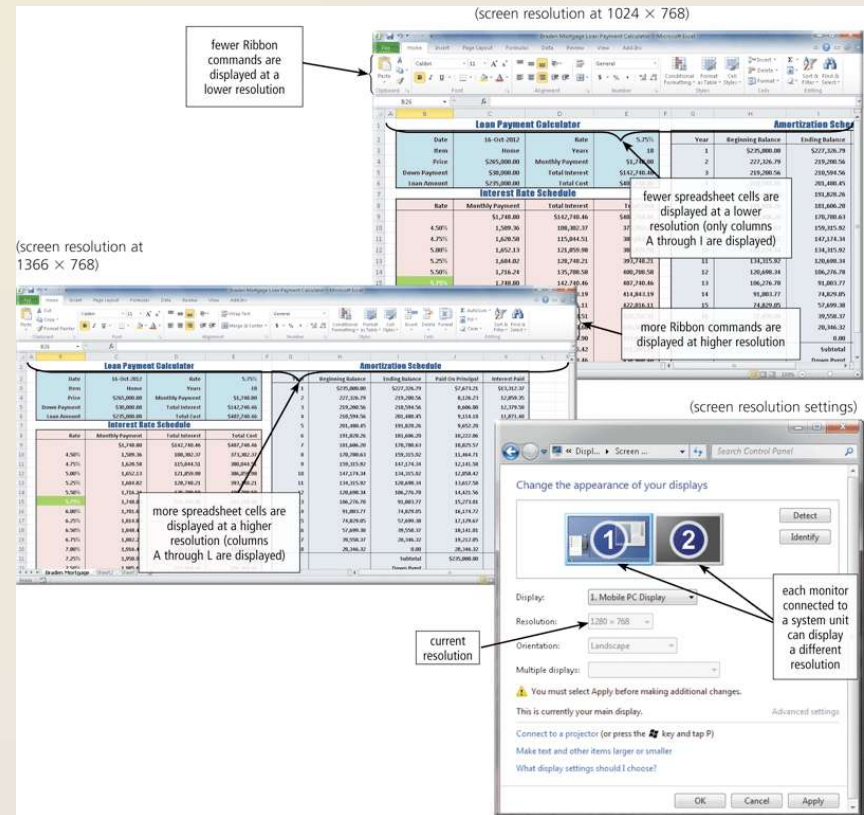
**Resolution**

Response time

Brightness

Dot pitch

Contrast ratio

# Display Devices

- **Resolution** is the number of horizontal and vertical pixels in a display device
  - A higher resolution uses a greater number of pixels

# Display Devices

- The graphics processing unit (GPU) controls the manipulation and display of graphics on a display device

- LCD monitors use a digital signal and should plug into a DVI port, an HDMI port, or a DisplayPort



DVI port
S-video port
standard monitor port
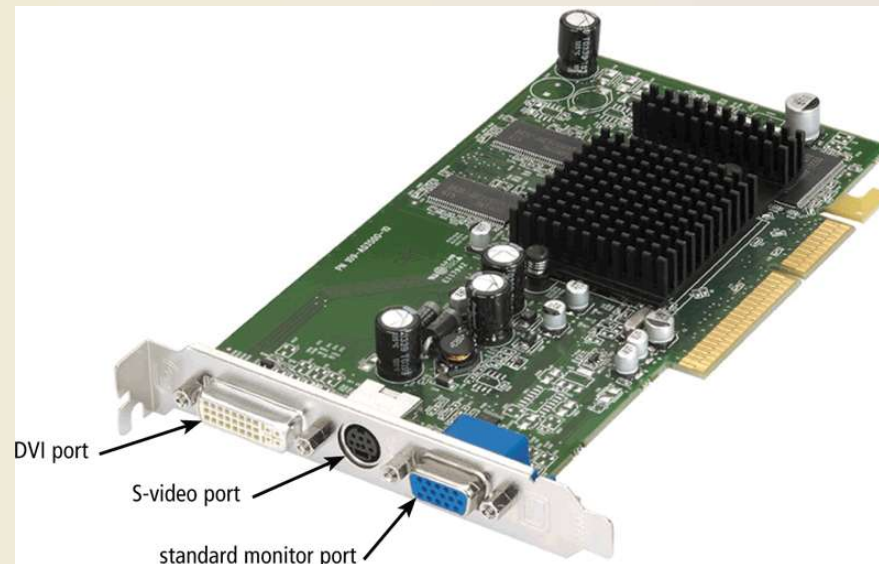
# Display Devices

- **Plasma monitors** are display devices that use gas plasma technology and offer screen sizes up to 150 inches

# Display Devices

- Televisions also are a good output device
  - Require a converter if you are connecting your computer to an analog television
- Digital television (DTV) offers a crisper, higher-quality output
- **HDTV** is the most advanced form of digital television

# Display Devices

- A **CRT monitor** is a desktop monitor that contains a cathode-ray tube
  - Have a much larger footprint than do LCD monitors

# Printers

- A **printer** produces text and graphics on a physical medium

  – Printed information is called a hard copy, or printout

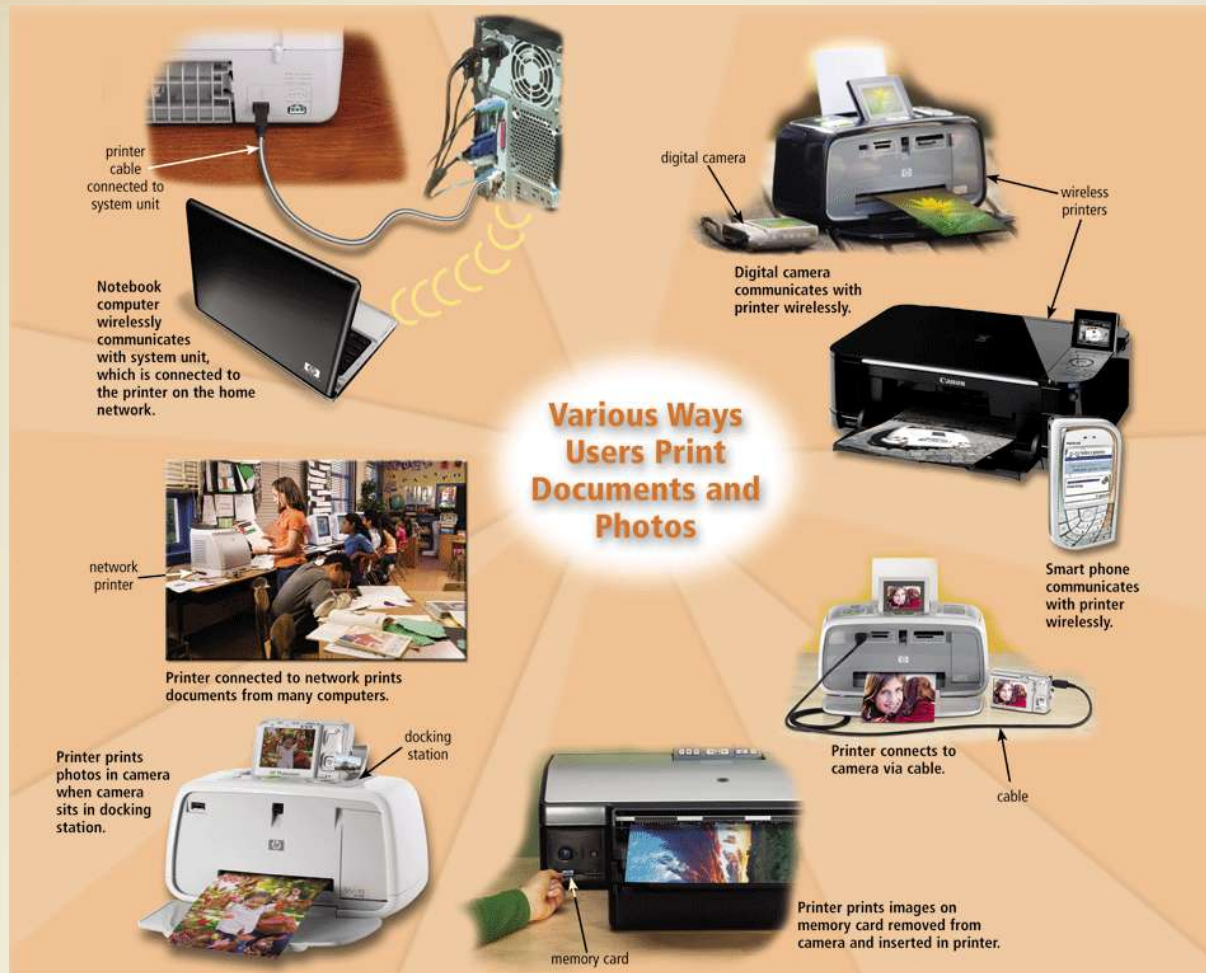  – Landscape or portrait orientation

# Printers

**Before purchasing a printer, ask yourself a series of questions:**

1. What is my budget?
2. How fast must my printer print?
3. Do I need a color printer?
4. What is the cost per page for printing?
5. Do I need multiple copies of documents?
6. Will I print graphics?
7. Do I want to print photos?
8. Do I want to print directly from a memory card?
9. What types of paper does the printer use?
10. What sizes of paper does the printer accept?
11. Do I want to print on both sides of the paper?
12. How much paper can the printer tray hold?
13. Will the printer work with my computer and software?
14. How much do supplies such as ink, toner, and paper cost?
15. Can the printer print on envelopes?
16. How many envelopes can the printer print at a time?
17. How much do I print now, and how much will I be printing in a year or two?
18. Will the printer be connected to a network?
19. Do I want wireless printing capability?

# Printers



Various Ways Users Print Documents and Photos

printer cable connected to system unit

Notebook computer wirelessly communicates with system unit, which is connected to the printer on the home network.

network printer

Printer connected to network prints documents from many computers.

Printer prints photos in camera when camera sits in docking station.

docking station

memory card

Printer prints images on memory card removed from camera and inserted in printer.

digital camera

wireless printers

Digital camera communicates with printer wirelessly.

Smart phone communicates with printer wirelessly.

Printer connects to camera via cable.

cable

# Printers

- A **nonimpact printer** forms characters and graphics on a piece of paper without actually striking the paper

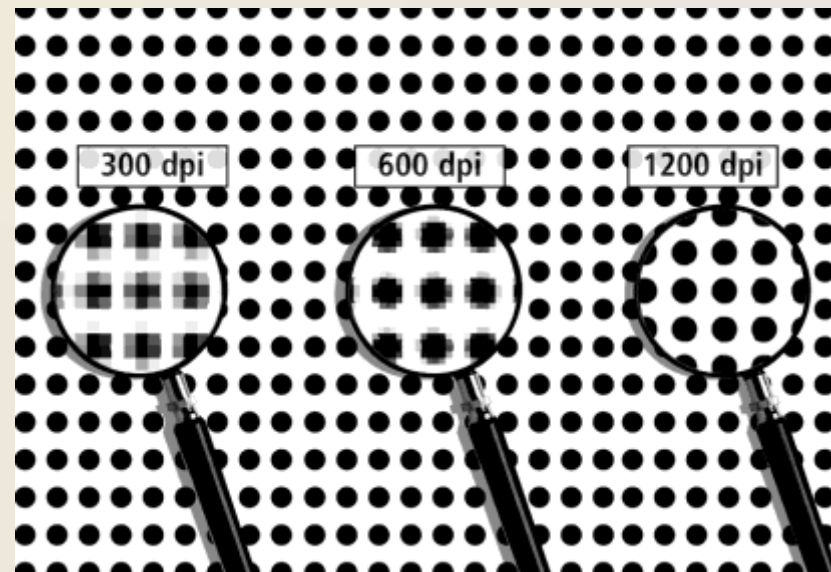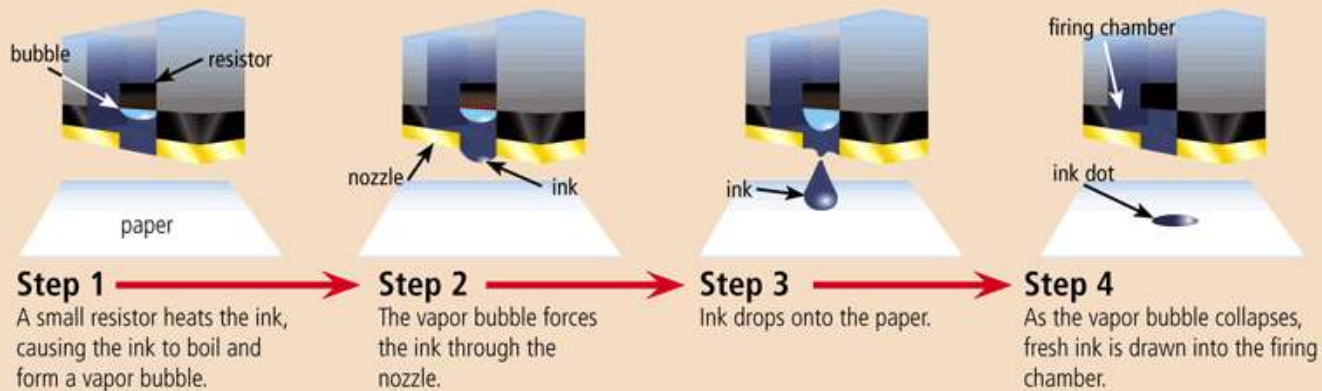| Ink-jet printers | Photo printers | Laser printers | Thermal printers |
|---|---|---|---|
| Mobile printers | Label and postage printers | Plotters | Large-format printers |

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# Printers

- An **ink-jet printer** forms characters and graphics by spraying tiny drops of liquid ink onto a piece of paper
  - Color or black-and-white
  - Printers with a higher dpi (dots per inch) produce a higher quality output

# Printers



How an Ink-Jet Printer Works

Step 1
A small resistor heats the ink, causing the ink to boil and form a vapor bubble.

Step 2
The vapor bubble forces the ink through the nozzle.

Step 3
Ink drops onto the paper.

Step 4
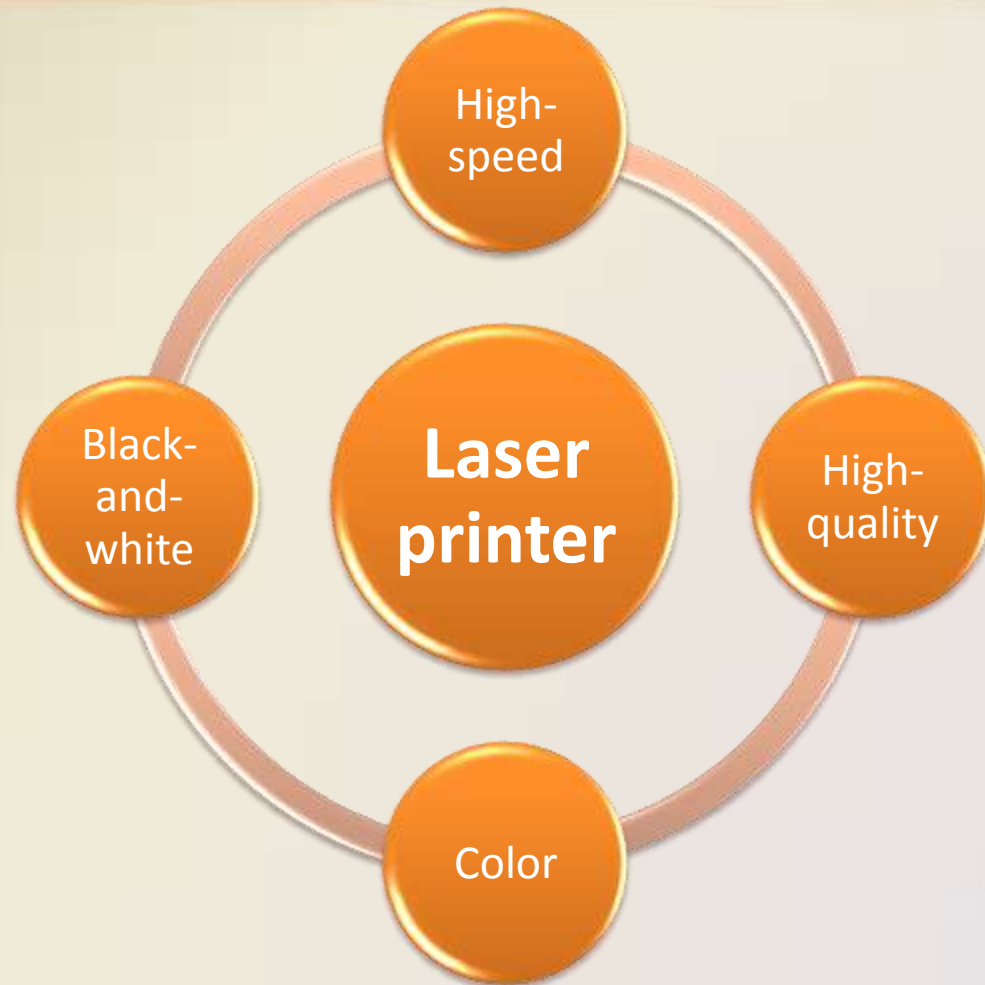As the vapor bubble collapses, fresh ink is drawn into the firing chamber.

# Printers

A **photo printer** produces color photo-lab-quality pictures

- Most use ink-jet technology
- PictBridge allows you to print photos directly from a digital camera
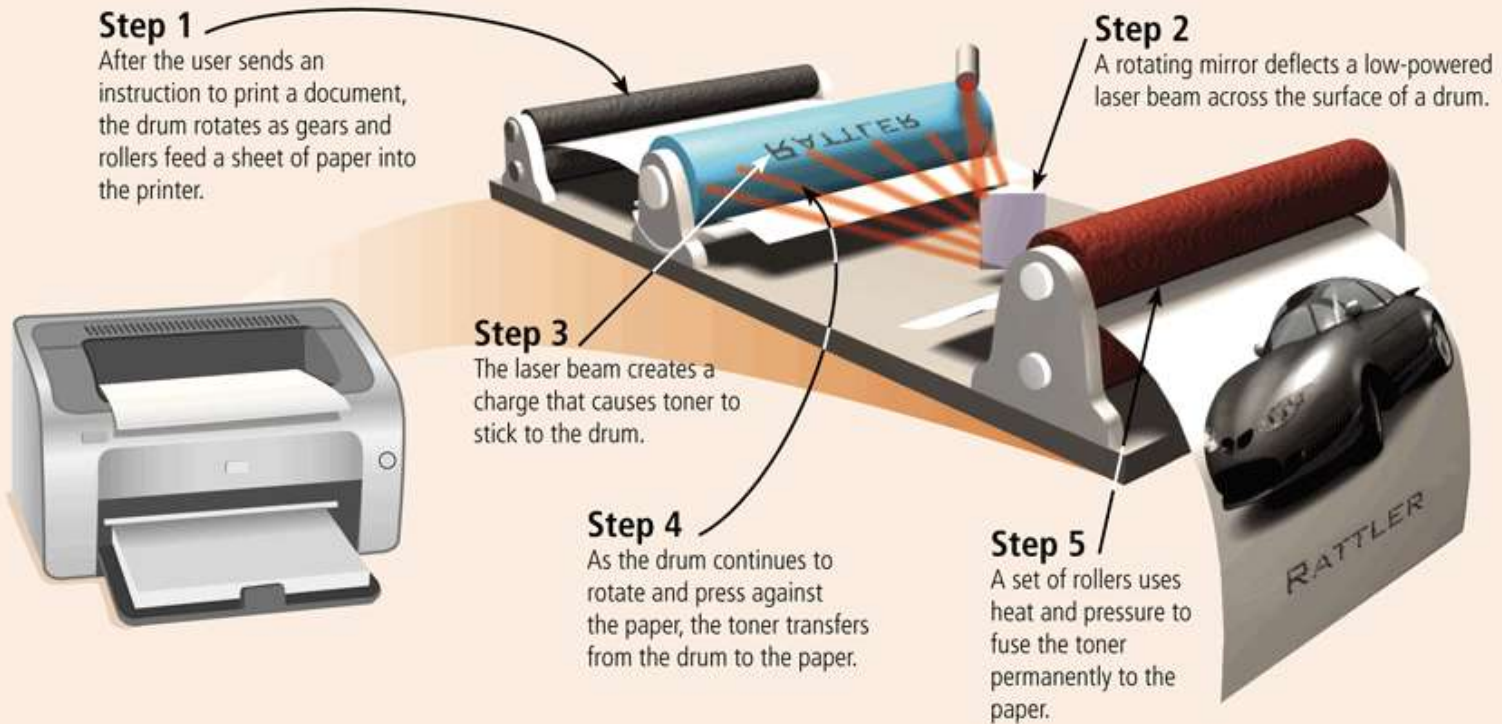- Print from a memory card and preview photos on a built-in LCD screen

# Printers



prints only
4 × 6 size

prints 4 × 6, 5 × 7,
8 × 10, 8½ × 11,
and panoramic sizes

# Printers



- High-speed
- Black-and-white
- Laser printer
- High-quality
- Color

# Printers

## How a Black-and-White Laser Printer Works

**Step 1**
After the user sends an instruction to print a document, the drum rotates as gears and rollers feed a sheet of paper into the printer.

**Step 2**
A rotating mirror deflects a low-powered laser beam across the surface of a drum.

**Step 3**
The laser beam creates a charge that causes toner to stick to the drum.

**Step 4**
As the drum continues to rotate and press against the paper, the toner transfers from the drum to the paper.

**Step 5**
A set of rollers uses heat and pressure to fuse the toner permanently to the paper.

# Printers

- A **multifunction peripheral** (MFP) is a single device that prints, scans, copies, and in some cases, faxes
  - Sometimes called an all-in-one device

# Printers

- A **thermal printer** generates images by pushing electrically heated pins against the heat-sensitive paper

Thermal wax-transfer printer

Dye-sublimation printer



dye-sublimation printer for the professional

dye-sublimation printer for the home or small office user

# Printers

- A **mobile printer** is a small, lightweight, battery-powered printer that allows a mobile user to print from a notebook computer, smart phone, or other mobile device

# Printers

- A **label printer** is a small printer that prints on adhesive-type material

- A postage printer prints postage stamps
  - Postage also can be printed on other types of printers

# Printers

- **Plotters** are used to produce high-quality drawings

- **Large-format printers** create photo-realistic quality color prints on a larger scale

# Printers

- **Impact printers** form characters and graphics on a piece of paper by striking a mechanism against an inked ribbon that physically contacts the paper

**Dot-matrix printer**

**Line printer**

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# Printers

- A **dot-matrix printer** produces printed images when tiny wire pins on a print head mechanism strike an inked ribbon

- A **line printer** prints an entire line at a time



continuous-form paper
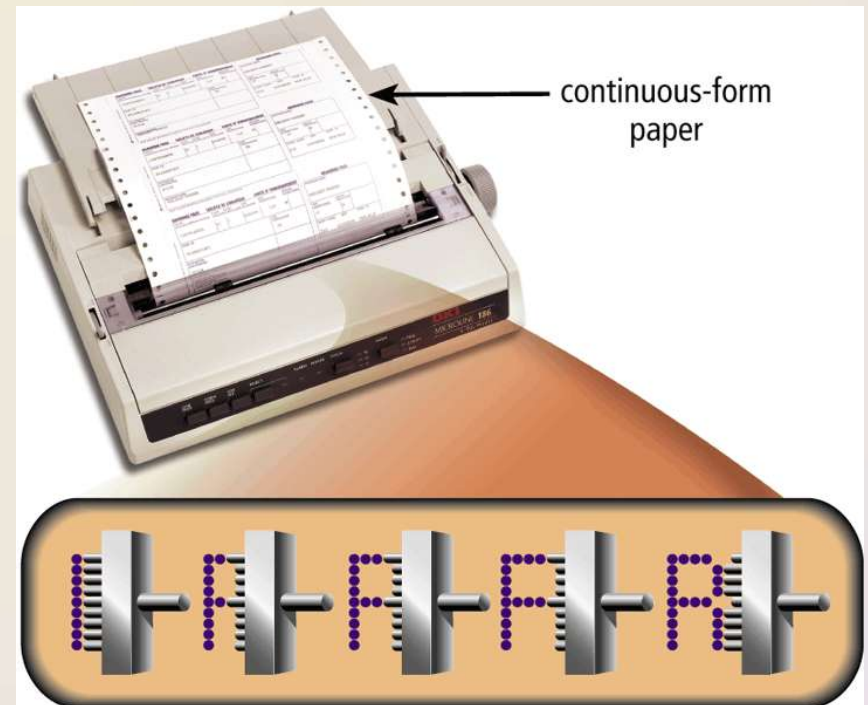
# Speakers, Headphones, and Earbuds

- An **audio output device** produces music, speech, or other sounds



Most computer users attach **speakers** to their computers to:

- Generate higher-quality sounds for playing games
- Interact with multimedia presentations
- Listen to music
- View movies

# Speakers, Headphones, and Earbuds

- **Headphones** are speakers that cover or are placed outside of the ear

- **Earbuds** (also called earphones) rest inside the ear canal



headphones

# Speakers, Headphones, and Earbuds

- Some speakers are specifically designed to play audio from a portable media player
  - Wireless speakers



portable media player

# Speakers, Headphones, and Earbuds

**Voice output** occurs when you hear a person's voice or when the computer talks to you through the speakers

- Some Web sites dedicate themselves to providing voice output
- Often works with voice input
- VoIP uses voice output and voice input

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# Other Output Devices

- Other output devices are available for specific uses and applications

**Data projectors**

**Interactive whiteboards**

Force-feedback game controllers

Tactile output

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# Other Output Devices

- A **data projector** is a device that takes the text and images displaying on a computer screen and projects them on a larger screen
  - LCD projector
  - Digital light processing (DLP) projector



data projector

computer

# Other Output Devices

- An **interactive whiteboard** is a touch-sensitive device, resembling a dry-erase board, that displays the image on a connected computer screen

# Other Output Devices

- Force-feedback sends resistance to the device in response to actions of the user

- Tactile output provides the user with a physical response from the device

# Putting It All Together

## Suggested Output Devices by User

| User | Monitor | Printer | Other |
|---|---|---|---|
| Home | • 19- or 20-inch LCD monitor, or 17-inch LCD screen on notebook computer | • Ink-jet color printer; or <br> • Photo printer | • Speakers <br> • Headphones or earbuds or headset <br> • Force-feedback game controller or tactile output |
| Small Office/Home Office | • 20- or 22-inch LCD monitor <br> • LCD screen smart phone or other mobile device | • Multifunction peripheral; or <br> • Ink-jet color printer; or <br> • Laser printer (black-and-white or color) <br> • Label printer <br> • Postage printer | • Speakers |

# Putting It All Together

## Suggested Output Devices by User

| User | Monitor | Printer | Other |
|------|---------|---------|-------|
| **Mobile** | • 17-inch LCD screen on notebook computer<br>• 8.9-inch screen on a netbook<br>• LCD screen on smart phone or other mobile device | • Mobile color printer<br>• Ink-jet color printer; or<br>• Laser printer for in-office use (black-and-white or color)<br>• Photo printer | • Headphones or earbuds or headset<br>• DLP data projector |
| **Power** | • 30-inch LCD monitor | • Laser printer (black-and-white or color)<br>• Plotter or large-format printer; or<br>• Photo printer; or<br>• Dye-sublimation printer | • Speakers<br>• Headphones or earbuds or headset |

# Putting It All Together

## Suggested Output Devices by User

| User | Monitor | Printer | Other |
|---|---|---|---|
| Enterprise | • 20- or 22-inch LCD monitor<br>• LCD screen on smart phone or other mobile device | • High-speed laser printer<br>• Laser printer, color<br>• Line printer (for large reports from a mainframe)<br>• Label printer | • Speakers<br>• Headphones or earbuds or headset<br>• Networked DLP data projector<br>• Interactive whiteboard |

# Output Devices for Physically Challenged Users

- Many accessibility options exist for users with various disabilities

# Summary

Various methods of output

Several commonly used output devices

Display devices, printers, speakers, headphones, earbuds, data projectors, interactive whiteboards, force-feedback game controllers, and tactile output

# Output

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**Chapter 6 Complete**