

Chapter Six

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 ear buds

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



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

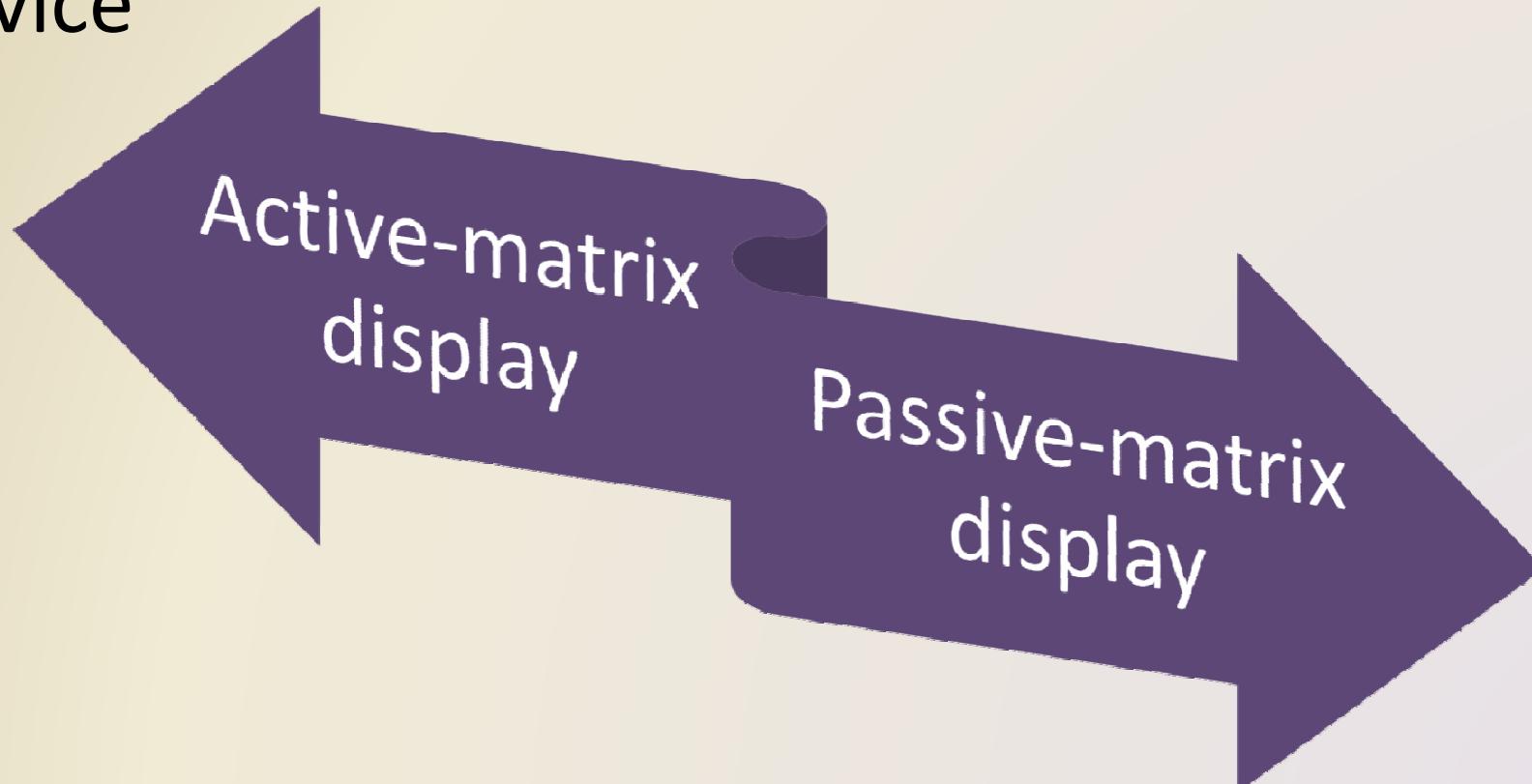
Display Devices

- A **display device** visually conveys text, graphics, and video information
- A **monitor** is packaged as a separate peripheral
 - **LCD monitor**
 - Widescreen

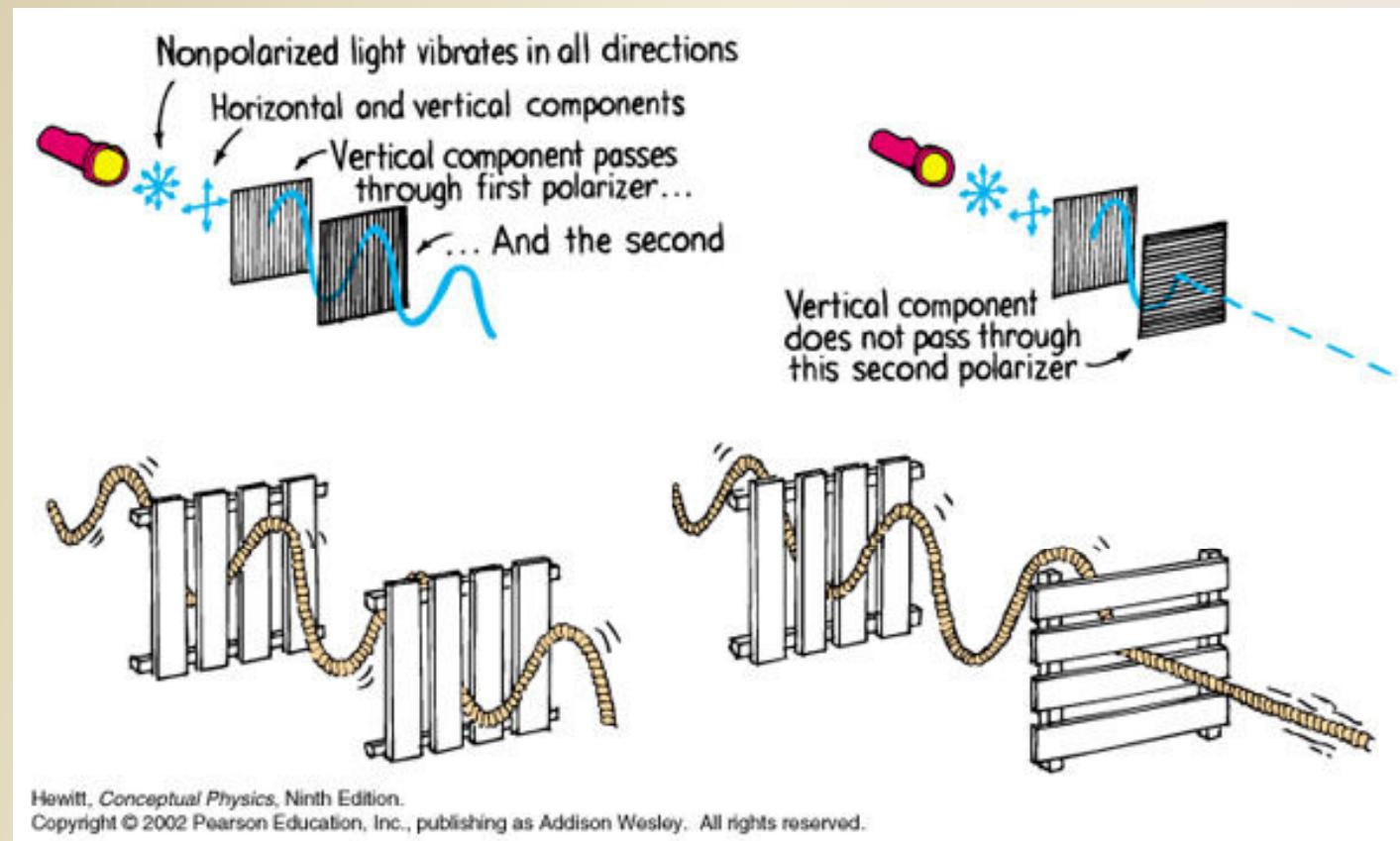
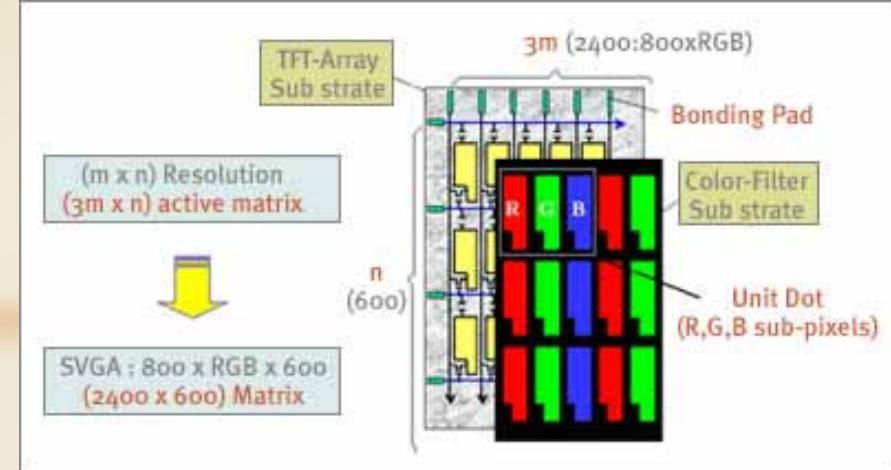


Display Devices

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



LCDs



Hewitt, *Conceptual Physics*, Ninth Edition.

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Display Devices

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



Resolution



Response time



Brightness



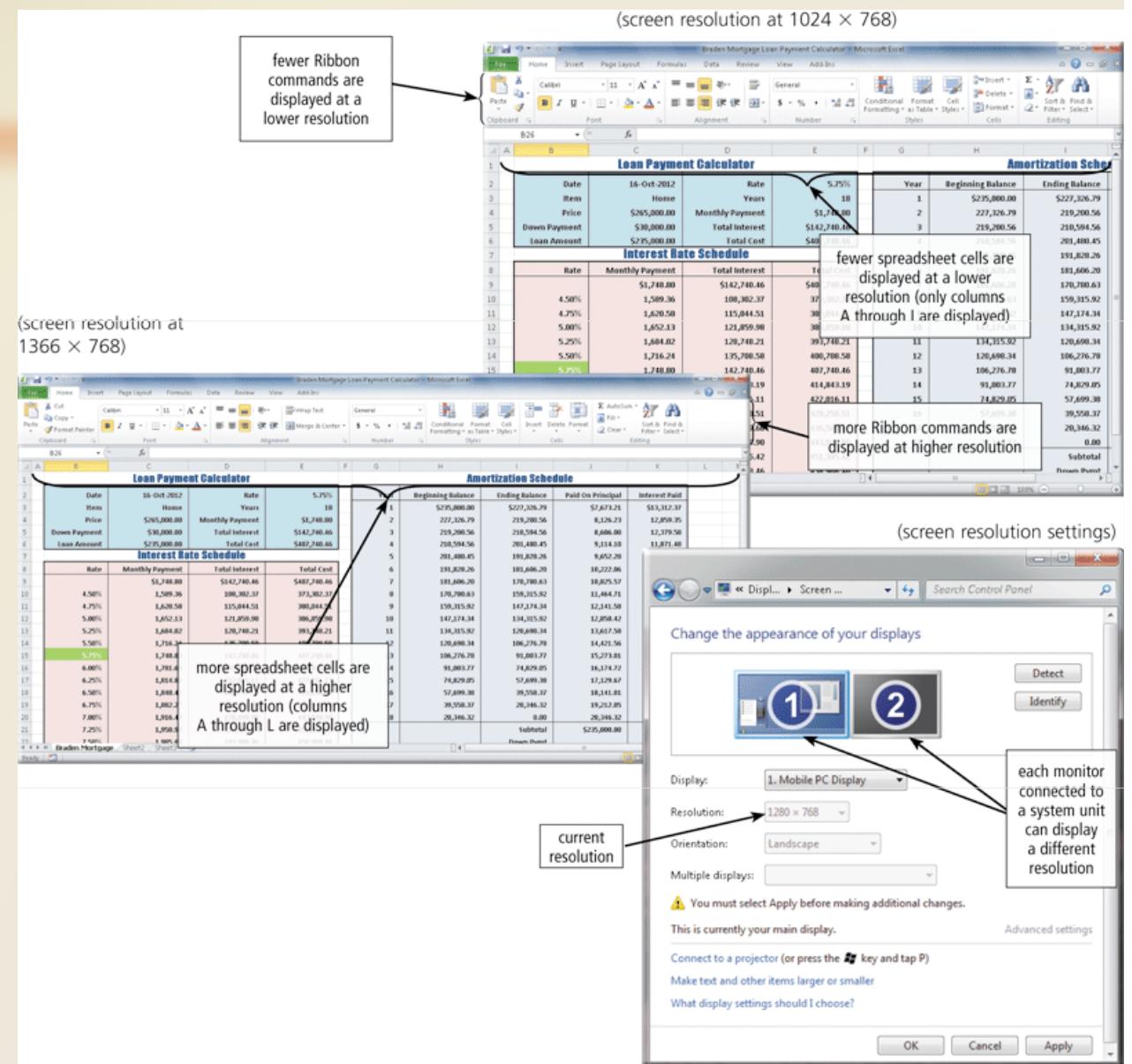
Dot pitch



Contrast ratio

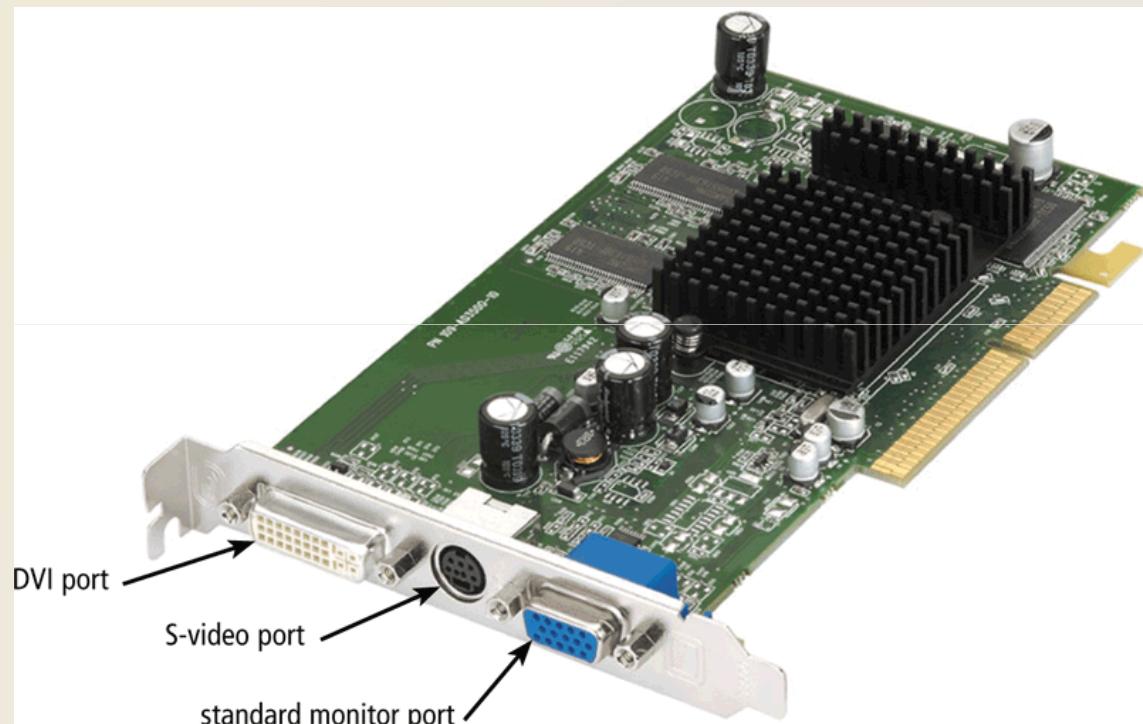
Display Devices

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

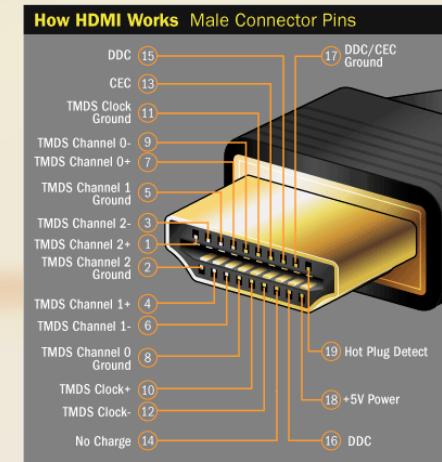
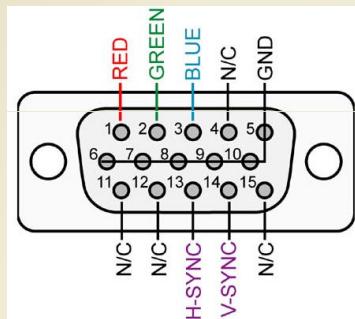
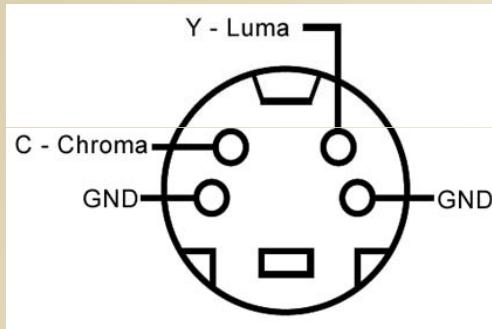
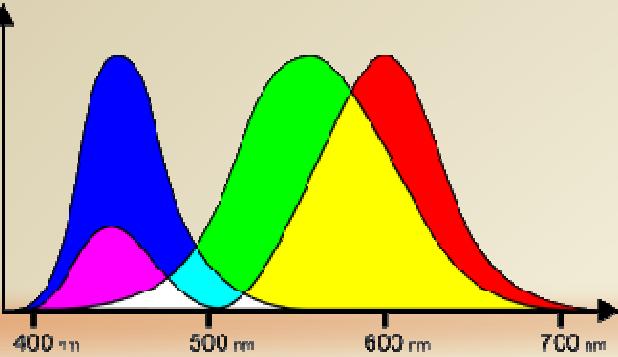


Display Devices

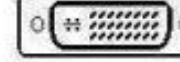
- The graphics processing unit (GPU) controls the manipulation and display of graphics on a display device
- LCD monitors use a digital signal and should plug into a
 - Digital
 - DVI port,
 - HDMI port
 - Analog
 - VGA port
 - S-Video



Ports



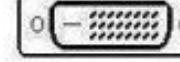
DVI-I (DVI Digital & Analog) Single Link



DVI-I (DVI Digital & Analog) Dual Link



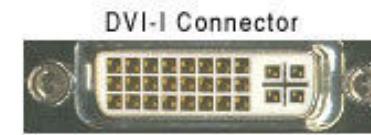
DVI-D (DVI Digital) Single Link



DVI-D (DVI Digital) Dual Link



DVI-A (DVI Analog)



DVI-I Connector



VESA DMS-59 Connector



DVI-D Connector



New Mini
DisplayPort

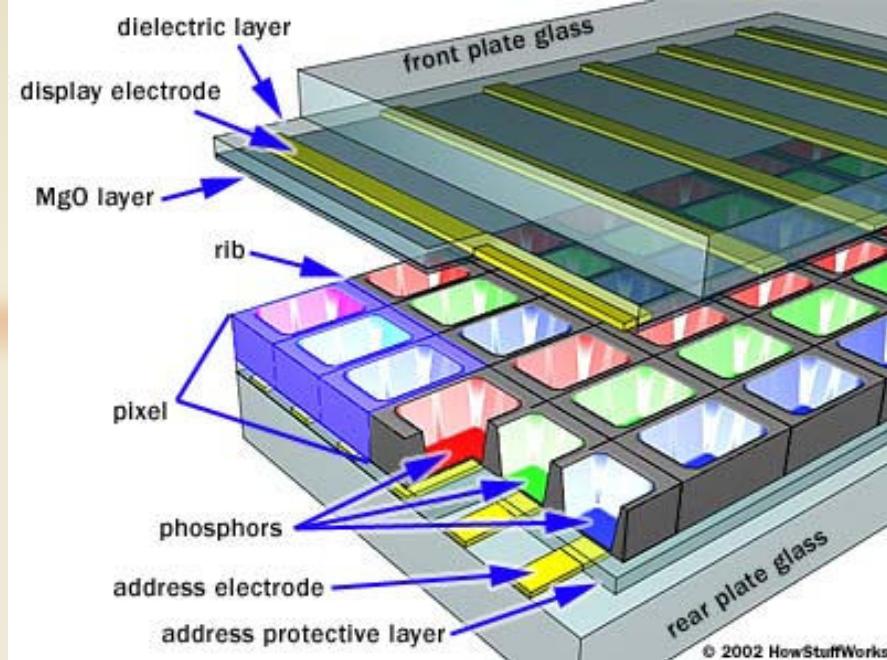


Display Devices

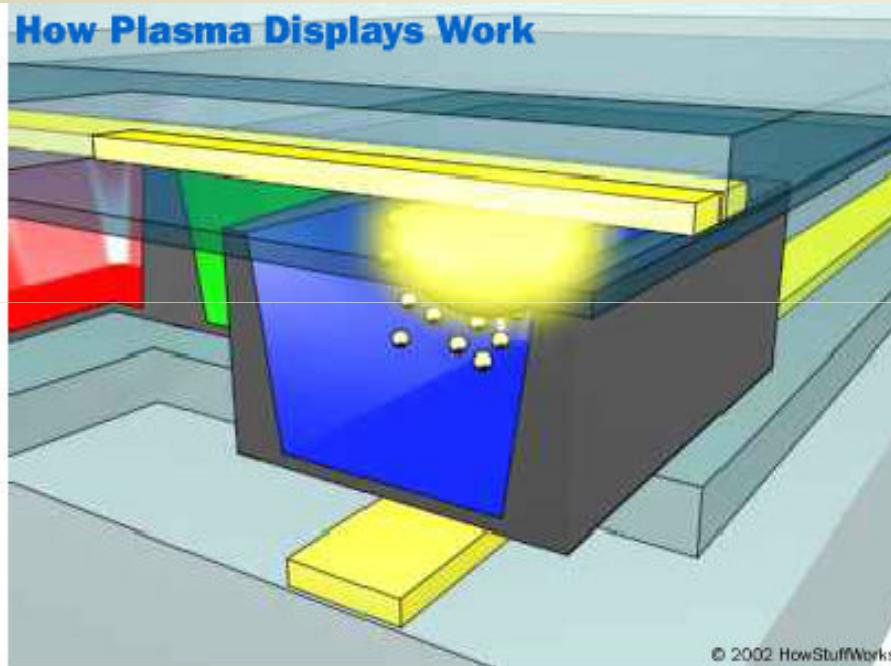
- **Plasma monitors** are display devices that use gas plasma technology and offer screen sizes up to 150 inches



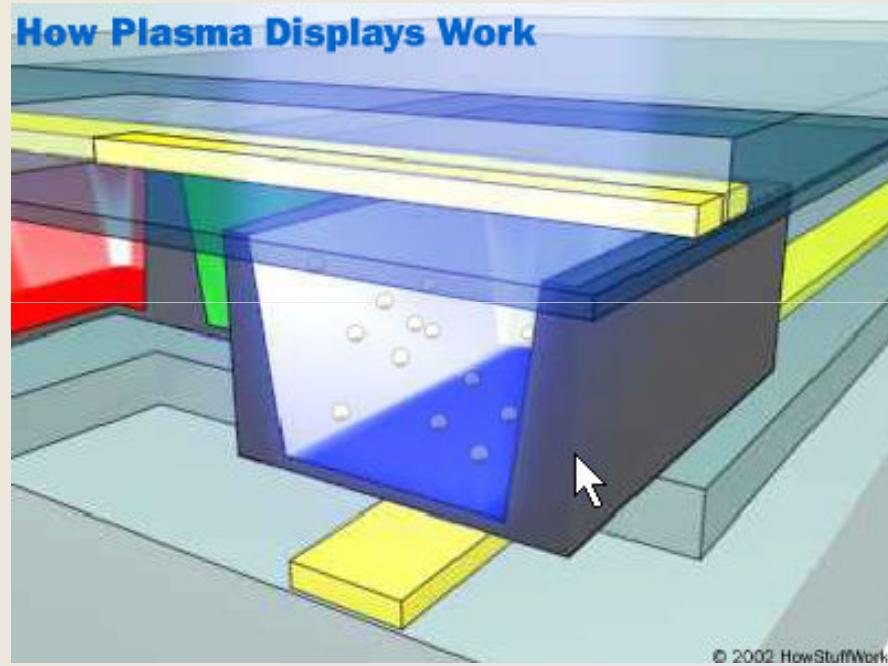
Plasma technology



How Plasma Displays Work

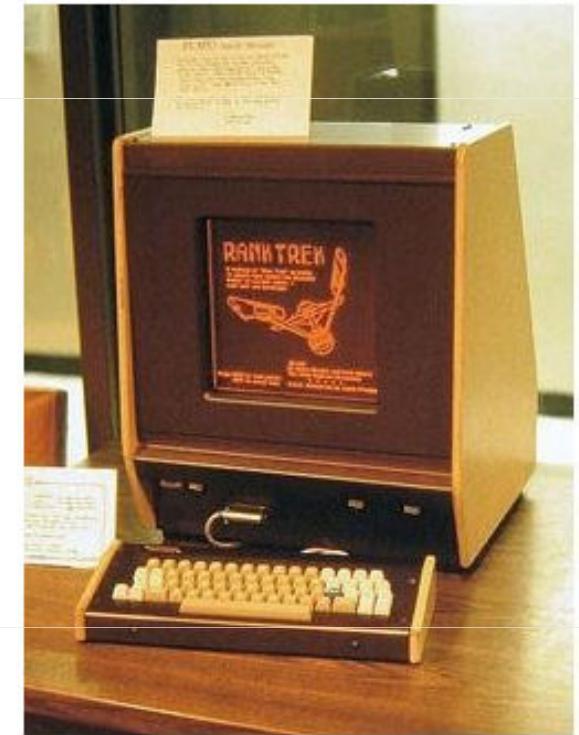


How Plasma Displays Work



The first plasma display

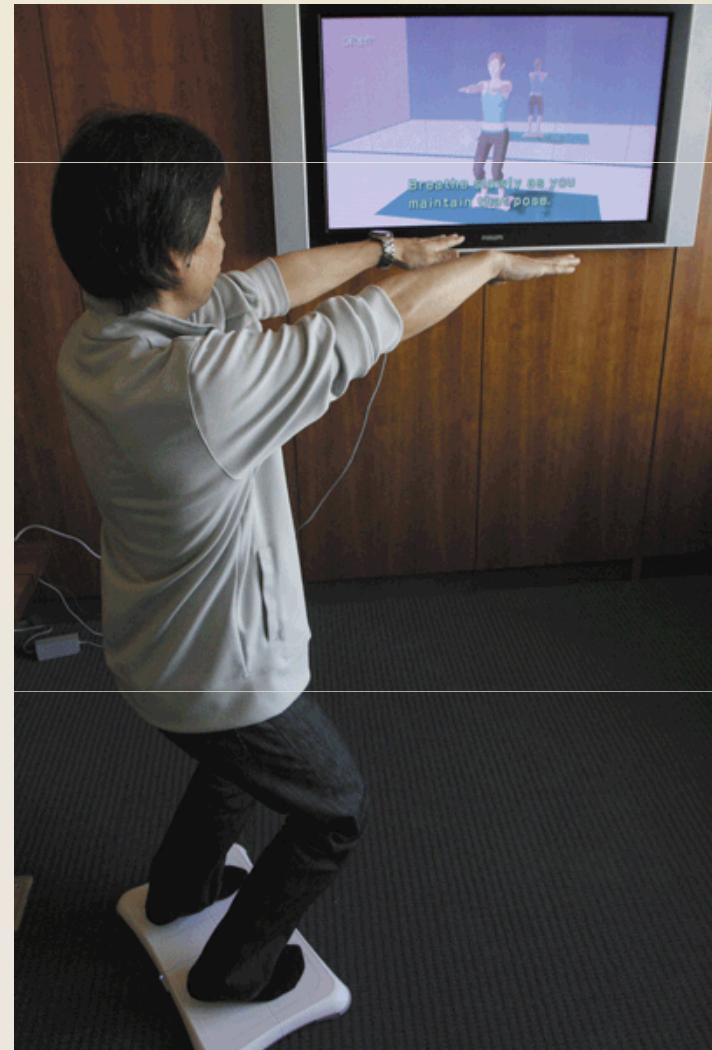
- PD was invented in 1964 at University of Illinois by Donald Bitzer
- Monochrome display
- Slow display
 - Limited by memory technology in speed and size
- Many company focus on CRT technologies



The PLATO plasma display by Donald Bitzer

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



Video: SID: Size Matters

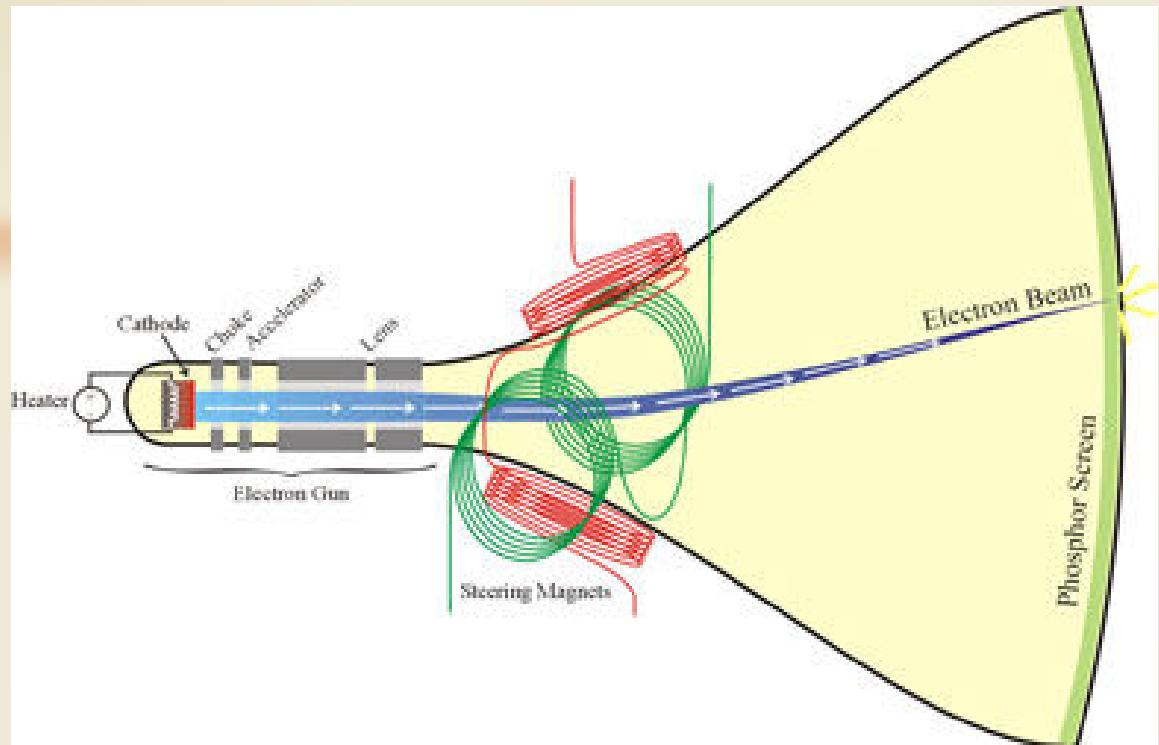
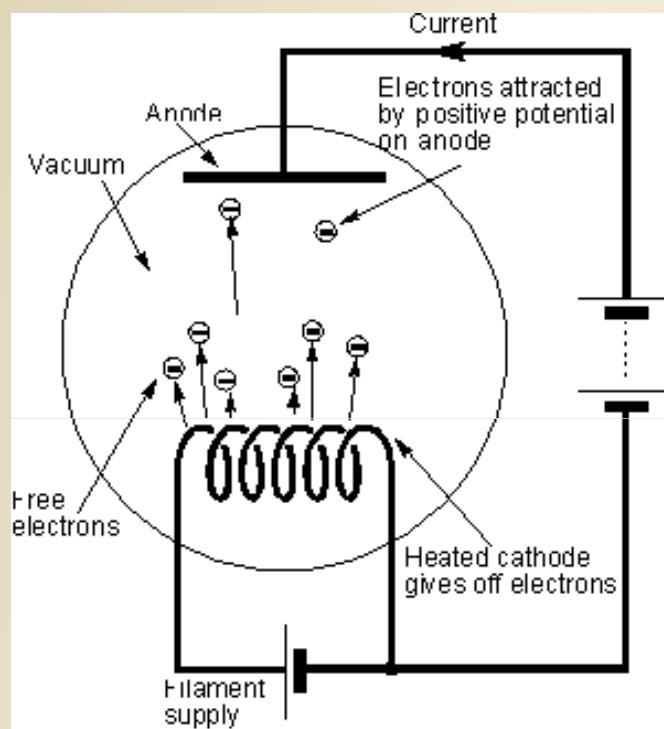


Display Devices

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



How CRT work



Printers

- A **printer** produces text and graphics on a physical medium
 - Printed information is called a **hard copy**, or printout
 - Landscape or portrait orientation

The Eleventh Frame
Monthly Newsletter
Volume 27 Issue 4

Past participants have praised Mr. Lance's work, noting that their games did improve measurably. After they attended his clinic, last March at the first free clinic sponsored by the clinic for the senior league, "I am a better bowler," said one bowler. Past participants have praised Mr. Lance's work, noting that their games did improve measurably. After they attended his clinic, last March at the first free clinic sponsored by the clinic for the senior league, "I am a better bowler," said one bowler.

Appreciate and delivery
Bowlers, get ready for a new season! Spring league begins in two weeks, just in time to save you from the winter blues. This spring, two new teams have joined the senior league. Spring is limited, so be certain to reserve your spot now. Call us at 555-1234 to register for the start of the new season.

Clinic Scheduled
Mark your calendar for March 26. Bow-A-Rama Lane Resurfacing will be fortunate enough to obtain the services of Fred Lance, retired professional bowler. Mr. Lance is a two-time state champion and has competed and taken home championships at the national level. He is known to have a winning record. Mr. Lance has scored 300 games to his credit (an accomplishment most of us have not achieved). This two-hour clinic will focus on improving approach, delivery and scoring. According to Mr. Lance, "Approach and delivery are two of the most important facets of bowling well. If you can improve either of these, your score is almost certain to rise."

Lane Resurfacing
The lanes are resurfacing will begin with Lane 1 at the east end of the alley. Four lanes at a time will be resurfaced, so that resurface and open bowling will alternate. Open bowling patrons are cautioned, however, that they could experience a slightly longer wait for an open lane.

Congratulations to this month's senior high-scorers!

Bowler	Team	Score
Bill Delgado	Silver Streakers	290
Marilyn Williams	Go-Getters	287
Phoebe Gold	Go-Getters	283
Tim Wu	Day Trippers	282

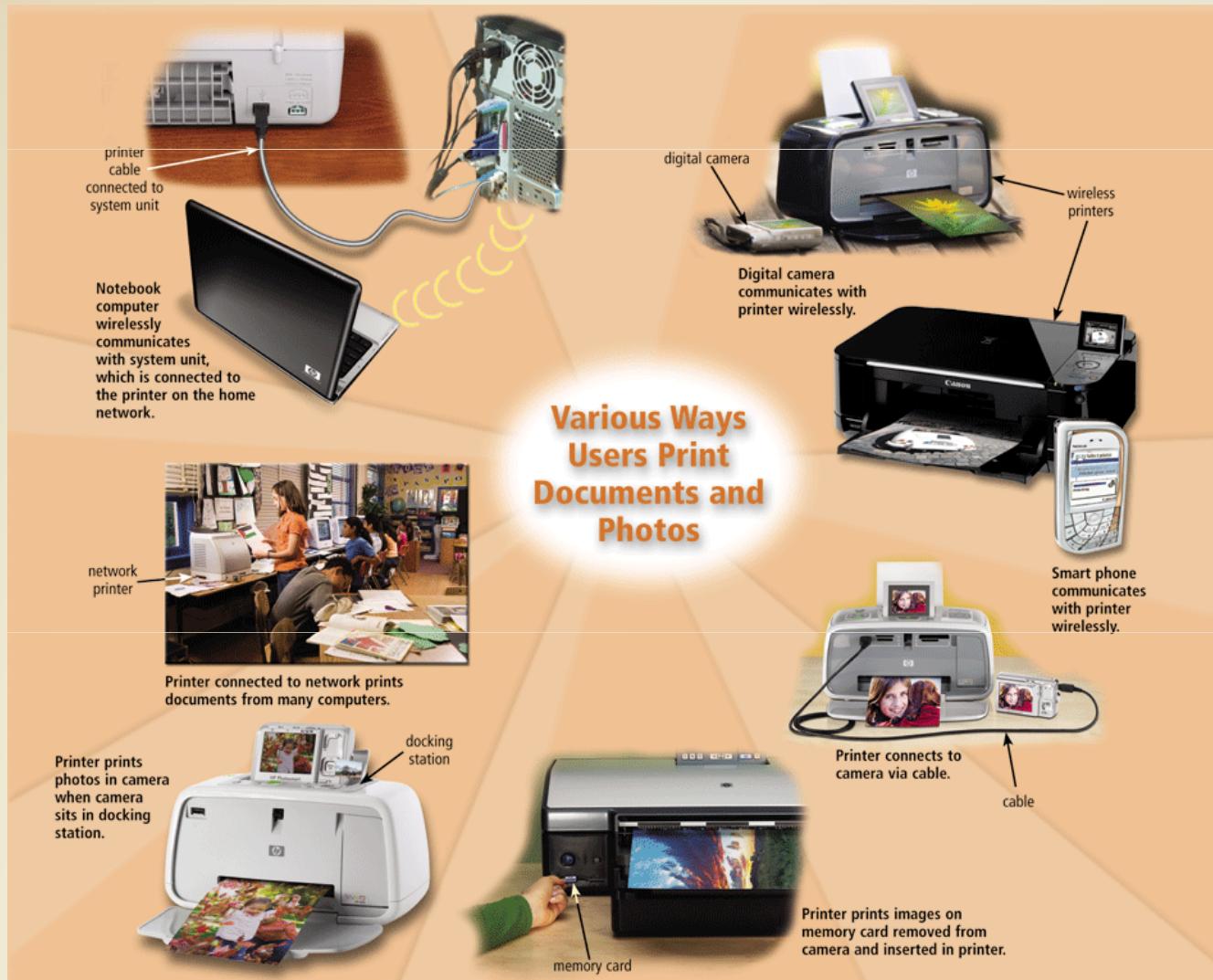


Printers

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



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

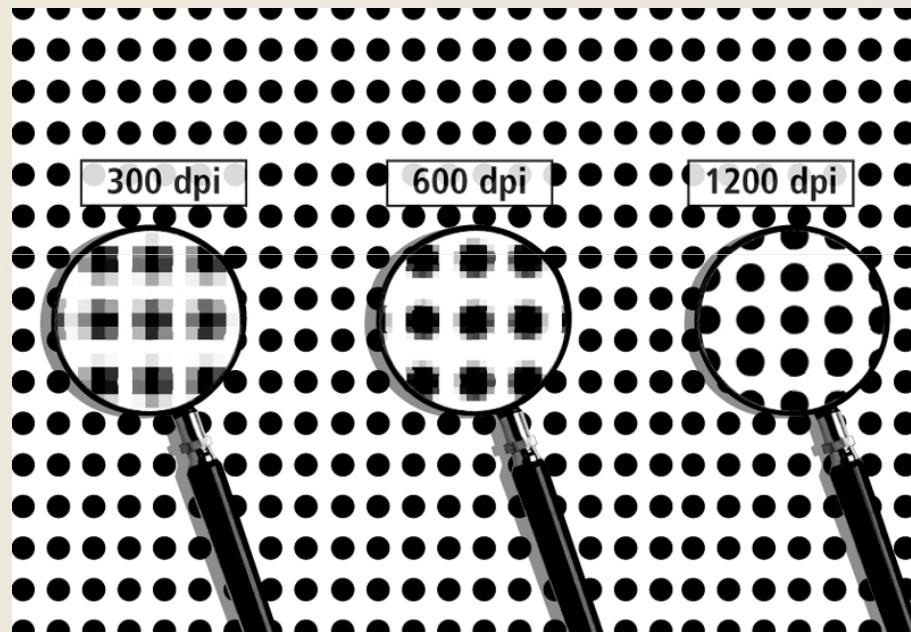
Label and
postage
printers

Plotters

Large-
format
printers

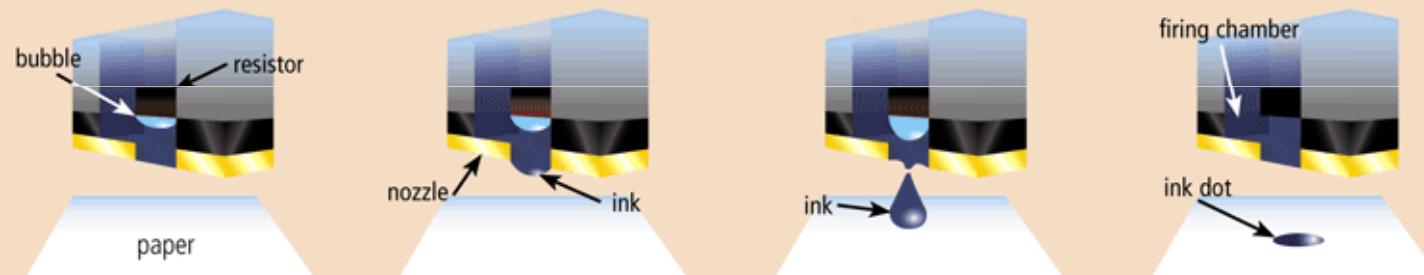
Printers

- 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

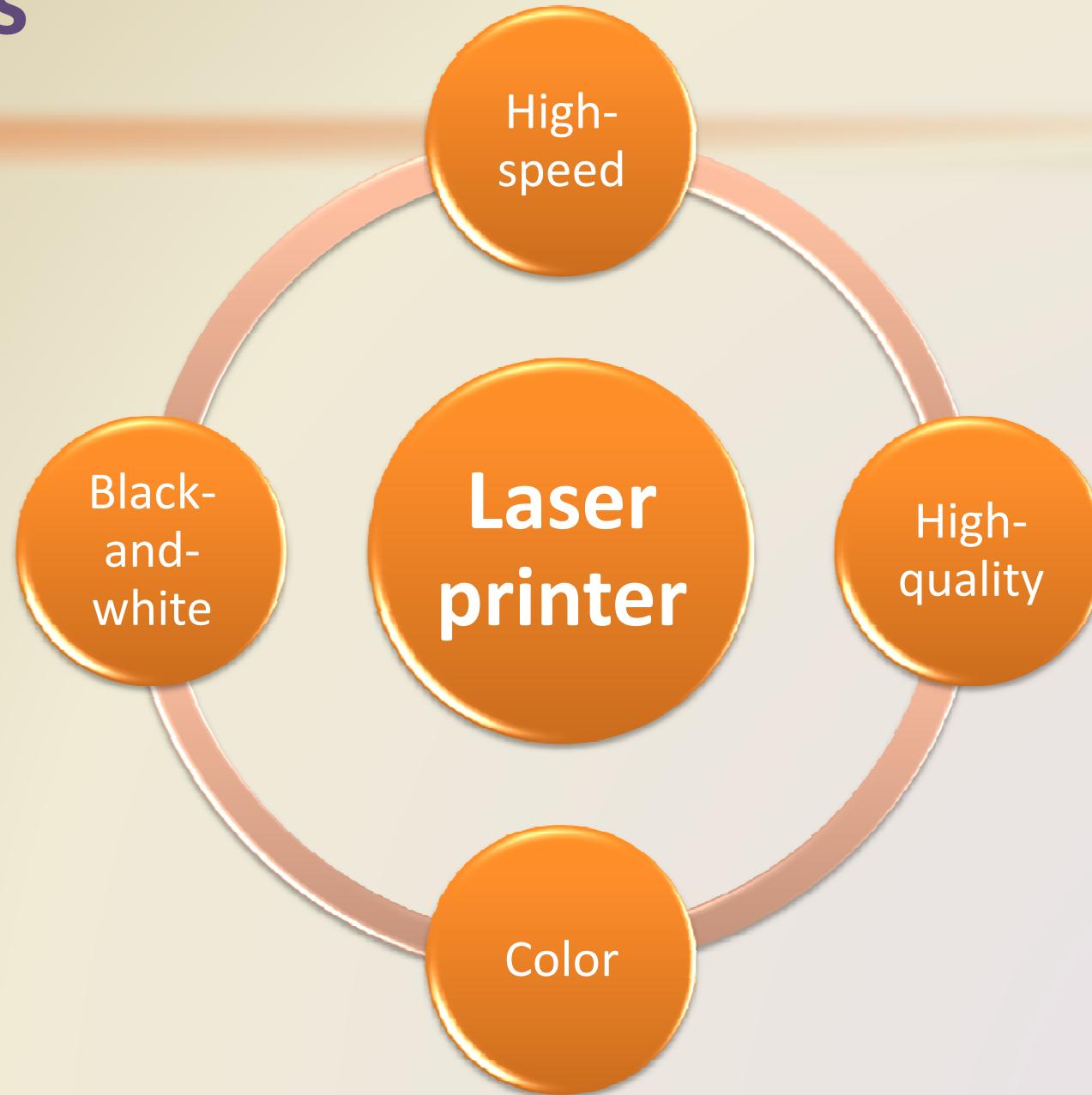
A photo printer produces color photo-lab-quality pictures

- 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

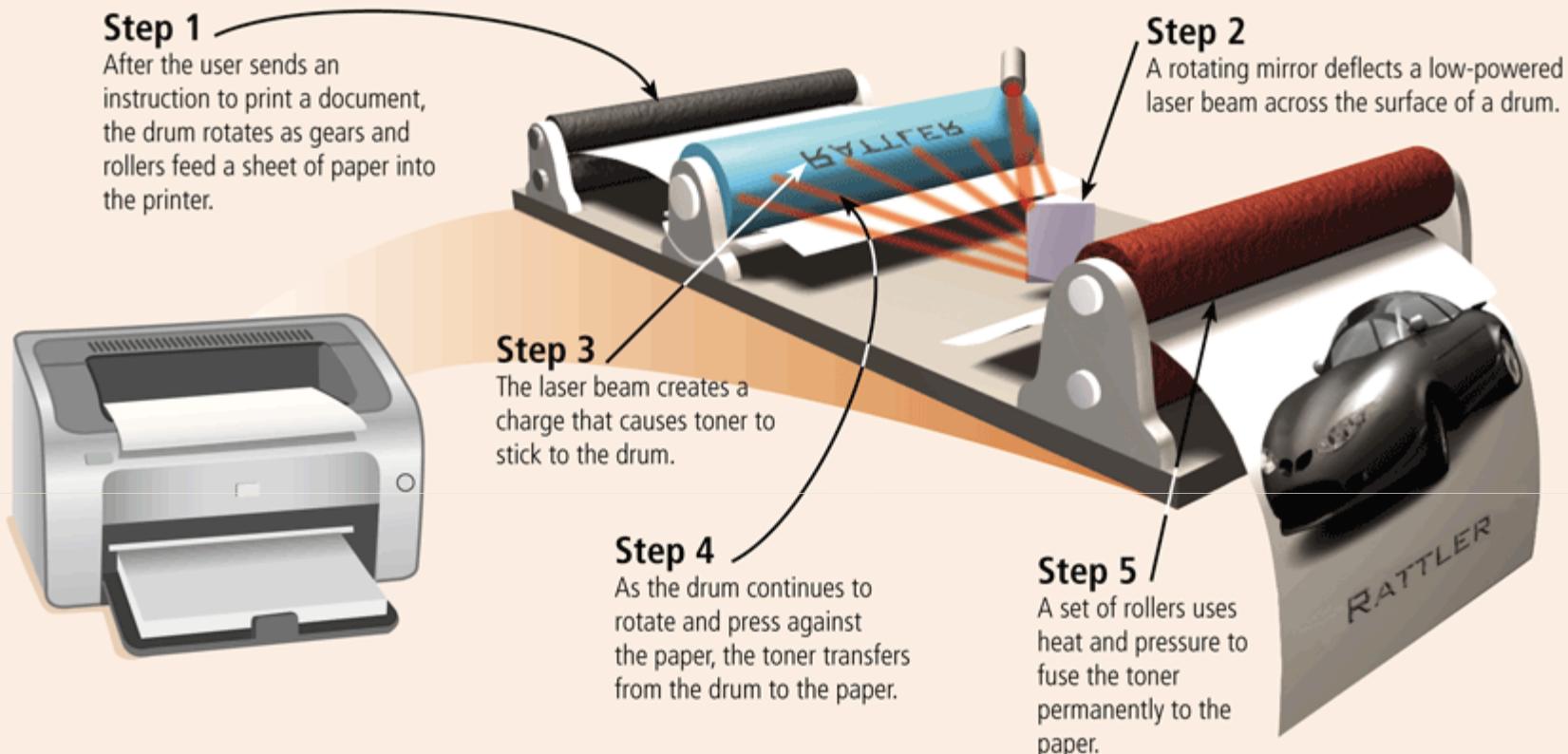


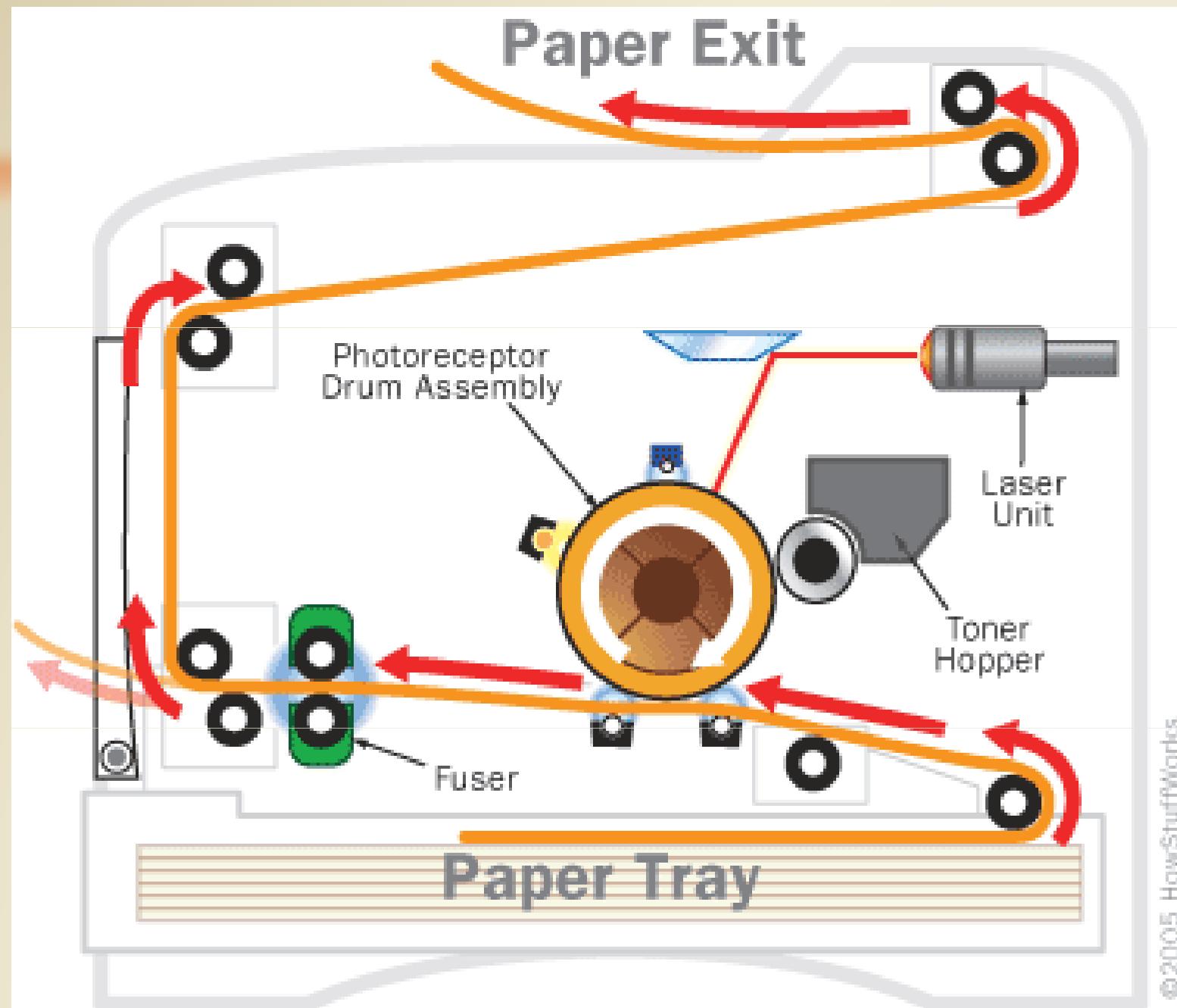
Printers



Printers

How a Black-and-White Laser Printer Works





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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

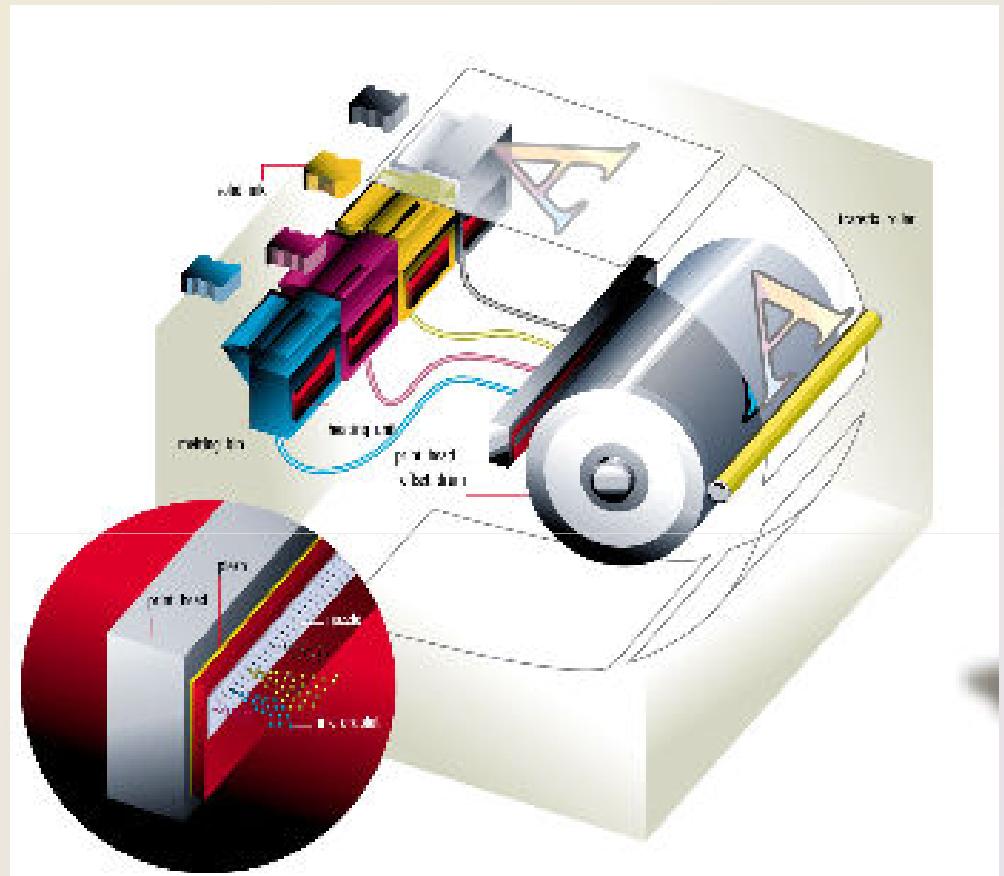
Thermal wax-transfer
printer

Dye-sublimation
printer



Solid-ink printer

- Original created by Tektronix in 1986
- The stick inks are non-toxic (touch)



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

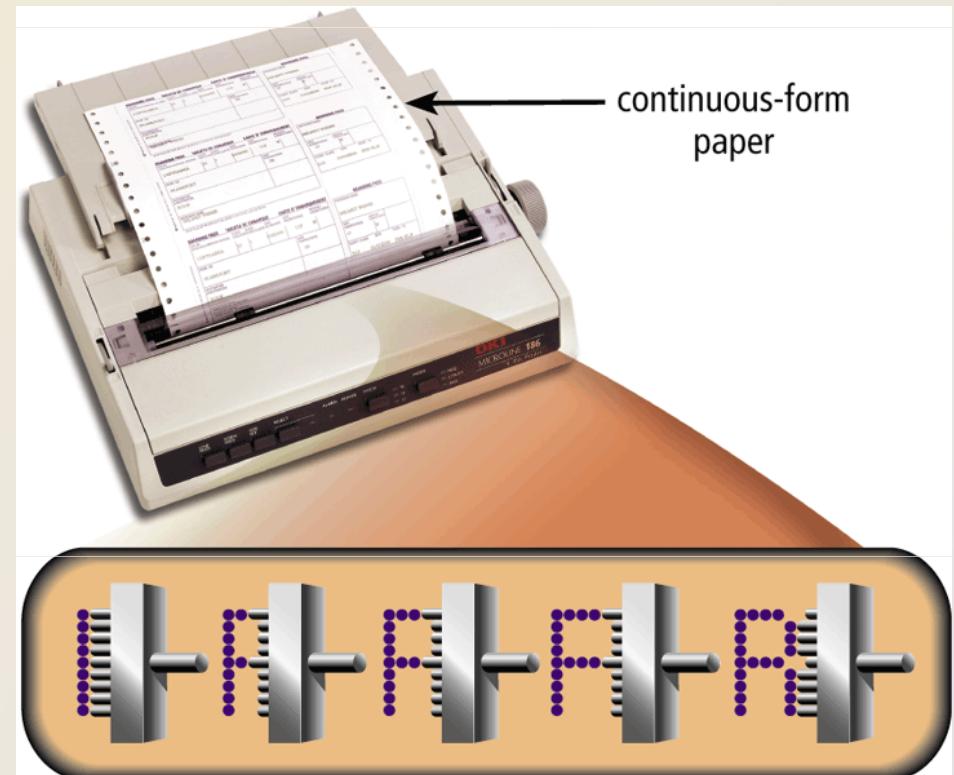
- **Impact printers** form characters and graphics on a piece of paper by striking a mechanism against an inked ribbon that physically contacts the paper

**Dot-matrix
printer**

**Line
printer**

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



Speakers, Headphones, and Earbuds

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

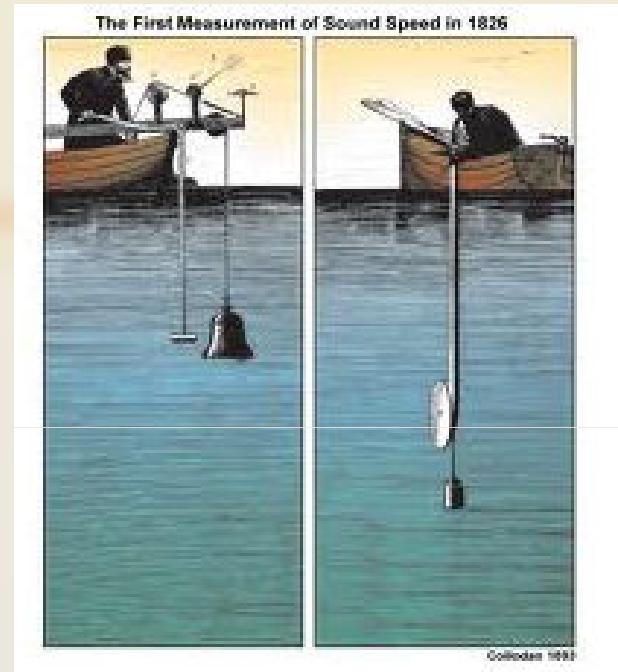


Most computer users attach **speakers** to their computers to:

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

Sounds

- Speed of sound is depend on a medium and frequency
 - Dry air at 20c, speed of sound approximately at 340Meters/sec
 - Water (liquids), sound speed faster 4.3 times, approximately at 1400Meters/sec
 - Gas, sound speed depends on pressure and density.



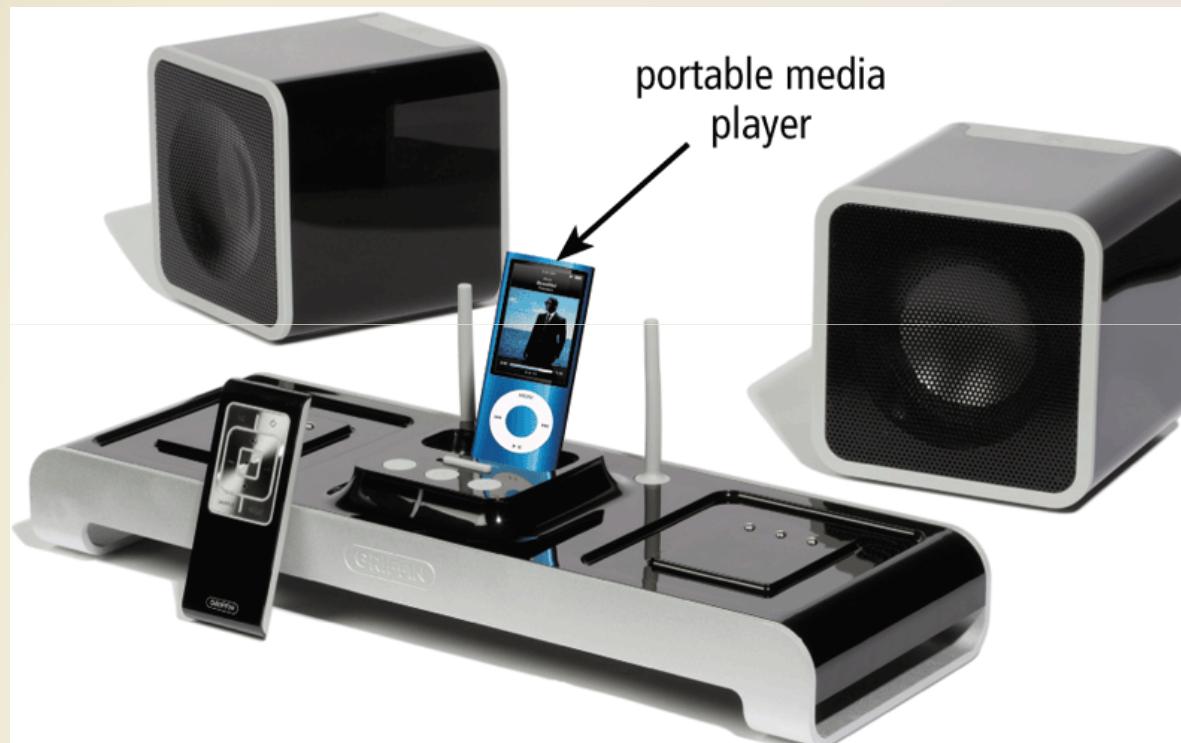
Speakers, Headphones, and Earbuds

- **Headphones** are speakers that cover or are placed outside of the ear
- **Earbuds** (also called earphones) rest inside the ear canal



Speakers, Headphones, and Earbuds

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

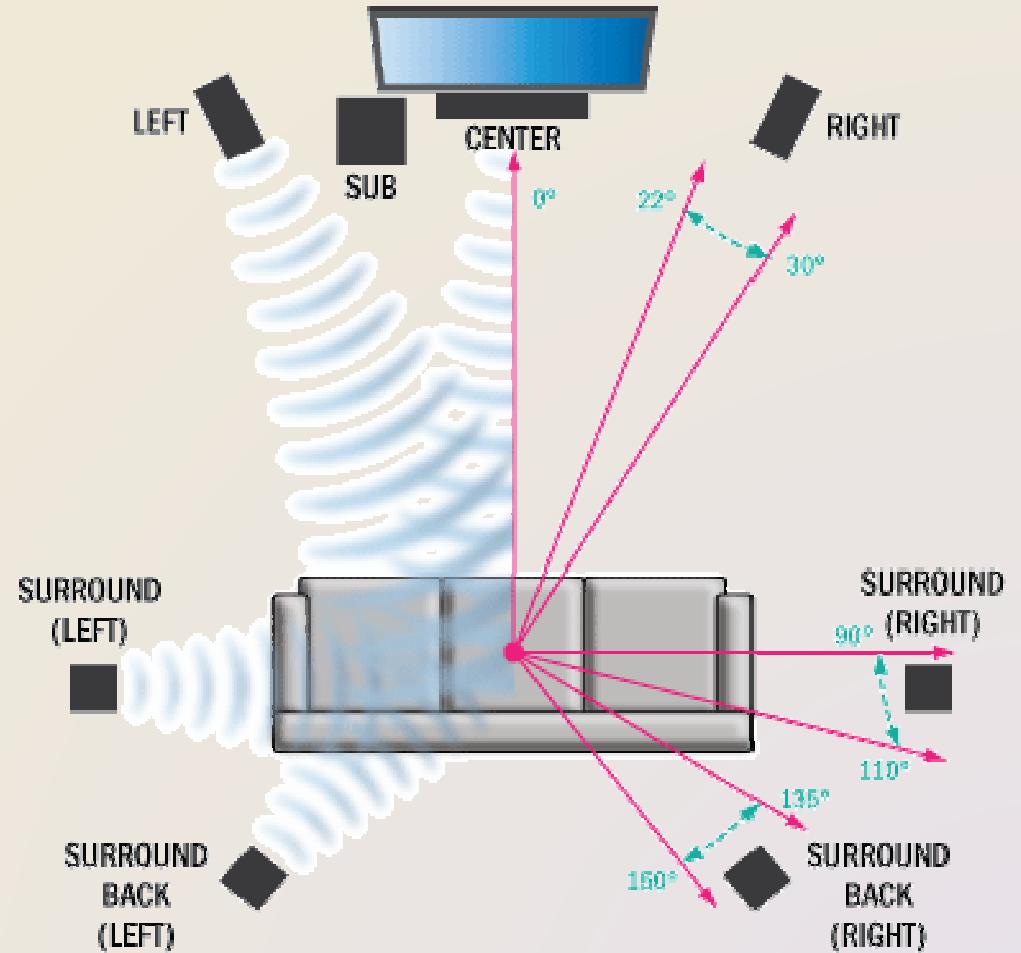


Speakers, Headphones, and Earbuds

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

Speaker systems in 2.1, 5.1, 7.1



Other Output Devices

- Other output devices are available for specific uses and applications

Data projectors

Interactive
whiteboards

Force-feedback
game
controllers

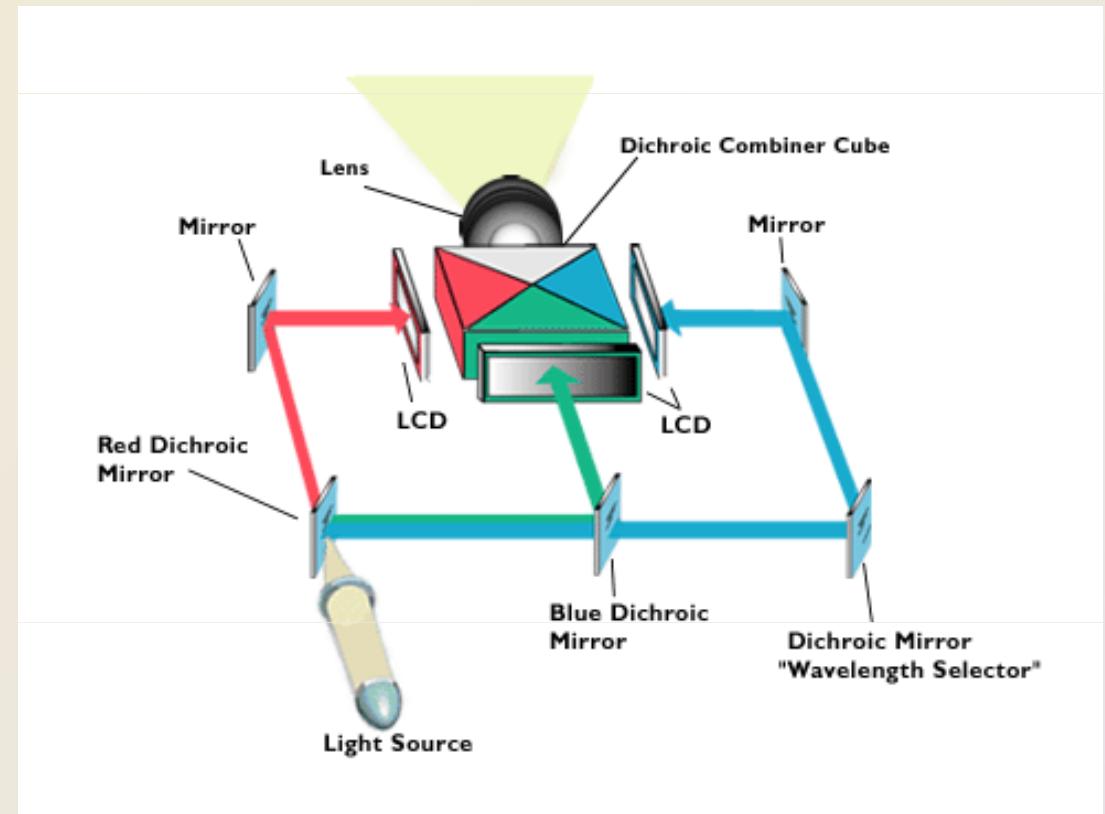
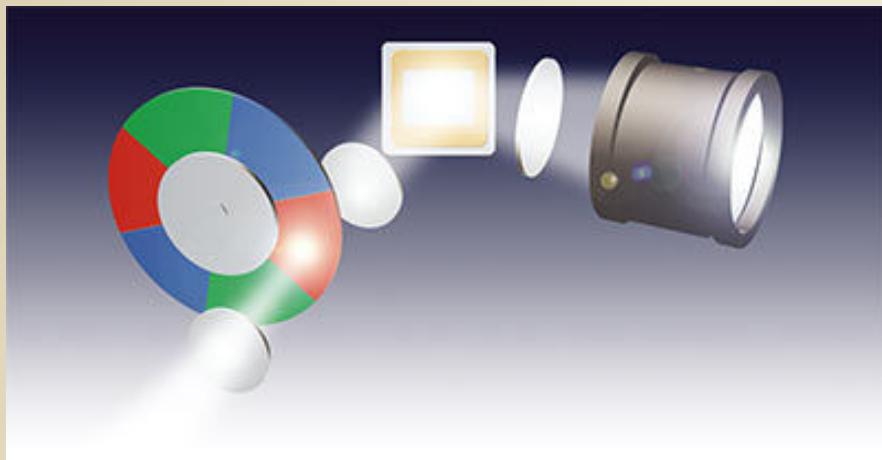
Tactile output

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



DLP VS LCD



Other Output Devices

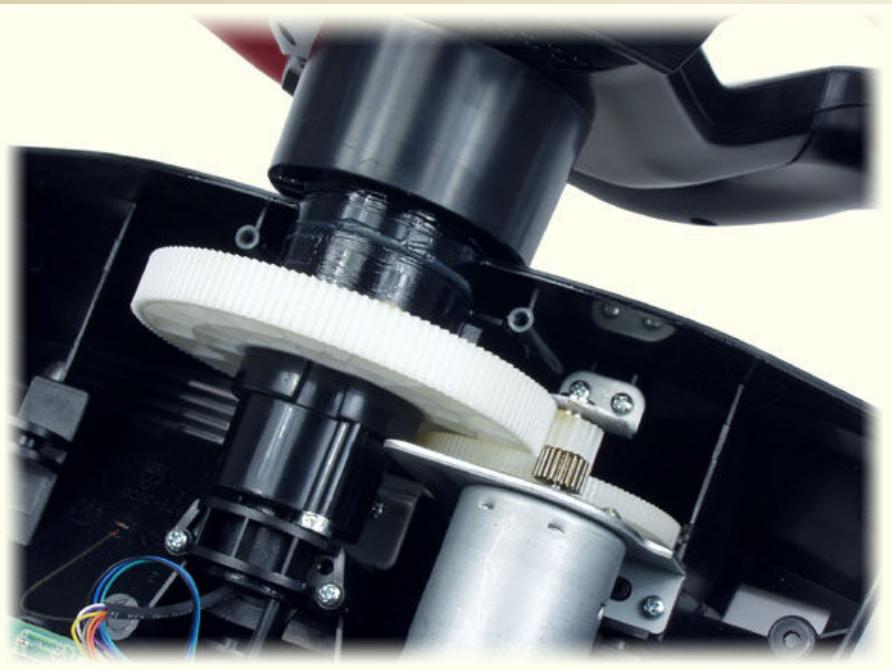
- An **interactive whiteboard** is a touch-sensitive device, resembling a dry-erase board, that displays the image on a connected computer screen



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





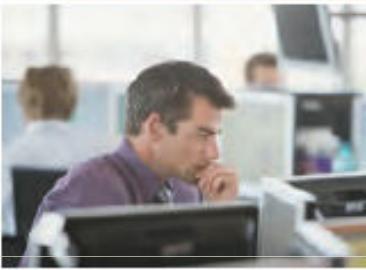
Putting It All Together

Suggested Output Devices by User			
User	Monitor	Printer	Other
Home 	<ul style="list-style-type: none">• 19- or 20-inch LCD monitor, or 17-inch LCD screen on notebook computer	<ul style="list-style-type: none">• Ink-jet color printer; or• Photo printer	<ul style="list-style-type: none">• Speakers• Headphones or earbuds or headset• Force-feedback game controller or tactile output
Small Office/Home Office 	<ul style="list-style-type: none">• 20- or 22-inch LCD monitor• LCD screen smart phone or other mobile device	<ul style="list-style-type: none">• Multifunction peripheral; or• Ink-jet color printer; or• Laser printer (black-and-white or color)• Label printer• Postage printer	<ul style="list-style-type: none">• Speakers

Putting It All Together

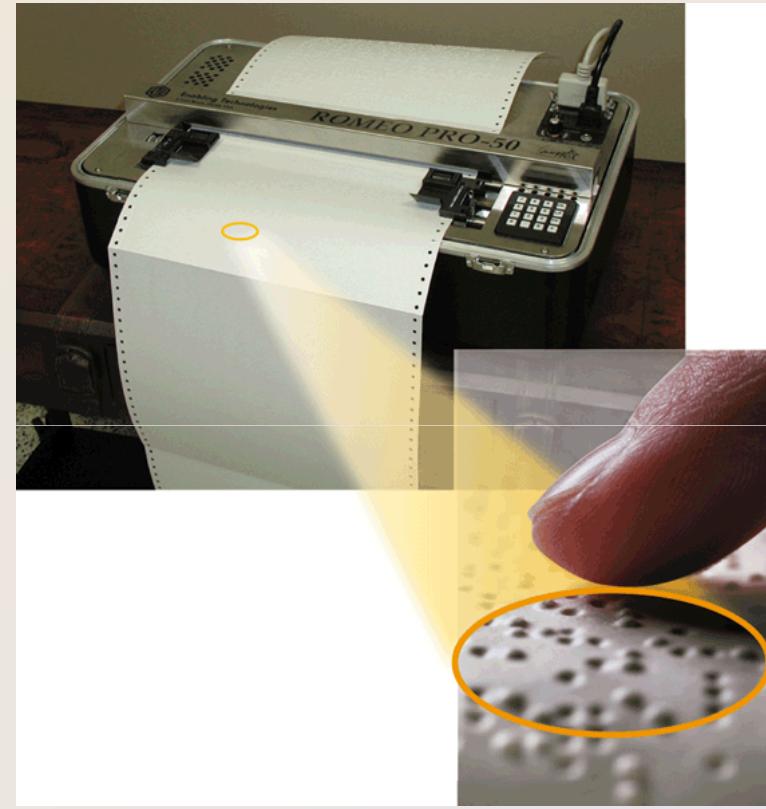
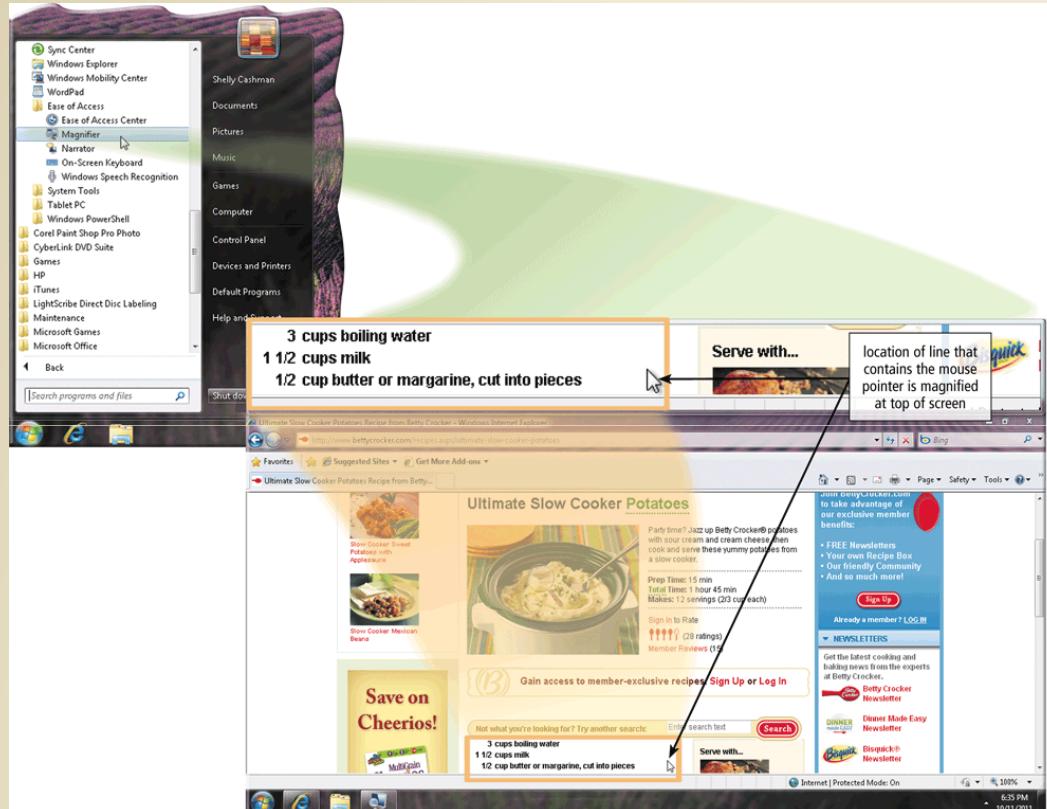
Suggested Output Devices by User			
User	Monitor	Printer	Other
Mobile 	<ul style="list-style-type: none">• 17-inch LCD screen on notebook computer• 8.9-inch screen on a netbook• LCD screen on smart phone or other mobile device	<ul style="list-style-type: none">• Mobile color printer• Ink-jet color printer; or• Laser printer for in-office use (black-and-white or color)• Photo printer	<ul style="list-style-type: none">• Headphones or earbuds or headset• DLP data projector
Power 	<ul style="list-style-type: none">• 30-inch LCD monitor	<ul style="list-style-type: none">• Laser printer (black-and-white or color)• Plotter or large-format printer; or• Photo printer; or• Dye-sublimation printer	<ul style="list-style-type: none">• Speakers• Headphones or earbuds or headset

Putting It All Together

Suggested Output Devices by User			
User	Monitor	Printer	Other
Enterprise 	<ul style="list-style-type: none">• 20- or 22-inch LCD monitor• LCD screen on smart phone or other mobile device	<ul style="list-style-type: none">• High-speed laser printer• Laser printer, color• Line printer (for large reports from a mainframe)• Label printer	<ul style="list-style-type: none">• Speakers• Headphones or earbuds or headset• Networked DLP data projector• 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

**Discovering
Computers 2012**

**Your Interactive Guide
to the Digital World**

Chapter 6 Complete

