What is Output?

What is output?

➢ **Data that has been processed into a useful form, called information**

- ▪ **Output device** is any hardware component that can convey information to user

TEXT GRAPHICS AUDIO VIDEO

Display Devices

What is a display device?

➢ **Output device that visually conveys information**

▪ Information on display device sometimes called **soft copy**

➢ **Monitor** houses display device as separate peripheral

Display Devices

What is a CRT monitor?

- **Contains cathode-ray tube (CRT)**

- **Screen coated with tiny dots of phosphor material**

  - Each dot consists of a red, blue, and green phosphor

- **Common sizes are 15, 17, 19, 21, and 22 inches**

  - **Viewable size** is diagonal measurement of actual viewing area

Display Devices

What is the ENERGY STAR® program?

➢ **Encourages manufacturers to create energy-efficient devices that require little power when not in use**

➢ **Monitors and devices meeting guidelines display ENERGY STAR label**

Display Devices

What is resolution?

- Sharpness and clarity of image
- Higher resolution makes image sharper, displays more text on screen, makes some elements smaller
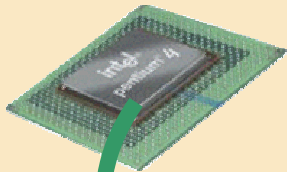- **Refresh rate** is speed at which monitor redraws images on screen
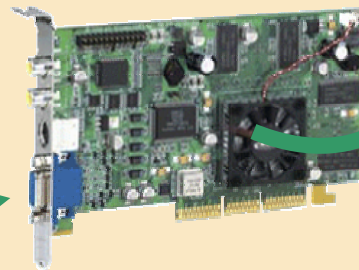
Next ▶

Display Devices

How does video travel from the processor to a CRT monitor?

➢ **Video card** (also called a **graphics card**) converts digital output from computer into analog video signal

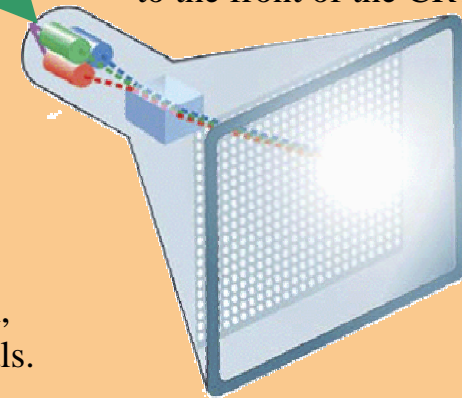**Step 1.** The processor sends digital video data to the video card.

Step 3. The analog signal is sent through a cable to the CRT monitor.

Step 4. The CRT monitor separates the analog signal into red, green, and blue signals.

Step 5. Electron guns fire the three color signals to the front of the CRT.

Step 6. An image is displayed on the screen when the electrons hit phosphor dots on the back of the screen.

Step 2. The video card's digital-to-analog converter (DAC) converts the digital video data to an analog signal.

Next ▶

Display Devices

What are video standards?

➢ **Video Electronics Standards Association (VESA)** develops video standards

Standard	Suggested Resolution	Maximum Possible Colors
Monochrome Display Adapter (MDA)	720 x 350	1 for text
Video Graphics Array (VGA)	640 x 480	16
	320 x 200	256
Extended Graphics Array (XGA)	1024 x 768	256
	640 x 480	65,536
Super Video Graphics Array (SVGA)	800 x 600	16.7 million
	1024 x 768	16.7 million
	1280 x 1024	16.7 million
	1600 x 1200	16.7 million
Beyond SVGA	1920 x 1440	16.7 million
	2048 x 1536	16.7 million

Next ▶

Display Devices

What are various video card configurations?

> ➤ **Color depth** determines number of colors video card can display

Video Memory	Color Depth	Number of Colors	Maximum Resolution
1 MB	8-bit	256	1024 x 768
	16-bit	65,536	800 x 600
2 MB	8-bit	256	1024 x 768
	16-bit	65,536	1280 x 1024
	24-bit	16.7 million	800 x 600
4 MB	24-bit	16.7 million	1024 x 768
6 MB	24-bit	16.7 million	1280 x 1024
8 MB	32-bit	16.7 million	1600 x 1200
16 MB	32-bit	16.7 million	1920 x 1440
32 MB	32-bit	16.7 million	2048 x 1536
64 MB	32-bit	16.7 million	2048 x 1536
128 MB	32-bit	16.7 million	2048 x 1536

Next ▶

Display Devices

What is a flat panel monitor?

- ➢ **Uses liquid crystal display**
  - ▪ Also called **LCD monitor**
- ➢ **Takes up less desk space than CRT monitor**
- ➢ **Consumes less than one-third the power**

Display Devices

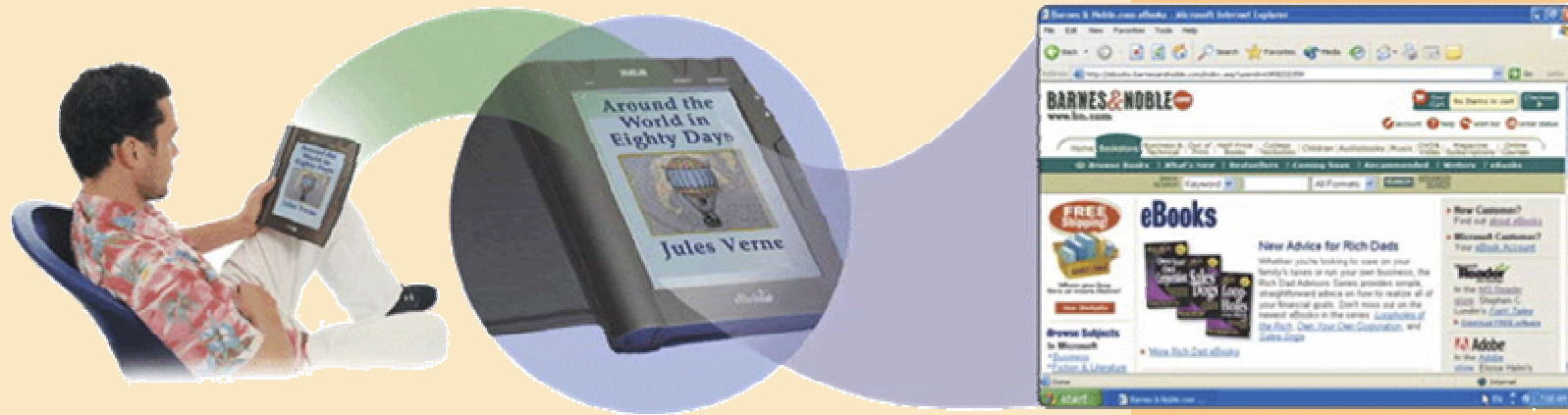**What are some mobile devices that have LCD screens?**

- ➢ **Notebooks**
- ➢ **Tablet PCs**
- ➢ **PDAs**
- ➢ **Smart phones**
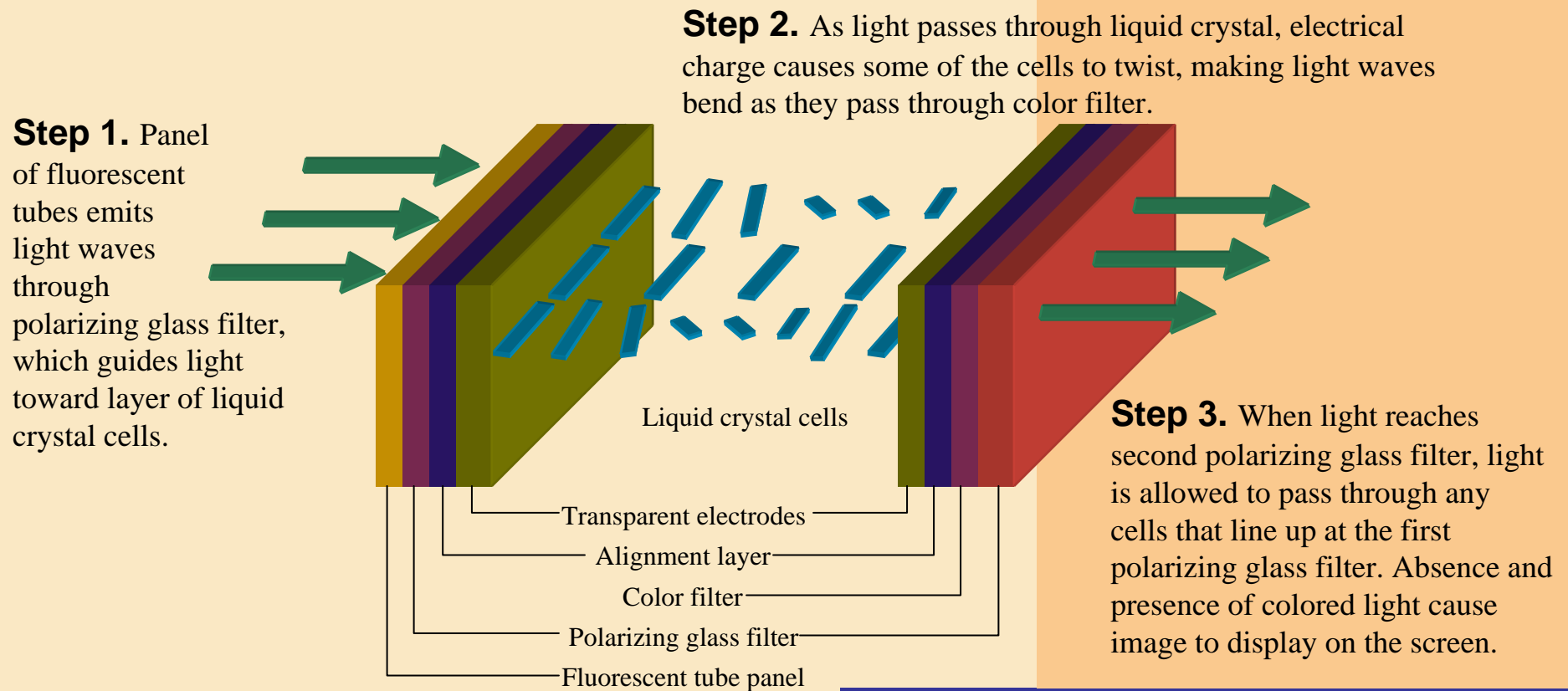
Display Devices

What is an electronic book (e-book)?

➢ Small, book-sized computer that uses LCD screen

➢ Allows users to read, save, highlight, bookmark, and add notes to online text

➢ Download new book content from Web

Next ▶

Display Devices

How does LCD work?

➢ **Uses liquid compound to present information on screen**

Step 1. Panel of fluorescent tubes emits light waves through polarizing glass filter, which guides light toward layer of liquid crystal cells.

Step 2. As light passes through liquid crystal, electrical charge causes some of the cells to twist, making light waves bend as they pass through color filter.

Liquid crystal cells

Step 3. When light reaches second polarizing glass filter, light is allowed to pass through any cells that line up at the first polarizing glass filter. Absence and presence of colored light cause image to display on the screen.

Transparent electrodes

Alignment layer

Color filter

Polarizing glass filter

Fluorescent tube panel

Next ▶

Display Devices

How do you use a flat panel monitor with a video card?

➢ **Plug monitor into Digital Video Interface (DVI) port on computer**

standard monitor port

S-video port

DVI port

Next ▶
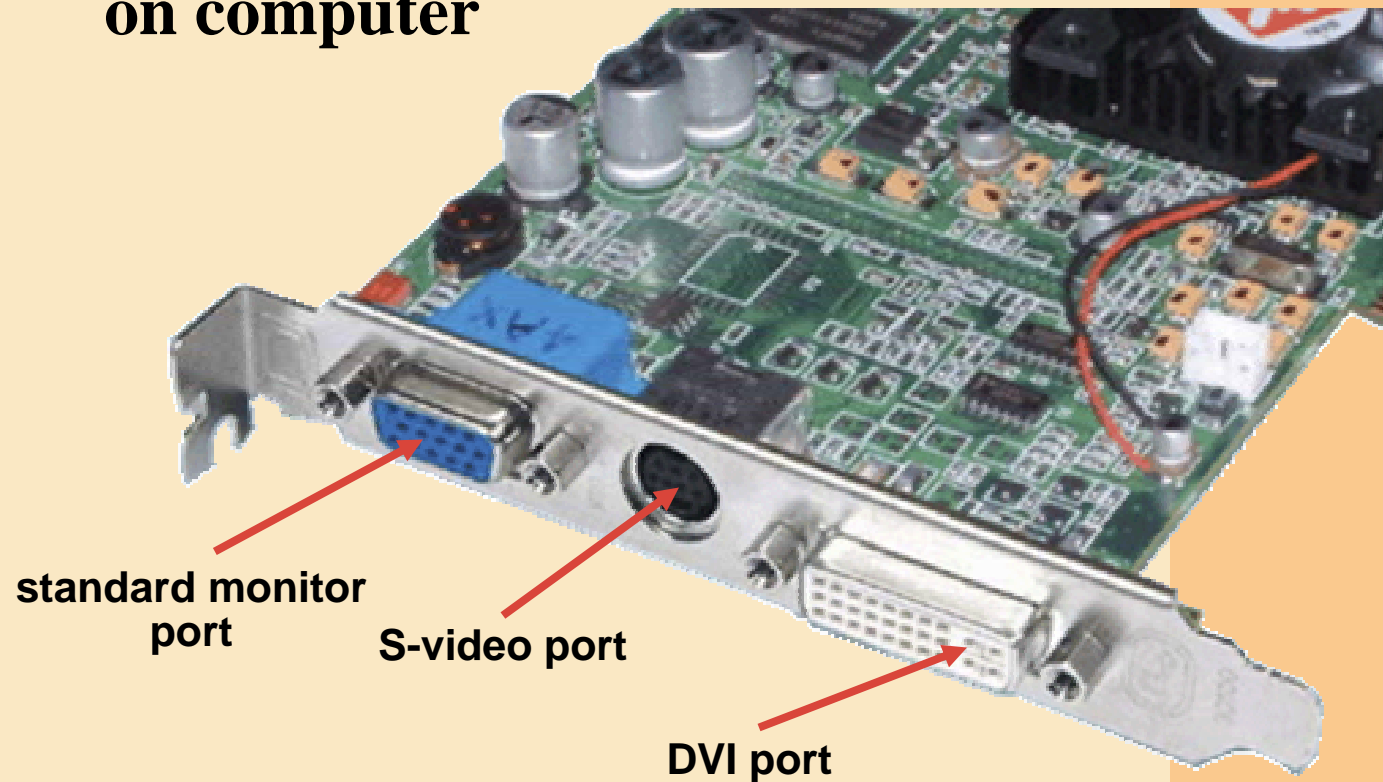
Display Devices

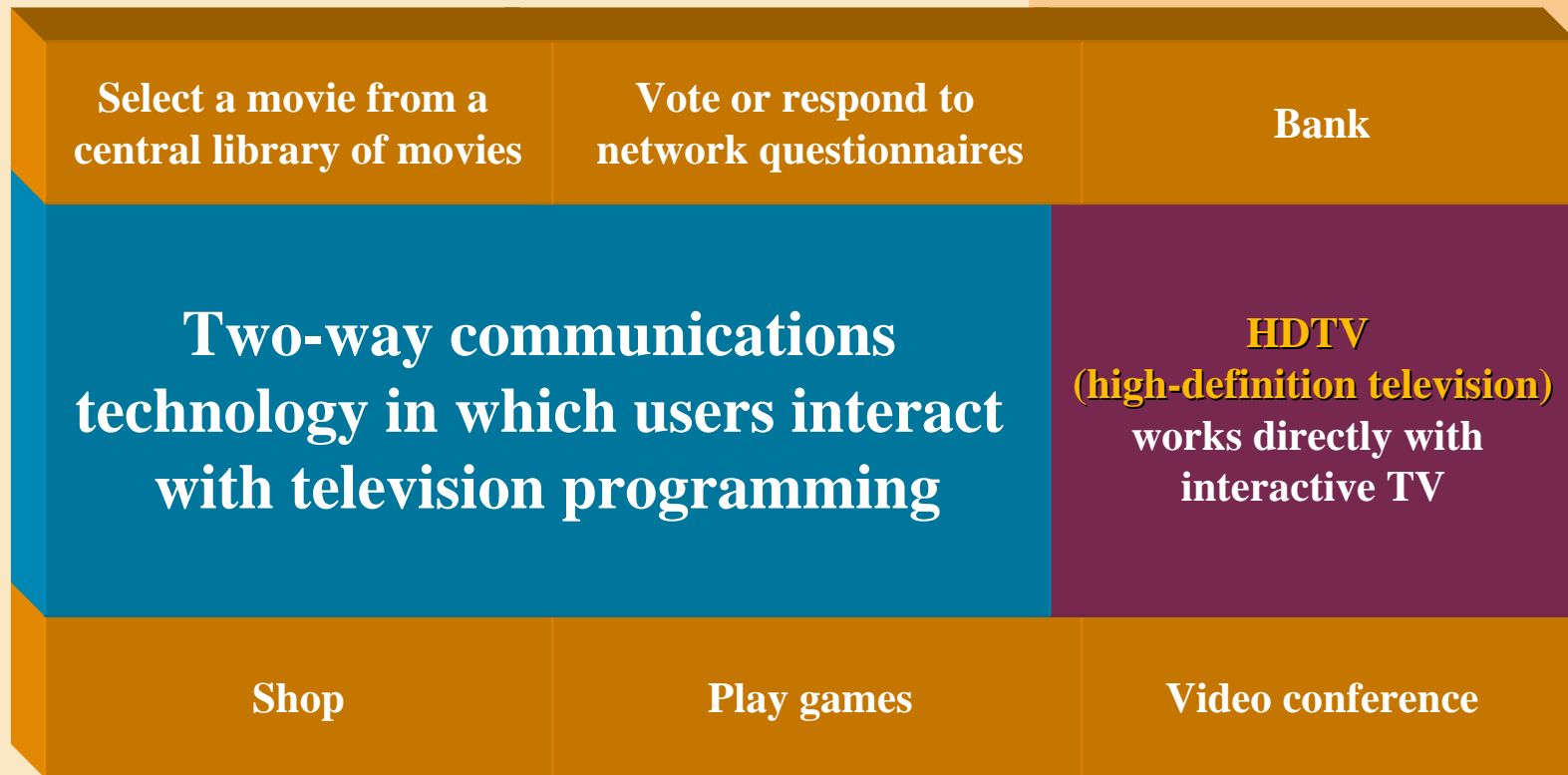## What is a gas plasma display?

- Displays image by applying voltage to layer of gas
  - Larger screen size and higher display quality than LCD, but much more expensive

Next ▶

Display Devices

What is interactive TV?

Select a movie from a central library of movies	Vote or respond to network questionnaires	Bank
Two-way communications technology in which users interact with television programming		HDTV (high-definition television) works directly with interactive TV
Shop	Play games	Video conference

Next ▶

Printers

What is a printer?

- ➢ **Output device that produces text and graphics on paper**
- ➢ **Result is hard copy, or printout**
- ➢ **Two orientations: portrait and landscape**

Portrait

Living with Computers

Monthly Newsletter   Vol. 22 • Issue 4

How to Maintain Your Computer

Landscape

| Rodney's Gadgets Annual Income Statement | | Break-Even Analysis | | |

Next ▶

Printers

How do you know which printer to buy?

➢ **Depends on printing needs**

Budget

Speed

Color or black and white

Cost per page

Graphics capability

Photo printing

Paper types and sizes

System compatibility

Future needs

Wireless capability
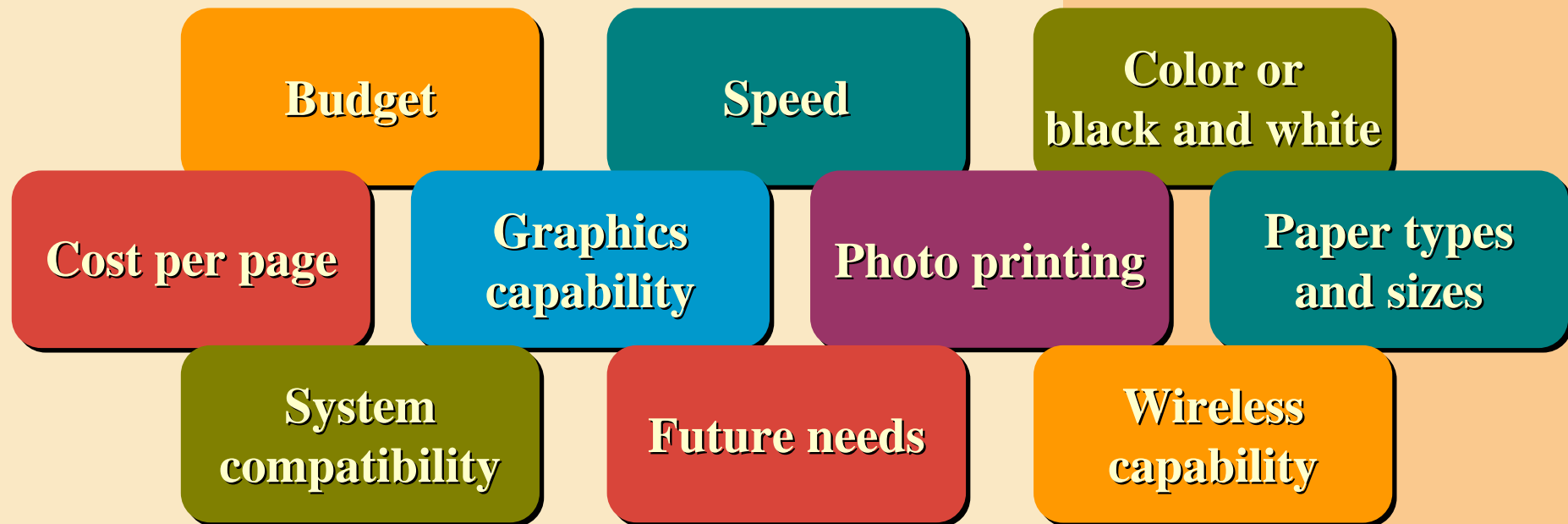
Printers

What is a dot-matrix printer?

➢ **Impact printer that produces printed images when tiny wire pins strike ribbon**

- **Impact printer** forms characters by striking mechanism against inked ribbon that contacts paper

Next ▶

Printers

What is a line printer?

- ➢ **High-speed impact printer that prints entire line at a time**
- ➢ **Speed measured in lines per minute (lpm)**
  - ▪ **Band printer** prints fully formed characters using a hammer mechanism
  - ▪ **Shuttle-matrix printer** is high-speed printer that works like dot-matrix printer

Printers

What is an ink-jet printer?

➤ **A type of nonimpact printer that sprays tiny drops of liquid ink onto paper**

▪ **Nonimpact printer** forms characters and graphics without striking paper

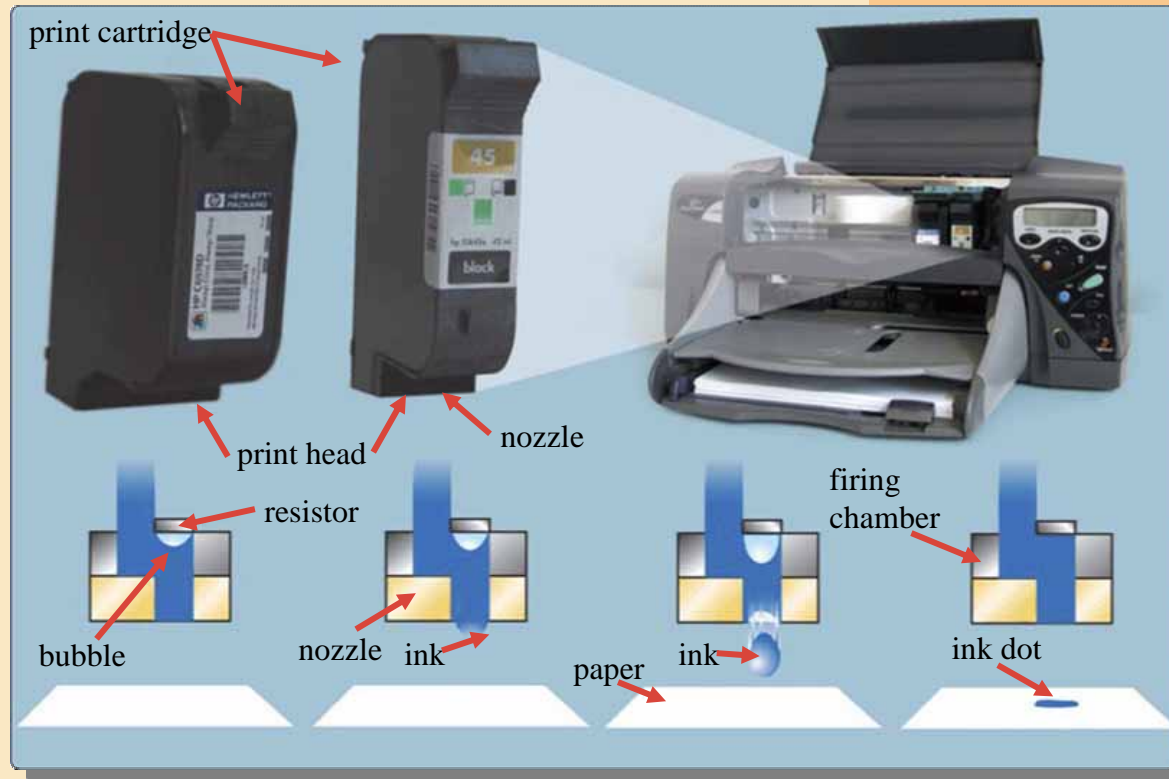➤ **Prints in black-and-white or color on a variety of paper types**

Printers

What is the resolution of a printer?

➢ **Sharpness and clarity**

➢ **Measured by number of dots per inch (dpi) printer can output**

Printers

How does an ink-jet printer work?

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.

Next ►

Printers

What is a photo printer?

➢ **Color printer that produces photo-lab-quality pictures**

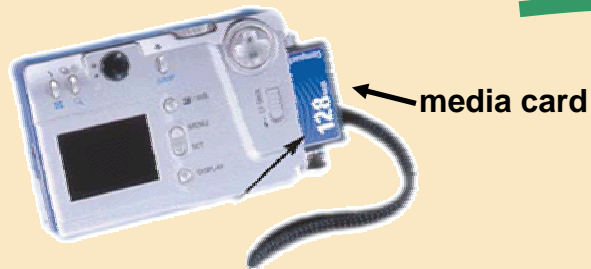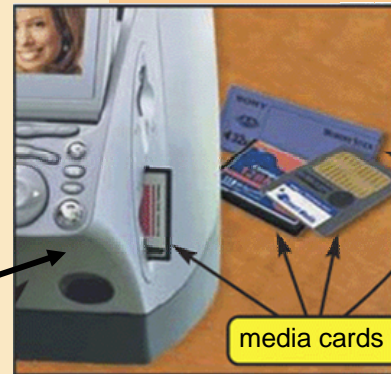**Step 1.** Take photograph with digital camera and store it on media card in the camera.

media card

Step 2. Insert media card into card reader on photo printer.

photo printer

media cards

Step 3. Use menu to select desired image to print, view it on LCD screen, edit if necessary, select size of the print, and then print image.
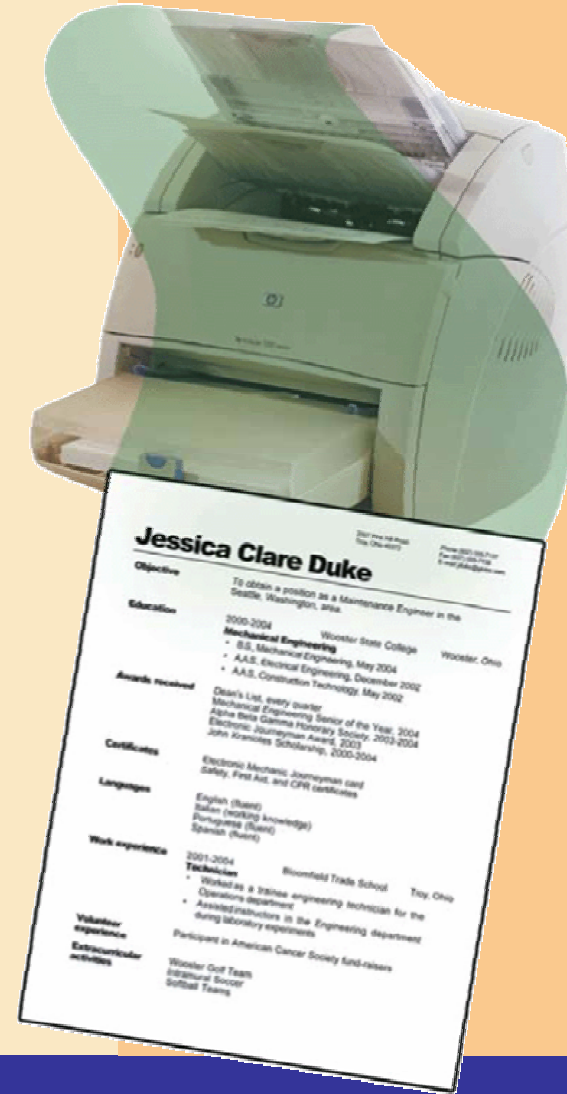
Step 4. Remove printed photo from the printer.

Next ▶

Printers

What is a laser printer?

- ➤ **High-speed, high-quality nonimpact printer**
- ➤ **Prints text and graphics in very high-quality resolution, ranging from 600 to 2,400 dpi**
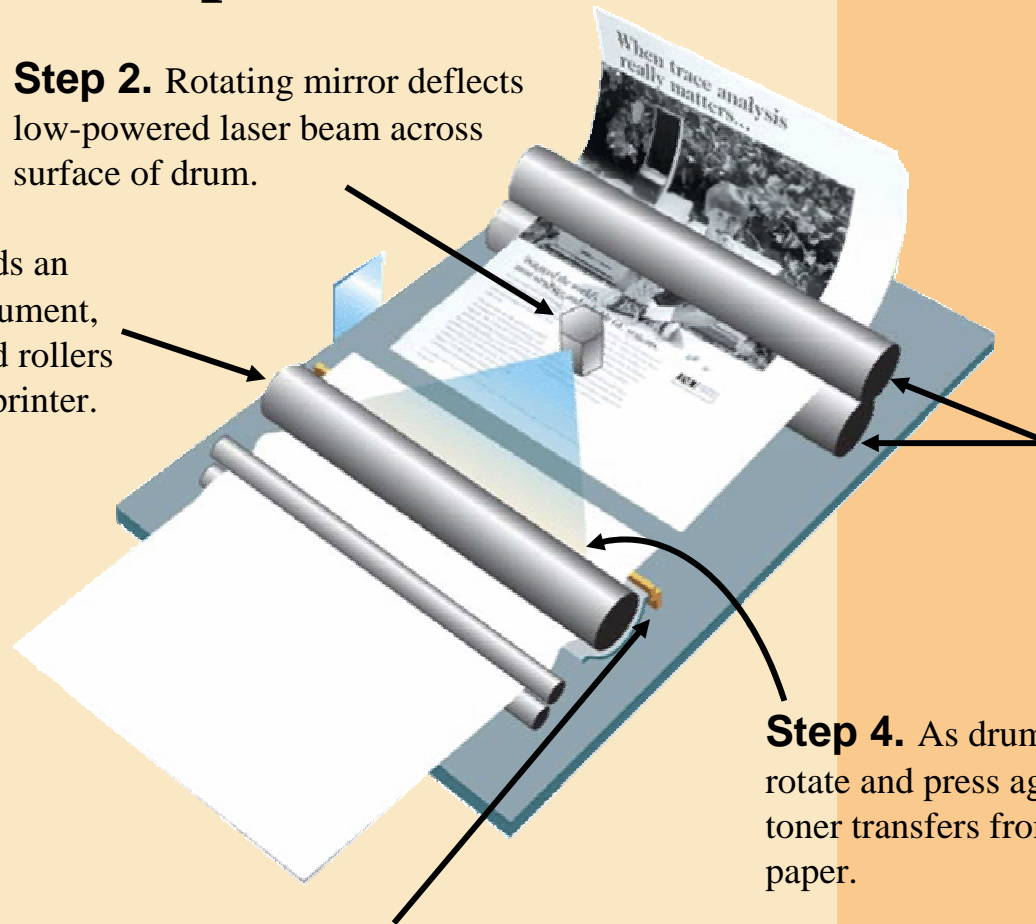- ➤ **Typically costs more than ink-jet printer, but is much faster**

Next ▶

Printers

How does a laser printer work?

Step 2. Rotating mirror deflects low-powered laser beam across surface of drum.

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

Step 5. Set of rollers uses heat and pressure to permanently fuse toner to paper.

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

Step 3. Laser beam creates a charge that causes toner to stick to drum.

Next ▶

Printers

What is a thermal printer?

➢ **Generates images by pushing electrically heated pins against heat-sensitive paper**

- **Dye-sublimation printer**, (also called a **digital photo printer**) uses heat to transfer dye to specially coated paper

professional

home use

Next ▶

Printers

What is a portable printer?

➢ **Small, lightweight, battery-powered printer that allows mobile user to print from notebook computer, Tablet PC, or PDA while traveling**

Printers

What is a label printer?

➢ **Small printer that prints on adhesive-type material**

➢ **Most also print bar codes**

▪ **Postage printer** has built-in digital scale and prints postage stamps

Next ▶

Printers

What is a plotter?

➢ **Sophisticated printer used to produce high-quality drawings**

➢ **Large-format printer creates photo-realistic-quality color prints**

Printers

**What is wireless printing?**

- ➢ **Output transmitted to printer wirelessly via infrared light waves or radio waves**
    - ▪ **Bluetooth™ printing** uses radio waves
    - ▪ Devices need to be within 30-foot range

Next ▶

Speakers and Headsets

What is an audio output device?

➢ **Computer component that produces music, speech, or other sounds**

➢ **Speakers and headsets are common devices**

subwoofer

speakers

Next ▶
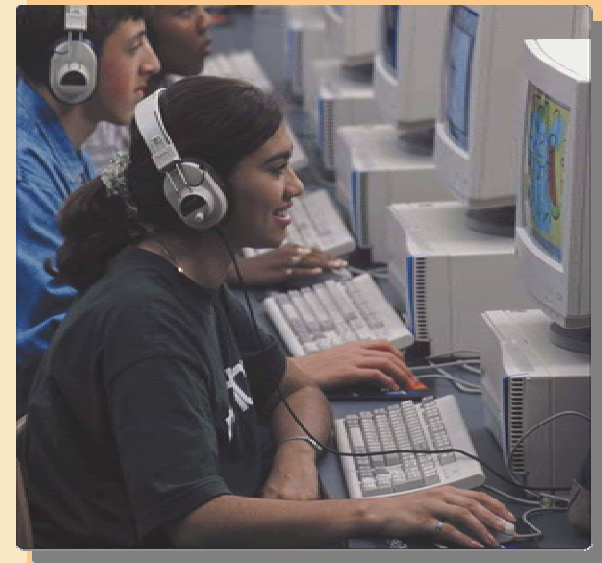
Speakers and Headsets
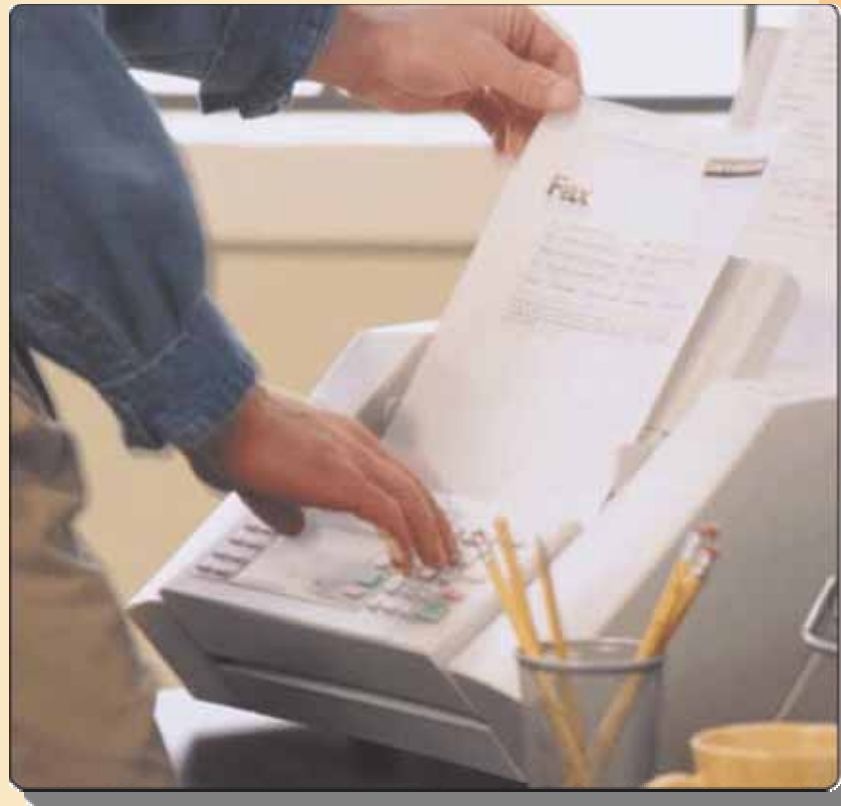
What is voice output?

➢ **Computer talks to you through speakers on computer**

➢ **Internet telephony allows you to have conversation over Web**

Next ▶

Other Output Devices

What is a facsimile (fax) machine?

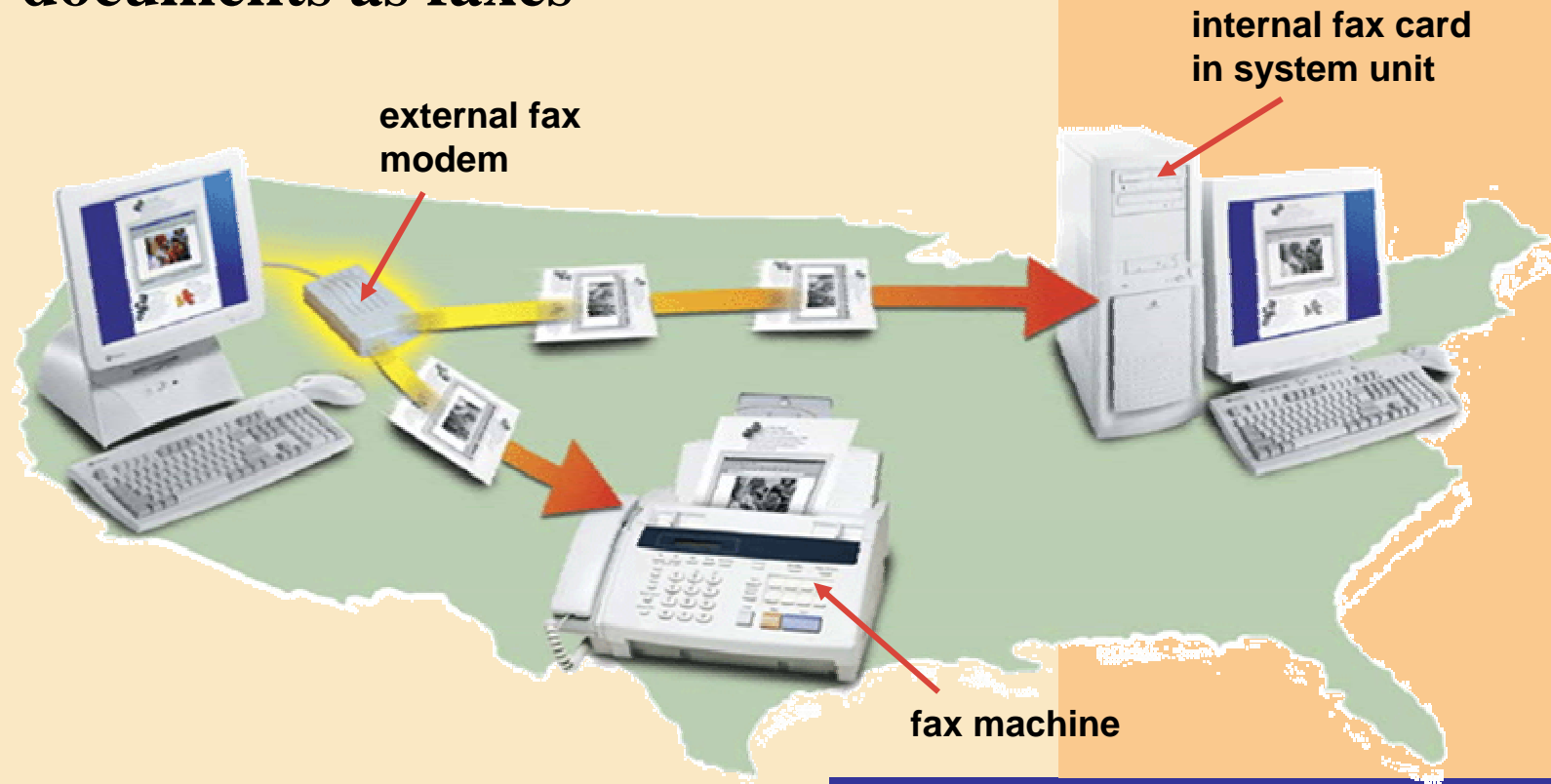➤ **Device that transmits and receives documents over telephone lines**

Other Output Devices

What is a **fax modem**?

➢ **Modem that allows you to send and receive electronic documents as faxes**

internal fax card
in system unit

external fax
modem

fax machine

Next ▶

Other Output Devices

What is a multifunction peripheral?

➢ **Provides functionality of printer, scanner, copy machine, and fax machine**

Next ▶

Other Output Devices

What is a data projector?

➢ **Device that takes image from computer screen and projects it onto larger screen**

Next ▶

Other Output Devices

What is force feedback?

➢ **Sends resistance to joystick or wheel in response to actions of user**

Putting It All Together

What are suggested output devices for the home user?

User	Monitor	Printer	Other
Home	• 17- or 19-inch color CRT monitor or flat panel monitor	• Ink-jet color printer • Photo printer	• Speakers • Headset • Force-feedback joystick and wheel

Next ▶

Putting It All Together

What are suggested output devices for the small office/home office user?

User	Monitor	Printer	Other
 Small Office/ Home Office (SOHO)	▪ 19- or 21-inch color CRT monitor or flat panel monitor ▪ Color LCD display on Tablet PC or PDA	▪ Multifunction peripheral ▪ Ink-jet color printer ▪ Laser printer, black and white ▪ Label printer ▪ Postage printer	▪ Fax machine ▪ Speakers

Next ▶

Putting It All Together

What are suggested output devices for the mobile user?

User	Monitor	Printer	Other
Mobile	▪ 15.7-inch color LCD display on notebook computer ▪ Color LCD display on PDA	▪ Portable color printer ▪ Ink-jet color printer ▪ Laser printer, black and white ▪ Photo printer	▪ Fax modem ▪ Headset ▪ DLP data projector

Next ▶

Putting It All Together

What are suggested output devices for the large business user?

User	Monitor	Printer	Other
Large Business	▪ 19- or 21-inch color CRT monitor or flat panel monitor ▪ Color LCD display on Tablet PC or PDA	▪ High-speed laser printer ▪ Laser printer, color ▪ Line printer (for large reports from a mainframe) ▪ Label printer	▪ Fax machine or fax modem ▪ Speakers ▪ Headset ▪ DLP data projector

Next ►

Putting It All Together

What are suggested output devices for the power user?

| User	Monitor	Printer	Other
Power	▪ 23-inch color flat panel monitor	▪ Laser printer, black and white ▪ Plotter or large-format printer ▪ Photo printer; or ▪ Dye-sublimation printer	▪ Fax machine or fax modem ▪ Speakers ▪ Headset

Next ▶

Output Devices for Physically Challenged Users

What is the Magnifier command?

➢ **Windows Magnifier command enlarges text and other items on screen**
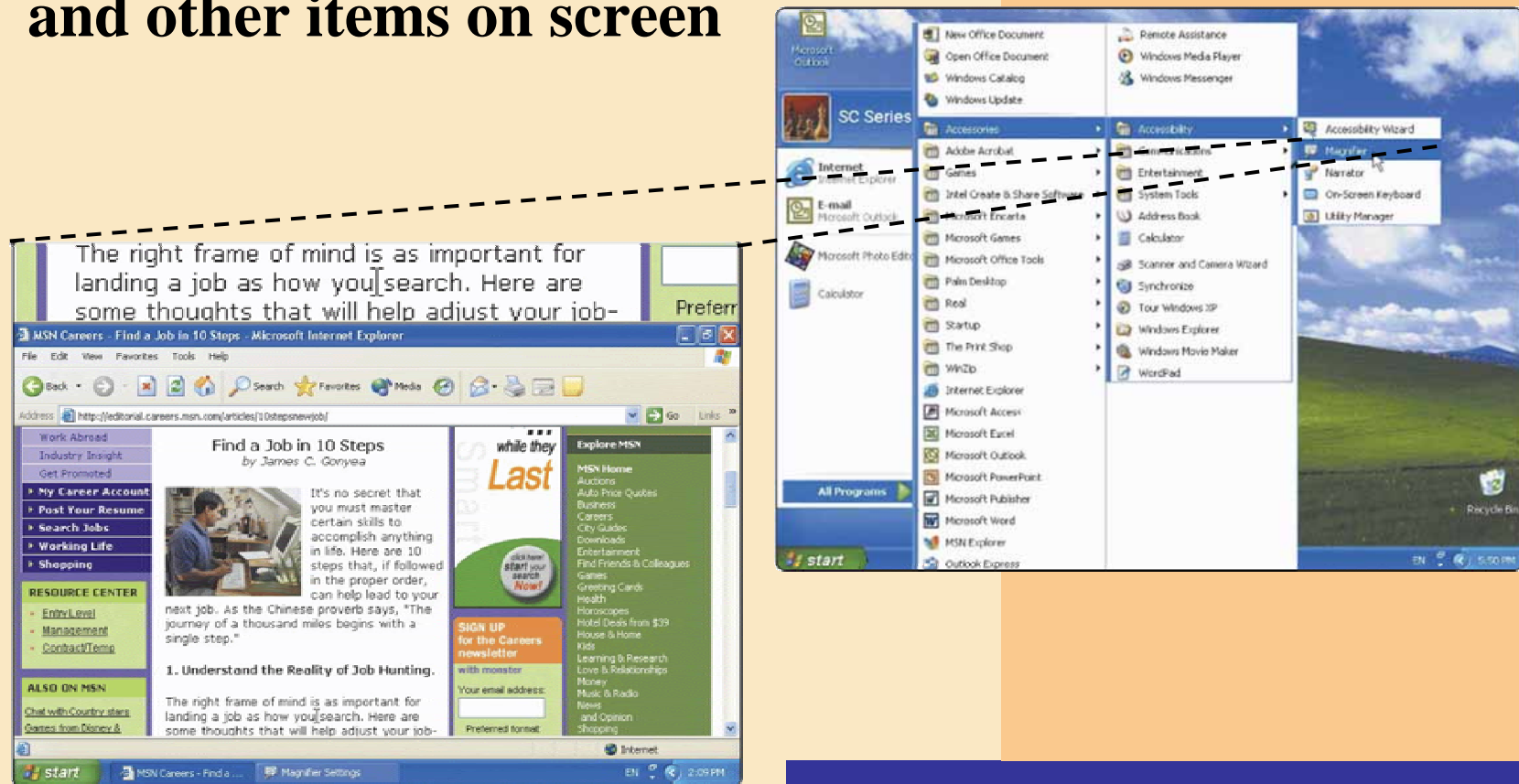
Output Devices for Physically Challenged Users

What other output options are available for visually impaired users?

- ➢ **Change Window settings, such as increasing size or changing color of text to make words easier to read**
- ➢ **Blind users can work with voice output**
- ➢ **Braille printer outputs information in Braille onto paper**