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# Introduction to PC: Help Desk

*Using Informed Design to  
Develop a Flowchart to  
Diagnose and Repair a PC*

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**NYSCATE**  
NEW YORK STATE CURRICULUM  
for Advanced Technology Education

Integrated MST Design Activities for  
High School and Community College Students

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The University of the State of New York  
The State Education Department







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# Introduction and Overview

## Abstract

This high school foundation-level module introduces students to the PC and its applications. In this module the teacher introduces students to PCs through a variety of experiences including:

- designing a “virtual PC” on the Internet to introduce students to the design process and provide an engaging Design Challenge;
- completing Knowledge and Skill Builders to obtain just-in-time information;
- formatting a hard disk and installing an operating system (OS) and applications;
- troubleshooting and correcting faults on a PC;
- developing flowcharts; and
- generating a computer presentation.

### Grade-Level Appropriateness

This is an introductory, foundation-level high school module appropriate for use in grades 9–10.

### TIME ALLOCATION IN 45-MINUTE PERIODS

25 periods

### EXISTING COURSES ENHANCED BY THE MODULE

As an introductory module on PCs, the package can be delivered in a variety of computer applications courses, or in technology education courses such as Digital Electronics, AC & DC Electronics, and Principles of Engineering.

# Design Challenge Overview

## SETTING THE CONTEXT FOR STUDENTS

### Introduction

For any given human-made device there are times when the device isn't working properly. Computers are no different; they will inevitably have problems that need to be addressed and remedies that need to be found. Many of us have experienced the frustration of trying to troubleshoot a problem ourselves and then trying to find someone who can fix the problem for us. In this module, you become a troubleshooter of computer problems.

### Design Challenge

As part of a group, you will design a flowchart for troubleshooting common errors in a computer and then implement that design using presentation software (i.e., PowerPoint, Corel Suite, Lotus Suite, etc.). Your “Help Desk” will meet quality specifications both when you test it and when your group formally presents it to the class.

### Specifications

Use presentation software with variable slide sequencing to navigate through a troubleshooting procedure. Slides must include graphics, text, and digital photos.

### Constraints

Entire presentation must fit on a single 1.4 MB floppy disk.

# Goals and Learning Outcomes

## New York State Learning Standards for Mathematics, Science, and Technology:

### **Standard 1B — Analysis, Inquiry and Design**

#### **Standard 2 — Information Systems**

Information technology is used to retrieve, process and communicate information and as a tool to enhance learning.

- prepare multimedia presentations demonstrating a clear sense of audience and purpose.
- access, select, collate and analyze information obtained from a wide range of sources.

#### **Standard 5 — Technology**

Engineering design is an iterative process involving modeling and optimization, used to develop technological solutions to problems within given constraints.

- carry out a thorough investigation of an unfamiliar situation and identify needs for technological innovation.
- generate creative solution ideas, choose the optimal solution to the problem.
- construct a model of the solution.
- in a group setting devise a test of the solution relative to design criteria and perform the test.

Computers as tools for designing, modeling, information processing, communication, and system control have greatly increased human productivity and knowledge.

- understand basic computer architecture.
- select a computer system that meets needs.

Technological systems are designed to achieve specific results and produce outputs, such as products, structures, services, energy and other systems.

- explain why making trade-offs among characteristics, such as function and cost, is necessary when selecting systems for specific purposes.

## New York State Learning Standards For Career Development and Occupational Studies

### **National Standards For Technological Literacy**

#### **Standard 2: The Core Concepts of Technology**

**AA**—Requirements involve identification of the criteria and constraints of a product or system and determination of how they affect the final design and development.

**BB**—Optimization is an ongoing process or methodology of designing or making a product and is dependent on criteria and constraints.

#### **Standard 8: The Attributes of Design**

**H**—The design process includes defining a problem, generating ideas, identifying criteria and constraints, making a model or prototype, testing and evaluating the design, refining the design, communicating process and results.

**K**—Requirements of a design, such as criteria, constraints, and efficiency, sometimes compete with each other.

#### **Standard 9: Engineering Design**

**K**—A prototype is a working model used to test a design concept by making actual observations and necessary adjustments.

**L**—The process of engineering design takes into account a number of factors.

#### **Standard 10: Role of Troubleshooting, Research and Development, Invention and Innovation, and Experimentation in Problem Solving**

**I**—Research and development is a specific problem-solving approach that is used extensively in business and industry to prepare devices and systems for the marketplace.

**J**—Technological problems must be researched before they can be solved.

#### **Standard 11: Applying the Design Process**

**O**—Refine a design by using prototypes and modeling to ensure quality, efficiency, and productivity of the final product.

## **Standard 12: Use and Maintain Products and Systems**

P—Use computers to access, retrieve and evaluate data and information.

## **Standard 17: Information and Communication Technologies**

L—Information and communication technologies include inputs, processes, and outputs associated with sending and receiving information.

O—Communication systems are made up of source, encoder, transmitter, receiver, decoder, storage, retrieval and destination.

# Materials and Resources

Provide each student group with materials needed to complete the challenge, such as: Five to ten PCs per classroom; old 486s are OK. Minimum requirements are: 16 MB RAM, 500 MB hard disk, CD-ROM drive, and Windows 95 or higher operating system. Students must be able to open these computers and have access to all of the internal components. It is recommended that students not open computers normally used for instructional purposes. (**Note:** Information provided to the students about materials in Student Handout #1 states: *You may use only materials and tools provided by your teacher, or materials and tools provided by your group and preapproved by your teacher.*)

Additional materials will be necessary to complete the Knowledge and Skill Builders. These materials are listed within the individual KSBs or in the Additional Support for Teachers section of this document.

### **Safety Considerations**

This module provides students with an opportunity to perform a variety of troubleshooting tasks on a computer. Since the computers will be open for some of these tasks, precautions must be taken to limit student exposure to line voltage. Power should be removed from any line voltage device before the computer is opened. Although this can be accomplished at either the circuit panel or power strip, the surest method is to **unplug the computer directly from the power source**. Power should not be reapplied until the teacher has ascertained that all work is complete and correct, and covers have been returned to their normal, closed position. Students' work areas should be kept clear of conductive materials (including screws or paper clips) and should be kept dry.

### **Resources**

Access to WWW.

A separate document, the NYSCATE *Pedagogical Framework*, provides in-depth understanding of the NYSCATE challenge statements, the FOCUS on Informed Design pedagogical model for teachers, student Knowledge and Skill Builders (KSBs), the informed design loop for students, and more.

## Timeline Chart

Session	FOCUS MODEL COMPONENT (for teachers)	INFORMED DESIGN LOOP COMPONENT (for students)	ACTIVITY
1	Focus discussion on problem context Organize for informed design	Clarify design specifications and constraints	Begin discussion of introductory packet (module overview). Discuss informed design cycle; finish packet.
2–14	Coordinate student progress	Research and investigation	Conduct KSB #1: Designing a Virtual PC. Conduct KSB #2: Operating System [OS] and HD Format. Conduct KSB #3: Introduction to Logic Circuits. Conduct KSB #4: Cable Installation & Safety. Conduct KSB #5: Flowchart Development.
15–24	Coordinate student progress	Generate alternative designs Choose and justify optimal design Construct and test the “Help Desk” solution	Create solutions for “common computer faults.” Create preliminary design solutions. Select and defend choice of preferred (optimal) solution. Develop & optimize “Help Desk.”
25	Unite class thinking about what has been accomplished Sum up progress on learning goals	Test and evaluate “Help Desk” design	Develop plans for testing the design solution. Hold class presentations of methods and results.

# Procedural Suggestions

## PERIOD 1

*Distribute Student Handout #1 (Overview of the Module Activity), page 17.*

Discuss the Problem Context section and the Design Challenge. Also discuss the student requirements and assessments, and the expectations for each team. The student requirements include: KSBs, Design Journal or Design Folio, Design Challenge, final report, and class presentation.

- Introduce computer as a modern tool for personal and business use.
- Elicit from students the need for everyone to become computer literate.
- Illustrate the use of computers as an information resource.
- Divide class into design teams of three students.

## PERIOD 2

*Distribute Student Handout #2 (KSB #1: Designing a Virtual PC), page 19.*

- Groups should select a name for their team and divide up team responsibilities.
- Develop computer architecture model; present block diagram included in KSB #1.
  - Central processing unit (CPU)
  - Main and auxiliary memory
  - Input/output devices
- Engage students in research of different “families” of microprocessors.
- Help students compare functions of the human brain to those of a computer system.
- Facilitate the identification by students of different input/output devices.
- See that students are able to check the total amount of memory, used memory, and free memory in their computer.

## PERIOD 3

- Describe the differences between personal and business computer systems.
  - Stand-alone systems
  - Networked systems
- Illustrate the many types of application software available.
- Elicit the common uses and abuses of the Internet.



**PERIOD 4**

*Distribute Student Handout #3 (KSB #2: Operating System [OS] and HD Format), page 20.*

- Summarize KSB #1 and explain its relationship to KSB #2.
- Discuss the operating system (OS) and guide students in the use of an OS.
  - DOS
  - Windows 95 or higher
- Have students use the most commonly used DOS commands including:
  - Dir Dir/p Dir/w
  - Copy files, disks
  - Chkdsk, Scandisk

**PERIODS 5-7**

Guide students through the following tasks:

- Formatting floppy disk
- Identifying the consequences of reformatting a disk
- Formatting a hard disk
- Installing an operating system (OS)



**PERIOD 8**

Guide students through the process of:

- Installing an application package on a computer
- Testing to ensure that the installation was performed properly

**PERIODS 9-11**

*Distribute Student Handout #4 (KSB #3: Introduction to Logic Circuits), page 21.*

- Explain the role of logic circuits in the operation of *all* digital devices (computers, calculators, etc.).
- Explain numbering systems and their bases.
  - Decimal, binary, octal, hexadecimal
- Illustrate a basic logic circuit: AND, OR, and NOT (inverters).
- Provide experiences and practice on the conversion of decimal numbers to binary and hexadecimal numbers.

**PERIODS 12–13**

Distribute Student Handout #5 (KSB #4: Cable Installation and Safety), page 22.

- Explain the different types of cables and connectors needed for computer systems:
  - SCSI
  - Serial
  - Firewire
  - USB
  - Power Cables
  - IDE
  - Parallel

Work with students as they identify and come to comprehend the following concepts:

- Static electricity and the relationship of static charges to sensitive microchips
- Safety procedures in the handling of motherboards, cards, and microchips
- Have student groups identify all cables and connectors and then connect them to a computer system.

**PERIOD 14**

Distribute Student Handout #6 (KSB #5: Flowchart Development), page 23.

- Discuss the purpose of logical sequencing in the development of flowcharts.
- Explain flowchart symbols and relate their different shapes to each other.
- Facilitate student groups as each develops a flowchart of a simple task that includes decision making.

**PERIODS 15–24**

Discuss the context, specifications, and constraints as they relate to the Design Challenge. Discuss the relationship of research to development of an optimal design solution. Have students discuss and generate the characteristics of good design. Discuss the expectations for each team and the expected end product for all.

- Explain the Design Challenge and tell students how they will be assessed.
- Present the presentation software.
- Discuss various presentation software products that are available.
- Discuss different types of problems that can occur with a computer system.
- Explain that students should be able to identify common computer problems and their solutions.



## Additional Support for Teachers

- Discuss the solutions process for common computer faults.
- Discuss the logical sequencing needed for the team presentations.

### PERIOD 25

- Teams present solution to their Design Challenge.

### POWERPOINT LOGIC FLOW

To set up the decision-making slides, it is necessary to have at least two buttons on each page. The buttons are programmable through “hyperlinks.” Although the “hyperlinks” can link to web pages, they can also link to other slides. They can only link to slides that have already been created.

*Procedure for inserting go-to's:*

1. Insert the buttons. Use the menu item Slideshow>Action Buttons and then click where you want it to be placed.
2. Since Buttons can be linked to existing pages, you must make up all your pages first. It has been useful to have the students create all their pages on paper—one slide to a page—before they start, using their logic diagrams.
3. You can format the button by clicking on it. To edit the “hyperlink,” right click on the previously inserted button and go to Edit Hyperlink.

The following are examples of PCs that were virtually designed using Internet resources. As the examples indicate, there are a variety of possible solutions; the teacher needs to be aware of this and modify the problem accordingly.

1 GHz AMD processor	Separate 120-watt speakers	Suite
128 MB high-speed micron syndram	Sound card — sound blaster emulation	Individually tested, brand-new, custom-built quality computer
8 MB shared video memory	Wave table device	No contracts, rebates, or gimmicks
40 GB hard drive	Joystick game port	1-year warranty on parts
10/100 Ethernet network card	Dual USB ports	Monitor <b>not</b> included
3.5" NEC floppy drive	Serial port	Software package
56k V.90 modem with Lucent chipset	Parallel port	Free lifetime Internet access
48X CD-ROM drive	Keyboard	
	Scrolling mouse	
	Quick restore CD	
	Corel Word Perfect Office	<b>\$499</b>

## Upgraded System

Above System with	Ordering:	15" monitor	\$149
Following Upgrades:	877-813-9261 (toll-free)	17" monitor	\$249
1.8 GHz AMD processor		Internal ZIP	\$99
256 MB high-speed micron syndram	FedEx Priority Overnight shipping only \$39	CD-Rewritable/Recordable	\$249
80 GB hard drive		DVD ROM player	\$259
<b>\$649</b>			

The following tables contain a series of computer faults that the teacher might introduce to provide students with a learning experience related to computer troubleshooting. The common computer faults shown here are intended only to provide teachers with examples; they are not intended to be all-inclusive.

### PC is not going on:

Condition	How to induce fault	Simulates
Monitor is dead.	Unplug the monitor (and/or PC).	Simulates dead (or unplugged) monitor.
Monitor is dead.	Loosen the monitor to VGA card cable.	Simulates loose cable.
Power supply is dead.	Unplug power supply connection to the motherboard—no beeps, no sound!	Simulates bad power supply.
Motherboard (mainboard) is dead.	Take out processor (486 or above uses a ZIF [zero insertion force] lever); will get different beeps depending on motherboard type.	Simulates bad motherboard supply.

### Hard disk problems

Condition	How to induce fault	Simulates
System won't boot up.	File or operating system is missing on boot up. Delete a needed hard disk file such as Win.com (back it up somewhere).	Simulates disk problems from a bad program or virus or intermittent hard disk problems in which files are lost.
System won't boot up.	Complete OS needs to be reloaded.	Simulates disk problems from a bad program or virus or intermittent hard disk problems in which files are lost.
System won't boot up.	Hard disk has died completely—unplug hard disk.	Simulates hardware failure.

**CD-ROM drive is not working:**

Condition	How to induce fault	Simulates
CD-ROM drive not found	Remove a device driver for CD-ROM (copy it and/or rename it, so it can be put back in easily).	Simulates missing driver.
CD-ROM drive not found	Remove cable for CD-ROM.	Simulates hardware failure.

**Floppy drive is not working:**

Condition	How to induce fault	Simulates
Can' t read from A: drive	Change BIOS setting to low density or 5-1/4.	Simulates battery died and/or faulty bios.
Can' t read from A: drive	Unplug power supply cable to floppy.	Simulates hardware error –floppy drive had died.
Can' t read from A: drive	Reverse data plug to floppy.	Simulates reversed data plug.

**ASSESSMENT**

These assessment scoring sheets assess student performance in the following five categories:

- A. Design Challenge Solution:** How well the “Help Desk” presentation actually worked. Was the design solution effective? How well did it meet design criteria?
- B. Oral Presentation to Class:** Preparation and presentation of material to the class. Was the design solution justified?
- C. Student Class Work & Group Work:** Participation of each student. Did student demonstrate individual effort and contribute sufficiently to the group effort?
- D. Design Journal (or Design Folio):** Student record keeping. Were all investigations documented?
- E. Final Report:** Does the final design solution reflect work on the KSBs? Has the design process been used correctly? Does the report demonstrate good written English?



**“The Help Desk”**  
**Assessment Student Scoring Sheets**

**A. Design Solution Using Presentation Software**

1. Slides follow a logical sequence.	(0–15 pts.)	_____
2. Slides demonstrate clarity of communication.	(0–10 pts.)	_____
3. Decision-making process is well designed for the presentation.	(0–15 pts.)	_____
4. Presentation provides accurate solutions to the computer system errors.	(0–15 pts.)	_____
5. Presentation meets disk storage requirements/ constraints.	(0–10 pts.)	_____
6. Appearance of the slides is pleasant and engages the attention of the viewer.	(0–15 pts.)	_____
7. Number of slides is sufficient to provide the needed information to the viewer.	(0–10 pts.)	_____
8. Graphics and sound are used to enhance the presentation.	(0–10 pts.)	_____
<b>Total</b>	(100 pts.)	_____

**B. Oral Presentation to Class**

1. Presentation followed a logical sequence.	(0–5 pts.)	_____
2. All team members actively participated.	(0–5 pts.)	_____
3. Presenters were clear and audible.	(0–5 pts.)	_____
4. Presenters were appropriately dressed.	(0–5 pts.)	_____
5. Presentation held the attention of the audience.	(0–5 pts.)	_____
6. Audience participation was encouraged.	(0–5 pts.)	_____
7. Questions were answered in a professional manner.	(0–5 pts.)	_____
8. Presenters were well prepared (all materials were ready).	(0–5 pts.)	_____
9. Technical terms (when appropriate) were correctly used.	(0–5 pts.)	_____
10. The design solution was justified to the class.	(0–5 pts.)	_____
<b>Total</b>	(50 pts.)	_____

**C. Student Class Work and Group Work**

- |                                                                |                  |       |
|----------------------------------------------------------------|------------------|-------|
| 1. Assigned tasks were completed in a timely fashion.          | (0–10 pts.)      | _____ |
| 2. Student made good use of time.                              | (0–10 pts.)      | _____ |
| 3. Student worked collaboratively with teammates.              | (0–10 pts.)      | _____ |
| 4. Student followed teacher’s instructions well.               | (0–10 pts.)      | _____ |
| 5. Student contributed her/his share of the group effort.      | (0–10 pts.)      | _____ |
| 6. Student conducted herself/himself in a businesslike manner. | (0–10 pts.)      | _____ |
| <b>Total</b>                                                   | <b>(60 pts.)</b> | _____ |

**D. Design Journal (or Design Folio)**

- |                                                                                                         |                  |       |
|---------------------------------------------------------------------------------------------------------|------------------|-------|
| 1. Journal documents all work completed on both the KSBs and the Design Challenge.                      | (0–6 pts.)       | _____ |
| 2. Journal contains observations and data that were collected during the KSBs and the Design Challenge. | (0–8 pts.)       | _____ |
| 3. All entries are legible and complete with correct grammar and punctuation.                           | (0–8 pts.)       | _____ |
| 4. Entries are chronologically correct.                                                                 | (0–6 pts.)       | _____ |
| 5. Entries were made on a daily basis.                                                                  | (0–6 pts.)       | _____ |
| 6. Illustrations are used to enhance the journal entries.                                               | (0–6 pts.)       | _____ |
| <b>Total</b>                                                                                            | <b>(40 pts.)</b> | _____ |

**E. Final Report**

- |                                                                                                     |                   |       |
|-----------------------------------------------------------------------------------------------------|-------------------|-------|
| 1. The relationship between the work on the KSBs and the Design Challenge is described / discussed. | (0–10 pts.)       | _____ |
| 2. Evidence of student research is included as it relates to the Design Challenge and the KSBs.     | (0–10 pts.)       | _____ |
| 3. The design process is followed and solutions show evidence of optimization.                      | (0–10 pts.)       | _____ |
| 4. Justification is provided for the Design Challenge solution.                                     | (0–10 pts.)       | _____ |
| 5. Report documents the challenges that the students needed to overcome.                            | (0–10 pts.)       | _____ |
| <b>Total</b>                                                                                        | <b>(50 pts.)</b>  | _____ |
| <b>Grand Total: Sections A-E</b>                                                                    | <b>(300 pts.)</b> | _____ |

***STANDARDS-DRIVEN LEARNING OUTCOMES***

*This module places major emphasis on the following learning standards:*

# Introductory Packet



## Overview of the Module and Design Challenge

### Here's What You Will Do

---

In the NYSCATE module *Help Desk*, you will work in a group to:

- Design a "virtual PC," using the Internet (or other sources).
- Complete Knowledge and Skill Builders to obtain information just in time.
- Learn about the architecture (organization of the various systems) of a computer.
- Partition and format the hard drive of a PC and install operating system software.
- Design circuits that make logical decisions, and then wire and test your circuits.
- Identify and install a variety of cables used to configure a computer system.
- Develop a "Help Desk" to be implemented using presentation software (Help Desk is for use in troubleshooting problems with a PC).

### Problem Context

---

#### Introduction

For any given human-made device there are times when the device isn't working properly. Computers are no different; they will inevitably have problems that need to be addressed and remedies that need to be found. Many of us have experienced the frustration of trying to troubleshoot a problem ourselves and then trying to find someone who can fix the problem for us. In this module, you will be asked to troubleshoot computer problems.

#### Design Challenge

As part of a group, you will design a flowchart for troubleshooting common errors in a computer and then implement this design using presentation software (i.e., PowerPoint, Corel

Suite, Lotus Suite, etc.). This "Help Desk" will meet quality specifications when tested and formally presented to the class.

#### Specifications

Use presentation software with variable slide sequencing to navigate through a troubleshooting procedure. Slides must include graphics, text, and digital photos.

#### Constraints

**Entire presentation must fit on a single 1.4 MB floppy disk.**

#### Materials

You may use only materials and tools provided by your teacher, or materials and tools provided by your group and preapproved by your teacher.

#### Student Requirements

---

- You will maintain an individual **Design Journal** (or Design Folio), which will contain all of your observations and collected data. Entries will be made on a daily basis and will document your efforts on the KSBs and the Design Challenge.
- Your team will submit a **final report** that will contain information gathered from your Design Journal:
  - literature searches
  - hands-on research (factor explorations)
  - completion of Knowledge and Skill Builders (KSBs)
  - work on the Design Challenge
  - methods used to generate the final design solution
- Your team will make an oral presentation to the members of your class.



- This presentation should justify your design solution.
- It should use a variety of media.
- It should be prepared and delivered in a

professional manner.

- Your team will test their “Help Desk” solution with members of the class to determine how well it addresses design criteria.



## Designing a Virtual PC

This KSB will introduce you to computer hardware as it relates to the purchase of a new computer. Many important decisions need to be made when new computers are purchased. Some characteristics are more important than others, and the importance of each depends upon many factors. These factors typically include the intended use of the computer as well as the amount of money available for purchasing.

### Description

You will use the Internet and printed sources to research the design of a basic business-oriented computer system. There are minimum system requirements that are needed:

- 1 GHz processor
- 17" color monitor
- 128 MB RAM
- network ready
- 40 GB hard disk
- internal fax modem

Windows 2000 and a business software suite (Office 2000, Corel Suite, or Lotus Suite) are needed for this computer system as well. The allotted budget for this system (both hardware and software) cannot exceed \$1,750!

Your team will submit a proposal for your designed system. Your proposal is to include: your team name and members, an itemized list with manufacturer names, models, and prices for all of the components specified.

### DEVELOP YOUR UNDERSTANDING

1. Did all of the manufacturers offer the same Computer System Architecture warranty for their products?
2. Which of the resources that you used would you consider the best?
3. Did manufacturers offer technical support for their equipment?
4. How can your virtual PC be upgraded?
5. What would have been different if your virtual PC was designed for **home**, rather than business, use?

BLOCK DIAGRAM



Abbreviations for diagram above:

- FD: Floppy Disk
- mP: Microprocessor
- RAM: Random Access Memory
- HD: Hard Disk
- Cache: On-board, high-speed memory
- ROM: Read Only Memory
- CD: CD-ROM



## Operating System (OS) and HD Format

In this KSB you will become familiar with the characteristics of a computer operating system (OS). The OS acts as a “traffic cop” in a computer system by controlling the operations, and it is active whenever the computer is on. The flow of data to peripherals (i.e., a printer or a disk drive) is controlled by first checking the status of the peripheral and then sending the data. As the umbrella for all computer

operations, it is the OS that is managing everything when a file is saved or opened in an application (such as word processing).

### Description

You will partition, and then format, the hard disk of a computer and install an operating system. You will test the OS installation with a variety of OS commands, and then install one or more applications programs.

### **SELF-ASSESSMENT/SUMMARY**

---

1. Describe 10 OS commands that you tried, and indicate the results of these commands.

*Use both DOS/Command prompts and Windows commands for questions 2–4.*

2. How would you copy a file from the hard disk to a floppy disk?
3. How would you copy all files of a particular extension to a disk?
4. How would you ensure that the desired files were copied?
5. What procedures differed in comparing the installation of OS and applications programs?

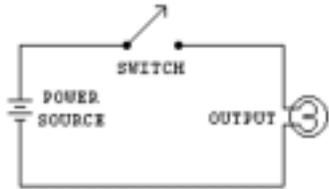


## Introduction to Logic Circuits

This KSB will introduce you to the digital world of 1s and 0s. All digital devices, including your computer, calculator, and pager, have circuits that make decisions. These decisions (or outputs) are based upon the inputs that are applied to a circuit. The inputs are in the form

of 1s and 0s, which refer to the open and closed conditions of a circuit. The inputs are then used to make logical decisions.

*See the illustration below.*

	
<ul style="list-style-type: none"> <li>■ Open Circuit</li> <li>■ Switch is "off"</li> <li>■ Logic 0</li> </ul>	<ul style="list-style-type: none"> <li>■ Closed Circuit</li> <li>■ Switch is "on"</li> <li>■ Logic 1</li> </ul>

### Description

You will use common materials of your choice including a manila folder, paper fasteners, paper clips, aluminum foil, wire, small lamps, and a power source to construct three basic logic circuits that can be used to solve a problem. These three logic circuits are AND, OR, and NOT (inverter).

### DEVELOP YOUR UNDERSTANDING

1. What circuit configuration best simulates the logic AND function?
2. What circuit configuration best simulates the logic OR function?
3. How does the NOT logic function differ from AND and OR?
4. How can these logic circuits be combined?



## Cable Installation and Safety

This KSB will enable you to assemble the components of a computer system in a reliable and safe manner. You will identify and attach both cables and jumpers to properly configure a computer system. Many systems and cable

formats are in use; these include SCSI, IDE, series, parallel, USB, firewire, and a variety of power cables.

### Description

You will identify the many cables found in a computer system and label where they are used. These cables will then be used to assemble a computer system.

### DEVELOP YOUR UNDERSTANDING

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1. Why are some cables thicker than others?
2. How does a floppy disk drive cable differ from a hard disk drive cable?
3. What is a DB connector? How does it differ from a DIN connector?
4. What is the correct (safest) procedure to remove power before opening the case of a computer?
5. What can be the effect of static charges on the components of a computer? How can static charges be avoided?



## Flowchart Development

This KSB will introduce you to the use of flowcharts. Flowcharts are powerful tools that help people to design in a logical, sequential manner. Flowcharts are graphical and therefore provide us with an important visual reference.

### Description

You will design and draw a flowchart for one of the following common tasks.

- Deciding what clothes to wear on a given school day
- Choosing the amount of study time versus free time each day
- electing which college to attend

### **DEVELOP YOUR UNDERSTANDING**

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1. What are the different shapes of flowchart symbols and what is their function?
2. Other than programming, where can flowcharts be used?
3. Can flowcharts representing different systems be integrated or combined?
4. How can a flowchart be linked to a written list of instruction?



