SKILL TECH II

SPYMASTER'S GUIDE

A FACILITATOR'S GUIDE FOR BOYS & GIRLS CLUBS OF AMERICA STAFF

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You don't need to have a lot of prior experience with computers to help members learn about computing and computer technology–all you need to run a successful program is right here in this program guide.

Inside you will find three program levels—Beginner, Intermediate and Advanced. These different programs have recommended age groups, but may also be used based on your membership's experience level.

Each program level contains 8 "missions". The missions contain all the information you will require to prepare, lead and evaluate every group session:

THE MISSION

Here the goal of the mission is clearly defined.

INTELLIGENCE GATHERED

A break-out of the areas of computer knowledge covered in the mission.

SPY TOOLS

A checklist of required and optional materials needed.

BRIEFING: WHAT'S ON THE COURSEWARE

Where you'll find all the background information on the subject to be covered, with definitions and concise explanations of related concepts.

THE GROUP SESSION

A step-by-step guide to run the activity with your members—what to do, when to do it, who to do what, etc. Additional activities, alternate ideas for group sessions or special challenges are also included where necessary.

SPYNOTES

Ready-to-copy hand-outs for your members that accompany each mission.

After taking your members through all 8 missions in a program level, they will have learned about how computers work, the Internet, Web sites, network connections and even computer careers. The Beginner Program includes all the basics to get anyone started, while the Advanced Program covers such topics as building a computer from scratch, writing programs, shopping for a computer and more.

Perhaps the most important aspect of the program overall is that it generates excitement and interest in computers and technology because the group activity sessions were created to be fun while instilling a sense of pride in members as they learn together.

THE BEGINNER PROGRAM

SUPERSPY LEVEL

AGES 6-9

Most likely, even your youngest members will already have some experience with computers. Members who use computers at home or in school may already have some strong skills. They may be anxious to move ahead to new lessons and show off what they already know. Try to keep the excitement of these members focused in a productive, constructive fashion.

Generally, children in this age group have shorter attention spans than older members. The courseware sessions have been kept short and to the point so they don't overwhelm users with too much information at one time. Try to maintain this same light approach as you run the group sessions.

THE BEGINNER MISSIONS

BEGINNER MISSION 1

WHAT IS A COMPUTER?

SPY SECTOR: HARDWARE

THE MISSION:

Members learn about the parts of a computer by opening a computer, identifying the main parts inside, closing the computer and turning it back on.

INTELLIGENCE GATHERED:

- Knowledge of basic computer terminology
- Ability to identify external parts of computers
- Ability to identify internal parts of computers
- Basic understanding of the internal parts of computers
- Knowledge of safe, ethical use of the Internet and/or computer technology

SPY TOOLS:

- An older PC (preferably in working order) that will be taken apart. This PC should be an older, non-essential computer.
- A screwdriver, if necessary, to open the computer's case
- A paper cup for saving the screws
- A shoebox or other cardboard box with a lid
- Practice Parts (located at the end of this mission)

BRIEFING: WHAT'S ON THE COURSEWARE

What, exactly, is a computer?

A computer is a tool, like a hammer or a fork, that a person can use to help him or her do something. But computers are very special tools because in a lot of ways a computer is like a person.

We have eyes and ears and fingers to get information from the world around us. A computer has a keyboard and a mouse to take in information. We have a mouth for talking to others. A computer uses a screen and a printer to communicate. We have a brain to think and to remember things. A computer has a microchip to make calculations, which is its way of thinking. And it has a hard drive for remembering things.

Let's review the important parts that a computer must have:

- A computer needs an **input**. That's a way for you to talk to the computer. Input devices include keyboards and mouses.
- A computer needs an **output**. That's a way for the computer to talk to you. Monitors and printers are examples of output devices.
- A computer needs **storage**. That's a way for the computer to remember. A computer has two different kinds of memory. For things it only needs to remember for a short time, the computer has a microchip called **RAM**. For things it has to remember for a long time, the computer has a **hard drive** on the inside, plus another drive for saving things onto **disks**.
- And a computer needs a **processor**, which acts as its brain. The processor is a special microchip.

THE GROUP SESSION

After members have completed Mission 1 on the courseware, gather everyone together for a group activity. Today, members will learn how to safely open a computer, identify the main parts inside, close the computer back up, and turn it on.

First, practice this procedure with members using the cut-outs from *Practice Parts*. Before the session, make a copy of each page and cut out each part with scissors. Place them all inside a shoe box or other cardboard box with a lid, following the attached *Practice Parts* diagram.

Guide members through all the steps of taking a computer apart using these paper parts. Each member should start by lifting the shoebox lid (to represent opening the computer case), and then touching the inside of the shoe box (to represent grounding out).

Next, have members take turns identifying the paper versions of the following parts:

- **The power supply**. A large metal box into which the power cord connects.
- **The metal case**. This is what members should touch first before reaching into the computer.
- **The floppy drive**. This is the part into which a floppy disk can be inserted.
- **The hard drive**. This is the size of a small book, and is probably just above or below the floppy drive.
- **The CD-ROM drive**. This is the part into which a CD or CD-ROM can be inserted.
- **Motherboard**. This is the main circuit board. It contains the **CPU** and a number of other microchips.
- **Expansion cards** or **peripheral cards**. If your computer has these, they'll be fitted into available slots. Your computer might have a **video card**, an **audio card** or both. It might even have a **modem** or **network card**.

Once you've finished, you're ready to take apart a real computer. (Note: If you need a reference while you're taking apart the computer and identifying parts, use **SPYNOTE: Inside Edition**, which follows Intermediate Mission 1.)

Tell members that, unlike pieces of paper, computers are electrical devices and, if you don't handle them properly, they can give you a very dangerous shock. To avoid being shocked, you must unplug a computer and all its attached parts before you begin.

Ask one member in the group to unplug all devices, including the computer.

Tell members that, once the computer is unplugged, there's no risk of being shocked. But now the *computer* is in danger of being injured. Tell members that their bodies carry a small amount of static electricity — they may have experienced a shock because of this when they touched a doorknob on a cool, dry day — and if they touch the computer on the inside, they can damage its parts. To avoid damaging the computer, you must **ground out**. The easiest way to do this is to touch the inside of the computer's metal case after you've opened it, but before touching anything else. This will get rid of the extra electricity in their bodies.

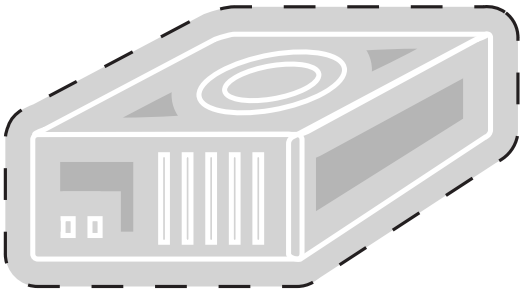
Begin opening the computer case. If you're not sure how to do this, refer to your computer manual. You might need to remove some screws. If you do, be sure to save them nearby, perhaps in a paper cup, so that you don't lose any. Let members take turns removing screws, if there are screws to remove.

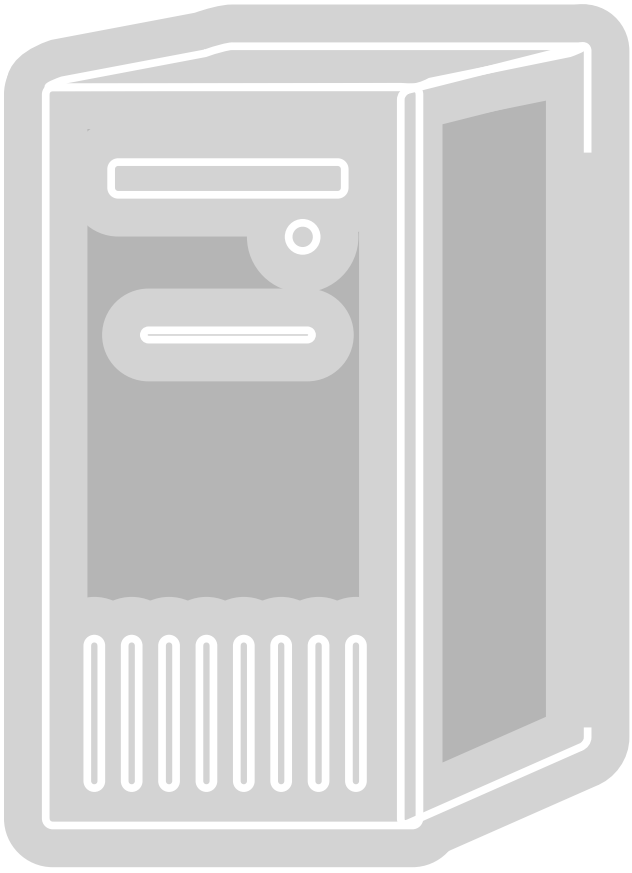
Once the case is open, ground yourself by touching the inside of the case. Point out to members the same important internal parts they identified before:

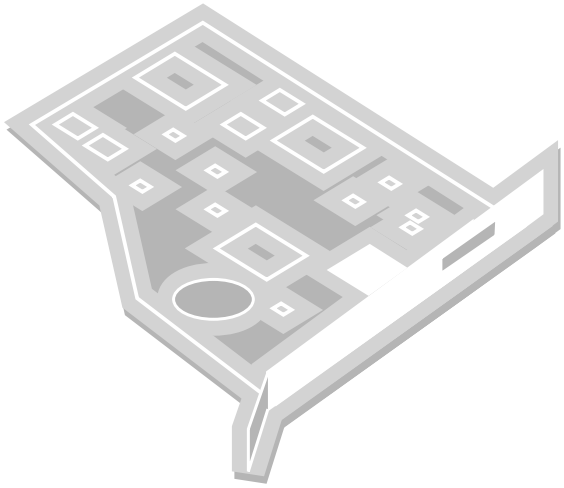
- The power supply
- The metal case
- The floppy drive
- The hard drive
- The CD-ROM drive
- The motherboard
- Expansion cards or peripheral cards

One at a time, have each member step up, ground him or herself, then point out each of these parts to you. When finished, have one member close the case and let other members take turns putting the screws back in. Ask another member to plug in the computer and any other devices back into the wall.

Your final step is to turn the computer on and watch all of those parts working together to light up the screen as it loads Windows.



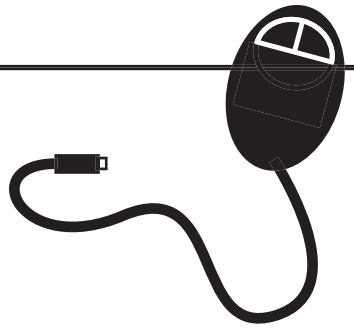




BEGINNER MISSION 2

INPUT AND OUTPUT

SPY SECTOR: HARDWARE



THE MISSION:

Members learn about basic input and output devices by disconnecting, identifying and reconnecting all peripheral devices from a computer.

INTELLIGENCE GATHERED:

- Ability to identify external parts of computers
- Ability to identify computer peripherals
- Understanding of computer hardware and operations

SPY TOOLS:

- A computer with standard peripheral devices (printer, keyboard, monitor, mouse, etc.)
- A stopwatch (optional)

BRIEFING: WHAT'S ON THE COURSEWARE

Input devices let you talk to the computer.

A **keyboard** lets you type in words and numbers.

A **mouse** lets you move a pointer or cursor on the screen to make selections. It inputs the movements of your hand.

A **graphics tablet** works like a pad of paper and a pen, except that everything you draw on the pad is instantly sent to the computer, where you can see the image on the screen.

A **digital camera** is an input device for sending photographs to the computer.

A **microphone** is an input device for sending sounds, like voices or music, to the computer.

A **scanner** is an input device that takes pictures of flat things like papers, letters or photographs, then sends the images to the computer.

A **joystick** is similar to a mouse; it uses the movements of your hand to input information into the computer.

A computer talks to you by using an **output device**.

The most important output device is the **monitor**. The monitor is a screen – kind of like a television – that displays pictures, text and other information.

Another important output device is a **printer**. Some printers are black-and-white, some print in color. They let you print out onto paper whatever is on your screen.

Speakers are an output device for listening to sounds.

THE GROUP SESSION

Let members take turns disconnecting the printer, the keyboard, the mouse, the monitor, and any other devices you have, such as a joystick or trackball, scanner, digital camera, modem, external hard drive, etc.

Then let members take turns re-connecting everything. Once it's all back together, turn the computer back on.

Have members take turns double-checking that all of the devices they disconnected and reconnected are working properly.

A note before getting started: Different computers have different requirements when it comes to plugging and unplugging peripheral devices. Some computers have devices that are "hot-swappable," meaning you can plug or unplug them without turning off the your computer. On other computers, you must shut down first or you could damage the peripheral device and the computer. This is because cables on some devices can carry an electrical charge. Unplugging them while the computer is still on can cause serious damage.

If you want to play it safe, shut down the computer

and unplug everything from the electrical outlets before this activity. But if you have time to read your manuals, you might find that some of your devices don't require this safety precaution.

ALTERNATE METHOD FOR GROUP SESSION

Start by disconnecting and then reconnecting all the peripheral devices as a demonstration to members. Make sure that all members understand exactly what you did.

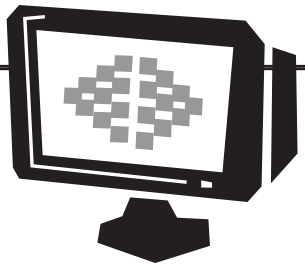
Then divide members into two teams and conduct a race – one team against the other – to see who can safely disconnect and reconnect all peripherals in the shortest time. Teams must prove they've succeeded by turning the computer back on and demonstrating that each peripheral device is working.

If you want, you can take this session out of the tech center and into the gym or other open area so that you can conduct it as a relay race. For example, one member could disconnect a peripheral device, then carry it to another member on the other side of the gym. The second member could walk back to the computer, reconnect the first device, disconnect a second device, and then carry the second device to a third member, with the game progressing in this way until all the peripherals have been disconnected and reconnected.

If you only have one computer for this activity, each team can go through the process individually as you time them with a stopwatch. In this case, teams would race against the clock to beat their competitors.

OPTIONAL REWARD

Reward members who complete this mission with a 15-minute free period of CD-ROM-based game playing, using a game controller or joystick if available.



BEGINNER MISSION 3

MAKE YOUR COMPUTER COOL

SPY SECTOR: HOW COMPUTERS WORK

THE MISSION:

Members learn how to make changes to their computers using the control panels.

INTELLIGENCE GATHERED:

- Knowledge of basic computer terminology
- Understanding of computer hardware and operations

SPY TOOLS:

- Custom Cards (located at the end of this mission)
- A computer with Internet connection (optional)
- A digital camera and/or scanner for taking pictures of members for wallpaper (optional)

BRIEFING: WHAT'S ON THE COURSEWARE

Using the **control panels** in Windows, you can change the way your computer looks, sounds and acts. Once you know how to do this, you can make your own computer look and sound the way you want it to.

Use **keyboard properties** to change the **cursor blink rate** or the **character repeat rate**. The **cursor** is the little blinking vertical bar where text appears when you type. The faster the rate, the faster it will blink on and off. The character repeat rate changes how long you have to hold down a key on your keyboard before that letter or number is repeated. A **character** is another word for a letter, a number or a symbol: anything you can type on a keyboard.

Use **sound properties** to change the different sounds your computer makes to alert you in different situations. You can choose which situations have a sound and what sound your computer should play. You can also change the volume, which can be very important if someone else is working nearby.

Use **display properties** to change the background picture or wallpaper, to choose a screen saver, to change the colors of the windows, to change the size of icons, to change the screen area of your monitor and to change the monitor from color to black and white. **Wallpaper** is the picture that always remains on the screen of your computer. You might not always see it when you have windows opened on top of it. A **screen saver** starts working whenever you step away from your computer for a period of time.

Use **date/time properties** to change the time, date or time zone.

THE GROUP SESSION

Pass out the attached Custom Cards, giving one to each member. Each card contains an instruction, such as "Set your computer to Hawaii's time zone" or "Make the cursor blink as fast as possible." Instruct each member to use the control panels to make the change written on his or her Custom Card.

ALTERNATE METHODS FOR GROUP SESSION

Your Club may have a protection system on your computers to prevent members from making changes to the control panels. If this is the case, you will need to log members in as if they were staff. In such a case, it might be more convenient to run the session as a group activity, with only one demonstration computer logged, so you can more closely supervise the changes as members make them.

Either way, you may choose to do this as a group activity. Show one Custom Card at a time to the whole group and have members raise their hands to announce how they would make the change on the card. Then have that member or another who hasn't had a turn yet come up and make the change while the rest of the group watches.

OPTIONAL REWARD

After they've successfully modified all the control panels and settings on the checklist, you may want to let members have 15 minutes to go online and download

wallpaper, system sounds, icons and other add-ons, which they can use to further customize their computers. You'll need to supervise downloads according to the policies of the Club.

Or, you can reward the first member to complete the assignment by putting his or her picture on the computer as the wallpaper for the day. If there are enough computers for everyone, you can do this for all members.

CUSTOM CARDS

SUPERSPY MISSION 3

Make the cursor blink as quickly as possible

SUPERSPY MISSION 3

Make the cursor blink as slowly as possible

SUPERSPY MISSION 3

Set the computer to Hawaii's time zone

SUPERSPY MISSION 3

Set the computer to London's time zone

SUPERSPY MISSION 3

Set the computer to Moscow's time zone

SUPERSPY MISSION 3

Turn off all the system sounds

SUPERSPY MISSION 3

Turn the volume up as loud as it goes

SUPERSPY MISSION 3

Turn the volume as quiet as possible without turning it off

SUPERSPY MISSION 3

Turn off the volume (mute)

SUPERSPY MISSION 3

Make the desktop a red pattern

SUPERSPY MISSION 3

Make the desktop a blue pattern

SUPERSPY MISSION 3

Make the desktop a striped pattern

SUPERSPY MISSION 3

Make the screen area as big as possible

SUPERSPY MISSION 3

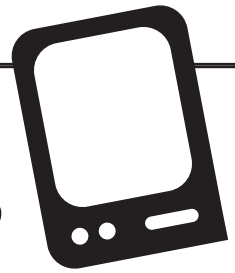
Make the screen area as small as possible

SUPERSPY MISSION 3

Change the computer's date to your birth date

SUPERSPY MISSION 3

Make the character repeat rate as fast as possible



BEGINNER MISSION 4

THE FUTURE OF COMPUTERS

SPY SECTOR: HOW COMPUTERS WORK

THE MISSION:

Members explore the history of computers to gain insight into what computers might be like in the future.

INTELLIGENCE GATHERED:

- Insight into potential uses of technology in the future

SPY TOOLS:

- Paper, pens, colored pencils, crayons
- Old computer parts, clay, Popsicle sticks and other craft supplies (optional)
- **SPYNOTE: Invention Ideas**

BRIEFING: WHAT'S ON THE COURSEWARE

At one time, computers were so large, each could fill an entire room. Nowadays, they can fit on your lap or in the palm of your hand.

Engineers used to have to enter information into a computer using paper cards with holes punched in them. There was no keyboard and no mouse. Now, it's much easier to work with computers.

The brain of a computer used to be made of giant glass vacuum tubes. Now, thanks to microprocessors, the brain of a computer is almost as small as your thumbnail.

Many important inventions have come along to change the way we use computers. Here are a few examples of new inventions:

- You can talk into a microphone instead of typing and the computer will understand you.
- You can be connected to the Internet or your network without any wires at all. New wireless networks let you work from your sofa or the backyard.
- A new type of input device is a glove you wear on your hand. Instead of using a mouse, you can just wiggle your fingers.
- Computers can even read your handwriting. Instead of typing, you can just write on a pad or on the screen.
- You can take digital photos, put them on your computer and change the images. You can even take a picture of a friend and then make it look like he or she is in another country.

THE GROUP SESSION

Ask members to brainstorm new ideas for input devices, output devices or new uses for computers.

Duplicate and pass out **SPYNOTE: Invention Ideas** (located on the next page). Each member should pick one of the starting ideas on the **SPYNOTE** and draw an idea of what this invention would look like.

CHALLENGE

After they complete their drawings of computing inventions, you can let members use old computer parts, along with clay, popsicle sticks and other craft materials to construct models of their inventions. As an additional activity, each member or team could take turns presenting their idea to the group.

SPYNOTE: INVENTION IDEAS

Design an input device that a dog could use to operate a computer

Design an output device so big that everyone all around town could see it

How could you computerize a basketball? A sneaker?

What would a computerized school bus look like? What would it do?

BEGINNER MISSION 5

HOW THE WEB WORKS

SPY SECTOR: NETWORKING

THE MISSION:

Members embark on an online scavenger hunt to learn about the Internet and the World Wide Web.

INTELLIGENCE GATHERED:

- Basic understanding of how the Internet works
- Knowledge of search strategies

SPY TOOLS:

- Computers with Internet connections
- **SPYNOTE: Scavenger Hunt**

BRIEFING: WHAT'S ON THE COURSEWARE

The **Internet** is a worldwide network of connected computers located in offices, homes, schools, government buildings and libraries that allows people to find information and communicate with others. Remember: every single computer connected to the Internet can communicate with every other computer connected to the Internet, no matter where in the world it is located.

The **World Wide Web** is a way to show information on the Internet with colorful pictures, video, sounds and easy-to-read text.

A **Web browser** is a program on your computer that lets you see the words and pictures and hear sounds on World Wide Web pages.

A **Search Engine** is a tool for finding web pages that contain specific information.

A **URL** is the address of a Web site. For example, the URL for Boys & Girls Clubs of America is www.bgca.org. Just as you need the address of your friend's house if you want to visit him or her, your computer needs the URL to find a Web site.

If you don't know the URL for a Web page that has the information you're looking for, a search engine can help you find what you want. By typing in one or more keywords, you can ask a search engine to look all around the Internet to see if it can find what you want.

THE GROUP SESSION

Begin the group session by discussing two important topics that were not covered in the courseware. Both are better raised as a discussion between a Club professional and members.

1. Internet safety and security. Stress to members the importance of never giving out personal information such as last names, home addresses, phone numbers, or parents' credit card information. Whenever a Web site asks for these, members should always talk to an adult first. Remind them that *anyone* can have a Web site; that includes criminals and strangers they shouldn't trust. And any time they give out information on a Web site, it goes to the Web site's owner, who can share it with anyone he or she chooses. Parents, teachers and Club professionals can help members decide when it is safe to share personal information.

2. Ethics of using material online. Many times, a teacher might ask a student to research a topic. The Internet is a perfect tool for finding all kinds of information. In such a situation, members should read what they find and take notes. But that does not mean it is OK to copy word for word from the Internet, and pass something off as their own. Just as members should not copy another person's paper or from a book, they also should not copy material from the Internet.

Divide members into teams of two and pass out **SPYNOTE: Online Scavenger Hunt**. Instruct each team to find five things from the list provided on the Internet using a search engine.

Before members begin, give them one important hint. Whenever they are going to use a search engine to look for a **phrase** (a group of two or more words), they should put that phrase in quotation marks. For example, if they are looking for a page about Miami, they can just type Miami, but if they are looking for a page about Miami Beach, they will need to type "Miami Beach."

As members find each item, they should check it off their lists and write down the URL of the site on which they found it. When each team is done, you can double-check their URLs to make sure they succeeded in finding all 10 items. Consider rewarding a prize to the team that finishes first.

CHALLENGE:

Here's a quick and fun game for members to try. Instruct them to go to the search engine www.yahooligans.com. Then, they should try to think of a phrase they can search for that will result in only one result. More than one is too many, and zero is not enough. They should keep trying new ideas, or changing their original terms, until they get just one result.

You can make a list all your members' successful one-result searches.

OPTIONAL REWARD:

Reward those who successfully complete the scavenger hunt with a 15-minute period of free surfing on the Internet, supervised by the Club Professional.

SPYNOTE: ONLINE SCAVENGER HUNT

WEBPAGE	URL
Find a Web page that has photographs of horses.	_____
Find a Web page that has a recipe for meatballs.	_____
Find a dictionary Web page that lets you look up the meaning of words.	_____
Find a Web page about your city.	_____
Find a Web page about a Boys & Girls Club.	_____
Find a Web page that has pictures of kites.	_____
Find a library's Web page.	_____
Find a Web page that has maps of the world.	_____
Find a Web page about your favorite movie.	_____

BEGINNER MISSION 6

WHAT'S IN A WEBSITE?

SPY SECTOR: NETWORKING

THE MISSION:

Members plan their own Web sites to learn what kinds of information can be included on Web pages.

INTELLIGENCE GATHERED:

- Basic understanding of how the Internet works

SPY TOOLS:

- Paper, pens, markers, colored pencils, crayons and posterboard
- Front Page, Creative Writer, Microsoft Word or other software for creating Web pages (optional)
- **SPYNOTE: Site Starters**

BRIEFING: WHAT'S ON THE COURSEWARE

Remember, the Web lets you surf the Internet in an easy, colorful way. It lets you look at pictures and listen to sounds, in addition to reading words. A Web page can contain many different types of information, such as text, music or other sounds, pictures, animation or even movies.

You will usually find a lot of **hyperlinks**. Sometimes these are underlined, but not always. Clicking on a hyperlink, or "link" for short, will take you to a new Web page or to a different place on the same Web page. Sometimes clicking a link will open a picture. If you read carefully, a Web page will usually tell you what is going to happen once you click on a hyperlink.

Sometimes clicking a link will start downloading a file to your computer. Remember to be very careful when downloading. You should always check with an adult before downloading anything from the Internet.

THE GROUP SESSION

Pass out paper and drawing supplies (pens, pencils, crayons). Ask members to come up with an idea for a Web page and then draw it. You can divide members into small groups to work as teams. Copy and distribute **SPYNOTE: SIte Starters** to help get them going.

Start members off with smaller sheets of paper for sketching their ideas. Once a group has agreed upon an idea for a Web page, pass out large sheets of paper or posterboard and let them draw a final version.

CHALLENGE

This activity provides a perfect opportunity for the older Club members to work as mentors and partners with the younger members. Team up one or two older members with each group of younger members.

Older members can use Front Page, Microsoft Word or any other Web design software to transform the younger members' ideas from drawings on paper to actual Web pages. Tell the older members to let the younger members make lots of choices about how their pages look: font and text size, background color, placement of buttons and links.

Or, have members go through a module of B&GCA's Web Tech courseware so that they can create a simple Web page themselves.

SPYNOTE: SITE STARTERS

A HOBBY SITE

A FAN SITE

A PERSONAL JOURNAL SITE

A TRAVEL SITE

A FAMILY ALBUM SITE

A NEWS SITE

AN ONLINE STORE

A DIRECTORY OF OTHER SITES

A PET SITE

A VIRTUAL TOUR

BEGINNER MISSION 7

NETWORK CONNECTIONS

SPY SECTOR: NETWORKING

THE MISSION:

Members create models of different network configurations to learn what networks are and how computers communicate with each other.

INTELLIGENCE GATHERED:

- Understanding of how networks work

SPY TOOLS:

- Cardboard boxes, magic markers, string and tape
- **SPYNOTE: Network Designs**

BRIEFING: WHAT'S ON THE COURSEWARE

A network is a connection of two or more computers. You can have a network of two computers, 2,000 computers or 2 million computers.

Networks let people work together, play together and share information. With a network, more than one person can work on the same project at the same time, even if they are in different places. A network can connect computers at neighboring desks, in different rooms or even in different countries.

Some networks are called **client-server**. This means that there is one big, central computer, called a server. The server holds all the important information, like a giant library.

Each person on the network works on his or her computer, which is called a **client**. The client computers are all connected to the server. Anyone working on one of the client computers can look at the files kept on the server. It's like checking out a book from the library, except that more than one person can check out the same book at once. You can add to the library by sending new files to the server for other people to use.

Other networks are called **peer-to-peer**. This means that there is no central computer or server. Instead, the computers in the network are connected to each other directly. There's no centralized place to store and share information. If you want to find a particular file, you have to look on each computer in the network until you find it.

Networks can also connect to other networks. To do this, each separate network connects to the same **hub**. A hub lets you use a computer on one network to get to information that is stored on another network, like an on-ramp lets your car move from the network of the city streets onto the network of the freeways.

THE GROUP SESSION

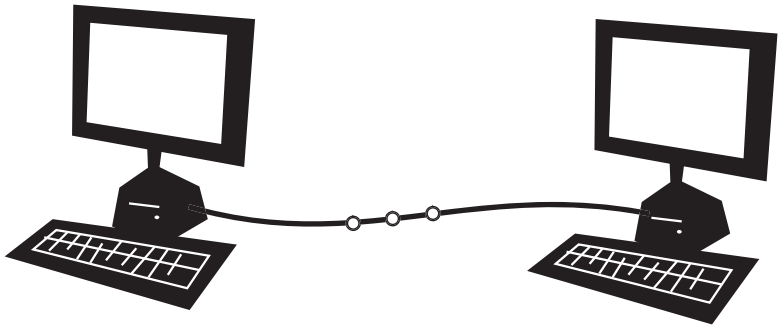
Before starting the session, gather several cardboard boxes, string and tape that members can use to construct models of different network configurations. Label the boxes as either "computer," "server" or "hub." For the most complicated configuration, you'll need eight boxes (six labeled "computer," one "server" and one "hub") and 10 pieces of string (about 2 feet long), which represent network connections.

Ask members to assemble one of the network designs on the attached **SPYNOTE** by selecting the boxes they need and taping string between boxes that should be connected to each other. Then take it apart to try another configuration.

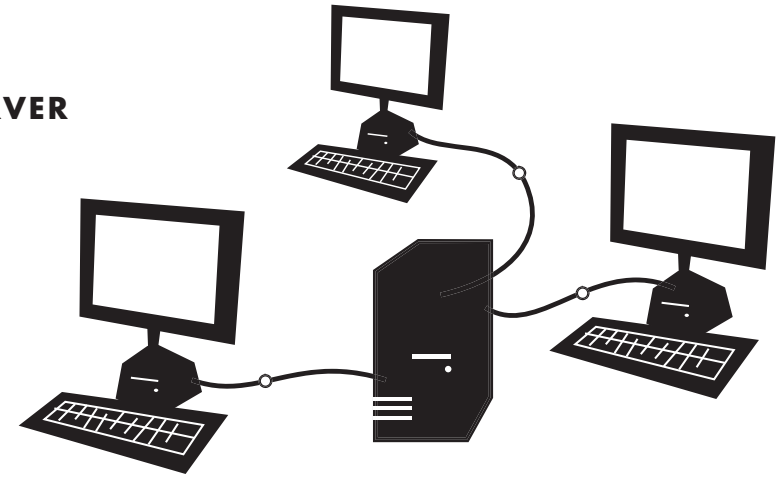
If you want, create two sets of labeled boxes and divide members into two teams. Call out the name of a network configuration and let the teams race against each other to create a model network with this configuration.

SPYNOTE: NETWORK DESIGNS

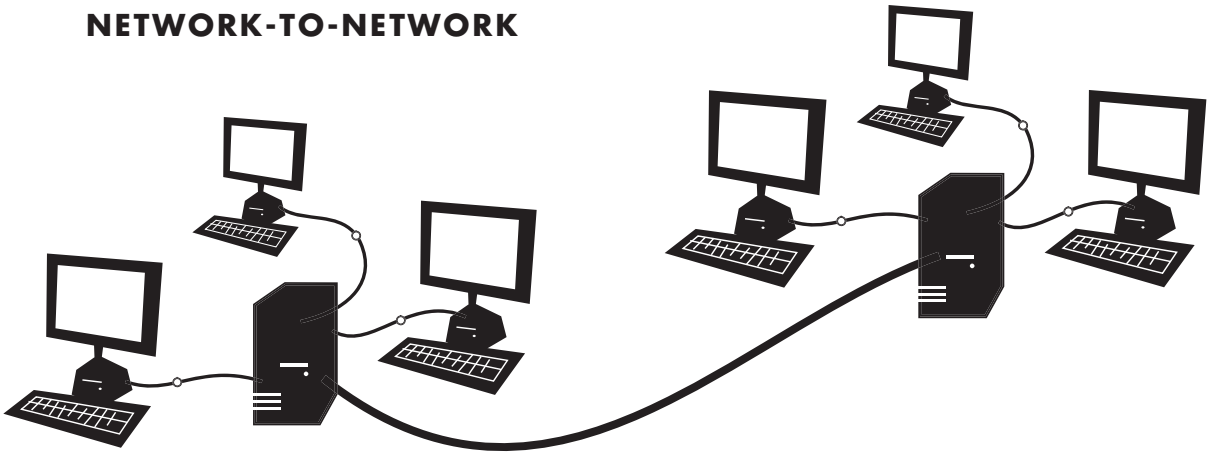
PEER-TO-PEER



CLIENT-SERVER



NETWORK-TO-NETWORK



BEGINNER MISSION 8

COMPUTER BASICS

SPY SECTOR: HARDWARE

THE MISSION:

Members review important terms and concepts.

INTELLIGENCE GATHERED:

- Understanding of computer hardware and operations
- Basic understanding of how the Internet works
- Understanding of how networks work
- Knowledge of basic computer terminology
- Ability to identify external parts of computers
- Ability to identify computer peripherals
- Basic understanding of the internal parts of computers

SPY TOOLS:

- Computer Cards (located at the end of this mission)
- Networking Cards (located at the end of this mission)

BRIEFING: WHAT'S ON THE COURSEWARE

A review of the important basics:

A **computer** takes information you feed it, makes calculations, then displays the results.

If you write a letter to a friend and spell-check it, the computer is making a calculation. In fact, even when you move your hand around on the mouse, the computer has to calculate where your hand is and it uses this information to move the cursor or arrow where you want it to go on the screen.

If you're playing a game the computer is making millions of incredibly fast calculations. For example, if you want to move your game character to the right, the computer has to figure out how to redraw the pictures so that you see your character moving to the right.

To do all of these things, the computer first has to know what you're thinking and what want to do. It can't read your mind; computers aren't that advanced yet. So you have to type it in on a **keyboard** or point and click with a **mouse**. These are called **input devices**.

Next, the computer needs to keep this information in **memory**. It stores it for a little while on a **microchip** called **RAM**. If you need to save something for later, it saves it on the **hard drive** or on a little **floppy disk**.

Once the computer knows what you want, it's time to perform those calculations – whether it's adding numbers, moving your spaceship around the screen or playing a certain song from a CD – and this is where the **processor** comes in. This microchip is responsible for making all of these important calculations work together, just like a brain.

Finally, it's time for you to see the results. Computers use two main types of **output devices**: a **monitor** and a **printer**.

You can use control panels to set all kinds of outputs to the way you like them; you can change the sounds the computer makes, the picture it shows on the background or desktop, and even the time zone.

Sometimes, instead of just talking to your computer with your keyboard and mouse, you'll want your computer to talk to other computers. It can do that with a **network**. A network connects two or more computers. You can connect computers that are near to each other with cables. Today, some networks are connected using radio waves. These wireless networks do not need cables.

You can connect to an enormous network of computers and lots of other networks through the Internet. You can use a modem to go online, where you can surf the **World Wide Web**. This lets you see Web pages with text, graphics, sound and animation. There you'll find **hyperlinks** that take you directly to other Web pages or to other places on the same Web page.

To find pages more easily, you can use a search engine to look for certain words or phrases. If you already know the address of aWeb site, called a URL, you can just type it into the window at the top of your Web browser.

THE GROUP SESSION

Duplicate the cards at the end of this mission. You'll need one each of the following Computer Cards for each member participating in the session:

- **Mouse**
- **Keyboard**
- **Monitor**
- **Printer**
- **CPU or Processor**
- **Networking Card**
- **Video Card**
- **Sound Card**
- **RAM or Memory**
- **Internal Hard Drive**
- **Floppy Disk Drive**
- **CD-ROM Drive**
- **Windows CD-ROM**
- **Power Supply**

Duplicate enough of the following Networking Cards for each team to receive several of each:

- **Cable**
- **Hub**
- **Server**

Divide members into two teams. Create two "decks" of the Computer Cards. Give each team a deck that contains one of each card listed above for each member on the team.

Ask one member from each team to shuffle the team's deck, pass out five cards to each member in the team and put the remaining cards, face down, in the center of the group. Use the rules of "Go Fish." (Sitting in a circle, each member takes a turn by asking another member for a card he or she does not have. If the person he or she asks has that card, the person must hand it over. If not, the member completes his or her turn by drawing a card from the face-down pile in the center. This game only requires that one of the requested cards be handed over at a time, however.)

When a member has compiled a complete set of cards representing all the components needed to build a computer, he or she is done. (To help members with this, you may want to write a list of what they'll need for a complete set on a board or flipchart at the front of the room.) Any extra cards should go at the bottom of the center pile. The rest of the team continues playing until each team member has a complete set. The members who are finished can help the other team members complete their sets.

Once each member has a complete set of cards, pass out several "cable," "hub" and "server" cards to each team. Ask the members in each team to work together using these cards to create a network connecting all team members' computers.

COMPUTER CARD

Printer

COMPUTER CARD

Sound Card

COMPUTER CARD

CD-ROM Drive

COMPUTER CARD

Monitor

COMPUTER CARD

Video Card

COMPUTER CARD

Floppy Disk Drive

COMPUTER CARD

Keyboard

COMPUTER CARD

Network Card

COMPUTER CARD

Internal Hard Drive

COMPUTER CARD

Mouse

COMPUTER CARD

CPU or Processor

COMPUTER CARD

RAM or Memory

NETWORKING CARD

Cable

NETWORKING CARD

Cable

NETWORKING CARD

Hub

NETWORKING CARD

Cable

NETWORKING CARD

Cable

NETWORKING CARD

Hub

COMPUTER CARD

Power Supply

NETWORKING CARD

Cable

NETWORKING CARD

Server

COMPUTER CARD

Windows CD-ROM

NETWORKING CARD

Cable

NETWORKING CARD

Server

THE INTERMEDIATE PROGRAM

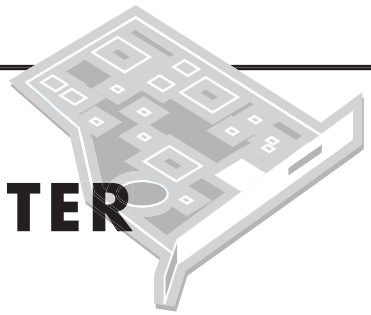
CRAZYSPY LEVEL

AGES 10-13

To an even greater degree than the youngest group, members of this age group will already have a range of experiences with computers and peripheral equipment. It is important for you to stress that they will be working as a group and should channel their individual knowledge into an opportunity to learn from each other.

Also, much of what members may already have learned will be a simple set of internalized "instructions." They may know that they need to type in a URL to go to a certain Web page, for instance. In this program, however, they will learn to think about some of the important concepts in computing – the difference between input and output, the various types of memory or the role of programming. In other words, they will learn the "why"s in addition to the "how"s.

THE INTERMEDIATE MISSIONS



INTERMEDIATE MISSION 1

THE PARTS OF A COMPUTER

SPY SECTOR: HARDWARE

THE MISSION:

Members take apart and re-assemble a computer to learn about its internal parts and how to safely handle them.

INTELLIGENCE GATHERED:

- Understanding of computer hardware and operations
- Knowledge of basic computer terminology
- Ability to identify the internal parts of computers
- Basic understanding of how the parts interact with each other
- Ability to remove and reinstall simple computer components

SPY TOOLS:

- A PC that can be disassembled and reassembled (ideally, a working PC). This PC should be an older, non-essential computer.
- A screwdriver, craft paper, magic markers and masking tape
- **SPYNOTE: Inside Edition**

BRIEFING: WHAT'S ON THE COURSEWARE

A review of the important parts that make up a computer:

The **motherboard** contains the **CPU** or **central processing unit**. This is the part of the computer that does all the important calculations. It is called a processor.

A **floppy disk drive** is for storage. This lets you save your work and load programs on removable disks.

The **internal hard drive** and the **CD-ROM** drive are the other two important **storage devices**.

A **video card** improves the computer's ability to display video images and graphics.

A **sound card** improves the computer's ability to play sounds and music.

The computer also has **RAM chips**, which are the computer's memory. The more RAM you have, the more information the computer can work with at one time. For instance, a computer with a lot of RAM can run several programs at once.

Computers also have a large metal box called the **power supply**, which provides the electricity the computer needs to work.

The entire computer is situated inside of a metal case. This metal case is important beause you can use it to ground yourself when you take a computer apart. Your body holds static electricity that can damage a computer's sensitive parts. Any time you unplug and open a computer, always touch the metal case first to discharge this electricity in your body. This is called **grounding out**.

THE GROUP SESSION

Tell members that they will be taking apart an old, spare computer.

Duplicate and pass out to members the **SPYNOTE: Inside Edition**, which has a series of diagrams of the most common configurations of computers. They can use this as a reference for locating each part after they've opened the computer. If the computer you're using for this activity is significantly different from all of the diagrams, provide members with a copy of the owner's manual that came with it.

First, have one member turn off all power, unplug the computer from the wall and all the peripheral devices from the computer. Next, have another member, using a screwdriver if necessary, open the case of the computer.

Show members how to ground out by touching the metal case of the computer before touching any other parts. This will prevent the electronic circuits from being damaged by static electricity.

Have members take turns carefully removing each internal part. You might want to cover a table with brown craft paper. Use a magic marker to draw squares around each part. Write the each part's name beside it and place any screws that have been removed or connecting cables along with the part. (You may want to tape down the screws so they can't roll away.) Members also can label cables by wrapping a piece of masking tape around them and writing the name on the tape. Number the parts in the order you remove them.

Once you've removed all the parts, cover the names of the parts with tape or a piece of dark paper and quiz members until everyone can name every part.

Let members put the computer back together, in reverse of the order in which they took it apart.

If this is a working computer, plug the computer in and start it up so members can see that it works.

SPYNOTE: INSIDE EDITION

INTERMEDIATE MISSION 2

MEMORY AND STORAGE

SPY SECTOR: HARDWARE

THE MISSION:

Members practice backing up files and experiment with floppy disks and CD-ROMs to learn about different types of memory and storage devices, and how disk drives and CD-ROM drives work.

INTELLIGENCE GATHERED:

- Understanding of computer hardware and operations
- Basic understanding of the internal parts of the computer
- Basic understanding of how parts interact with each other

SPY TOOLS:

- A floppy disk and label for each member, felt-tip pens
- An old hard drive to take apart, a screwdriver (optional)
- Old floppy disks, one or more magnets (optional)

BRIEFING: WHAT'S ON THE COURSEWARE

All memory is measured in **bytes**. The smallest possible unit of information is a **bit**. There are eight bits in a byte. A byte is the amount of memory needed to save one character or letter. Usually you will see the amount of space available on a disk, hard drive or CD-ROM measured in **MB**, **GB** or, sometimes, **KB**. A KB, or **kilobyte**, is 1,000 bytes. An MB, or **megabyte**, is 1,000 times bigger: it's 1 million bites. A GB, or **gigabyte**, is a thousand times bigger still – it's one billion bytes. If you have a 20 GB hard drive, that means it can hold twenty billion bytes of information.

In the future, more and more computers will offer storage measured in **TB**, or **terabytes**, and **PB** or **petabytes**. A terabyte is 1 trillion bytes. And a petabyte is 1,000 trillion bytes.

A **RAM** chip is the fastest and the most expensive type of **storage**. But it only remembers things temporarily. It's a kind of short-term memory. It only remembers whatever data the computer is processing at that moment. It is the memory your computer uses to remember, for instance, the sentence you just typed, but haven't saved yet. If you restart the computer or turn off the power, everything in RAM is lost. To save your files, programs and data, you need a more permanent kind of storage.

The most common types of storage devices, including your internal hard drive, store information magnetically. They are called **magnetic media**. A "hard" drive is so named because it is made out of a stack of hard metal plates.

Every file on your computer, whether it's a letter to a friend or a picture or a software program, is made up of bytes of information. These basic building blocks can form the code for a sound or a picture or a letter or anything else on your computer, just as the twenty-six letters in our alphabet can be put together to make every single book in the library. These bytes of information that make up each file are written onto the surface of the hard drive's metal plates in magnetic patterns.

A magnetically charged head moves just above the surface of the plates, writing the data in a specific pattern. Instead of writing in ink like a pen, it writes with magnetism. The hard drive doesn't lose this magnetic charge, even when the computer is shut off. When you open a file stored on your hard drive, another head moves just above the plates to read these magnetic patterns and sends the stored bytes of information to your computer's CPU.

A floppy disk stores information much like a hard drive, but, instead of metal plates, it is made out of a special kind of plastic called mylar.

Remember to take good care of your floppies. Don't bend them, expose them to heat or dust. Don't try to touch the plastic inside. And keep them away from anything magnetic, or they could be erased.

When you save information onto your hard drive, it doesn't just go into a simple little drawer. Instead, because the drive is always spinning, the file you are saving gets broken up into many little pieces scattered to different areas of the hard drive. The same thing happens when you save a file onto a floppy disk.

So how does your computer remember where all of the pieces of those files are located? Every disk and hard drive has a **root directory**. This is a list of files and where they are stored. Every time you want to open a file, the computer looks at this list to find out where the pieces of the file are. The computer then loads them into memory and "stitches" them back together. All of this happens very quickly and invisibly. Every time you save something onto a floppy or your hard drive, the computer updates the root directory.

A CD-ROM is a type of **optical media**. To create a CD-ROM, lasers etch a series of valleys into the plastic surface of the CD. If you could look very closely at a CD-ROM, you'd see a series of reflective places, where the shiny coating remains, and a series of non-reflective places, where the shiny coating has been removed by the laser. When you open a file from a CD-ROM, another laser reads these valleys and converts them into digital information that you can see on your computer screen.

CD-ROMs are sturdy and aren't affected by magnets, but you should only touch them by their edges or the small plastic center. **DVDs** and **DVD-ROMs** are identical to CD-ROMs, except they hold about eight times more information. A CD-ROM, if used to record music, can hold about 80 minutes worth of audio. A DVD, on the other hand, can hold a three-hour movie with digital sound and video.

Memory sticks and **flash cards** are becoming increasingly popular. Hard drives, floppy drives and CD-ROM drives all are mechanical, with lots of moving parts. Drop them, and they'll break. Memory sticks and flash cards on the other hand are **solid-state media** devices. This means they have no moving parts, because everything is electronic.

Because everything is stored on a tiny chip, these devices can be very small. There are even 10 MB memory sticks that you can keep on a key ring. They are small, lightweight and convenient. Solid-state devices and large-capacity optical storage will probably replace magnetic media in the future.

THE GROUP SESSION

In this session, members will practice backing up and restoring files.

First, each member should create a "dummy" or test file. The easiest way to do this is to have each member use Microsoft Word, open a new document, and type something like, "This is a test for practicing backups." Each member should save the file on the C: drive with a unique name such as nametest.doc, where "name" is the member's name. Make sure that each member's file name is unique. If you have two Sally's in your Club, for example, they can use their last initials, too, so that one file is sallyatest.doc, and the other is sallymtest.doc.

Pass out a floppy disk and label to each member, plus felt-tip pens. Ask members to write the names of their files on the labels, then carefully apply the labels to the floppy disks.

Each member should insert his or her disk into the floppy disk drive (taking turns if you are using only one computer for this session). Next, each member should click on Start, then Programs, then Windows Explorer. (Note: in some versions of Windows, they will have to click on Start, then Programs, then Accessories, then Windows Explorer.)

You will see a list of all of your drives – C is the hard drive, where members should have saved their original documents; A is the floppy drive where members insert their disks – as well as the files and folders stored on each.

Have members find their files on the C drive, then drag them onto the icon for the A drive. This will cause the computer to copy the files onto the floppy disks. When their files have finished copying, members should eject their disks.

After all members have made backups of their files, have them delete their original files from the C drive. Explain to members that this simulates something going wrong with the computer and the files being lost or destroyed. Remind them that things *can* go wrong with computers, which is why it is *so important* to always make backups of important files.

Next, have members restore their "lost" files by re-inserting their floppy disks, running Windows Explorer, and this time dragging the file from the floppy disk to the appropriate folder on the hard drive.

Tell members that they have now successfully backed up and restored files.

ADDITIONAL ACTIVITY

Use a magnet to erase files from a floppy disk. *Note: All data on this floppy will be lost, and the disk itself might no longer be usable. Keep any magnets at a distance from the computer or important floppies.*

Start by saving a copy of a file on an old floppy disk. Remove the disk from the computer and let members pass a magnet over the outside of it for a few minutes. Then, put the floppy back in the disk drive and have members see if the file is still there. This is a good way to show members that the computer really is saving all the data in the form of a magnetic impression, which can be distorted or erased by another magnet.

ADDITIONAL ACTIVITY

Take apart an old hard drive while members watch; or let them take it apart. *Note: This hard drive will not be put back together.*

Most likely, you'll begin by removing all the screws. You should find an integrated circuit board, which is probably green plastic with several microchips, attached to the main mechanical part of the drive, which looks like a small, old-fashioned record player. It will have a central metal disk, probably grey, and a read/write arm that juts out diagonally.

Separate the electronic part (the circuit board) from the mechanical part (the disk and the arm). A couple of very strong magnets may fall out. Demonstrate to members that they are indeed magnetic by putting them near paper clips or other metal objects.

OPTIONAL REWARD

Reward members who successfully complete this mission with 15 minutes of free game-playing time on the computer.

INTERMEDIATE MISSION 3

NETWORKS OF ALL KINDS

SPY SECTOR: NETWORKING

THE MISSION:

Members design a simple LAN to learn about networks and network configurations.

INTELLIGENCE GATHERED:

- Understanding of how networks work
- Basic understanding the Internet

SPY TOOLS:

- Paper, pens and pencils
- The Club's computer network (optional)

BRIEFING: WHAT'S ON THE COURSEWARE

Whenever two or more computers are connected together, it's called a network. There are two major types of networks.

A **client-server** network uses a central computer called a **server** to store important information. The server can then share data with all the **client** computers connected to it. Simply, the server serves the clients, providing information from a central location.

A **peer-to-peer** network does not have a central server. Instead, all the computers in the network share information directly with each other.

You may also hear the terms **LAN** and **WAN** to describe networks. A LAN, or **Local Access Network**, connects a small number of computers that are relatively close to each other. A WAN or **Wide Access Network** connects many computers that are physically spread out over a large distance.

There are several other types of networks, each named for the pattern made by the arrangement of the computers that form them.

First is the **star pattern**. In this one, all computers are connected to a central computer that houses all of the shared information. All communications must go through the central computer. If the server goes down, the whole system shuts down. The star is a type of client-server network, because it uses a centralized server.

Next is the **ring pattern**. All computers are connected to each other in a ring. Communication goes in one direction, around the ring. If one of the links goes down, the whole network can go down. The ring pattern can act as either a peer-to-peer OR a client-server network. If one of the computers on the ring is a server, then it is a client-server ring. It is a type of peer-to-peer network if there is no computer on the ring that acts as a server.

A **bus pattern** network links all computers through a single communication line. (If you imagine the Internet as a road map, having a bus pattern network would be like having a whole road, going to all the computers on your network, that could only be used by those computers.) All computers on the network can communicate directly with each other, without having to go through a central server or getting stuck amidst the other traffic on the Internet . If any one computer on the network goes down, it does not affect the others, since the communications line is always running, with each computer tapped into it individually. The only downside is that this type of network is very expensive. Because there is no centralized server, the bus is also a kind of peer-to-peer network.

THE GROUP SESSION

Start by asking members the following questions:

- What if you wanted every Boys & Girls Club in America to have its own LAN? What kind of network would be ideal?
- What configuration would you use (i.e. star pattern, bus pattern, etc.)?
- How would you go about connecting each Club's LAN to those of other Clubs nationwide?
- How would you form a Boys & Girls Club WAN?

Have members draw their ideas for Boys & Girls Club networks on paper. Let them experiment with different configurations.

CHALLENGE

If your Club doesn't have a network, have members create an actual, simple LAN using the Club's computers and a hub. If you don't have the necessary hardware, have members draw it on paper instead.

Also, have them make a "shopping list" of every item they would need to build the network they envision for the Club. Keep this on hand. You never know when your club might be able to make this plan into a reality.

CHALLENGE

If your Club does have its own computer network, you can help members examine its configuration. Ask members to draw a picture of the configuration with arrows to indicate in which direction(s) information flows.

INTERMEDIATE MISSION 4

BUILD YOUR OWN WEBSITE

SPY SECTOR: NETWORKING

THE MISSION:

Members find their computers' IP addresses, clock their connection speeds and create simple Web pages.

INTELLIGENCE GATHERED:

- Understanding of how networks work
- Basic understanding of the Internet

SPY TOOLS:

- Microsoft Word
- A computer with Internet access
- Paper, pens or pencils
- **SPYNOTE: Web Wise** (optional)
- Microsoft Front Page or another Web design program (optional)

BRIEFING: WHAT'S ON THE COURSEWARE

HTML is an abbreviation for Hypertext Markup Language. This is the special language used in files that will appear as Web sites on the Internet. It's easy to create a Web page without knowing anything about programming, though. All you need is Microsoft Word. Here's how:

Open a new document in Microsoft Word and type in text. Use commands like "Italics" or "Bold" to change the way the text appears. Insert graphics, if you like.

When you are done, go to the File menu and select "Save as Web Page." Word will automatically save your file as an HTML file, which ends in the letters .htm or .html. This tells a Web browser that the file is written in HTML.

You can open your HTML document in a Web browser, such as Internet Explorer, and you'll see the Web page, just as you created it in Word.

The browser will "know" which words should be in italics, which should be in bold and where the pictures go by using HTML. You can see the HTML codes by opening the document in Word and, under the View menu, choosing HTML Source.

You'll also see codes that you never typed; they represent to a browser the way you wanted things to appear. For example, the symbols and before and after text will make that text appear in italics. These special codes are also known as **tags**.

Some Web programmers and designers like to write in HTML code. It is a computer language, like any other. They prefer to type in all of those symbols and tags.

But with programs like Word or Microsoft Front Page, you never have to learn these symbols. You can just type your text and make it look the way you want. When you save the file as a Web page, the software will do all the hard work for you.

THE GROUP SESSION

First, explain to members that an **IP address**, or Internet Protocol, is a number that is assigned to every computer that logs onto the Internet. When you share information over networks, the IP address routes the information you want to your computer. It's sort of like the street address for a house or the URL for a Web site.

Show members how to find their computer's IP address. Go to Start, then Programs, then Accessories, then Command Prompt. At the prompt, type "ipconfig." You will see your IP address.

CLOCK CONNECTION SPEED

Then, ask members to test the speed of their Internet connection. Hand out paper and pens or pencils and ask members to visit each one of the following sites. These Web sites will clock the time it takes to transfer a file in order to calculate approximate connection speed.

http://www.rietta.com/speedar/

http://promos.mcafee.com/speedometer/

http://www.pcpitstop.com/internet/Bandwidth.asp

http://dslreports.com

Afterwards, have members compare their results from the different sites. Some of these Web sites are located on servers farther away from your Club. If you happen to be very near one of them, then your connection will be fairly straight and direct. If it is geographically farther away, the information must stop and make connections and changes several times along the way, which slows down connection speed.

If members ask you which of these numbers is their *real* speed, there are two good answers:

1. The highest number is the speed: this gives the closest approximation to how fast your computer can possibly connect to the Internet.
2. They are all right. There is no one speed for accessing the Internet. The time it takes to download a file from a Web page on a server in your city will be shorter than the time it takes to download the same file from Web page on a server in China.

MAKE AN INSTANT WEB PAGE

If you have Microsoft Front Page or another application designed to create Web pages, you should review the manual and let members try to create pages using this software. Most software, like Front Page, comes with a tutorial. Or, have members go through one session of B&GCA's Web Tech (available through National Supply Service) and then use either Front Page or Creative Writer to create a Web page.

If you do not have Web design software, members can use Microsoft Word, using the "Save as Web Page" option.

However members create their pages, when they are done, have them open their files in a browser so they can see how they'd look on the Web.

REWARD

After completing this mission, reward members with 15 minutes of Web surfing. Or let them devote this time to working more on their Web pages.

ADDITIONAL ACTIVITY

Members learned in this session how easy it is to create a Web site. Because it's so easy to create and post Web sites, almost anyone can do it, even if their sites are not very good.

Distribute **SPYNOTE: Web Wise** to members. Have them visit each of the following sites and rate them based on the criteria on the SPYNOTE.

1. http://www.howstuffworks.com
2. http://www.kids-space.org
3. http://www.kidnews.com
4. http://www.slsc.org/docs/online/spiders/index.shtml
5. http://www.pbrc.hawaii.edu/bemf/microangela/index.html
6. http://nces.ed.gov/nceskids/crunch
7. http://www.amnh.org/nationalcenter/infection/index.html
8. http://storytrain.kids-space.org
9. http://www.sikids.com/index.html
10. http://kids.msfc.nasa.gov
11. http://www.courttv.com/teens
12. http://www.littleleague.org

SPYNOTE: WEB WISE

URL: **RATING**

EASY TO READ	TERRIBLE	POOR	FAIR	GOOD	GREAT
COLORFUL, FUN IMAGES	TERRIBLE	POOR	FAIR	GOOD	GREAT
INTERESTING TEXT	TERRIBLE	POOR	FAIR	GOOD	GREAT
INFORMATIVE TEXT	TERRIBLE	POOR	FAIR	GOOD	GREAT
EXTRAS (LIKE SOUND OR ANIMATION)	TERRIBLE	POOR	FAIR	GOOD	GREAT

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INTERMEDIATE MISSION 5

TROUBLESHOOTING A COMPUTER

SPY SECTOR: HOW COMPUTERS WORK

THE MISSION:

Members examine the Club's computers' profiles and learn basic troubleshooting techniques.

INTELLIGENCE GATHERED:

- Understanding of computer hardware and operations
- Knowledge of basic troubleshooting techniques

SPY TOOLS:

- Paper, pens or pencils
- Original Windows CD-ROM

BRIEFING: WHAT'S ON THE COURSEWARE

Sometimes things go wrong with computers. For instance, the screen might freeze. When things go wrong, you need to **troubleshoot** to fix these problems.

Sometimes a computer doesn't work for the simplest reasons. It might be unplugged. One of the first things to check if your computer is not working is that all the cables are securely connected. To be safe, shut down your computer and turn off all your peripheral devices such as printer, monitor, etc. Once they're off, check all the connections.

If your computer freezes, one solution is hitting the **CTRL-ALT-DELETE** key sequence. This will bring up a task list showing you which programs are not responding. Close any programs that are not responding. You are also given the option of shutting down the computer. Most of the time, hitting CTRL-ALT-DELETE twice will restart the computer.

Sometimes, simply restarting the computer will solve a problem. There are three ways to restart or reboot a computer:

- The first is simply called restarting. Select Restart from the Shut Down option in the Start menu. If you have any applications open, they will prompt you to save any unfinished work before closing.
- If that doesn't work, you will have to try a soft reboot. Hit CTRL-ALT-DELETE twice. Only use this to restart the computer if you are unable to restart from the Start menu. With this method, if you haven't saved your work, you will lose it when the applications close.
- If hitting CTRL-ALT-DELETE doesn't do anything, you have to do a hard reboot. Your computer has a button that might be marked Power or Reset. Sometimes it is just marked with the symbol of a circle with a vertical line through it. Check your computer's manual if you're not sure where the Power or Reset button is. Pressing this button will force a hard reboot. It is the same thing as turning the power off, then back on. You should only do this if you've already tried restarting and soft rebooting. A hard reboot can damage your files and software. You will also lose any unsaved changes in the programs you were working on when the computer froze.

If restarting the computer doesn't work and you continue to get errors, you will need to boot from the original CD-ROM. Many times, when you buy a new computer, the **OS** or **operating system** (like Windows) is already installed on your computer. But you will also find in the box a CD-ROM that contains a copy of the OS in case something goes wrong and you need to re-install or repair it.

To boot from the original CD-ROM, first make sure the computer is plugged in; it needs power to open the CD-ROM tray. Now, press the small button on your CD-ROM drive and the tray will pop out. Insert the CD-ROM. Press the button again to close the drawer. Turn the computer on and it will boot from the CD-ROM instead of the hard drive. When you do this, the operating system will usually detect problems on your computer and offer to fix them. If this happens, click Yes.

Sometimes computers become infected with **viruses**. A virus can do a lot of damage to a computer

—deleting files, stealing information, even erasing the entire hard drive. The best way to combat a virus is with **anti-virus software**.

This software has two functions. First, it can scan your entire hard drive to make sure that there aren't any known viruses. If it finds one, it will try to fix it. Second, it scans any files that you download or any disks you insert to make sure that these files are not carrying viruses.

THE GROUP SESSION

In order to troubleshoot or fix a computer, members should first know their computers extremely well. Creating a profile is one essential tool to understanding your computer.

Ask members, on their computers, to click on Start, then Settings, then Control Panel, then System. They should each see a brief overview of the computer.

Next, instruct members to click on the tab marked Hardware, then click Device Manager. They'll see a list of all the types of hardware installed on the computer. Click on any one of the categories to see the actual model of hardware in that category. Highlight one of these and click on Properties. You will see detailed information about that item – what version it is, how big it is, etc.

Ask members to print out their computers' profiles by printing the main summary page each of the individual pages of properties.

Put members in small groups or let them work individually. Ask each member or team to rewrite the computer's profile in simple English. If the profile says that the computer has a 20 GB internal hard drive with 8.5 GB available, for example, members might write something like this:

"The computer has twenty gigabytes of storage space inside. Of this, 8.5 gigabytes are free. The other 11.5 gigabytes are already being used by all the saved files and programs."

Their answers don't have to be this precise, but it should be clear that they understand what the facts and figures in the profile mean.

ADDITIONAL ACTIVITY

On the computers, have members take turns practicing:

1. A Restart (from the Start menu)
2. A soft-reboot (using CTRL-ALT-DELETE)
3. A hard-reboot (using Power or Reset key)
4. Shutting down their computers, turning off all power and checking cables
5. Booting from the original CD-ROM

INTERMEDIATE MISSION 6

COMPUTER PROGRAMMING

SPY SECTOR: HOW COMPUTERS WORK

THE MISSION:

Members practice writing simple programs to learn about programming languages and how software is created.

INTELLIGENCE GATHERED:

- Basic understanding of programming languages
- Knowledge of computer and network terminology

SPY TOOLS:

- Paper and pencils
- Microsoft Word or other word processor (optional)

BRIEFING: WHAT'S ON THE COURSEWARE

A computer uses software to translate human language into computer language and vice-versa. The majority of people who use computers every day are not computer programmers, but they can still write letters, edit photographs and send e-mails without having to learn anything about the language a computer uses internally.

Computer programs are pieces of software that a programmer writes: it could be a word processor or a Web browser or a program that draws maps of the world. Anything you can do on a computer requires a program, and someone had to write it using a programming language. **BASIC** is an example of an easy-to-use programming language.

There was a time when you had to be a computer programmer just to use a computer. Today, that's not necessary because of the modern **OS** or **Operating System**. An operating system is a program that lets you use a computer without having to do any complicated programming of your own. Windows is one popular type of operating system.

In fact, each piece of software we use, like Microsoft Word or Internet Explorer, is a complex program that makes using a computer simpler, and saves users from having to know about programming.

THE GROUP SESSION

Explain to members that there are many programming languages, each with their own grammar and vocabulary. But what they all have in common is that they break down an operation into neat, orderly sets of simple instructions.

You can show members a sample of the programming behind what they see on the computer by opening a Web page in Internet Explorer and selecting View, then Source. This will reveal all of the HTML code behind the Web page.

Or, if you have a PC that can run DOS, show members how to look up the listing of files on a volume with the DIR command, an action that in Windows you can accomplish just by double clicking on a folder.

Write the following three-step program on a board or flip chart:

1. Ask for the first ingredient.
2. Ask for the second ingredient.
3. Display the words "Congratulations, you just made a (first ingredient) and (second ingredient) sandwich!"

Explain to members that this "computer program" asks a user to name the ingredients of a sandwich and then displays the name of the sandwich.

Ask members to give this practice program a try. Have them pretend that they are running this program. For example, when asked for the first ingredient they may reply, "peanut butter." And for the second ingredient they may reply, "pickles." Now ask members what the program will display when it reaches the third line. The correct answer is, "Congratulations, you just made a peanut butter and pickles sandwich!"

Now ask members to work in small groups to write a sample program in similar, simple English, for an operation that is a bit more complicated. The essential point members should learn is that, while different languages will have different ways of saying, "Ask for

the first ingredient," they all require the programmer to break the operation down into its smallest steps, one per line. Point out to members that if they have ever had to do a how-to presentation for school, this process is very similar.

Some ideas for a sample program are:

1. Write a program that takes a poll from a number of people on any subject, and then tallies the results at the end.
2. Write a program that creates a MAD LIBS style game, in which the user can input words and then see a finished story.
3. Write a program to play the game HANGMAN.

Remember:

- Members do not need to use any specific computer language notation to write these "programs."
- Instead of writing on paper, if you want members to practice using a word processor, you can have them type their programs into Microsoft Word.
- The most important thing is that members put the right steps – one at a time – in the right order. A computer can only do one thing at a time.

If you have a BASIC compiler, let members test their programs.

INTERMEDIATE MISSION 7

THE WAVE OF THE FUTURE

SPY SECTOR: HOW COMPUTERS WORK

THE MISSION:

Members learn about the changes computers have undergone throughout history to get them thinking about the ways computers might change in the future.

INTELLIGENCE GATHERED:

- Insight into potential uses of technology in the future

SPY TOOLS:

- Pens, pencils, colored pencils and crayons
- **SPYNOTE: Dream Car**
- **SPYNOTE: Dream House**

BRIEFING: WHAT'S ON THE COURSEWARE

In old movies, you may have seen pictures of old computers that filled entire rooms. They used vacuum tubes and there were no keyboards, no monitors, not even a mouse. Computer operators were highly-trained engineers who used paper cards with holes punched in them to input data. Calculations could take a very long time. There were no sounds, no graphics, no games. And no one had computers in their homes.

Computers have always needed the four basic components: Processor, Input, Output and Storage, but all four have changed a lot over the years. Here's how:

Processors

The ENIAC computer from 1946 filled a 30-ft.-by-50-ft. room, weighed 30 tons and had 18,000 vacuum tubes that processed information. This machine could perform 5,000 calculations per second. It was faster than any human could think, but nothing compared to the computers of today. Today, the fastest supercomputers can perform 12 trillion calculations per second.

In the 1960s, IBM invented the Q7. Each one was made of 30,000 vacuum tubes, but a company always had to buy two of them, in case one stopped working. They would take up three floors, one floor just for air conditioning. One of these set-ups, in Santa Monica, California, used up 10 percent of the entire city's energy every day. And they could never turn the computer off, for fear that it would send a huge surge and cause a city-wide blackout.

This behemoth of a computer had one single CPU running at about 12 KHz. This is short for kilohertz. Hertz is a measure of a processor's speed – the number of cycles of calculations it can make in one second. One KHz is one-thousandth of a MHz, or mega-hertz. The Q7 also had 64KB of RAM. A typical PC today makes calculations at a speed of 1.8 GHz – that's 1.8 gigahertz, 150,000 faster than the Q7. A modern PC also has a memory of 128 MB RAM. That's 2,000 times more than the Q7.

This all changed with the invention of the **transistor**, a tiny electrical circuit that could process a lot of information quickly as it passed through in a series of on-and-off pulses. As transistors replaced vacuum tubes, the digital age of processing was born. And computers began to shrink. As they got smaller, they also grew more affordable.

One **microchip** holds many transistors. The more transistors you have, the more quickly your computer can process information. The faster your computer is, the more complex calculations it can do.

Gordon Moore, one of the founders of Intel, the company that makes microchips for most PCs in the world, predicted in 1964 that the number of transistors that could fit on a microchip would double every 18 months. It's now almost forty years later, and his prediction is still pretty much true. In 1971, one of the first Intel chips held 2,250 transistors. In 2000, Intel came out with the Pentium 4, which has 42 million transistors on one microchip, a super-slim, single wafer of silicon.

Input Devices

Those first computers didn't have a **keyboard** or a **mouse**. Instead, engineers had to feed thousands of small, cardboard cards with punched holes into

the machine to input data. Nowadays, besides the keyboard and mouse, there are many other new ways to get information into the computer.

There are **graphics tablets**, which let you draw pictures that appear right on the screen. With some software, graphics tablets will even recognize your handwriting and convert it into text.

Scanners and **digital cameras** let you get pictures, documents and photographs directly into your computer, where all kinds of powerful image-editing software allow you to manipulate the images, changing colors or backgrounds or anything else you can possibly imagine.

Voice recognition technology lets people talk to their computers with their normal speaking voices. Some people are already using this to dictate letters into their computer or to give the computer voice commands like, "Go online" or "Empty the Trash," without ever having to touch the keyboard or mouse.

Output Devices

Those first computers not only used punch cards for input; they also used punch cards as their only form of output: no monitors, no printers, no speakers. One part of the machine would read the holes punched out of the cards. Another part of the machine would spit out newly punched cards to display the results of the calculations.

Nowadays, computers have big full-color **monitors**, **printers**, **speakers** and even **digital projectors** to share your ideas with an entire auditorium full of people.

Storage

The first computers kept their programmed instructions stored on gigantic spinning metal drums that looked like garbage cans. Later on, computers had enormous reels of magnetic tape for storing data.

Nowadays, not only do the smallest laptop computers have internal **hard drives** with massive storage capacity, but there are **zip disks**, **CD-ROMs**, **DVDs** and even tiny **memory sticks**, which hold a few hundred megabytes of data on a device that could fit on your key chain.

Other new inventions

New wireless technologies are allowing people to surf the Web or connect to their networks from the sofa, or in a cafe, or even at the beach. In the future, an entire city might have wireless transmitters installed everywhere so that you could connect to the Internet from anywhere without having to "plug in."

One scientist has implanted a microchip in his body. He can walk around his specially-wired house and just think to open a door. Now, his wife has had a chip implanted, too. They are making the first experiments in human beings networking with each other the way that computers do. It may sound pretty scary, but that's the way it is sometimes when you imagine future inventions.

Some new inventions aren't physical devices. They are new ways of thinking about computers. For example, almost every computer you see has rectangular windows, a desktop, file folders and a trash can, just like a real office. But some new computer operating systems might use concepts of time instead of space, grouping all your files along a timeline. Others might exploit three dimensions so that you'd be looking far off into the distance. You might find yourself looking inside a cube, with different documents or Web pages on all the walls around you. This may sound strange, but one day any of these new ideas could be as commonplace as the mouse is today.

THE GROUP SESSION

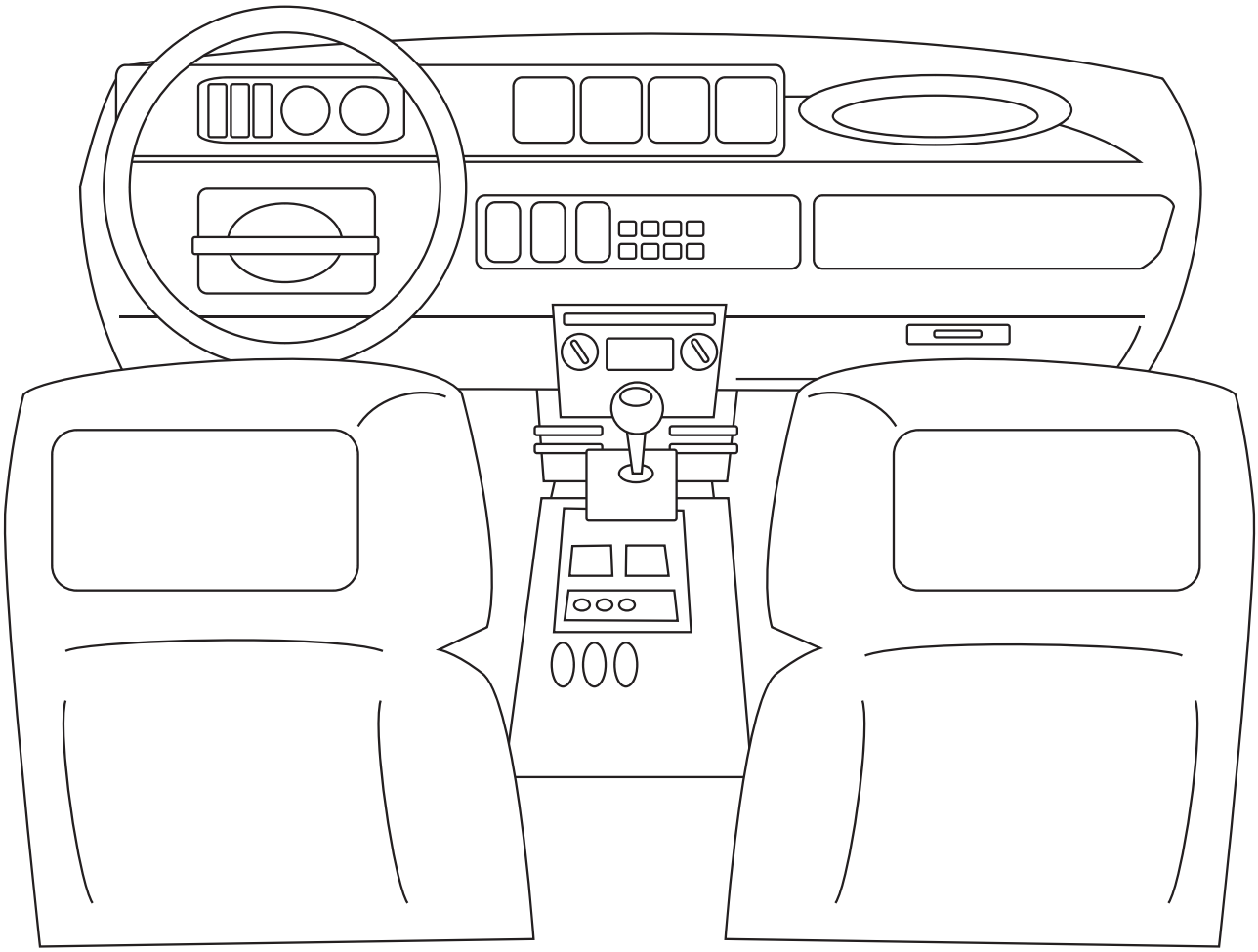
Talk with members about how their dream homes or cars of the future might use computers. Where would the computers be, what would they do and how would they be connected to each other?

Allow members to choose to design either a house or car of the future and provide them with the appropriate SPYNOTE.

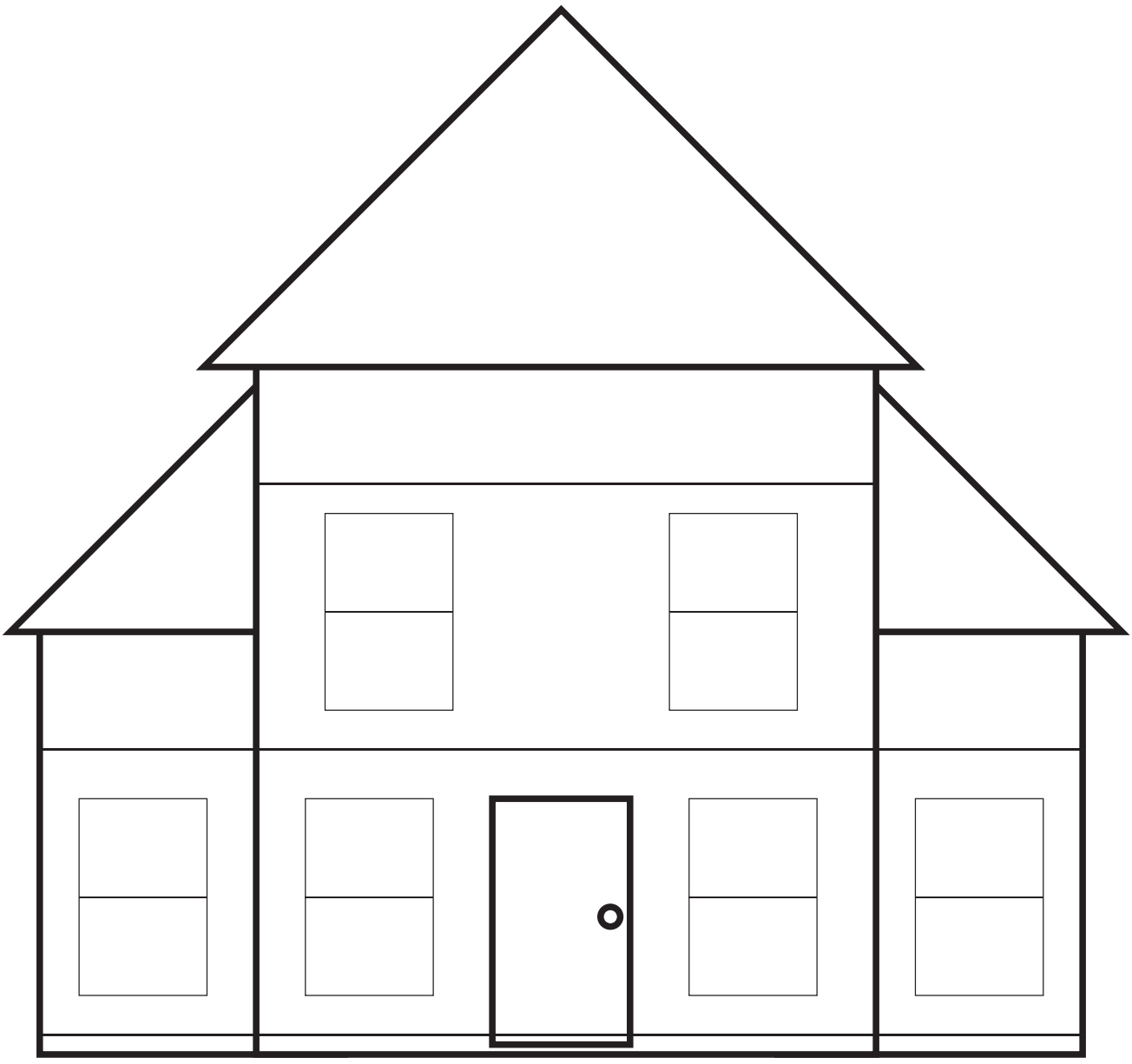
Remind them that computers don't have to look like computers. For example, one company is now making computerized refrigerators that let you surf the Net in the kitchen, and instantly order groceries when you run out of something in your fridge.

After the activity, display these dream homes and dream cars on a bulletin board.

SPYNOTE: DREAM CAR



SPYNOTE: DREAM HOUSE



INTERMEDIATE MISSION 8

COMPUTER CAREERS

SPY SECTOR: CAREERS IN COMPUTING

THE MISSION:

Members examine how professionals in different fields (IT and others) use computers and technology.

INTELLIGENCE GATHERED:

- Awareness of careers in technology

SPY TOOLS:

- Pens or pencils, paper
- **SYPNOTE: Career Match**
- A computer with Internet access (optional)

BRIEFING: WHAT'S ON THE COURSEWARE

People in many different professions use computers every day: doctors, lawyers, police officers, teachers, journalists, architects and engineers, just to name a few. They may all use similar computers, but how they use them and what programs or applications they run varies from profession to profession. People use computers as tools to meet their needs, and those needs differ depending on what a person does at work.

Here are three examples:

Healthcare Technology Worker

Computers can help doctors figure out what's wrong with patients. They also keep track of patient histories. In many hospitals a doctor can instantly look up a patient's file on a handheld computer while right in the room with the patient. No need to run back and forth.

Because people's lives depend on the computers working, healthcare technology workers have to be very fast. They must make sure that all computers and networks are running smoothly. Privacy is also very important. Medical records are so personal; if they're being shared among doctors, the network has to be completely secure so no one other than the healthcare professionals can access them.

Because the work is so demanding and timing is so important, these jobs pay extremely well. The IT (Information Technology) director of a hospital typically earns close to $100,000 a year. Network administrators earn almost $60,000. And senior programmers can earn $80,000 a year or more.

A new and growing field is called Telemedicine. Doctors can hold videoconferences between their patients and specialists in other parts of the world where a patient might not be able to travel. People going on expeditions far away from doctors and hospitals – like mountain climbers, for example – can take devices with them that measure heart rate, blood pressure, temperature and other vital signs and transmit them electronically to a doctor. The doctor can then transmit information back explaining how to treat their own medical problems until they can get to a hospital.

Web Site Manager/Web Developer

In a recent ranking of the best jobs in America, Web site manager came out as No. 1. And Web developer finished at No. 10 out of 250. In fact, nine of 10 top jobs were in computer or math-related fields.

What do Web developers do? If a Web page never changes, visitors won't return. Just as a regular store changes what's in the windows, a Web page needs to constantly evolve, adding new features and even changing the look from time to time. That means a developer needs to be good at listening to feedback, deciding what works and what doesn't, and what to keep and what to change.

When a person or organization has a Web site, the goal is to meaningfully represent the person or organization on a site that is well-organized and easy to use. So, Web developers have to be good thinkers with great organizational skills. But they also have to be great communicators and know how to balance the needs of many different people. Each department within a company, for example, may have different needs and different ideas for their own Web presence, but it all has to go on one site.

Web developers can be programmers, designers or both. They design pages, upload information, and

write the code to make animations or pictures appear and move. The Web site manager oversees their work. He or she also monitors site traffic makes sure that the secure pages stay secure.

Network Administrator/LAN Manager

There are three important tasks that network administrators/LAN managers are responsible for: keeping things up and running, backing everything up in case something goes wrong and maintaining the security of the network. They use special software to monitor the network's speed. If it slows down, they have to fix the hardware or change the software settings.

Most importantly, a network administrator has to make sure the network works. All the connections have to be secure, and each computer, server and hub has to be properly set up for them to speak to each other. Not only does a network have to work, it has to be fast. Everyone gets annoyed when work is slowed down by a slow network, so a network administrator has to monitor the traffic and keep that information flowing.

But even the best network has problems sometimes. A machine can crash or just plain stop working. Network administrators maintain back-up servers to jump in and take over if the main server goes down. And they keep backups of all files so nothing gets lost forever.

Security is also important. Individuals need to protect their personal information like credit cards from hackers. Companies worry about having their trade secrets stolen. That means a network administrator needs to be in charge of passwords. They also have to maintain a firewall to keep out unwanted intruders and must use special scrambling software called encryption.

Network administrators also have to keep an eye out for new networking tools. If they find something better that the company can afford, they have to purchase it, learn how to use it and then install it on all of the computers, including the server and the back-up server.

LAN managers earn almost $60,000 a year on average.

THE GROUP SESSION

Hand **SPYNOTE: Career Match** and pencils or pens. Ask members to choose three jobs and match each to the types of hardware and software a person doing that job would need.

Next, divide members into small groups. Assign each group one of the following occupations at random: architect, sports trainer, surgeon, police officer, automobile engineer, chef, journalist. Each group must brainstorm ideas of how their assigned profession would or could use computers to help them. You may want to let members go online to research their answers. **Www.salary.com** is a good site for gathering regional salary information and general job descriptions.

ADDITIONAL ACTIVITY

This mission is a perfect opportunity to invite a member of the community who works with computers to talk to the group. This could be someone who works for an actual computer company, or in IT, or any professional (doctor, architect, teacher, mechanic, etc.) who can discuss how computers have changed the way he or she works.

SPYNOTE: CAREER MATCH

In the box for each profession, write the letters that stand for the different hardware and software items the professional would need for his or her job.

Don't worry about "getting it right." There is more than one right answer. Just try to imagine the job of each professional and figure out how a computer could be useful and what hardware and software would be needed.

A. DESKTOP COMPUTER
B. LAPTOP COMPUTER
C. DIGITAL CAMERA
D. DIGITAL VIDEO CAMERA
E. SCANNER
F. BLACK-AND-WHITE PRINTER
G. COLOR PRINTER
H. MICROPHONE
I. MUSIC NOTATION SOFTWARE
J. WORD PROCESSOR
K. SPELL CHECKER
L. GRAMMAR CHECKER
M. ADDRESS BOOK
N. CALENDAR
O. INTERACTIVE MAPS
P. WEATHER MAPS
Q. SPREADSHEET PROGRAM
R. GRAPHICS/DRAWING PROGRAM
S. IMAGE EDITING SOFTWARE
T. VIDEO EDITING SOFTWARE

DOCTOR

ARCHITECT

TEACHER

MUSICIAN

JOURNALIST

FILMMAKER

TRUCK DRIVER

THE ADVANCED PROGRAM

COOLSPY LEVEL

AGES 14-18

In addition to important basic skills and concepts, the advanced missions focus on careers in computing and network construction. When they complete this program, members will also know how to build a computer from scratch.

All of these missions have a common goal of instilling pride and self-reliance in members. The missions are advanced, though, so you'll need to strategically offer your assistance in a way that ensures members understand the important concepts while allowing them to do as many of the required tasks as possible on their own.

THE ADVANCED MISSIONS

ADVANCED MISSION 1

BUILD YOUR OWN COMPUTER

SPY SECTOR: HARDWARE

THE MISSION:

Members build a working computer from scratch.

INTELLIGENCE GATHERED:

- Understanding of computer hardware and operation
- Basic understanding of how parts interact with each other
- Ability to identify the internal parts of computers
- Knowledge of safe, ethical use of the Internet and/or computer technology
- Knowledge of computer and network terminology

SPY TOOLS:

- Computer parts: case, motherboard, CPU, RAM, internal hard drive, CD-ROM drive, floppy drive, video card, sound card, USB card, SCSI card, networking card, modem card, cooling unit, , monitor, keyboard, mouse and cables
- Windows OS CD-ROM
- A screwdriver

BRIEFING: WHAT'S ON THE COURSEWARE

How To Build A Computer:

First, you will have to open the case and **ground yourself out**. This means discharging any static electricity your body might have built up. Many professional computer technicians wear a special electrostatic bracelet to discharge static electricity. But, there is another way: all you have to do is touch the metal case with your bare hand. As long as the computer is unplugged before you start, it's harmless.

Next, you will have to insert the main processing center of the computer – the **motherboard** and **central processing unit (CPU)**.

The processor generates a lot of heat but must remain cool at all times. So, you will need to attach the cooling unit on top of the processor.

Next, you will need to insert the computer's **RAM**, or memory chip. This computer has 128 MB of RAM on one **DIMM**. DIMM is short for "dual in-line memory module."

A DIMM is a small circuit board that holds memory chips. Insert the RAM into the first open slot. (You'll probably see another empty slot where you can add more RAM later. Ignore it for now.) As you insert the RAM, be sure not to touch the metal pins. Only touch the ceramic center by the edges. Press it into place gently but firmly.

RAM is a **microchip** that is extremely fast and is used to remember things for a short while. For example, whenever you restart the computer, everything in RAM is erased. But a **hard drive** is also a kind of memory: long-term memory. It can remember much more than RAM, and it remembers this information even after you've turned off and unplugged your computer.

The memory capacity of RAM and hard drives, as well as **floppy disks** and **CD-ROMs** are all measured in **bytes**. The smallest measurable amount of information is a bit. There are eight bits in a byte. A thousand bytes is called a **kilobyte (KB)**. A million bytes is called a **megabyte (MB)**. A billion bytes is called a **gigabyte (GB)**.

Next, place the **hard drive** inside the case. Then, place the **CD-ROM drive** inside the case. Now you will need to connect each of these drives to the **motherboard** with cables. First the hard drive, then the CD-ROM drive.

Now it's time to add specialized **PCI** cards in the **expansion slots**. This computer has six PCI cards: a **video card**, a **sound card**, a **networking card** that lets you use **Ethernet** connections, a **USB** card and a **SCSI** (pronounced "skuzzy") card.

Insert each one of them into a slot. Work from left to right with the computer facing you, in the order of cards just mentioned – video, sound, Ethernet networking card, USB and SCSI. Hold each card by the edges only. Insert one corner of the card and then bring the rest of

it down, like a lever, until it is securely in place. Repeat this with each of the six cards.

Many of the components you have just installed require power. Go ahead and attach the cables coming from the power supply to the cooling fan, the motherboard and the video card.

Close the case.

Attach the power cord. Plug in the mouse and keyboard. Attach the cable from the monitor.
Plug in the printer. Plug a telephone cord into the phone jack at one end and into the back of the computer.

Now plug the computer and the printer into the wall. You're ready for a test drive.

THE GROUP SESSION

Prepare for this session by disassembling a computer (preferably a working machine) and putting all of the necessary parts, a screwdriver and an original Windows OS CD on a table or other work surface.

Members, working as a team, should reassemble a computer, using the following instructions:

1. First, you will have to open the case and ground yourself out. All you have to do is touch the metal case with your bare hand. As long as the computer is unplugged before you start, it's harmless.
2. Next, you will have to insert the main processing center of the computer – the motherboard and central processing unit (CPU).
3. Attach the cooling unit on top of the processor.
4. Next, you will need to insert the computer's RAM, or memory chip. Insert the RAM into the first open slot. (You'll probably see another empty slot where you can add more RAM later. Ignore it for now.) As you insert the RAM, be sure not to touch the metal pins. Only touch the ceramic center by the edges. Press it into place gently but firmly.
5. Next, place the hard drive inside the case. Then, place the CD-ROM drive inside the case. Now you will need to connect each of these drives to the motherboard with cables. First the hard drive, then the CD-ROM drive.
6. Now it's time to add specialized **PCI** cards in the **expansion slots**. Insert each card you have into a slot. Work from left to right with the computer facing you, in this order: video, sound, Ethernet networking card, USB and SCSI. Hold each card by the edges only. Insert one corner of the card and then bring the rest of it down, like a lever, until it is securely in place. Repeat this with each of the six cards.
7. Many of the components you have just installed require power. Go ahead and attach the cables coming from the power supply to the cooling fan, the motherboard and the video card.
8. Close the case.
9. Attach the power cord.
10. Plug in the mouse and keyboard.
11. Attach the cable from the monitor.
12. Plug in the printer.
13. Plug a telephone cord into the phone jack at one end and into the back of the computer.
14. Now plug the computer and the printer into the wall.

When the computer is reassembled, turn the power on, install Windows OS from the original CD and then launch a program to make sure everything works.

ADVANCED MISSION 2

PROGRAMMING LANGUAGES

SPY SECTOR: COMPUTER SCIENCE

THE MISSION:

Members examine and, if possible, test sample computer programs to learn about programming languages, how software works and the programming that's behind the "built-in" features of their computers.

INTELLIGENCE GATHERED:

- Understanding of computer hardware and operations
- Basic understanding of programming languages
- Knowledge of computer and network terminology

SPY TOOLS:

- One computer with a BASIC compiler
- **SPYNOTE: Programming**
- Compilers for other programming languages (optional)

Note: If you don't have a BASIC compiler, you can download one free from CNET's Web site at **www.download.com**. Click on "Software Developer Solutions." On the next page, click on "Compilers and Interpreters." You'll see a list that includes BASIC compilers. You can also type BASIC into the search box.

BRIEFING: WHAT'S ON THE COURSEWARE

You're probably used to thinking of computer programs as coming on CD-ROMs or disks . Maybe you think of programs as application files stored on your hard drive or as files you can download from the Internet. All of these computer programs, or applications, are kinds of software. Word processors, Web browsers, graphics programs and video games are different types of software.

All computer programs or software applications, from word processors to games, are written in computer languages. There are many different types of computer languages, each with its own special advantages. Some are much more difficult to learn than others.

If you want to write computer programs, you will have to think like a translator. A translator can explain in one language what is written or said in another. Even though you understand and speak more than one language, computer programs can't understand human languages. In fact, computers and humans speak very different languages. A lot of translation has to be done before a computer can run a program written by a person. There are three steps in the translation of a computer program:

1. The first step is writing the program. To do this, computer programmers write in a computer language that is known as **source code**. Other programmers can read this code, but a computer cannot understand it.
2. So for the second step, a programmer must use a special translator program called a **compiler** that translates the source code into assembly code. A compiler translates one language, called source code, into another, called assembly code.
3. But the computer processor can't understand assembly code either. There's still one more step. The third step is using a translator program called an **assembler** to translate the assembly code into machine code. Machine code is the language that computers do understand. It's unreadable by a human, even the programmer who wrote the original source code – it's just a long stream of numbers.

Machine code is also called executable code, which means that it is finally a program that is ready to be executed or run. Have you ever seen the letters .exe after a program? That .exe stands for "executable" code.

Whenever you click on the icon for a program, like Microsoft Word, what you are really doing is **executing** that application. Remember, the only kind of program a computer can run is one written in executable code.

THE GROUP SESSION

If you don't have a BASIC compiler, download one on each computer members will be using before beginning this session.

Have members choose at least one of the following five sample computer programs from **SPYNOTE: Programming**. Each one is written in BASIC. Following each program is an explanation of what each line in the program tells the computer to do.

SPYNOTE: PROGRAMMING

Each line of a BASIC program begins with a number. This number tells the computer the order in which it should execute the commands of the program. Basic programmers often use a factor of 10 to start each line so they can go back and add new lines of code between two existing lines without re-numbering the whole sequence. Factors of 100 are also useful, and allow even more wiggle room for adding between lines.

Program 1

```
10 REM This program will let everyone know that this is your computer.
20 LET MYNAME$="Jane"
30 CLS
40 INPUT "What is your name?"; YOURNAME$
50 IF YOURNAME$=MYNAME$ THEN PRINT "WELCOME ";MYNAME$: END
60 PRINT "HEY! You're not" ;MYNAME$
70 END
```

Explanation of Program 1

10 REM means Remark. The computer will ignore this line. It's a way for you to write yourself a note about what the program does.

20 This line tells the computer what the variable called **MYNAME$** will represent. The dollar sign at the end tells the computer to let the user enter letters in addition to numbers, that means it will have letters instead of just numbers. When you type this program in, change the name Jane to your own name, unless your name *is* Jane.

30 CLS is a command telling the computer to clear the screen.

40 INPUT asks the user of the computer program to input information. The phrase in quotation marks is what the user will see printed on the screen. The answer the user types in is the value assigned to the variable called YOURNAME$. It ends in a dollar sign, too, so it also will have letters and not just numbers.

50 This is called an IF..THEN statement. If the equation is true, then the program will do whatever happens after the word THEN. If it is not true, the program goes to the next line. In this case, if it is true that YOURNAME$ (the name that the user typed in) is the same (=) your name (the name you assigned to MYNAME$), then the program will PRINT on the screen the word "Welcome," followed by your name. In this case, the command END at the end of the line ends the program here..

60 But, if the user types in a name other than yours, the program continues to this line. In this case, PRINT tells the computer to print the phrase, "Hey! You're not" followed by your name. (Remember, everything following PRINT will be printed on the screen.)

70 END ends the computer program

Program 2

```
10 REM This program will calculate your height in centimeters
20 PRINT "How tall are you (in inches)?"
30 INPUT IN
40 PRINT
50 PRINT
60 LET CM=IN * 2.54
70 PRINT "You are" ;CM; "centimeters tall."
80 END
```

Explanation of Program 2

10 REM means Remark. The computer will ignore this line. It's a way for you to write yourself a note about what the program does.

20 The PRINT command tells the computer to print on the screen whatever words come after it.

30 INPUT will ask the user to type a response to the question, "How tall are you in inches?" in. What the user types in will be assigned to the variable IN. This variable does *not* have a dollar sign after it. That means that what the user types in can only be a number, with no letters or other symbols.

40 Remember, PRINT will print on the screen whatever comes after it. In this case, nothing follows PRINT, so the computer will print a blank line on the screen. This is an easy way to skip a line.

50 This line prints another blank line.

60 LET assigns a value to a variable: in this case, the user's height in centimeters. This LET statement uses of a mathematical equation. There are 2.54 centimeters in an inch. So, this line tells the computer to multiply the user's height in inches by 2.54 to find the user's height in centimeters. The asterisk (*) means multiply. CM is the outcome of the calculation.

70 PRINT tells the computer to print on the screen whatever follows it. Any words following PRINT that are in quotation marks will appear on the screen exactly as you typed them. But if the words are not in quotation marks, like the CM in this line, the program prints the value of the variable (in this case, the user's height in centimeters) instead of the letters themselves.

80 END ends the computer program.

SPYNOTE: PROGRAMMING

Each line of a BASIC program begins with a number. This number tells the computer the order in which it should execute the commands of the program. Basic programmers often use a factor of 10 to start each line so they can go back and add new lines of code between two existing lines without re-numbering the whole sequence. Factors of 100 are also useful, and allow even more wiggle room for adding between lines.

Program 3

```
10 REM This is a sports guessing game.
20 CLS
30 PRINT "Think of one of these sports – football, baseball, basketball, soccer, hockey
– and I will try to guess which one you are thinking of."
40 PRINT
50 PRINT "Does this game use a ball?"
60 INPUT YN$
70 IF YN$="no" THEN PRINT "You are thinking of hockey.":END
80 PRINT "When you're on the field, are you allowed to touch the ball with your hands?"
90 INPUT YN$
100 IF YN$="no" THEN PRINT "You are thinking of soccer.":END
110 PRINT "Do you try to hit the ball with a bat?"
120 INPUT YN$
130 IF YN$="yes" THEN PRINT "You are thinking of baseball.":END
140 PRINT "Does each game begin in the center of the playing area?"
150 INPUT YN$
160 IF YN$="yes" THEN PRINT "You are thinking of basketball.":END
170 PRINT "You are thinking of football."
180 END
```

Explanation of Program 3

10 REM means Remark. The computer will ignore this line. It's a way for you to write yourself a note about what the program does.

20 CLS is a command telling the computer to clear the screen.

30 The PRINT command tells the computer to print on the screen whatever words come after it.

40 Remember, PRINT will print on the screen whatever comes after it. In this case, nothing follows PRINT, so the computer will print a blank line on the screen. This is an easy way to skip a line.

60 INPUT asks the user to type something, which will be assigned to the variable YN$. Because this variable ends in a dollar sign it can contain letters and symbols, not just numbers. Here, the user should type either "yes" or "no," since the program asked a yes/no question.

70 If the user types "no," then the value of YN$ equals "no." In this case, then the program will print "You are thinking of hockey," (because hockey is the only game on the list that does not use a ball) and then end.

80-180 The rest of the program follows the same set of commands in order to keep guessing at the sport. Each yes/no question eliminates one sport until the only possible answer is football.

Program 4

```
10 REM This program will repeat the user's name a specified number of times.
20 INPUT "What is your name?"; NAME$
30 INPUT "How many times would you like me to shout your name?"; SHOUT
40 CLS
50 FOR COUNT=1 to SHOUT
60 PRINT NAME$; "!!!!!!!!!!"
70 NEXT COUNT
80 END
```

Explanation Of Program 4

10 REM means Remark. The computer will ignore this line. It's a way for you to write yourself a note about what the program does.

20 INPUT asks the user to type something, which will be assigned to the variable NAME$. Because this variable ends in a dollar sign it can contain letters and symbols, not just numbers.

30 INPUT asks the user to type something else, which will be assigned to the variable SHOUT. Because this variable does *not* end in a dollar sign, the user can *only* type in a number.

40 CLS is a command telling the computer to clear the screen.

50 and **70** These two lines make up what is called a FOR...NEXT loop. They make the computer count from one number to another. In this case, the program counts from 1 to the number that the user entered for the variable SHOUT (the number of times that he or she wants his or her name shouted). Until the count reaches **SHOUT**, at line 70 the computer loops back to line 50.

60 PRINT prints on the screen whatever follows it. Because NAME$ is not in quotation marks, the program will print the VALUE of this variable, which is the user's name inputted earlier. Then the program will print 10 exclamation points; the exclamation points are in quotation marks, so they will be printed exactly as you typed them.

80 END ends the program.

SPYNOTE: PROGRAMMING

Each line of a BASIC program begins with a number. This number tells the computer the order in which it should execute the commands of the program. Basic programmers often use a factor of 10 to start each line so they can go back and add new lines of code between two existing lines without re-numbering the whole sequence. Factors of 100 are also useful, and allow even more wiggle room for adding between lines.

Program 5

```
10 REM This is a fortune-telling program.
20 CLS
30 PRINT "HIT ANY KEY TO GET YOUR FORTUNE."
40 GET ANY$
50 LET FORTUNE=RND(4)+1
60 IF FORTUNE =1 THEN PRINT "You will hit a home run!"
70 IF FORTUNE =2 THEN PRINT "You will find a dollar bill!"
80 IF FORTUNE=3 THEN PRINT "You will lose your pen tomorrow."
90 IF FORTUNE=4 THEN PRINT "You will be a famous computer programmer."
100 IF FORTUNE=5 THEN PRINT "Your favorite TV show will be cancelled next year."
110 END
```

Explanation of Program 5

10 REM means Remark. The computer will ignore this line. It's a way for you to write yourself a note about what the program does.

20 CLS is a command telling the computer to clear the screen.

30 The PRINT command tells the computer to print on the screen whatever words come after it.

40 GET is a command similar to INPUT, except that the user can only hit one key, and he or she does not have to hit ENTER or RETURN afterwards. This is useful when you want the user to type any key to continue, as in this example. The key that the user hit is assigned to the variable ANY$, but it doesn't matter: this information will not be used for anything.

50 The command RND makes the computer pick a random number from 0 to the number inside the parentheses. So RND(4) will pick either 0, 1, 2, 3 or 4. The plus sign and the 1 tell the computer to add one to whatever number (from 0 to 4) is randomly selected, so that the possibilities really become 1, 2, 3, 4, or 5. The final number is assigned as a value for the variable FORTUNE.

Note: Some BASIC compilers have a slightly different RND command. The number inside the parentheses does not matter, instead the command generates a fraction between 0 and 1. If this program does not work when you enter it as written into your BASIC compiler, try altering line 50 so that it reads, LET FORTUNE= INT(RND(*7*)*5)+1.

60-100 These lines all use an IF...THEN statement. Depending on which number was randomly selected, the computer will display one of the five fortunes.

110 END ends the program.

ADVANCED MISSION 3

DESIGNING NETWORKS

SPY SECTOR: NETWORKING

THE MISSION:

Members examine their computers' IP settings and create model or actual computer networks.

INTELLIGENCE GATHERED:

- Basic understanding of computer networks
- Basic understanding of network configurations
- Ability to configure a simple peer-to-peer network
- Knowledge of computer and network terminology

SPY TOOLS:

- Paper and pens
- At least one computer with an Internet connection

BRIEFING: WHAT'S ON THE COURSEWARE

When two or more computers are connected to each other, this is called a **network**. A network lets more than one computer share a piece of hardware, like a printer or a scanner.

Some networks are arranged to connect several computers to one central computer, called a **server**. This kind of network lets different computers access the same information.

A server is cool if lots of people need access to information that changes frequently. For example, if all the employees of a company can connect to a master list of their names and phone numbers on the server, it makes it easy to update any changes. When someone's phone number changes, the new number only has to be changed once on the server. Then everyone can see the updated information.

Networks fall into two major categories. In a **client-server** network, all the computers are connected to a central computer called a server, which holds all the important information that is shared over the network. In a **peer-to-peer** network, there is no central server, and all the computers in the network are connected to each other.

Networks can also be organized in different patterns or designs. In the **star pattern**, each client in the network is connected to a central server. Every communication between computers must go through the central server, so the star is a type of client-server network.

This is ideal for a large business like an airline. If someone sells a ticket for a certain seat on a flight, every other computer will register this change. All computers on the network will always have up-to-date information. A big problem with this design is that if the central server stops working, the entire network shuts down until the server can be fixed.

In a **ring pattern**, there is no central computer or server. Each computer is directly connected to the next computer, forming a circle. This is a simple network to set up. However, if any one computer goes down, the entire network goes down with it and no communications can be sent or received until it is fixed. Because there is no centralized server, the ring is a type of peer-to-peer network.

A **bus pattern** network links all computers through a single communication line. (If you imagine the Internet as a road map, having a bus pattern network would be like having a whole road, going to all the computers on your network, that could only be used by those computers.) All computers on the network can communicate directly with each other, without having to go through a central server or getting stuck amidst the other traffic on the Internet . If any one computer on the network goes down, it does not affect the others, since the communications line is always running, with each computer tapped into it individually. The only downside is that this type of network is very expensive. Because there is no centralized server, the bus is also a kind of peer-to-peer network.

How do you decide what kind of network you need? If you have the wrong network design, you can end up with bottlenecks where too many computers are trying to share a line of communication that is not fast enough for the things they're trying to do.

A good network designer needs to consider several factors before designing a network:

1. What is the budget for building the network? Some networks cost more than others.

2. How many computers will be using the network? A network of three computers will need to be configured differently than a network of 3,000 computers.

3. What kind of information do the computers on the network need to share? Is it information, like bank balances, that need to be kept secure? Or are they public files, like Web pages?

4. How often will the computers need to connect to the network? The more computers you have and the more often they access the network, the more work you will have to put into troubleshooting, supporting users and keeping things running smoothly.

THE GROUP SESSION

First, explain to members that an IP address is a number that is assigned to every computer that logs onto the Internet. When you share information over networks, the IP address routes the information you want to your computer. It's sort of like the street address for a house or the URL for a Web site.

Ask members to find the IP addresses of the computers they're using. They can do this by going to the Start menu, clicking on Run and then typing "winipcfg" in the field.

Note: If your Club has its own network, its settings are protected by a password that only the network administrator can access. If members are going to experiment with these settings you will first need to obtain permission and the password from your network administrator.

Choose one of the following ways, based upon your Club's set up, to run the rest of this session:

- If your Club has a network, there will be a lot for members to explore directly. Let them examine how the network is set up, both physically – in terms of the cabling, hubs, etc. – and in terms of the **TCP/IP** settings on each computer.

Ask members exploratory questions, such as, "What type of network does the Club have? Why?"

Ask members to try clocking the speeds of different operations: for instance, sending a file from one computer to another. Do all of the connections work at the same speed? What about running a software application on one computer versus another? Is it faster or slower on one machine?

- If your Club's computers are not networked, focus on "what if" questions. What if you were going to connect the Club's computers with a network? What would it take to connect them? What hardware and software would you need? What would be the advantages of being on a network? What would the disadvantages be?

CHALLENGE

If you have at least two computers, members can build a simple network. It's not very expensive and it doesn't take long. Your total cost for building the network from scratch should come to less than $100.

First, ask members, "What are the benefits of networking two computers versus simply having two unconnected computers?" Some possible answers:

1. If one computer has a scanner or printer attached, the other computer can use it, too.

2. If one computer can connect to the Internet, the other can use the same connection.

3. You can move files from one computer to the other without having to save them on a floppy disk, walk over to the other computer, open and re-save them.

4. If you have multi-player games, you can play against an opponent on the other computer over the network.

Next, working with Club members, follow the instructions below to create a two-computer network.

1. Both computers must have a networking card, which might also be called an Ethernet card or a NIC (Network Interface card). If either computer lacks one, you will need to purchase one. You can probably find one at a computer chain store for less than $30.

2. Purchase one crossover cable, also known as a CAT 5 cable, for about $15.

3. If your computer does not have a networking card, install one. Follow the instructions in the manual that comes with the card. Unplug the power, open the case, touch the metal case to ground yourself, and then slide the card into one of the expansion slots. Repeat this on the other computer you will be networking.

4. Turn on both computers. Windows will detect the new networking card and will prompt you to insert the CD-ROM that came with the card to install the necessary drivers. Do this, following the on-screen instructions.

5. Connect the crossover cable to both computers. Each end will plug into the Ethernet jack.

6. Give each computer a name. You can choose any name, but for now let's call them BGCA1 and BGCA2. On one of the computers, go to the Start menu, then Control Panels, and open Networking Properties. Click on the tab labeled Identification. In the space next to Computer Name type in BGCA1.

7. Both computers have to share a workgroup. On BGCA 1, in the space next to Workgroup, enter a name; for now let's call it BGCANET.

8. Click on the tab labeled "Access Control." Choose "Share-level access control." If you had a very big network with lots of different people, you could use this tab to determine who gets access to which files and hardware, but for now, let's keep it simple.

9. Click on the tab labeled "Configuration." Click on the button that says "File and Print Sharing" and check both boxes. This will let both computers share each other's files and the printer.

10. Close the Network properties window. Windows will prompt you to reboot. Click OK.

11. After Windows reloads, double-click My Computer. Right-click the drive you want to share; this will probably be the C drive, your hard drive. A menu will pop up; choose "Sharing." Click on the "Shared As" field and type in a name. You can just call it C or HARD DRIVE 1. Under Access Type, select "Full" to give full access.

12. Repeat steps 7-11 on BGCA2. Once you finish, your two computers will be networked together and able to share files and programs.

13. If you want to share a printer, here's how: On the computer to which the printer is already connected, double-click on My Computer. Open the Printers folder. Right-click on the printer and choose Sharing. Under "Share As," give the printer a name. On the other computer, double-click on My Computer. Open the Printers folder. Click on "Add Printer." A Wizard will appear. Choose "Network Printer." Click "Next," then "Browse." You will see "BGCA1" appear with a plus sign next to it. Click the plus sign. "Printer #1" will appear. Highlight "Printer #1" and click OK. You have now networked your printer.

ADVANCED MISSION 4

SYSTEM MANAGEMENT

SPY SECTOR: HARDWARE

THE MISSION:

Members learn and practice basic troubleshooting techniques, preventive measures and periodic check-ups on their computers.

INTELLIGENCE GATHERED:

- Knowledge of basic troubleshooting techniques and computer repair
- Knowledge of safe, ethical use of the Internet and computer technology
- Knowledge of computer and network terminology

SPY TOOLS:

- A floppy disk and label for each member, felt-tip pens
- Anti-virus software and/or other diagnostic or repair utilities (optional)

BRIEFING: WHAT'S ON THE COURSEWARE

Windows comes with two important utilities (tools for keeping your computer healthy), **ScanDisk** and **Disk Defragmenter**. Use these to keep your system healthy. Both of them can be found by going to the Start Menu, then Programs, then Accessories, then System Tools. When you run ScanDisk, be sure to click the box next to "Fix Problems Automatically." ScanDisk will look at all your files and at the physical surface of the hard drive (if you select a "Thorough" scan) to look for problems.

As you use your computer, the operating system breaks up files and programs into small chunks, which it scatters to different places on the hard drive. From time to time you need to run Disk Defragmenter to put all the pieces back where they belong. This fragmenting process is normal – nothing gets lost – it just takes your operating system longer to find a file or to launch a program if its pieces are widely scattered.

You should run ScanDisk and Disk Defragmenter about once a month, more frequently if you use your computer a lot. This routine maintenance can help keep your computer healthy.

Anti-virus software is also critical for the health of your computer. A computer virus can be spread via e-mail or a downloaded file or from a disk you put into the floppy drive. A virus can harm your programs, destroy files or even erase your entire hard drive.

Anti-virus software does two important things: it scans your hard drive for viruses and it watches over your computer, checking any newly downloaded or installed files to make sure they are not carrying viruses. If the software finds a virus, it will attempt to remove it. If it cannot, it will try to isolate the virus to a tiny portion of your hard drive where it won't be able to affect any of your other files.

The smartest thing you can do for your computer is **back up your files**. If you've saved copies of your important files onto a disk or CD-ROM, you will always be safe. Even if something goes terribly wrong with your computer, you can get your important information off a disk.

Once you've backed up your important files, you can do some serious housecleaning on your computer's hard drive. **Initializing** your hard drive (sometimes called re-initializing or re-formatting) will erase all of the data you've stored there. That means not just your files, but your programs and even the operating system.

When you're done, *everything* will be gone. This is a severe operation that you should only try if you have a serious hard drive problem and you've backed up all your files. Remember, this step will cure your computer of any virus or software bug. But it is irreversible. There's no "Undo." Once you've initialized it, you'll have a blank hard drive and that's that.

You'll also need the original CD-ROMs for all of your software and for your operating system. (Always store your original CD-ROMs in a safe but easy-to-find place.) Once you initialize your hard drive, you have to re-install your operating system and all software from the original disks. Start with the operating system. Then start the computer and re-install your software applications. Finally, re-save all of your backed up files.

One preventive measure you can try is **partitioning** your hard drive. You can partition your hard drive into two or more sections. This won't give you extra space, but it will break up your one big drive into some smaller ones. Why would you want to do this? Some people need to use more than one operating system, like Windows and Linux, each of which would need its own hard-drive partition.

Sometimes parents like to partition a computer shared by the whole family. A young child might accidentally erase something on his partition, but it will have no effect on the information stored on other partitions. But, like initializing, partitioning a drive also erases all data. This is a good thing to do when you first get a new computer. If you do it later, you'll have to save and reload all of your files, software and the operating system.

THE GROUP SESSION

Let members run ScanDisk, Disk Defragmenter, Disk Cleanup and any other utilities you have to check on the health of one of the computers.

Start with ScanDisk. (Windows 2000 and XP do not have ScanDisk. If you're using either of these operating systems, use Disk Cleanup instead.) To run ScanDisk, members should simply click on the Start menu, then Programs, then Accessories, then System Tools, then ScanDisk. Select the hard drive (C) and make sure that "Thorough" is not checked. (A thorough scan can take 30 minutes or longer.) Click Start. The program may suggest some repairs; if it does, accept them.

Next, explain to members that during the course of using a computer, many unnecessary files accumulate on the hard drive. Windows has a built-in tool for getting rid of files that are no longer needed in order to free hard drive space. This tool is called **Disk Cleanup**.

Ask members to double-click on My Computer, then right-click on the hard drive and choose Properties. Now have them choose Disk Cleanup.

They will see a list of file types that can be deleted, as well as how much space each category would free if all the files in it were deleted. As members highlight an item, Windows will display an explanation, letting them know exactly what the files do. When members have made their selections, they should click OK. Windows will delete the files they selected.

If you want, have members click on More Options to remove any components of Windows that your Club does not use (like "Fax Services" perhaps). If they make mistakes, you can always reinstall applications later.

If you have Windows 98, explain to members that they can use the **Maintenance Wizard** to automatically run ScanDisk, Disk Defragmenter and Disk Cleanup late at night or early in the morning when no one will be using the computer. Explain that you could program the Wizard to perform these tasks automatically on a regular schedule. Show members where the Wizard is located by clicking on Start, then Programs, then System Tools, then Maintenance Wizard.

Last, members should practice backing up a file.

Start by passing out floppy disks, labels and felt-tip pens. Tell members to write their names on the labels first and then carefully attach them to the disks.

If a member does not already have an important file on the computer that he or she wishes to back up, let the member make a practice file. The easiest way to do this is to launch Microsoft Word and type in something like, "This is a file to practice making backups." The member should then save it to the hard drive.

Depending on which version of Windows you have, you might use Windows Explorer or File Manager to easily copy a file from the hard drive (C) to the floppy disk drive (A). Each member should take a turn dragging his or her selected file from the hard drive to the floppy disk in drive A.

The last step is for members to put their floppies away somewhere safe, cool, dry and dust-free. For example, in a carrying case inside a drawer would be a good spot.

ADVANCED MISSION 5

INTERNET CONNECTIONS

SPY SECTOR: NETWORKING

THE MISSION:

Members learn about different types of connectivity and how information travels on the Internet.

INTELLIGENCE GATHERED:

- Basic understanding of computer networks
- Basic understanding of the Internet
- Knowledge of computer and network terminology
- Ability to distinguish between types of connectivity and determine the best connectivity option for specific needs

SPY TOOLS:

- Club computers
- Pens or pencils
- Copies of simple world maps that members can draw on (Try www.eduplace.com/ss/maps/pdf/world_cont.pdf)
- Networking hardware (optional)

BRIEFING: WHAT'S ON THE COURSEWARE

Many computer systems come with a built-in analog modem to send and receive data. This is called a **dial-up connection**, because the computer modem dials a telephone number and transfers information as a series of signals over the phone line. This type of connection is very slow, but phone lines can be found anywhere so an analog modem can be used in places where more modern, faster connections aren't available.

The fastest connections do not use an analog modem or a dial-up connection. They use digital modems, such as **ADSL**, **ISDN** or **cable**.

ISDN stands for **Integrated Services Digital Network**. It uses a digital phone line, which must be specially installed by a phone company. It's expensive, but fast.

A **cable modem** connects to the same cable that delivers cable TV. You must be in an area where cable TV is available and the local cable company offers data services. This type of connection is extremely fast, but the more people in your neighborhood who are sharing the cables with you, the slower your connection will be.

ADSL (DSL for short) stands for **Asymmetric Digital Subscriber Line**. It lets you use one telephone line to talk on the phone and connect to the Internet at the same time. The connection speeds are very fast. Your computer will stay connected to the Internet all the time, so you never need to dial up as you would with an analog modem.

The fastest of all Internet connections is a **T3 line**. This is the type of connection most large businesses use. A dedicated T3 connection to the Internet is a high-speed connection that is always on. Unlike dial-up, ADSL, ISDN, or cable, access is only shared with the other people in the office, so it is usually very fast, regardless of other traffic on the Internet.

THE GROUP SESSION

Explain to members that any time you connect to the enormous network of networks called the Internet, information does not flow in a straight line; it travels along a specific route, like a city bus, making stops, changes and transfers from one network to another at various points, called **nodes**, along the way.

If you have Windows 98, 2000 or XP, you can actually trace the path between your computer and any other computer or Web page. Instruct members to open a DOS window by going to Start, then Programs, then Accessories, then Command Prompt. They should type **tracert location name** ("location name" is the IP address of another computer or the URL of a Web page). For example, they could type "tracert www.bgca.org." They would see the pathway between the computer and Boys & Girls Clubs of America's Web site.

They can see the path fly over oceans (via satellites or high speed cables), if the destination is overseas. Have members try, as a second example, "tracert www.uffizi.firenze.it," an Italian site.

Photocopy and distribute simple world maps and pens or pencils.

Have each member use Command Prompt to see the routes between a Club computer and three different Web sites of your choice. Ask members to draw these routes on their world maps. For each place a route passes through a node – it's called a "hop" when this happens – members should draw a circle. When they connect the circles with lines, they'll see the route.

By combining all the pathways, members can begin to see the big picture of the entire Internet: where the important nodes are and how information travels to reach servers in China, Australia or other parts of the world.

Encourage members to find sites all over the country and the world. They may want to use Internet Explorer and a search engine to search specifically for pages from far-away locations.

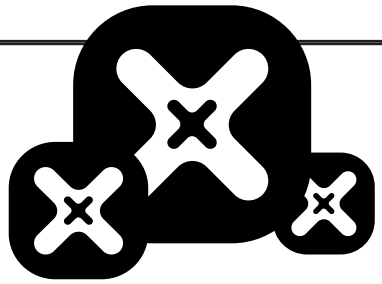
ADDITIONAL ACTIVITY

Have a contest to see who can find the site the that requires information to travel through the most nodes to get to a Club computer. (Most likely, contenders will be sites that are the most geographically distant from the Club.)

ADVANCED MISSION 6

STOPPING VIRUSES

SPY SECTOR: NETWORKING



THE MISSION:

Members learn about network security and evaluate the security of the Club's computer systems using online assessment tools.

INTELLIGENCE GATHERED:

- Basic understanding of the Internet
- Basic understanding of computer networks
- Knowledge of computer and network terminology
- Knowledge of troubleshooting techniques and safe methods for computer repair
- Knowledge of safe, ethical use of the Internet and computer technology

SPY TOOLS:

- A computer with an Internet connection

BRIEFING: WHAT'S ON THE COURSEWARE

Everyone knows how much fun it is to get online and surf the Net. And we've learned the great benefits of building a network. Unfortunately, as soon as you go online or join a network, you open your computer up to attacks and intrusions from unwanted guests. There are several defenses you can use to protect your computer, however.

Anti-virus software will monitor any file that you download or any new files that you save on your computer, whether through a network's file-sharing or with a diskette. The program will search the new file for any known viruses before it allows you to open or save it.

Because hackers and criminals are always thinking up new viruses, the people who create the anti-virus programs are always adding new information to their databases. So, it is very important to update your anti-virus software every month. Unless you update your anti-virus software, it will only stop viruses programmers knew about before the software was developed. It won't be able to recognize new viruses.

If you send personal information over the Internet, like a credit card number when you buy something, you will want it delivered securely and safely. Secure transmissions are made using secret codes called **encryption**.

To know whether a Web site is secure, look at the bottom corner of your Web browser; you should see a closed padlock there. Also, some secure Web pages have special URLs. Look for a URL that begins https:// or shttp://.

Passwords are an important key to network security. Every network has an **administrator** who assigns passwords to everyone on the network. There may be several levels of passwords. In this case, depending on which password you have, you will have a different degree of access to the files and programs on the network.

When you go online, you often need passwords to access certain sites, too. Remember to take passwords seriously. *Never tell your password to anyone.*

More and more people have Internet connections that let them stay online all the time (even when they are asleep or out of the house). This is a great convenience, but it's a little like leaving your front door unlocked. One of the best ways to keep out unwanted visitors is with a **firewall**. A firewall is a software package that monitors all the traffic into your computer or network, screening out any uninvited guests.

The newest version of Windows, Windows XP, includes a new feature called the **Internet Connection Firewall (ICF)**. It monitors every communication you make over the Internet and allows only replies to these communications to enter your computer. So, no one can send you information unless you've sent information to him or her in the past.

A really great resource for assessing and maintaining network security is Microsoft's Personal Security Advisor, at www.microsoft.com/security/mpsa/. When you get to this site, click the button that says "Scan Now," and it will search your system for security holes.

Another good site is Shields Up! at http://grc.com/default.htm. This site contains many free utilities for testing your computer's potential vulnerabilities.

So what exactly are the dangers from which we're trying to protect ourselves? Some hackers use **Denial of Service** (DoS) attacks. They use a **sniffer**, a program or device that tracks data as it travels over a network to gain access to other people's computers. Then, they take control of the computers and use them to send thousands and thousands of requests for information to a specific Web site. That Web site's server can't handle the load and shuts down. Shut downs cost site operators a lot of money.

A **trojan horse** is a kind of intrusion hidden inside a seemingly innocent program you might download, like a free game. The game secretly sends your computer's **IP address** and other vital information to the hacker, who can then browse through your hard drive, similar to the way you would normally visit a Web site. A good firewall and other security measures will keep a hacker from finding your computer in the first place.

Viruses are meant to spread. They can come hidden in e-mail attachments, such as pictures or games. The most common way viruses spread is by sending copies of themselves to everyone in your e-mail address book. Moving this way, a virus can spread around the world in a single day. These viruses contain tiny bits of computer code contained in small executable files. Once executed, a virus file can wipe out anything on your hard drive. There are more than 60,000 known viruses right now.

THE GROUP SESSION

Have members use Microsoft's Personal Security Advisor at www.microsoft.com/security/mpsa/. When they get to this site, they should click the button that says "Scan Now." It will search members' computers for holes in the security systems.

After this, have them run more analyses of their computers' security system at Shield's Up!, located at http://grc.com/default.htm.

Remind members how important it is not to open e-mail from people they don't know.

If your computers have Windows XP, let members explore the built-in Internet Connection Firewall. They should double-click My Network Places, then right-click on Internet connection and choose Properties. The ICF is on the "Advanced" tab.

If you don't have Windows XP, look for a free firewall package you can download and install. Let members configure it, then restart the computer. One good, free firewall for Windows can be found at http://downloads-zdnet.com.com/3000-2092-10159856.html?tag=lst-0-1.

ADVANCED MISSION 7

SHOPPING FOR A COMPUTER

SPY SECTOR: HARDWARE

THE MISSION:

Members read and decipher advertisements for computers.

INTELLIGENCE GATHERED:

- Ability to make good consumer choices about computer equipment
- Ability to advise others about computer-related purchases
- Ability to choose the proper types of devices to install in computers
- Knowledge of computer and network terminology

SPY TOOLS:

- Pens or pencils
- **SPYNOTE: Advertisement**
- Newspapers and computer magazines (optional)

BRIEFING: WHAT'S ON THE COURSEWARE

Newspaper or magazine advertisements selling computers are good places to get an overview of computer parts and terminology, including common abbreviations.

It's important to read advertisements very carefully so you can make educated, informed buying decisions. Take a look at the sample ad on **SPYNOTE: Advertisement**. It looks pretty daunting, but here's how to decipher it line-by-line:

Processor: Intel Pentium 4 Processor at 1.8GHz with 400MHz system bus for lightning-fast speed.

This computer's processor, or **CPU**, runs at a speed of **1.8 gigahertz (GHz)**. The **system bus** measures the speed at which the computer sends messages internally. The CPU is like the computer's brain. Its speed is a measure of how fast it "thinks." The system bus acts like nerves sending signals from the brain to the rest of the body or, in this case, from the CPU to the other parts of the computer. When you want a fast computer, it's not enough to have a fast brain, you also need fast nerves to communicate the information That's why the system bus is so important.

Memory: 256MB PC-133 SDRAM, 1.5 GB maximum

This computer comes with 256 megabytes (MB) of memory. This type of memory is called **RAM**, which stands for Random Access Memory. Any program or file you are using is stored in RAM temporarily while you use it. So the more RAM you have, the more programs you can run at the same time. Some programs, like video games or graphics software, take a lot of RAM to run well.

Microsoft Office, for example, requires 128 MB of RAM to run efficiently. Each additional Office program (like Word or Excel) needs another 8 MB of RAM. The Windows **operating system** itself requires 128 MB of RAM for optimal performance. Luckily, the ad also tells you that you can add memory to the computer, up to a maximum of 1.5 GB.

Storage: 60GB Ultra ATA/100 hard drive

This computer comes with a 60 gigabyte (GB) hard drive. The bigger your hard drive the more programs and files you can store on your computer. Windows XP Home Edition takes up 1.5 GB of hard drive space. Office XP requires a minimum of 210 megabytes (MB) of hard drive space (it takes 1,000 megabytes to equal one gigabyte, by the way). Every time you create a new document or install a new program, you'll be using up a little bit more space on your hard drive. 60 GB is a lot of storage space, though. If you tried to fill up this hard drive with words, you could put more than 25,000 copies of the English dictionary on it and still have room to spare!

ATA stands for "Advanced Technology Attachment." It is the most common type of hard drive in personal computers. The other common type of hard drive is called **DMA**, for Direct Memory Access. DMA and ATA drives have the fastest access rates, meaning they can read and write information faster.

Optical Drive: 16X (max.) DVD-ROM and 24X/10X/40X (max.) CD-RW

This computer has a **DVD-ROM** drive. That means

it can read anything on a DVD-ROM. DVD-ROMs look like CDs but they can hold about eight times as much information. Note that this computer does not have a DVD-RW, a DVD-rewritable drive. A DVD-RW drive costs more, but lets you save files to your own DVDs.

A DVD-ROM drive can also play movies on DVD, although this requires an extra bit of hardware called a MPEG2 decoder card. Check carefully; this card is usually included with your DVD-ROM drive, but not always.

This computer also has a **CD-RW** drive. CD-RW means CD-rewritable. This drive can read files from a CD-ROM, burn files to a CD-ROM, even create original audio CDs by burning audio files to a blank disk. It's cool, not to mention useful, to have a CD-burner built into your computer.

16x and **24x/10x/40x** refer to how fast the CD or DVD drive can spin. In this case, the DVD-ROM drive can spin at 16x, which is fairly standard, and the CD-RW drive can spin at up 40x speed, which is actually quite fast, meaning it can write data to a CD-ROM disk very quickly.

Networking: 10Base-T/100Base-T Fast Ethernet

Ethernet lets your computer connect to a network with other computers, to the Internet or to devices like printers and scanners. This computer has a port that can handle two different types of Ethernet cable, **10baseT** and **100BaseT**.

10baseT means that it can transmit 10 million bits per second. This is good enough for most home uses. 100baseT, also called **Fast Ethernet**, can transmit information faster – 100 million bits per second – but it costs a little more. This computer can handle both kinds of Ethernet connections

Modem: v.90 compatible data/fax modem

A modem lets your computer connect to the Internet or another network over a regular telephone line. v.90 refers to the most common type of modem for use with regular phone lines. If you need a modem in your computer, make sure it is v.90 compatible. Virtually all modems can handle "data and fax," so this part of the ad isn't very important.

Input: Wheel mouse, 1 PS/2-style keyboard: 6-pin mini-DIN

The computer comes with two standard input devices. The first is a special kind of mouse that has a small wheel on top between the two buttons. Rolling the wheel with your finger lets you scroll the screen up and down. The second is a keyboard. PS/2 refers to the type of plug the keyboard uses to attach to the computer.

I/O ports: i.LINK(R) (IEEE 1394) digital interface, 4 USB ports (2 in front, 2 in back), one serial port, one parallel port

I/O means "Input/Output," so this part of the ad tells you all the ways the computer can connect to other devices. IEEE 1394 is sometimes called **Firewire**. **USB**, **serial**, **parallel** and Firewire ports let you connect other devices to your computer. They are shaped differently to accommodate different types of plugs. There really aren't any other major kinds of connectors, so as long as you have these four, you're all set.

A serial port is a old kind of connection and it's very slow. There aren't many printers or modems that use serial ports anymore. **USB** means **Universal Serial Bus**. Universal means it can be used to hook up just about any kind of device. A USB port can move data very quickly: more thanr 100 times faster than a serial connection.

SCSI (pronounced "scuzzy") is short for Small Computer Serial Interface. SCSI is generally used only for hard drives and CD-ROM drives. It transfers data at about 40 megabits per second. Firewire is also known as IEEE 1394, but it's easier to just remember "Firewire." This is a super-fast connection that lets you connect almost anything, but it's most often used with digital video cameras and some digital still cameras. Firewire is the fastest connection of them all, moving 800 megabits of data per second.

Removable storage: Two 3.5-inch bays for floppy drive and/or Zip 250 drive.

This computer doesn't have a **floppy disk drive** or a **Zip drive**. It only has empty bays where you could install them. A bay is like a little, empty garage in the computer where you can add disk drives. If you have files on floppy disks or Zip disks, this computer won't be able to read them. Be sure to keep this in mind, as it might mean you have to purchase additional hardware, which increases the total cost of your new computer.

Video Graphics: ATI Rage 128 Pro card with 16MB video memory.

This **video card** allows the computer to display high-quality graphics. This is important if you're going to play the latest games on your computer. This is one of the newest types of video cards, called **AGP** (Accelerated Graphics Port). The more on-board memory the video card has, the faster it can draw complex scenes on your monitor. A 16MB card is standard, while 32MB, 64MB, and even 128MB cards are available for more advanced applications and better-looking video game graphics.

Monitor: 21" (19.8" viewable) CRT display.

This ad is particularly honest, as it tells you the **viewable area** of the monitor. The number, in inches, is measured diagonally. If an ad doesn't tell you specifically the *viewable* area, you should subtract about 1.5 inches from the monitor size, because the plastic corners of the casing of a conventional monitor cover up a little bit of each corner of the screen. This is a conventional monitor, like a television set. You can tell by the letters **CRT**, which means **cathode ray tube**. Other computers might have an **LCD** or **liquid crystal display**. These monitors are especially flat. LCDs are becoming more popular because they take up less space, generate less heat and are easier on the eyes than a traditional CRT display. LCD monitors are generally more expensive than CRTs, though.

Sound: Premium SoundBlaster soundcard and Harman Kardon speakers with subwoofers for high-quality sound.

A sound card lets the computer play music and other sounds. It even lets you play music CDs from the CD-ROM drive. SoundBlaster is probably the best name in sound cards. If you get a different brand, just make sure it is SoundBlaster compatible. The computer also has external stereo speakers to provide a richer sound. Subwoofers boost the bass.

Expansion: 4 PCI slots.

PCI card slots let you add additional hardware, such as special video output cards or a TV tuner. This computer has four free slots. That's plenty of room for you to add more devices later.

Case: Clam-shell design provides easy access. Dimensions: 7.1" in. width x 16.7 in. height x 17.6 in. depth (18.03 cm x 42.42 cm x 44.7 cm)

Older computers required a screwdriver to open them. This clam-shell design lets you easily access the inside of your computer without unscrewing a bunch of screws.

Warranty & Service: 1-Year Limited Warranty, Optional 3-Year On-Site Service

It's extremely important that your computer be covered by a warranty in case anything goes wrong with it. All new computers will come with some kind of warranty, usually one year. Sometimes the extended service plan is a good idea, but sometimes it's a big rip-off. Just keep in mind that if the computer costs $800, and in a few years it might be obsolete, which means you'll have to buy a new one anyway, spending $300 on a three-year warranty is probably a waste of money.

On-site service means that if something goes wrong with your computer, a repair technician will come to your home or office to fix it.

There are a few tricks and traps to watch for when you're reading computer advertisements:

- If the price seems too good to be true, it probably is. Be sure to look at the fine print for catches like, "Monitor and keyboard not included." Buying the keyboard and the monitor will add several hundred dollars to the advertised price.
- When you're buying software or looking at the software that comes bundled with a new computer, read the names of the programs carefully. Many programs come in a **Lite** or **LE** (limited edition) version. These versions are often free to download from the Internet and are much less powerful than the full version. Many important features might be missing. So getting a bunch of Lite or LE software thrown in isn't such a great treat.

THE GROUP SESSION

Divide members into small groups. Hand out **SPYNOTE: Advertisement** with the same advertisement used above or clip ads from a newspaper or magazine.

Ask members to translate their ads into plain, simple language. They should imagine that their contact person for this mission is only 9 years old, so they must rewrite the ads in words a 9-year-old could understand.

ADDITIONAL ACTIVITY

Have members go through newspapers and magazines and find at least five computer ads. Have them analyze each ad to determine which of the five represents the best deal and why.

ADDITIONAL ACTIVITY

Some Web sites, such as that of Hewlett Packard (www.hp.com), offer interactive buyer's guides, from which visitors can select a computer and all of its components. These choices are reflected in the tallied cost.

Have members visit www.hp.com, and go through the site as if they were purchasing a customized PC. They should experiment with different configurations to see how much each would cost.

SPYNOTE: ADVERTISEMENT

Processor: *Intel Pentium 4 Processor at 1.8GHz with 400MHz system bus for lightning-fast speed.* ***Memory:*** *256MB PC-133 SDRAM, 1.5 GB maximum.* ***Storage:*** *60GB Ultra ATA/100 hard drive.* ***Optical Drive:*** *16X (max.) DVD-ROM and 24X/10X/40X (max.) CD-RW.* ***Networking:*** *10Base-T/100Base-T Fast Ethernet. Modem: v.90 compatible data/fax modem.* ***Input:*** *Wheel mouse, 1 PS/2-style keyboard: 6-pin mini-DIN.* ***I/O ports:*** *i.LINK(R) (IEEE 1394) digital interface, 4 USB ports (2 in front, 2 in back), one serial port, one parallel port.* ***Removable storage:*** *Two 3.5-inch bays for floppy drive and/or Zip 250 drive.* ***Video Graphics:*** *ATI Rage 128 Pro card with 16MB video memory.* ***Monitor:*** *21" (19.8" viewable) CRT display.* ***Sound:*** *Premium SoundBlaster soundcard and Harman Kardon speakers with subwoofers for high-quality sound.* ***Expansion:*** *4 PCI slots.* ***Case:*** *Clam-shell design provides easy access.* ***Dimensions:*** *7.1" in. width x 16.7 in. height x 17.6 in. depth (18.03 cm x 42.42 cm x 44.7 cm).* ***Warranty & Service:*** *1-Year Limited Warranty, Optional 3-Year On-Site Service.*

ADVANCED MISSION 8

WORKING WITH COMPUTERS—
AND GETTING PAID FOR IT

SPY SECTOR: CAREERS IN COMPUTING

THE MISSION:

Members learn about technology careers, evaluate their own marketable skills and practice interviewing for technology-related positions.

INTELLIGENCE GATHERED:

- Awareness of careers in technology
- Knowledge of computer and network terminology

SPY TOOLS:

- Paper and pens
- **SPYNOTE: Skill Checklist**

BRIEFING: WHAT'S ON THE COURSEWARE

There are thousands of companies looking to hire people with solid computer skills. For some specialized jobs, you need a lot of training, but just having the basics can help you get many jobs.

Here are three examples of computing professions:

Computer Programmer

Programmers need excellent communication skills. They don't just interact with computers. In fact, they spend much of their time listening to people in other departments describe their technology needs. Programmers have to be good listeners, and good talkers, too. They have to explain which problems software can solve, and which ones they can't.

This is a great time to be a computer programmer. It was one of the top-paying jobs for recent college graduates in 2002; the average salary was more than $50,000 a year. According to the *Jobs Rated Almanac*, it's also one of the 10 best jobs in America. Being President of the United States of America, on the other hand, ranked No. 229 out of 250 jobs.

It's a young profession, too. About a quarter of all computer programmers are between 20 and 29 years old. The need for skilled computer programmers is really growing. A report from the U.S. Office of Technology Policy predicts more than a million new programmers will be needed by 2006.

A great place to begin preparing for a career in computer programming is the library or bookstore. Pick up a book on programming, such as a an introduction to C++. You'll see that it's like writing in a language not too different from English. Once you've typed in this code you get to sit back and watch it work – or not. If it doesn't work, you have to go back, find and fix your mistakes.

IT Specialist for the Federal Government

In general, working for a government agency doesn't pay as well as some jobs in the private sector. But it's great work, the demand is high and there are no worries about the company going out of business.

This year, the federal government will spend more than $50 billion on IT (Information Technology). According to a recent CNN news report, two of the top 10 IT jobs right now are in federal and local government. The demand is enormous; every aspect of the government, from the defense department to accounting, to network security and record-keeping, relies heavily on computers.

Because the government isn't like any other employer, its need for security is especially high. That means that network experts are in particularly high demand. It also means that the government creates a lot of its own special software.

One specialized field within governmental IT is that of archive specialist. In this department, professionals look for the best possible ways to store information, whether it's a word processing file, a scanned document or anything else. Archive specialists are always coming up with better ways to organize these huge amounts of information so that others can retrieve it easily when they need it. Archive specialists write special programs to store and retrieve information.

Another group of IT professionals makes sure networks that connect the various government agencies are working and moving data as quickly as possible. Sometimes these professionals have to troubleshoot a connection or install new versions of the networking software. They also research different ways to safeguard information, against both hackers and the ravages of time.

Quality Assurance Engineer (QA)

QA engineers inspect computer programs to make sure that they work right. Before any program can end up in your home, school or business, someone at the software company spends hundreds of hours checking out the software for problems.

Sometimes, the problems are technical: a program crashes, stops working or doesn't do what it's supposed to. But sometimes the problems are more about how the software looks and how easy it is to use. QA engineers try to put themselves in the position of the person who would use the program they're testing.

They also have to anticipate all the complex and advanced ways a user might try to work with the program. Because every computer system is different, they have to make sure the program is compatible with an enormous range of hardware, operating systems and other applications.

To be a QA engineer you must be able to pay attention to detail. Knowing how to program is helpful, but not required. In what's known as Black Box testing, you really are just looking at the program from the user's point of view.

To do White Box testing, you need programming knowledge, because you have to test every line of code. A lot of White Box QA engineers major in Computer Science in college.

Because they're so important to the computer world, good QA engineers make an average salary of about $63,000 a year.

THE GROUP SESSION

Pass out **SPYNOTE: Skills Checklist** and have members complete. This will help them assess their own level of technology skills.

Have members choose an IT job they'd be interested in pursuing. Pair members up and have them give each other mock interviews for their chosen professions.

Note: Consider incorporating components of B&GCA's career prep programs into this session. Members can visit the Career Launch Web site at http://careerlaunch.bgca.net to take an interest survey to find careers they'd enjoy. They can also research employment outlooks, salaries, and skill and education requirements for specific careers. (Check with your CPO or teen director to see whether your Club is registered to use Career Launch. If not, your CPO must first visit the site and register.) Once members have chosen a potential career and researched its requirements, use "Unit 5: Interviewing" of Job Ready (available through National Supply Service) as a guide to conducting mock interviews.

ADDITIONAL ACTIVITY

This mission is a perfect opportunity to invite a member of the community who works with computers to talk to members in the Club. This could be someone who works for an actual computer company, in IT for a non-computer company, or any professional who can discuss how computers have changed the way he or she works.

SPYNOTE: SKILLS CHECKLIST

OPERATING SYSTEMS

- ❑ Windows
- ❑ Apple/Macintosh
- ❑ Other _____

SOFTWARE APPLICATIONS

- ❑ Word Processor
- ❑ Database Program
- ❑ Spreadsheet Program
- ❑ E-Mail
- ❑ Web Browser
- ❑ Virus Protection Program

PROGRAMMING LANGUAGES

- ❑ BASIC
- ❑ HTML
- ❑ Other _____

OTHER SKILLS

Have you...

- ❑ Taken a computer apart?
- ❑ Put a computer together?
- ❑ Connected two computers as a peer-to-peer network?
- ❑ Connected 3+ computers as a client-server network?
- ❑ Connected two networks together?
- ❑ Formatted a hard drive and installed an operating system?