

Digital Technology Merit Badge



Information to help you meet
the requirements of the
Digital Technology Merit Badge.





Binary at it's core

- Binary is a designation of “two numbers”: Bi-nary
- 0 and 1 are the basis of computer language, essentially off and on
- Computers interpret and translate complex binary strings into meaningful code, letters and numbers.
 - ASCII is the term referring to recognizable characters such as numbers, letters & symbols (A 5 #). These characters are equal to Binary groups of eight 1s and 0s per character
 - A in Binary is 010000001
 - 5 in Binary is 00110101
 - # in Binary is 00100011

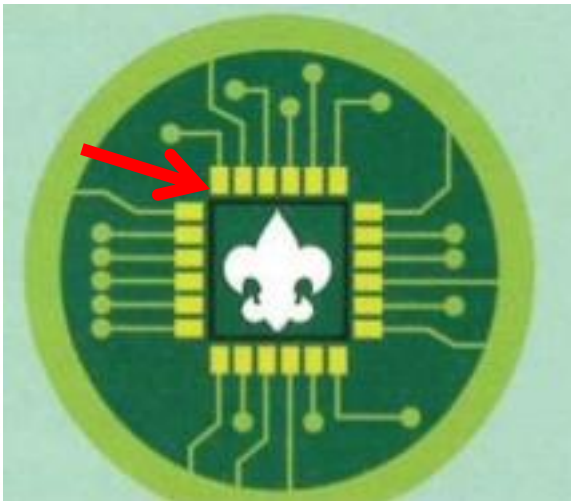


Digital Technology Merit Badge



Binary in a badge

As fun aside, see if you can figure out the message hidden in the image below. Starting from the top row far left side, notice a trace that stops at a circle, which represents a 0 (zero). Going clockwise, the next trace radiates outward, this represents an 1 (one). Continue around until you have gone around the entire badge.



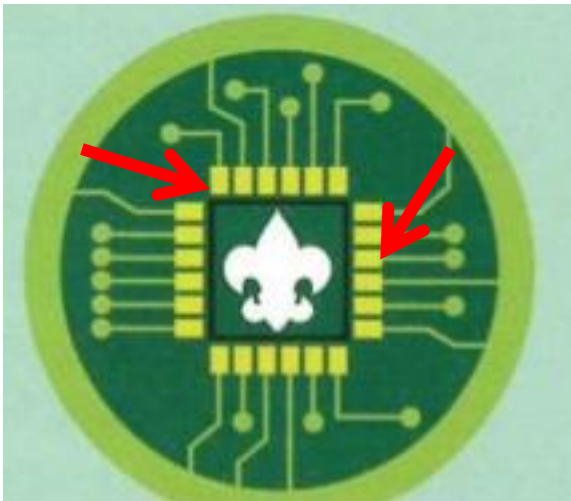
Use the handout to see if you can figure out the message.

Digital Technology Merit Badge



Binary in a badge

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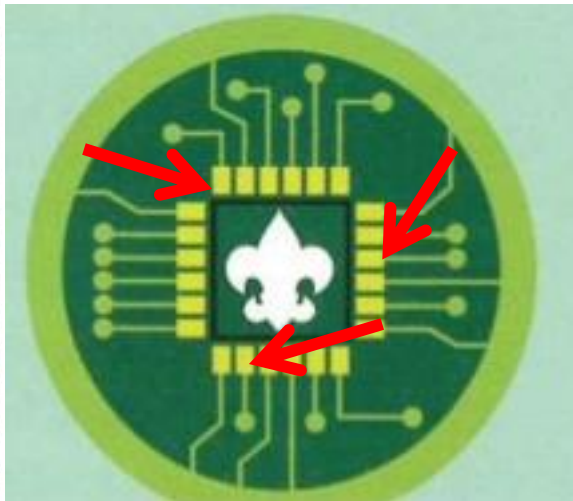
01000010

Digital Technology Merit Badge



Binary in a badge

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Use the handout to see if you can figure out the message.

01000010

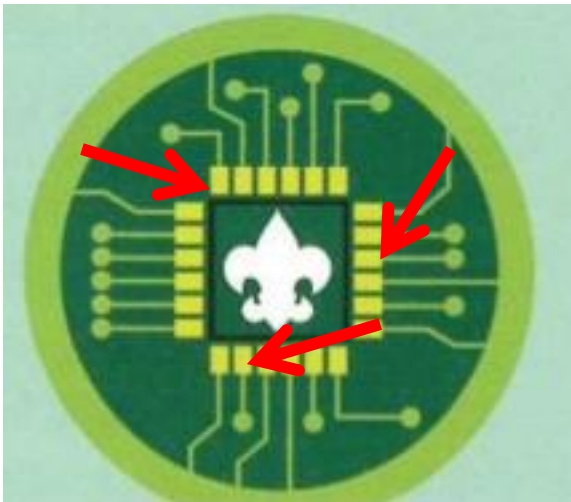
01010011

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Binary in a badge

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Use the handout to see if you can figure out the message.

01000010

01010011

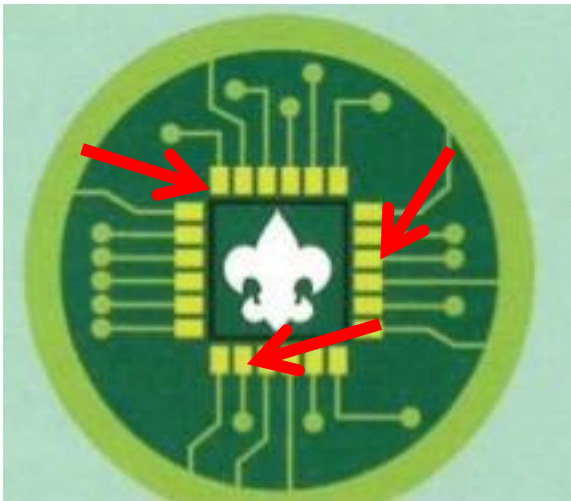
01000001

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Binary in a badge

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Use the handout to see if you can figure out the message.

01000010 = B

01010011 = S

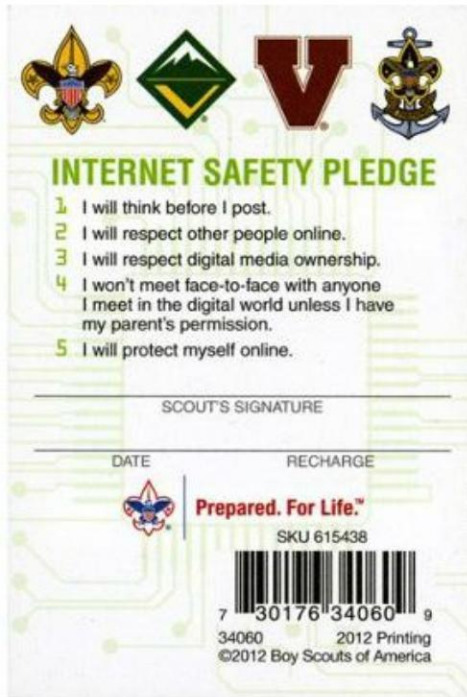
01000001 = A

Digital Technology Merit Badge



Requirement 1

Show your current up-to-date Cyber Chip.
They must be recharged after 1 year.





Requirement 2a

2. Do the following:
 - a. Give a brief history of the changes in digital technology over time. Discuss with your counselor how digital technology in your lifetime compares with that of your parent's, grandparent's, or other adult's lifetime.



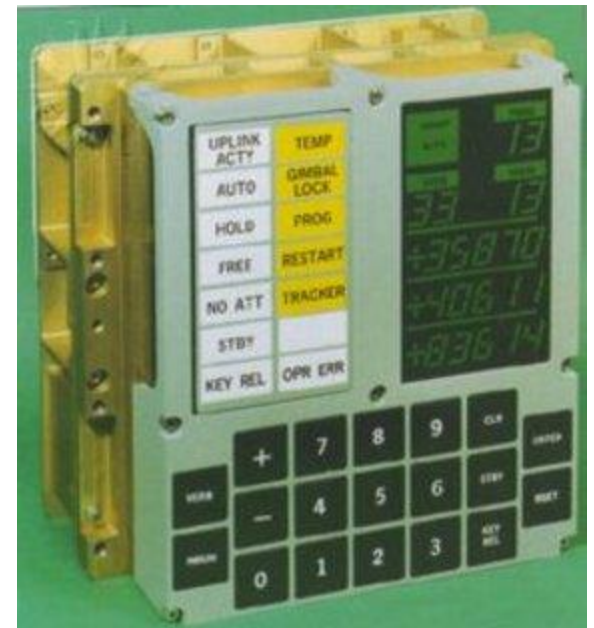
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2a

This is a picture of the computer that was used on the Apollo Lunar Module. It helped the astronauts land on the moon. Today's smart phones have more computing power than the Apollo computer.

You can read the full article at tiny.cc/bsadtmb

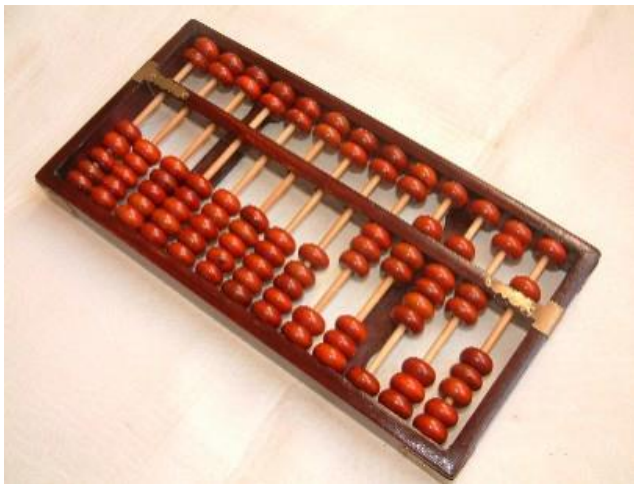


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2a

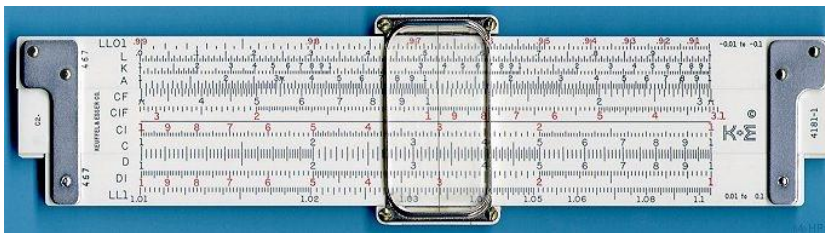
Digital Technology Over Time



1100 BC Abacus



1617 Logarithms



1632 Slide Rule



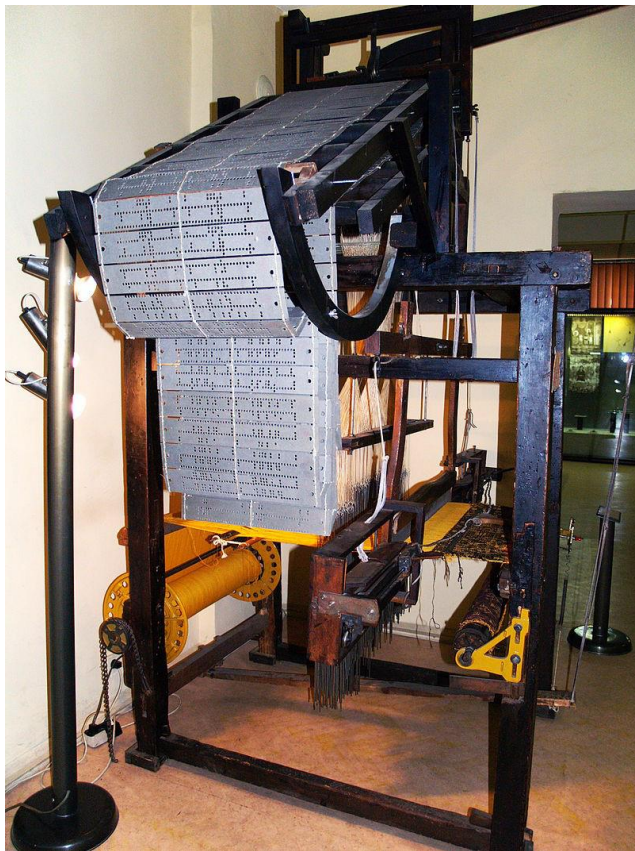
1642 Pascalie

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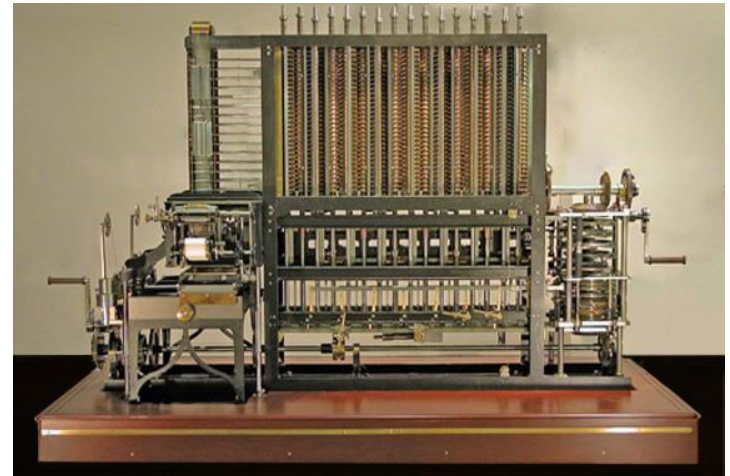


2a

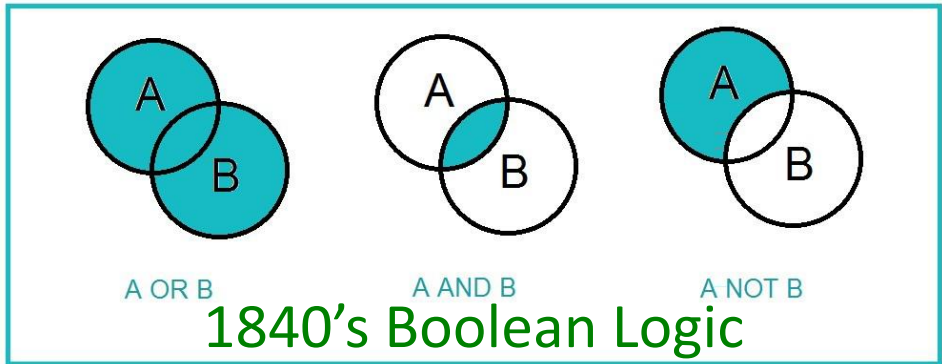
Digital Technology Over Time



1804 Automatic Loom



1830's Babbage Engine



1840's Boolean Logic

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2a

Digital Technology Over Time

Edison's Vacuum Tube

In 1883, a few years after Thomas Edison invented the electric light-bulb, he noticed something peculiar about how electricity flowed inside it. To protect the brightly glowing filament, air had been removed from the bulb, creating a vacuum tube. Surprisingly, if he placed a metal plate inside the bulb, electricity would flow across the vacuum from the filament to the plate. Edison patented the discovery of how electrons flowed across a vacuum, now known as the Edison Effect, though he made little use of it.



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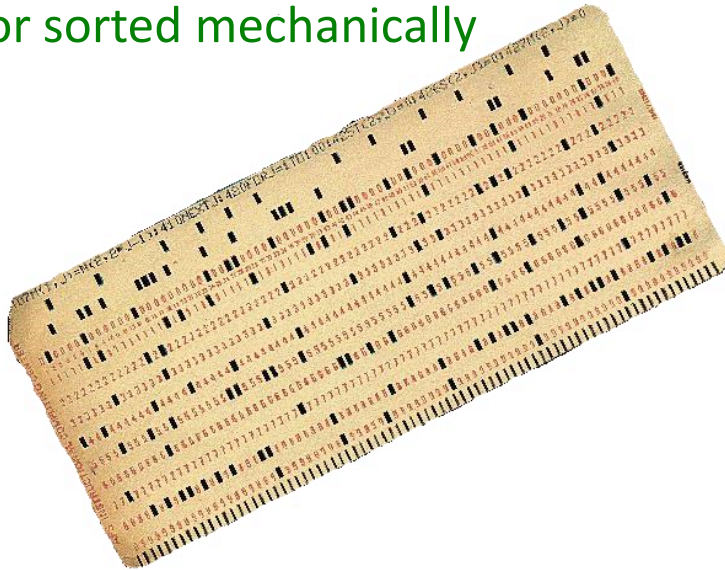


2a

Digital Technology Over Time

1890's

- Used electrical connections to trigger a counter, recording information
- Data could be encoded by the locations of holes in a card
- Hollerith determined that data punched on a card, could be counted or sorted mechanically



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2a

Digital Technology Over Time

Your Grandparents Time (~1940s-1970s)



Colossus Mark 1 - 1944

- 1st programmable digital computer.
- Weighed 5 tons
- Had 500 miles of wire
- 8 feet tall and 51 feet wide
- Ran no-stop for 15 years

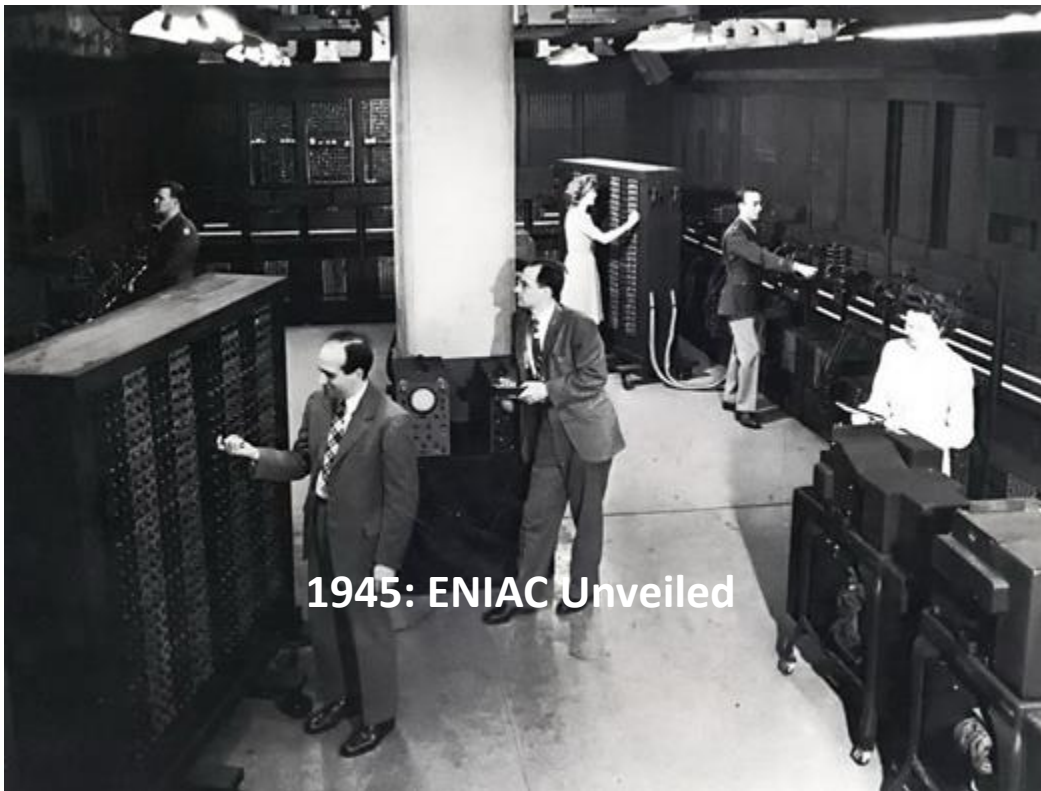
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2a

Digital Technology Over Time

Your Grandparents Time (~1940s-1970s)



1945: ENIAC Unveiled

- Electronic Numerical Integrator and Computer
- Housed in a 20 by 40 foot room
- Weighed 30 tons
- Use more than 18,000 vacuum tubes

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2a

Digital Technology Over Time

Your Grandparents Time (~1940s-1970s)



1959: IBM Stretch

- The IBM 7030 or Stretch was IBM's first transistorized supercomputer
- Cost \$7.78 million
- Fastest computer until 1964

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2a

Digital Technology Over Time

Your Grandparents Time (~1940s-1970s)



1970s: IBM Mainframes

- Standard dual-processor capability
- Memory through microcode floppy disk

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2a

Digital Technology Over Time
Your Parents Time (~1980s-2000)



1981: IBM 5150



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Digital Technology Over Time
Your Parents Time (~1980s-2000)



1982: Philips CD100



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2a

Digital Technology Over Time
Your Parents Time (~1980s-2000)



1985: Nintendo Entertainment System



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2a

Digital Technology Over Time
Your Parents Time (~1980s-2000)



1990: First HDTV Broadcast



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2a

Digital Technology Over Time
Your Parents Time (~1980s-2000)



1991 – 2000: The Rise of the “Internet”



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2a

Digital Technology Over Time Your Time (~2000s-Present)



Growth of Digital Storage Availability

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2a

Digital Technology Over Time Your Time (~2000s-Present)



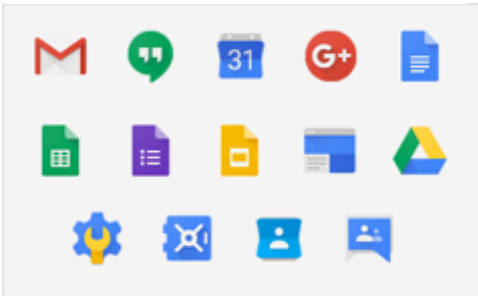
Cellphone to Smartphone Revolution

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2a

Digital Technology Over Time Your Time (~2000s-Present)



Social Networks Logos | Icons FLATICON



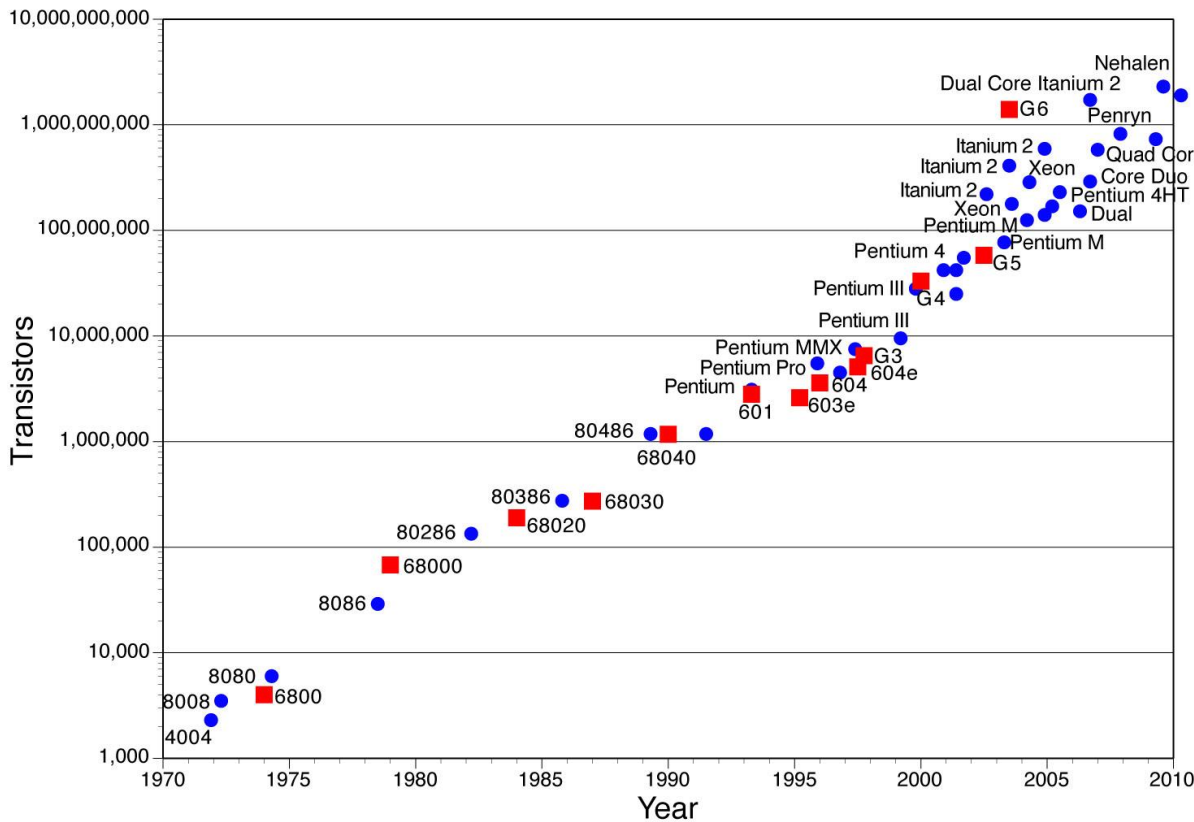
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2a

Digital Technology Over Time

Moore's Law



The number of transistors per integrated circuit doubles about once every 2 years, while the price of the chip remains about the same. In 1954, a transistor cost \$5.52. By 2004, its price tag was a billionth of a dollar



Requirement 2b

2. Do the following:
 - b. Describe what kinds of computers or devices you imagine might be available when you are an adult.



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2b

Digital Technology Over Time

What do you think technology will look like in the future?





Requirement 3a

3. Do the following:
 - a. Explain to your counselor how text, sound, pictures, and videos are digitized for storage.



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3a

Digital Technology - Digital Files

Different types of data are digitized into different types of formats.

Text is digitized as ASCII

Digital Formats: txt, doc, ods, pdf



Digital Technology Merit Badge



3a

Digital Technology - Digital Files

Different types of data are digitized into different types of formats.

Text is digitized as ASCII

Digital Formats: txt, doc, ods, pdf



Sound is digitized as waves forms

Digital Formats: mp3, wma, aiff, wav



Digital Technology Merit Badge



3a

Digital Technology - Digital Files

Different types of data are digitized into different types of formats.

Text is digitized as ASCII

Digital Formats: txt, doc, ods, pdf



Sound is digitized as waves forms

Digital Formats: mp3, wma, aiff, wav



Pictures are digitized as pixel patterns

Digital Formats: jpg, gif, png, tiff



Digital Technology Merit Badge



3a

Digital Technology - Digital Files

Different types of data are digitized into different types of formats.

Text is digitized as ASCII

Digital Formats: txt, doc, ods, pdf



Sound is digitized as waves forms

Digital Formats: mp3, wma, aiff, wav



Pictures are digitized as pixel patterns

Digital Formats: jpg, gif, png, tiff



Videos are digitized as frames and rates

Digital Formats: avi, mpeg, flv, mov

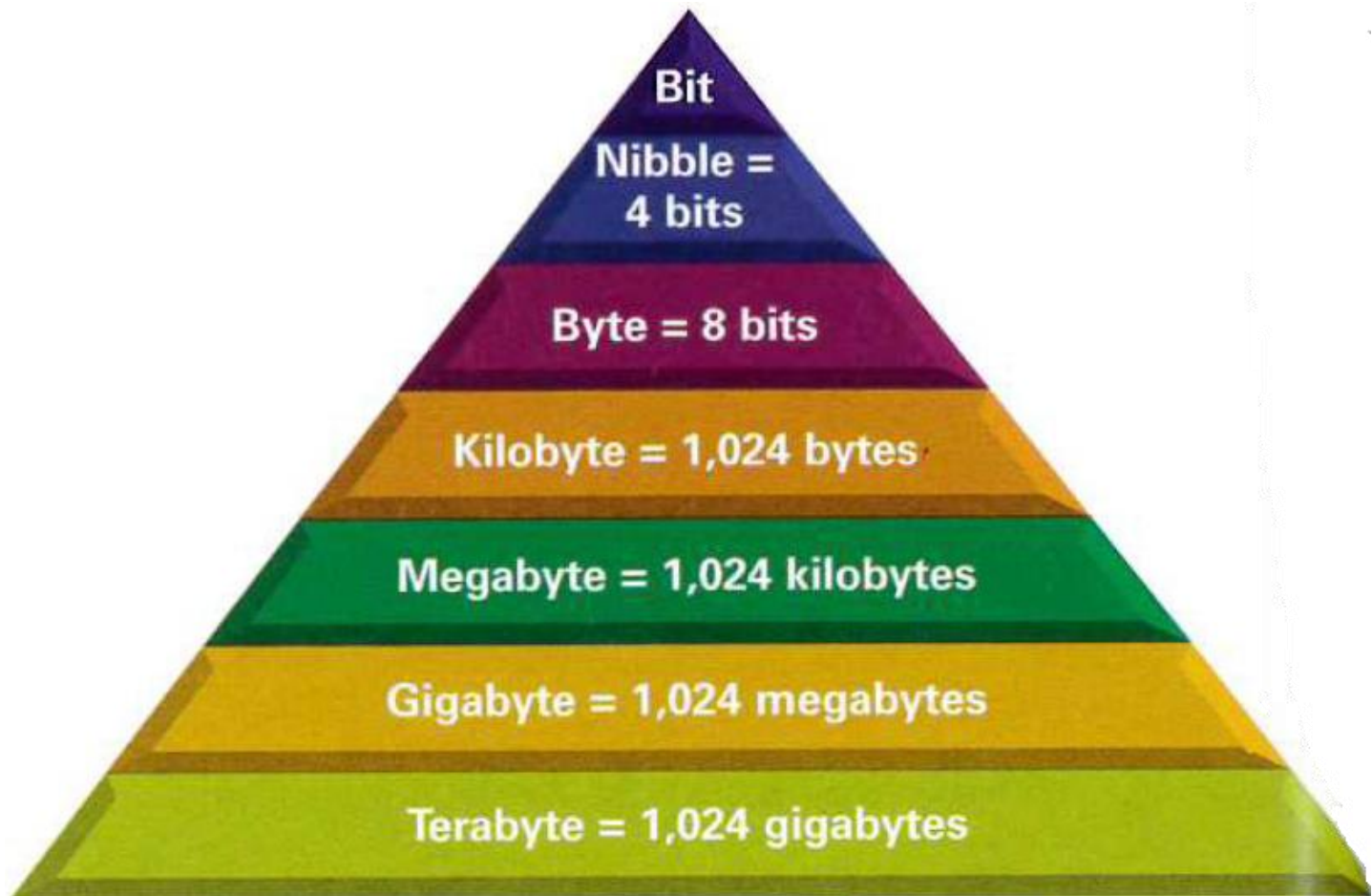


Digital Technology Merit Badge



3a

Digital Storage



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3a

Digital Storage



Name	Abbr.	Size
Kilo	K	1,024
Mega	M	1,048,576
Giga	G	1,073,741,824
Tera	T	1,099,511,627,776
Peta	P	1,125,899,906,842,624
Exa	E	1,152,921,504,606,846,976
Zetta	Z	1,180,591,620,717,411,303,424
Yotta	Y	1,208,925,819,614,629,174,706,176

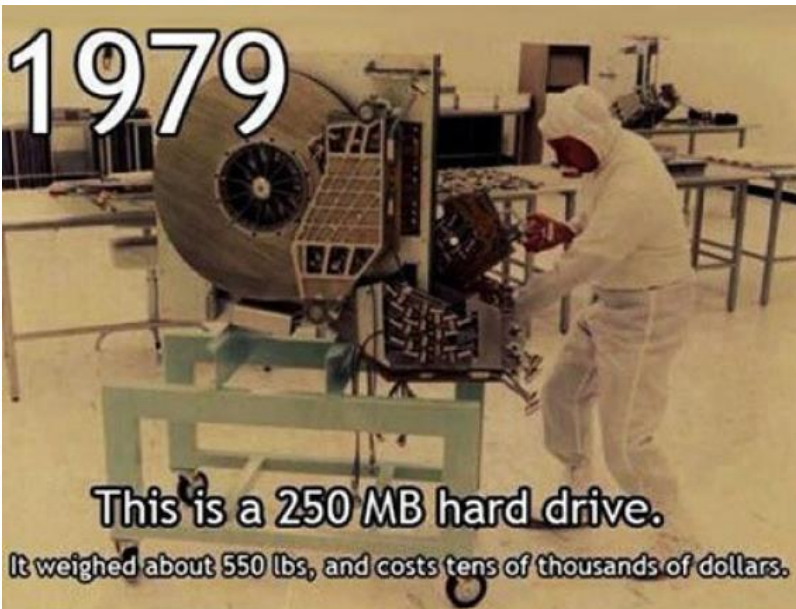
Digital Technology Merit Badge



3a

Digital Storage

1979



This is a 250 MB hard drive.

It weighed about 550 lbs, and costs tens of thousands of dollars.

2013



This is a 16 GB microSD card.

It holds about 64x the data as the HD above.

It weighs about 4/10 of 1 gram,
and costs about \$11.



Requirement 3b

3. Do the following:
 - b. Describe the difference between lossy and lossless data compression, and give an example where each might be used.



Digital Technology Merit Badge



3b

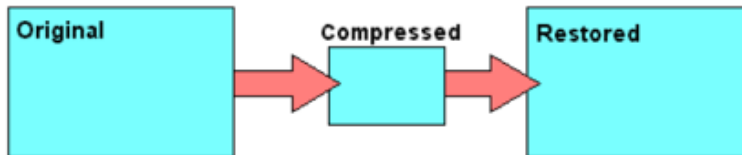
Digital Technology – Lossy vs Lossless

Compression works by removing extraneous data to make the size of the digital file smaller.

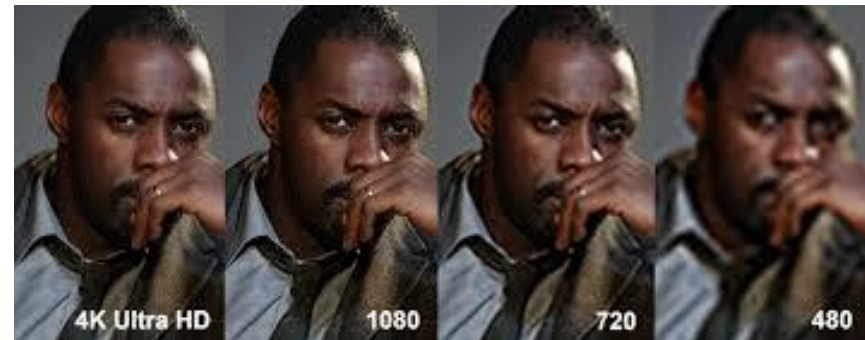
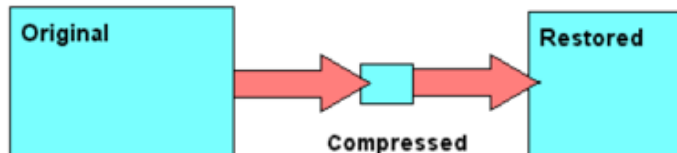
Lossy means some of the original quality data is removed to reduce the size and cannot be recovered. Examples: JPG, GIF, MP3

Lossless the original quality data remains. Examples: WMA, PNG, WebP

LOSSLESS



LOSSY



Digital Technology Merit Badge



3b

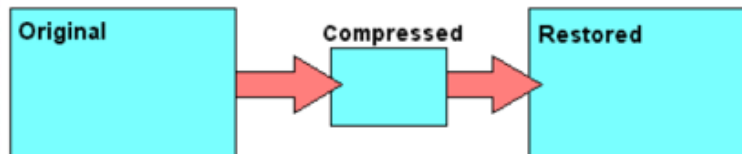
Digital Technology – Lossy vs Lossless

Compression works by removing extraneous data to make the size of the digital file smaller.

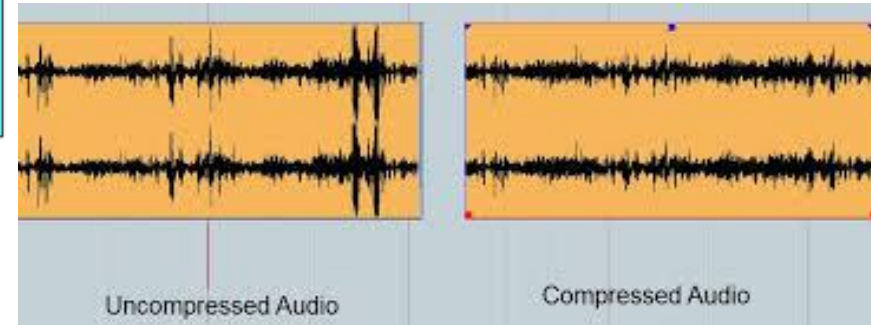
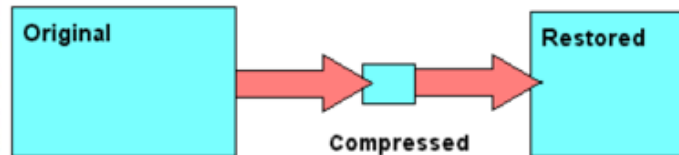
Lossy means some of the original quality data is removed to reduce the size and cannot be recovered. Examples: JPG, GIF, MP3

Lossless the original quality data remains. Examples: WMA, PNG, WebP

LOSSLESS



LOSSY



Digital Technology Merit Badge



3b

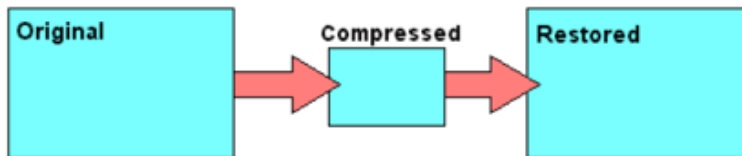
Digital Technology – Lossy vs Lossless

Compression works by removing extraneous data to make the size of the digital file smaller.

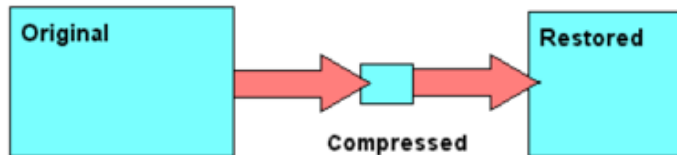
Lossy means some of the original quality data is removed to reduce the size and cannot be recovered. Examples: JPG, GIF, MP3

Lossless the original quality data remains. Examples: WMA, PNG, WebP

LOSSLESS



LOSSY





Requirement 3c

3. Do the following:
 - c. Describe two digital devices and how they are made more useful by their programming.



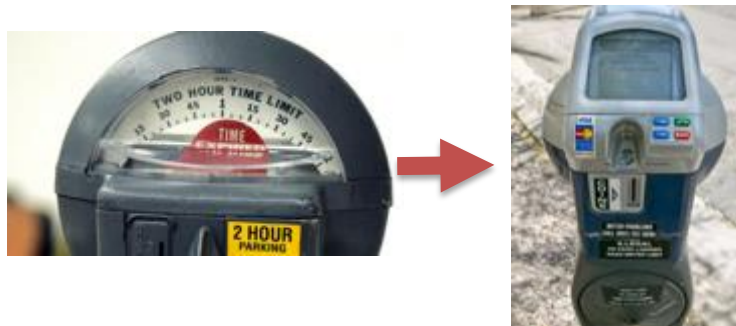
Digital Technology Merit Badge



3c

Digital Technology – Programming

There are many devices that can and are made better with some type of digital programming.



Digital Technology Merit Badge

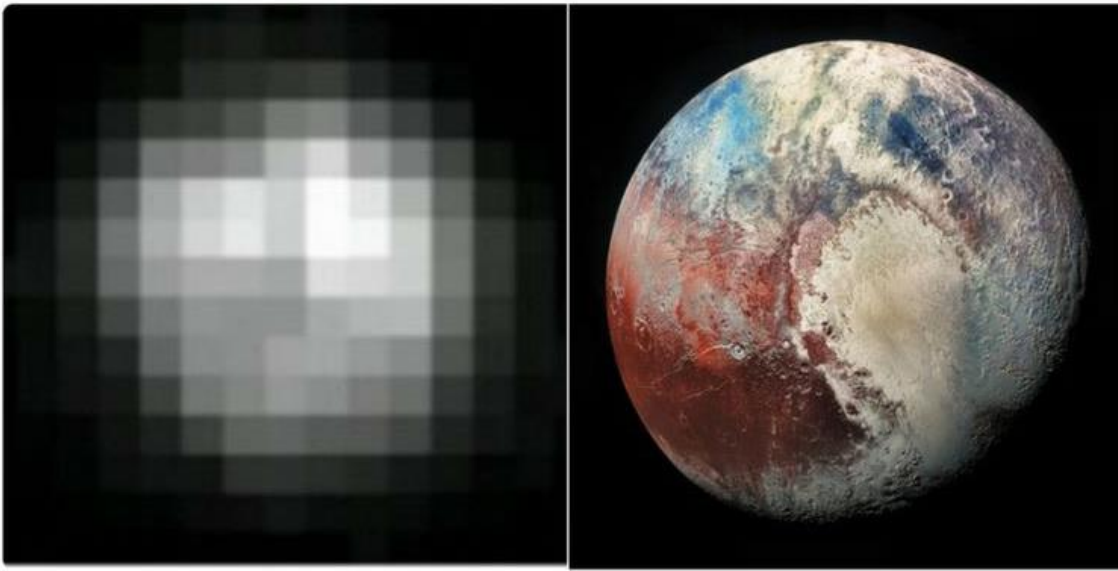


3c

Digital Technology – Programming

There are many devices that can and are made better with some type of digital programming. Cameras and digital imaging have really benefited.

Pluto 1984 vs 2018



Can you
name
more?





Requirement 3d

3. Do the following:
 - d. Discuss the similarities and differences between computers, mobile devices, and gaming consoles.



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3d

Digital Technology Computers, Gaming Consoles & Mobile



Similarities:

Processors
Sound
Display

Programs
Install Software
Internet Access

Connectivity
Digital Storage
Audio Input (Most)

Differences:

Keyboard
Multi-user
Expansion

Portable
Cellular
Restricted Apps

Controllers
Proprietary Media
Online platforms





Requirement 3e

3. Do the following:
 - e. Explain what a computer network is and describe the network's purpose.



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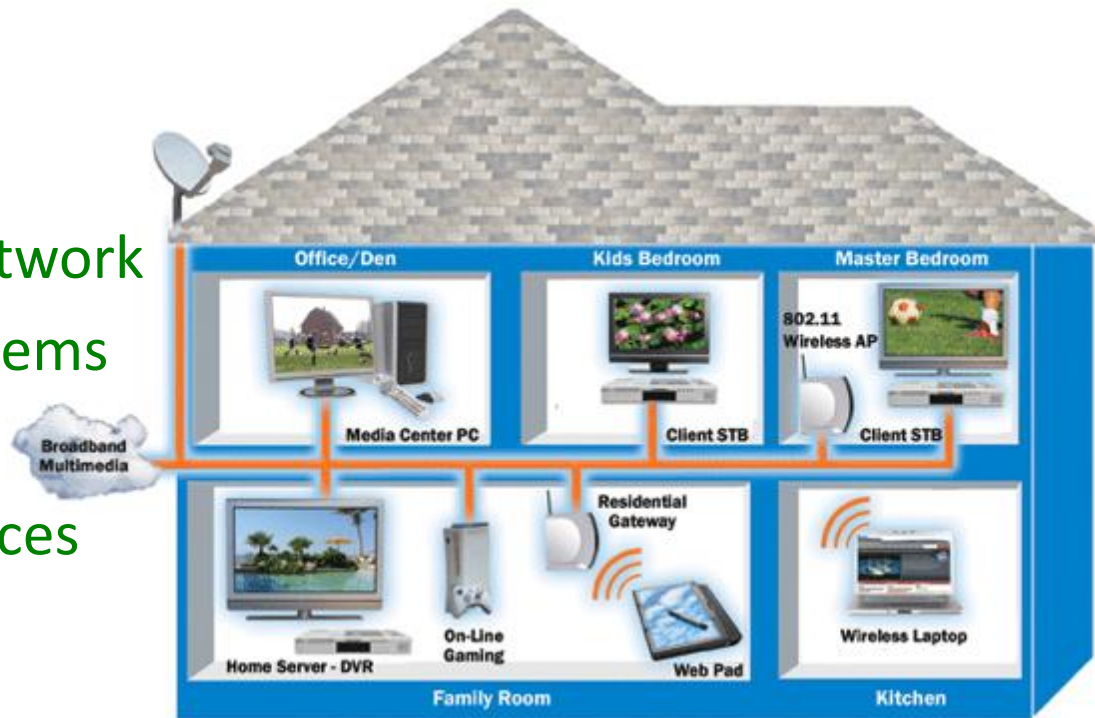


3e

Digital Technology – Computer Networks

Home Network

- Computers
- Wireless Network
- Gaming Systems
- TV Systems
- Mobile Devices
- Internet



A computer network is a group of computer systems and network devices interconnected to allow access to shared resources, such as printers, documents, files, and the Internet.

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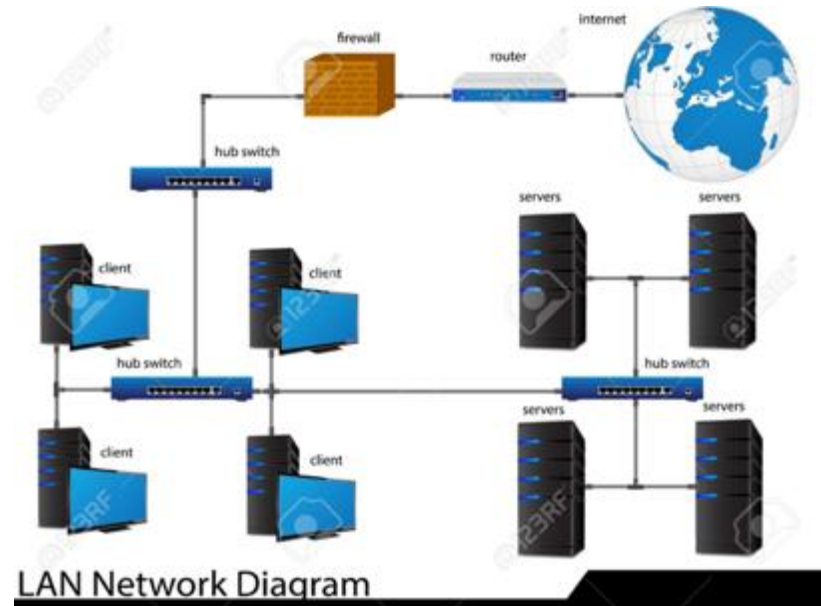


3e

Digital Technology – Computer Networks

Business Network

- Computers
- Servers
- Hubs
- Firewall
- Router
- Internet





Requirement 4a

4. Do the following:
 - a. Explain what a program or software application or “app” is and how it is created.



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4a

Software, programs, and apps are series of commands or set of instructions for a processor to complete a task:

- Word Processing
- Games
- Utilities (calendar, calculator)
- Photo/Video Editor



ComputerHope.com



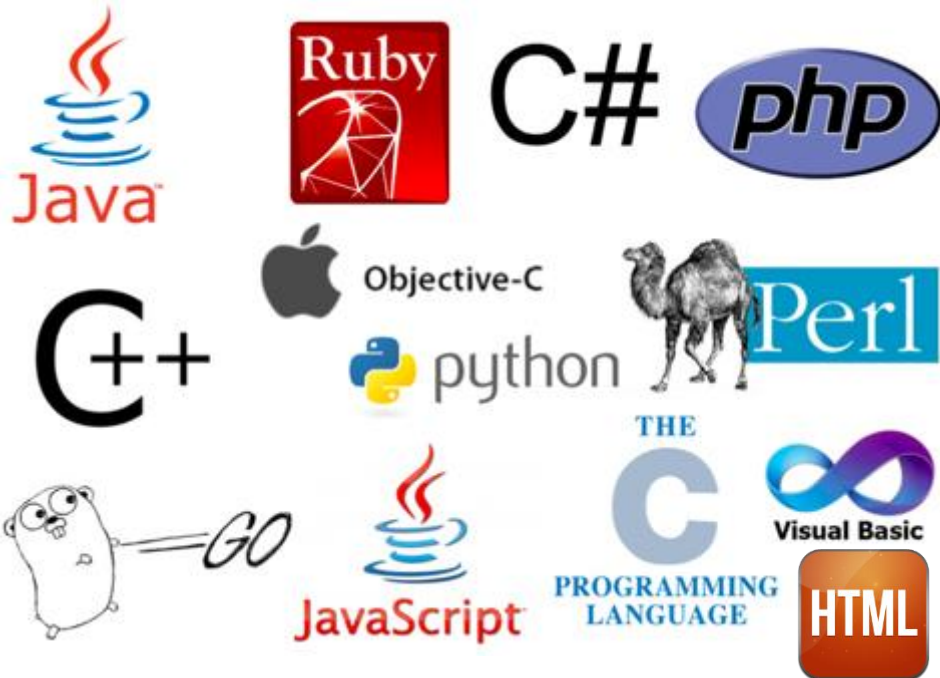
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4a

Software, programs, and apps are created by developers using specific code or script.

Examples of coding or programming languages are:



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4a

This is html code for a website.

```
<span class="style28">Digital Technology Merit Badge
Power Point PDF</span></p>
  <p class="style31">
    <a href="https://www.scouting.org/training/youth-protection/cyber-chip/" target="_blank">
      <span class="style28">Cyber Chip</span></a>
    <span class="style33">Requirement 1</span></p>
    <p class="style31">
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        <span class="style28">Kompozer</span></a><span class="style33"> Requirement 6h</span></p>
    <p class="style31">
      <a href="https://filezilla-project.org/" target="_blank">
        <span class="style28">FileZilla</span></a><span class="style33"> Requirement 6h</span></p>
    <p class="style31">
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        <span class="style28">Libra Office</span></a>
      <span class="style33">Requirement 6 a/b/d</span></p>
    <p class="style31">
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      <span class="style33">Requirement 6c</span></p>
    <p class="style31">
      <a href="https://www.scribus.net/" target="_blank">
        <span class="style28">Scribus</span></a><span class="style33"> Requirement 6c</span></p>
  </td>
<td class="style34" valign="top">

  <p class="style31">
    Articles:</p>
  <p class="style31">
    <a href="http://www.abc.net.au/science/articles/1999/07/15/2621430.htm" target="_blank">
      <span class="style28">Apollo Lunar Module Computer</span></a></p>
    <p class="style31">
      <a href="http://www.computerhistory.org/babbage/" target="_blank">
        <span class="style28">The Babbage Engine</span></a></p>
    <p class="style31">
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        <span class="style28">Automatic Loom</span></a></p>
    <p class="style31">
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        <span class="style28">Boolean Logic</span></a></p>
```


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4a

This is the website from the code on the previous slide.



 **Digital Technology Merit Badge** 

[HOME](#)

PAGE UNDER CONSTRUCT

Digital Technology Merit Badge Handout

[Digital Technology Merit Badge Workbook](#)

Digital Technology Merit Badge Power Point PDF

[Cyber Chip](#) Requirement 1

[Kompozer](#) Requirement 6h

Articles:

[Apollo Lunar Module Computer](#)

[The Babbage Engine](#)

[Automatic Loom](#)

[Boolean Logic](#)



Requirement 4b

4. Do the following:
 - b. Name four software programs or mobile apps you or your family use, and explain how each one helps you.

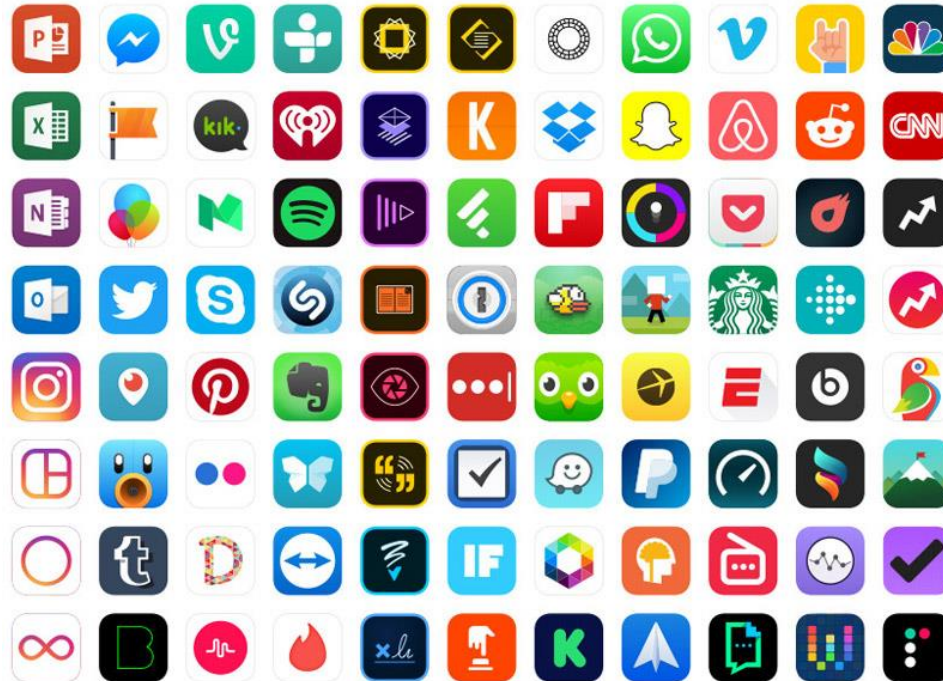


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4b

What apps or programs do you and your family use? What do you use them for and how do they help you?





Requirement 4c

4. Do the following:
 - c. Describe what malware is, and explain how to protect your digital devices and the information stored on them.



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4c

- Malware is malicious code in the form of:

- Viruses
- Worms
- Trojan horses
- Spyware
- Adware
- Scareware
- Ransomware



- Any software used to disrupt computer operation, gather sensitive information, or gain access to private computer systems
- Defined by its malicious intent, acting for the interests of the malware owner, rather than the user

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4c

How do you protect against Malware?

- Anti-Virus Programs
- Anti-Malware Programs
- Software and System Updates
- Smart Internet Browsing



NetSmartz®

System Updates





Requirement 5

5. Do the following:
 - a. Describe how digital devices are connected to the Internet.



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5a

What is the Internet?

- ❖ Global Interconnection of networks
- ❖ Supports transmission of data in multitudes of formats
- ❖ Supports the “World Wide Web”
- ❖ Works on a principal of routing requests and responses



InterNet and World Wide Web

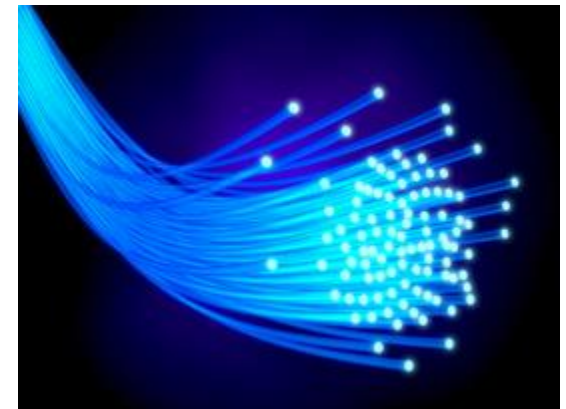
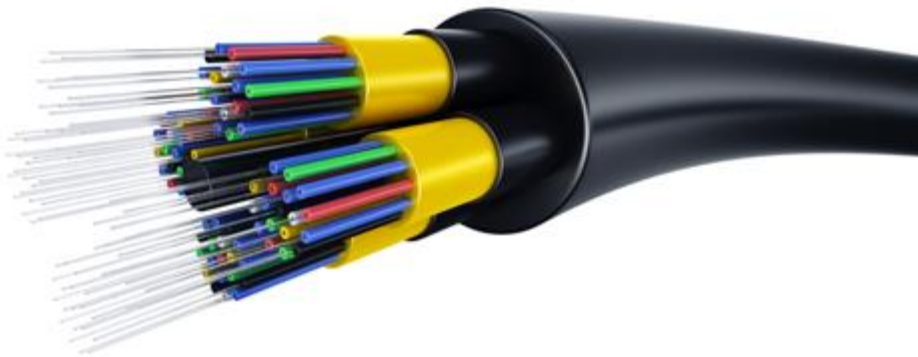
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5a

How is the internet brought to your house?

Optical cable and optical devices make today's internet work. Lasers and optical cable transmit data in a series of flashes, where on and off signify Binary data streams like Morse code on a telegraph line.



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5a

How do computer and tablets connect to the internet?



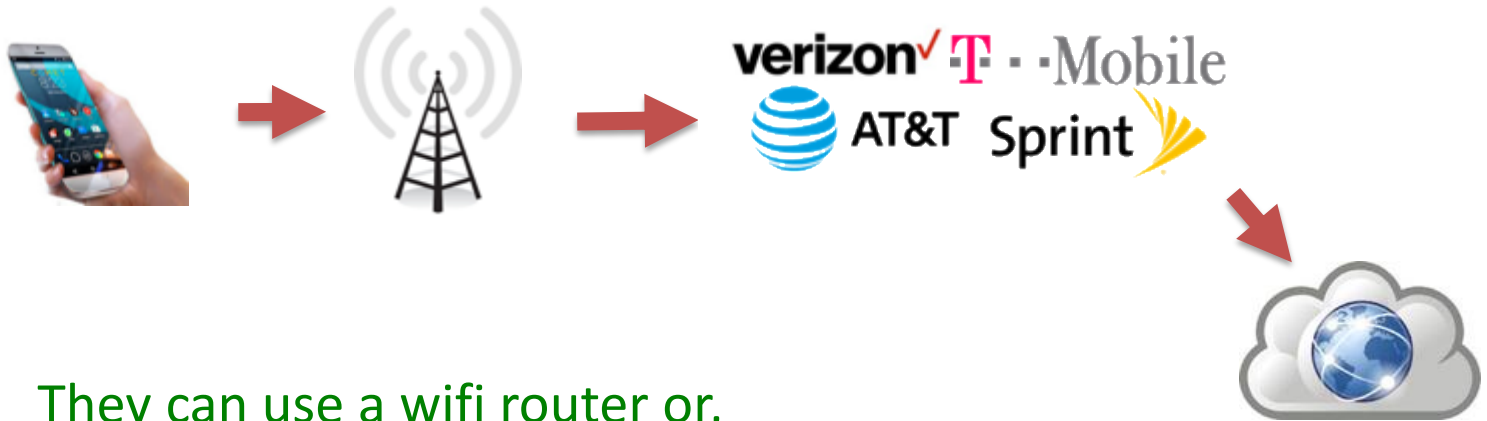
1. Tablets and computer obtains an IP address from a wifi router
2. The wifi router is connected to a modem
3. The modem is connected to your Internet Service Provider (ISP)
4. ISP moves traffic and data to and from the internet.

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5a

How do smart phones connect to the internet?



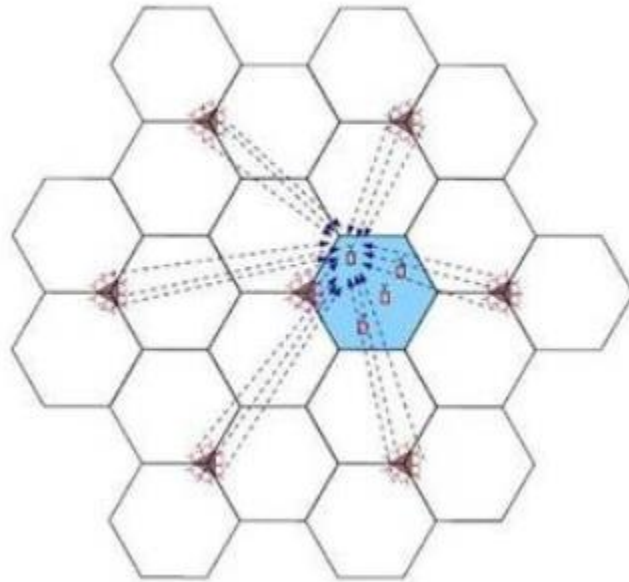
1. They can use a wifi router or,
2. They connect to a cell tower
3. The cell tower is connected to an ISP/carrier
4. ISP moves traffic and data to and from the internet.

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5a

Cellular providers set up several towers around a city. Your phone connects to the closest, strongest one. When you move away from the tower, you are automatically connected to the next closest tower.





Requirement 5

5. Do the following:
 - b. Using an Internet search engine (with your parent's permission), find ideas about how to conduct a troop court of honor or campfire program. Print out a copy of the ideas from at least three different websites. Share what you found with your counselor, and explain how you used the search engine to find this information.



Digital Technology Merit Badge



5b

Early and modern search engines enable powerful search capabilities by using logic:

Examples:

1. Campfire program - Match anything with campfire or program
2. Campfire +program - Matches those with both words only
3. "Campfire program" - Matches only when those words appear exactly
4. Campfire program –girlscouts - Matches both words withOUT "girlscouts"

Other powerful capabilities are to search for video, image and shopping results





Requirement 5

5. Do the following:
 - c. Use a Web browser to connect to an HTTPS (secure) website (with your parent's permission). Explain to your counselor how to tell whether the site's security certificate can be trusted, and what it means to use this kind of connection.



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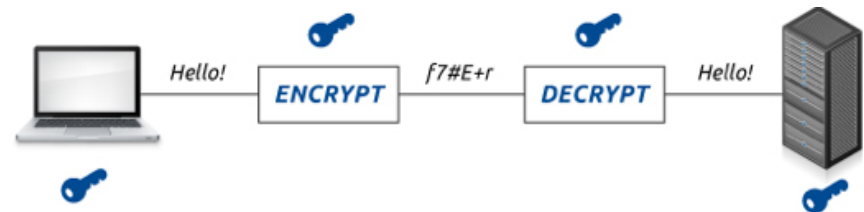
5c

HTTPS is the secured “protocol” used to protect web browsing content on the internet.

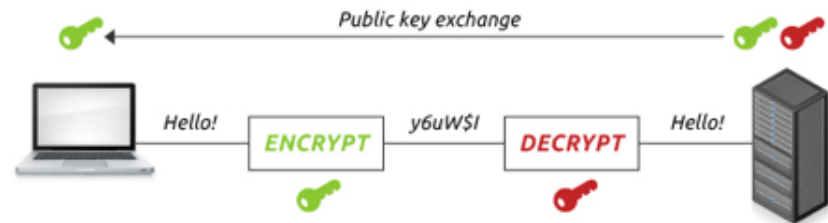
Principles of HTTPS:

1. Uses encryption between the sender and receiver
2. Allows for the sender to “verify” the receiver before sending sensitive data
3. Supports ability to ensure data wasn’t tampered with

Symmetric Cryptography



Asymmetric Cryptography



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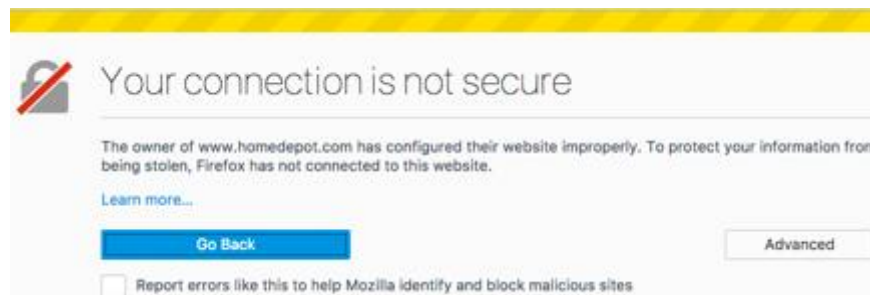
5c

Modern internet browsing uses an extensive process to try and protect internet users through HTTPS.

When visiting a site over HTTPS browsers will display a lock icon or say "Secure"



This means that the browser has checked the certificate of the website and has completed a secure connection using HTTPS and the website's certificate. Modern internet browsers will also warn you if there is an issue with a certificate

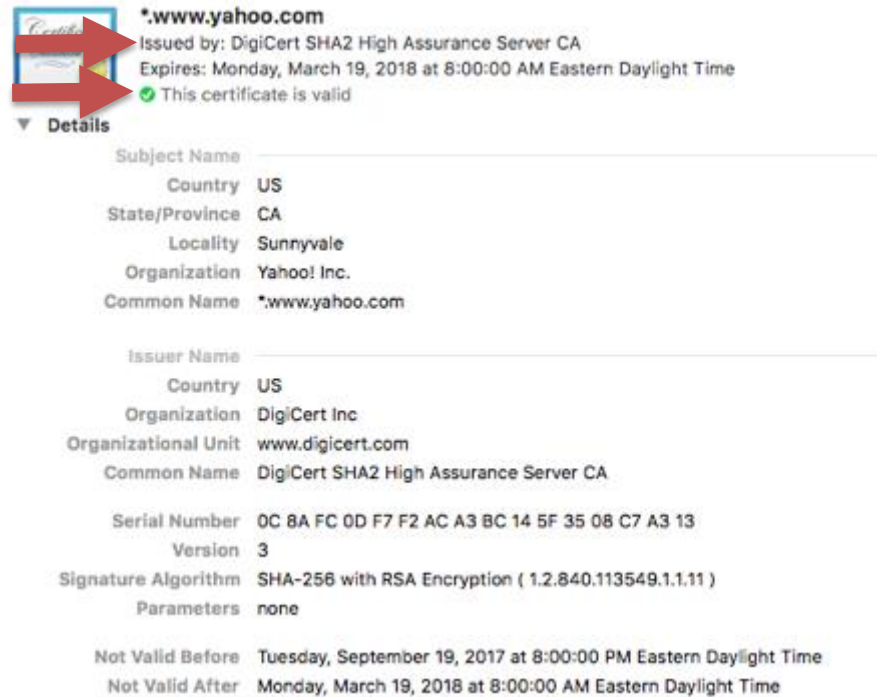


Digital Technology Merit Badge



5c

Website certificates help browsers identify and validate secure websites.



The image shows a browser's certificate details for the domain *.www.yahoo.com. The certificate is issued by DigiCert SHA2 High Assurance Server CA and expires on Monday, March 19, 2018 at 8:00:00 AM Eastern Daylight Time. A green checkmark indicates that the certificate is valid. The details section lists the following information:


Subject Name	*.www.yahoo.com
Country	US
State/Province	CA
Locality	Sunnyvale
Organization	Yahoo! Inc.
Common Name	*.www.yahoo.com
Issuer Name	DigiCert SHA2 High Assurance Server CA
Country	US
Organization	DigiCert Inc
Organizational Unit	www.digicert.com
Common Name	DigiCert SHA2 High Assurance Server CA
Serial Number	0C 8A FC 0D F7 F2 AC A3 BC 14 5F 35 08 C7 A3 13
Version	3
Signature Algorithm	SHA-256 with RSA Encryption (1.2.840.113549.1.1.11)
Parameters	none
Not Valid Before	Tuesday, September 19, 2017 at 8:00:00 PM Eastern Daylight Time
Not Valid After	Monday, March 19, 2018 at 8:00:00 AM Eastern Daylight Time

Digital Technology Merit Badge



5c

Website certificates help browsers identify and validate secure websites.



DigiCert SHA2 High Assurance Server CA
Intermediate certificate authority
Expires: Sunday, October 22, 2028 at 8:00:00 AM Eastern Daylight Time
✔ This certificate is valid

▼ Details

Subject Name	
Country	US
Organization	DigiCert Inc
Organizational Unit	www.digicert.com
Common Name	DigiCert SHA2 High Assurance Server CA

➔

Issuer Name	
Country	US
Organization	DigiCert Inc
Organizational Unit	www.digicert.com
Common Name	DigiCert High Assurance EV Root CA

Serial Number	04 E1 E7 A4 DC 5C F2 F3 6D C0 2B 42 B8 5D 15 9F
Version	3
Signature Algorithm	SHA-256 with RSA Encryption (1.2.840.113549.1.1.11)
Parameters	none

Not Valid Before	Tuesday, October 22, 2013 at 8:00:00 AM Eastern Daylight Time
Not Valid After	Sunday, October 22, 2028 at 8:00:00 AM Eastern Daylight Time

Digital Technology Merit Badge



5c

Website certificates help browsers identify and validate secure websites.



DigiCert High Assurance EV Root CA

Root certificate authority

Expires: Sunday, November 9, 2031 at 7:00:00 PM Eastern Standard Time

✓ This certificate is valid

▼ Details

Subject Name _____

Country US

Organization DigiCert Inc

Organizational Unit www.digicert.com

Common Name DigiCert High Assurance EV Root CA

Issuer Name _____

Country US

Organization DigiCert Inc

Organizational Unit www.digicert.com

Common Name DigiCert High Assurance EV Root CA

Serial Number 02 AC 5C 26 6A 0B 40 9B 8F 0B 79 F2 AE 46 25 77

Version 3

Signature Algorithm SHA-1 with RSA Encryption (1.2.840.113549.1.1.5)

Parameters none

Not Valid Before Thursday, November 9, 2006 at 7:00:00 PM Eastern Standard Time

Not Valid After Sunday, November 9, 2031 at 7:00:00 PM Eastern Standard Time



Requirement 6

6. Do THREE of the following. For each project you complete, copy the files to a backup device and share the finished projects with your counselor.
 - a. Using a spreadsheet or database program, develop a food budget for a patrol weekend campout OR create a troop roster that includes the name, rank, patrol, and telephone number of each Scout. Show your counselor that you can sort the roster by each of the following categories: rank, patrol, and alphabetically by name.
 - b. Using a word processor, write a draft letter to the parents of your troop's Scouts, inviting them to a troop event.
 - c. Using a graphics program, design and draw a campsite plan for your troop OR create a flier for an upcoming troop event, incorporating text and some type of visual such as a photograph or an illustration.
 - d. Using a presentation software program, develop a report about a topic approved by your counselor. For your presentation, create at least five slides, with each one incorporating text and some type of visual such as a photograph or an illustration.
 - e. Using a digital device, take a picture of a troop activity. Send or transfer this image to a device where it can be shared with your counselor.
 - f. Make a digital recording of your voice, transfer the file to a different device, and have your counselor play back the recording.
 - g. Create a blog and use it as an online journal of your Scouting activities, including group discussions and meetings, campouts, and other events. Include at least five entries and two photographs or illustrations. Share your blog with your counselor. You need not post the blog to the Internet; however, if you choose to go live with your blog, you must first share it with your parents AND counselor AND get their approval.
 - h. Create a Web page for your troop, patrol, school, or place of worship. Include at least three articles and two photographs or illustrations. Include at least one link to a website of interest to your audience. You need not post the page to the Internet; however, if you decide to do so, you must first share the Web page with your parents AND counselor AND get their approval.





Requirement 7

7. Do the following:
 - a. Explain to your counselor each of these protections and why they exist: copyright, patents, trademarks, trade secrets.



Digital Technology Merit Badge



7a

A Copyright is a legal right created by the law of a country, that grants the creator of an original work exclusive rights to its use and distribution, usually for a limited time, with the intention of enabling the creator to receive compensation for their intellectual effort.

What they do:

Provides legal protection for the use and distribution of an original work

Why they exist:

Encourages original work to be created with the intent it is protected and can be profitable to the creator



Digital Technology Merit Badge



7a

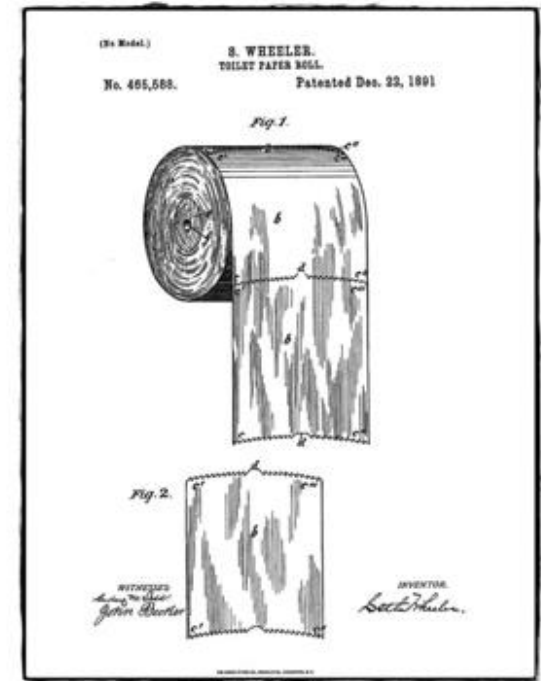
A Patent is a set of exclusive rights granted by a sovereign state to an inventor or assignee for a limited period of time in exchange for detailed public disclosure of an invention.

What they do:

Provides protection to the inventor of a solution product or process as the owner

Why they exist:

Identifies ownership of a solution, product or process while publicly recording the solution.



Digital Technology Merit Badge



7a

A Trademark is a recognizable sign, design or expression which identifies products, services or a company from those of others. Trademark owners can be individuals, business organizations or any legal entity. Trademarks can be located on packaging, labels, print media or even verbal phrases.

What they do

Provides protection of a unique design or expression to its creator or owner

Why they exist

Protects the owner from misuse or impersonation and creates an identity



Digital Technology Merit Badge



7a

A Trade Secret is an invented formula, practice, process, design, instrument, pattern, commercial method or compilation of information which is not generally known or reasonably ascertained by others, and by which a business can obtain an economic advantage over competitors or customers.

What they do

Legally recognizes unique solutions as the property of the developer

Why they exist

Protects the solutions and methods of a developer from being forcibly divulged while keeping products unique and safe.





Requirement 7

7. Do the following:
 - b. Explain when it is permissible to accept a free copy of a program from a friend.



Digital Technology Merit Badge

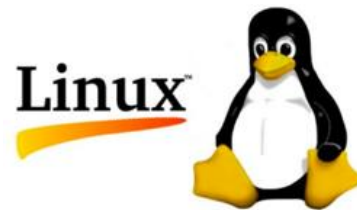


7b

Software can be protected by copyright, trademark and patent laws. The defining difference in the software world is how the software is “Licensed”.

You can freely share software with your friend if it is Open Source licensed software.

Open source means that software is made available, including its source code, for distribution or modification.



Digital Technology Merit Badge



7b

Open Source software can often be as capable, or more capable than proprietary software. Here are some examples of proprietary software and open source alternatives:

Proprietary



Open Source





Requirement 7

7. Do the following:
 - c. Discuss with your counselor an article or a news report about a recent legal case involving an intellectual property dispute.



Digital Technology Merit Badge



7c

Investors in a company named IJR applied for a trademark for a new restaurant. The trademark was for “Krusty Krab”



Viacom, owner of the SpongeBob brand, argued that while it did not have a trademark on “Krusty Krab” it was too distinctively tied to its intellectual property to be trademarked by IJR.



Requirement 8

8. Do TWO of the following:
 - a. Describe why it is important to properly dispose of digital technology. List at least three dangerous chemicals that could be used to create digital devices or used inside a digital device.



Digital Technology Merit Badge



8a

Electronic devices are a complex mixture of many different materials. A single smartphone contains between 500 and 1,000 components. Many of these contain toxic heavy metals as well as hazardous chemicals and materials which do not decay.

Proper disposal of electronics protects the environment, humans and wildlife from exposure to dangerous and toxic materials that are in digital technology devices.



Digital Technology Merit Badge



8a

Some dangerous chemicals used in electronic devices include:

- Brominated Flame Retardants – used in circuit boards and casings. Long term exposure can lead to impaired learning and memory functions. It can also interfere with thyroid and estrogen hormone systems
- Lead – Used in cathode ray tubes (CTR) in monitors. Exposure can cause intellectual impairment, and damage nervous, blood and reproductive systems.
- Mercury – Used in lighting for flat screen displays. Can damage the brain and nervous system especially during early development
- Hexavalent Chromium compounds – Used in metal housing production. Highly toxic and carcinogenic to humans and animals.
- Polyvinyl Chloride (PVC) – Used in wire and cable insulation. Releases highly persistent and toxic fumes when burned.





Requirement 8

8. Do TWO of the following:
 - b. Explain to your counselor what is required to become a certified recycler of digital technology hardware or devices.



Digital Technology Merit Badge



8b


Turtle Wings is an R2 certified recycler of electronics:

To earn an R2 certification you must follow these steps:

1. Able to determine if technology can be reused or recycled
2. Able to test equipment prior to reuse
3. Able to repair equipment for reuse or resale
4. Able to separated non-reusable items into components
 - a. Steel, copper, aluminum, glass, plastic
 - b. Circuit boards, memory chips, power supplies
5. Able to reprocess components for remanufacturing
 - a. Reprocess components internally
 - b. Transfer components to re-processors



TURTLE WINGS
Globally Beneficial Recycling and Reuse of Electronics

Brought to you by  Wisetek™



Requirement 8

8. Do TWO of the following:
 - c. Do an Internet search for an organization that collects discarded digital technology hardware or devices for repurposing or recycling. Find out what happens to that waste. Share with your counselor what you found.



Digital Technology Merit Badge



8c

Two recyclers recognized by the EPA

- Responsible Recycling Practices (R2)
sustainableelectronics.org



- e-Stewards®
e-stewards.org



Digital Technology Merit Badge



8c

Some local business support recycling of digital technology devices and batteries:

STAPLES



BatteriesPlus 



Digital Technology Merit Badge



8c

How can scouts be involved?

Why not start your own recycling effort in your community? Think about how you can educate your community about e-waste and set up drop boxes for digital technology that you could then send to a recycling and reuse center. You might even be able to sell the devices you collect to a refurbishing company and use the proceeds for your troop.





Requirement 9

9. Do ONE of the following:
 - a. Investigate three career opportunities that involve digital technology. Pick one and find out the education, training, and experience required for this profession. Discuss this with your counselor, and explain why this profession might interest you.
 - b. Visit a business or an industrial facility that uses digital technology. Describe four ways digital technology is being used there. Share what you learned with your counselor.

Digital Technology Merit Badge



Complete on Your Own

Requirement 5b

Print ideas on how to conduct a Troop Court of Honor or Campfire Program from 3 different sites. Explain how you searched for them on the internet.

Requirement 6

You need to complete 3 of the items listed in requirement 6.

Requirement 9

You need to complete 1 of the items listed in requirement 9.

