**Overview:**

Students work individually to understand and establish the specifications for a PC dedicated to a specific task or function. (The specific task or function will be assigned to the student from the list below.) The function and features of various hardware components are researched to develop a general understanding. Specific components and features are then selected based on appropriate need for the assigned task or function. The final product is a brochure that will be shared with other classmates during a tradeshow event.

**Objectives:**

* Use correct terminology to describe computer hardware, speed measurements, and size

measurements

* Describe the functions of the internal components of a computer
* Describe the functions of common computer peripheral devices
* Assess user computing needs and select appropriate hardware components for different

situations

**Getting Started:**

1. You will be required to design a “dream machine” personal computer (PC) for one of the tasks assigned to you from the list below.
2. To get started, develop a general understanding of what will be important features and what will be less important features of our dream machine. Consider the following:
   1. Operating system software
   2. Special application software
   3. Processor & motherboard speed
   4. Main memory speed and size
   5. Secondary storage speed and size
   6. Graphics and display speed and resolution
   7. External devices (e.g. keyboard, pointing devices, joysticks, etc.)
   8. Network connectivity
   9. Power and data backup
   10. Printers, scanners, and similar equipment
   11. Portability and durability
   12. Budget (cost) considerations

Specific Tasks & Functions

1. ***Game Computer***: Dedicated to playing PC games in a home environment
2. **Photo Editing & Organization**: Dedicated to editing and producing photographs and images in a home or professional environment
3. ***Business Office Computer***: Dedicated to producing documents and presentations and communicating with other people in a professional office environment
4. ***Student Home Computer***: Dedicated to completing homework, paying bills, communicating with friends and other similar tasks in a home environment
5. ***Factory Floor Computer***: Dedicated to reading documents, filling in forms, processing orders, etc. in a factory or warehouse environment.
6. ***Media Production and Streaming Computer***: Dedicated to production and distribution of video and/or music media in a semi-professional environment
7. ***Web Surfing Computer***: Dedicated to surfing the web, streaming media, and communicating through on-line services in a home environment

**Level 1: Processor & Memory**

1. Research and summarize the main features and function of a CPU processor chip. Consider the following:
   1. Physical packaging shape and size
   2. Processing speed and power
   3. Memory speed and size
2. The shape and size of the packaging of an Intel CPU processor chip is 5.591 x 4.724 x 1.969" and is the shape of a rectangular prism (a normal box)
3. The processing speed and power of an Intel Core i7 can be as fast as 4.2 GHz
4. A 920 (13x200) - 1600 i7 Intel CPU chip would include 1600MHz memory.
5. Research and summarize the history of how a CPU processor chip has changed over the years. Consider the following:
   1. Typical processor speed, size, model numbers in the early 1990s
   2. Typical processor speed, size, model numbers in the early 2000s
   3. Typical processor speed, size, model numbers in the current time
6. The typical speed in the 90s were 25 MHz, the size of 32 bit and the model number i486DX2-50.
7. The typical speed in the 00s was around 500 MHz, the size of 32 bit and the model number of this chip is 80524RX400128.
8. The typical speed for CPU chips today are around 3-5 GHz, the sizes are usually 16 or 32 bit and the model number for this chip is i7-8809G.
9. Research and summarize the main features of motherboards. Consider the following:
   1. Physical packaging shape and size
   2. Speed and size
10. the packaging size of an Intel Z270 motherboard is 23 mm x 24 mm and is the shape of a rectangular prism (a regular box)
11. 8 GT/s is how fast this motherboard is. 26.3 x 6.8 x 32.8 cm is the size
12. Research and summarize the history of how motherboards have changed over the years. Consider the following:
    1. Typical speed, size, model numbers in the early 1990’s
    2. Typical speed, size, model numbers in the early 2000’s
    3. Typical speed, size, model numbers in the current time
13. The typical speed in the 90s was about 100 MHz
14. The typical speed in the 00s was about 150-400 MHz
15. Can be over 800 Mhz today
16. Research and summarize the main features and function of RAM memory. Consider the following:
    1. Physical packaging shape and size
    2. Speed and size
17. The packaging size for a typical RAM memory usually includes a long width and a short length.
18. The typical speed of RAM memory can be over 800 Mhz. The size of RAM memory includes a long width but a short length.
19. Research and summarize the history of how RAM memory has changed over the years. Consider the following:
    1. Typical speed, size, model numbers in the early 1990’s
    2. Typical speed, size, model numbers in the early 2000’s
    3. Typical speed, size, model numbers in the current time
20. The typical speed for RAM memory was from 100-150 Mhz in the 90s.
21. The typical speed for RAM memory in the 00s was more than 500 Mhz.
22. The typical speed for RAM memory today can be as high or more than 2000 Mhz.
23. Research and summarize the main features and function of Hard Disk Drives (HDD). Consider the following:
    1. Physical packaging shape and size
    2. Speed and size
24. An HDD comes in a standard small box.
25. Typical laptops contain HDDs with 7200+ RPM but it can go much more than that. The standard HDD is 3.5 inches.
26. Research and summarize the history of how Hard Disk Drives (HDD) have changed over the years. Consider the following:
    1. Typical speed, size, model numbers in the early 1990’s
    2. Typical speed, size, model numbers in the early 2000’s
    3. Typical speed, size, model numbers in the current time
27. The speed of HDDs in the 90s was about 1500 rpm.
28. The speed of HDDs in the 00s was about 5400 rpm
29. The speed of HDDs today are 7200 rpm +
30. Explain and justify the processor and memory requirements for your ‘dream machine’ task. Discuss the following:
    1. Minimum and “would be nice” requirements for the CPU chip
    2. Minimum and “would be nice” requirements for the Motherboard
    3. Minimum and “would be nice” requirements for the RAM memory
    4. Minimum and “would be nice” requirements for the HDD
31. A minimum requirement for a CPU chip would have the speed around 3 GHz and a would be nice would have around 5 or more GHz.
32. A minimum requirement for a motherboard would have the speed around 5-g GT/s and a better one would have more than 8
33. A minimum requirement for RAM memory would have an 8 GB ram with 1500 MHz and a nice requirement would include a 16 GB ram with more than 2000 MHz
34. A minimum requirement for an HDD would have 7200 rpm and a nice one would have up to 15000 rpm.

**Level 2: Display & Peripherals**

1. Research and summarize the main features and function of Computer Display Monitor. Consider the following:
   1. Physical construction (CRT, LCD, etc)
   2. Display Standards (CGA, VGA, SVGA, XGA, etc.)
   3. Resolution & Colour depth
2. Stands for "Cathode Ray Tube." CRT is the technology used in traditional computer monitors and televisions. The image on a CRT display is created by firing electrons from the back of the tube to phosphors located towards the front of the display. LCD (liquid crystal display) is the technology used for displays in notebook and other smaller computers. Like light-emitting diode (LED) and gas-plasma technologies, LCDs allow displays to be much thinner than cathode ray tube (CRT) technology. <https://techterms.com/definition/crt> https://whatis.techtarget.com/definition/LCD-liquid-crystal-display
3. Computer display standards are a combination of aspect ratio, display size, display resolution, color depth, and refresh rate. They are associated with specific expansion cards, video connectors, and monitors.

c) The resolution of an image is determined by the number of individually addressable points that make up the image, whether it is the number of pixels that make up a screen image or the number of dots that make up a printed image. Colour depth is used to describe the maximum number of colours that are used in the image. The higher the number of colours then the more realistic the image will appear. Once again, with bitmap images, the chosen colour depth will affect the final file size. http://www.aifweb.com/2d\_graphics/resolution.html

1. Research and summarize the main features and function of a Computer Graphics Card. Consider the following:
   1. Physical packaging (e.g. On the motherboard, expansion card, etc.)
   2. Speed and frame rate (2D vs 3D)
   3. Resolution, colour depth, and memory size
2. The packaging on a CG card comes in a regular box
3. The speed of a Computer Graphic Card is normally 2-3 GHz and the frame rate for 2d is 60 Hz and for 3D is 120 Hz.
4. Research and summarize the history of how Computer Display Technology has changed over the years. Consider the following:
   1. Display standards and capabilities in the late 1980’s
   2. Display standards and capabilities in the late 1990’s
   3. Display standards and capabilities in the 2000’s
5. Research and summarize the main features and function of External Storage and Backup. Consider the following:
6. Removable media (e.g. floppy disks, CD/DVD-RW, CompactFlash, etc.)
7. USB media (e.g. Memory Stick, External HDD, etc.)
8. Cloud-based storage
9. Removable media is any type of storage device that can be removed from a computer while the system is running. Examples of removable media include CDs, DVDs, and Blu-Ray disks, as well as diskettes and USB drives. Removable media makes it easy for a user to move data from one computer to another.
10. A Universal Serial Bus (USB) is a common interface that enables communication between devices and a host controller such as a personal computer (PC). It connects peripheral devices such as digital cameras, mice, keyboards, printers, scanners, media devices, external hard drives and flash drives
11. Cloud storage is a model of computer data storage in which the digital data is stored in logical pools. The physical storage spans multiple servers (sometimes in multiple locations), and the physical environment is typically owned and managed by a hosting company.
12. Research and summarize the history of how External Storage and Backup has changed over the years. Consider the following:
13. Typical speed, size, model numbers in the early 1990’s
14. Typical speed, size, model numbers in the early 2000’s
15. Typical speed, size, model numbers in the current time
16. Research and summarize the main features and function of Network Connectivity. Consider the following:
17. Connection technology (e.g. Dial-Up, Ethernet, WiFi, BlueTooth, Fibre, etc.)
18. Upload and download speed
19. Security
20. Connectivity technology means a technology service / feature provided in the device (laptop in this case) to be able to connect with other devices and systems. There are two types of connectivity features - wireless (wifi, bluetooth, NFC) and wired (usb, network cable, HDMI).
21. The upload speed is the rate that data is transferred from the user's computer to the Internet. Cable companies set the default setting to download faster than upload. The reasoning behind this is that most people have more of a need to download information.

The number of bytes per second that data travels from a remote or local server to the user's computer or from the user's computer to a mobile device. See Internet speed and download.

c) Computer security, cybersecurity or information technology security is the protection of computer systems from theft or damage to their hardware, software or electronic data, as well as from disruption or misdirection of the services they provide.

1. Research and summarize the history of how Network Connectivity has changed over the years. Consider the following:
2. Typical speed, size, model numbers in the early 1990’s
3. Typical speed, size, model numbers in the early 2000’s
4. Typical speed, size, model numbers in the current time
5. In the 90s, networking connectivity was used mostly through Ethernet
6. In the 00s, networking connectivity was used mostly through cable modem
7. In present day, networking connectivitly is mostly wireless
8. Research and summarize the main features and function of Printer Technology. Consider the following:
9. Printing Technology (e.g. Dot Matrix, Ink Jet, Laser, etc.)
10. Connection Technology (e.g. Parallel Port, USB, WiFi, Network, etc.
11. How printing has changed over the years
12. Most common commercial printing technology in which the image to be printed is photographically transferred to a metal or plastic printing plate which is wetted by water. The image portion of the plate repels water but picks up oil-based ink from a roller, and the non-image areas retain water but repel the ink.
13. In general, when a machine is "online," it is turned on and connected to other devices. ... Recently, however, the term "online" usually means being connected to the Internet. The connection can be through a phone line, using a dial-up or DSL modem, a cable line via a cable modem, or through a wireless connection.
14. Until the nineteenth century, printers completed each step of printing by hand, just as they did in Gutenberg's printshop. As technology evolved, inventors adapted these new technologies to revolutionize printing. ... In the 1970s, computers were integrated into the printing process.
15. Explain and justify the processor and memory requirements for your ‘dream machine’ task. Discuss the following:
16. Minimum and “would be nice” requirements for the Computer Display
17. Minimum and “would be nice” requirements for External Storage and Backup
18. Minimum and “would be nice” requirements for Network Connectivity
19. Minimum and “would be nice” requirements for Printer Technology

**Task & Function Signup**

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| **Task** | **Student Name** |
| ***Game Computer*** |  |
| **Photo Editing & Organization** |  |
| ***Business Office Computer*** |  |
| ***Student Home Computer*** |  |
| ***Factory Floor Computer*** |  |
| ***Media Production and Streaming Computer*** |  |
| ***Web Surfing Computer*** |  |
| ***Game Computer*** |  |
| **Photo Editing & Organization** |  |
| ***Business Office Computer*** |  |
| ***Student Home Computer*** |  |
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