**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

This CPU can be ordered from amazon and comes in a small box. The CPU itself is a normal size CPU and looks the same as a CPU you would get with a normal computer.

* 1. Processing speed and power

The processing speed for this CPU is 1700. It has a 3.7 Ghz turbo.

* 1. Memory speed and size

The max memory on this CPU is 64 GB.

1. 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 1990’s
   2. Typical processor speed, size, model numbers in the early 2000’s
   3. Typical processor speed, size, model numbers in the current time

The typical processor in the 1990s was an intel 386. This CPU made a major increase in technology from intel. The Intel 386 was a 32 bit processor which meant its data throughput was twice that of the 286. This CPU worked with 4 GB of RAM and 64 TB of virtual memory. Intel 486 was released in 1998 and was an early 2000s CPU. This CPU had the same memory capacity as the 386 but had twice the speed at 26.9 MIPS ( Million Instructions Per Second). The latest Intel processor is the Intel core 9. This processor costs around $488.

1. Research and summarize the main features of motherboards. Consider the following:
   1. Physical packaging shape and size
   2. Speed and size

Motherboards are also known as the main circuit board, system board, logic board or baseboard.

Motherboards are generally 9.6 x 12 inches. Although some companies may extend that to 10x

12 inches. Motherboard speed usually depends the speed of the front side bus (FSB). FSB

speeds can range from 66 MHz to over 800 MHz. If you were to order a motherboard on amazon,

you will receive it in a small cardboard box.

1. 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

The Memory boards used to carry 1 Gb Ram which would have been enough for a computer back then, but now days computers need more Ram due to the increase in technology development and software coding’s. The motherboards are twice the size now as they have to hold bigger ports and sockets.

1. Research and summarize the main features and function of RAM memory. Consider the following:
   1. Physical packaging shape and size
   2. Speed and size

Ram memory is also known as Random Access Memory. It is a form of computer data storage that stores date and machine code currently being used. It is a small slim board which looks similar to the motherboard. RAM devices can either be 8-bit, 16-bit, 32-bit or 64-bit. If you were to buy a Ram, it would come in a small box with specifications and important user information.

1. 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

The first form of RAM came out in 1947 with the use of Williams Tube. Williams Tube is an early version of RAM which was also a digital storage device. Ram chips were generally big compared to RAM chips these days. RAM in the 1980s had a speed of 100 MHz. In the 1990s, RAM had a speed of 600 MHz. In 2018, RAM had a speed of 2133 MHz.

1. 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

A hard disk drive is the main and usually largest storage hardware in a computer. The hard drive is sometimes called the “C drive”. A hard disk drive is generally the size of a paperback book but much heavier. An HDD also keeps a hold of its date even when powered off. This explains why you can restart a computer but still have access to all the data when its back on. HDDs have pre drilled holes on the sides of them so it is easier to mount them in the 3.5-inch drive bay in the computer case. If you were to buy a HDD, you would receive it in a medium sized box which would be packaged in a way to protect the hard disk drive from damage.

1. 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

The first hard disk drives created were by IBM which were code named RAMAC. In the 1980’s floppy disks were made as an early version of hard disk drives. Floppy disks were boxes about 24 inches in length which you plug into your computer.

1. 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

Minimum of: Intel Core-i5 or higher – 6th-gen

Would be nice: Ryzen 7 1700 processor or higher - 8th-gen

* 1. Minimum and “would be nice” requirements for the Motherboard

Minimum of: Motherboard w/ Intel i5-6200U 2.3Ghz CPU, LA-D071P

Would be nice: MSI Z370M Mortar mATX Motherboard

* 1. Minimum and “would be nice” requirements for the RAM memory

Minimum of: 8 GB - 2400 MHz

Would be nice: 16-64 GB – 2400 MHz

* 1. Minimum and “would be nice” requirements for the HDD

Minimum of: WD Blue 1TB Desktop Hard Disk Drive - 7200 RPM SATA 6Gb/s 64MB Cache 3.5 Inch - WD10EZEX

Would be nice: Seagate Video 3.5 (Pipeline) 500GB Hot-Plug SATA NCQ 3GB/s 5900RPM 3.5-inch 8MB Hard Drive

**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 & Color depth

A Computer Display Monitor, commonly known as a Computer Monitor, is an output device that displays information visually. In modern monitors, the display device is generally a thin film transistor liquid crystal display with LED backlighting. Older monitors used a cathode ray tube (CRT). Monitors are connected with computers by VGA, Digital Visual Interface (DVI), HDMI, or Display Ports. The aspect ratio of computer monitors has changed from 4:3 to 16:10, to 16:9. The most common color depths a user will see is a 8-bit (256 colors), 16-bit (65,536 colors) and 24-bit (16.7 million colors).

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, color depth, and memory size

A graphics card, also known as video card, is an expansion card which generates a feed of output images to a display device such as a Computer Monitor. The fastest Graphics card is the Nvidia GeForce RTX 2080 Ti. This Graphics card is the latest most potent GPU around. GPU stands for “Graphics Processing Unit. People who need a high-end graphics card include gamers and people who do a lot of 3-D graphic work. A good video card can be measured by FPS (Frames Per Second). Frame Rate describes how many images the card can display per second. Small SVGA monitors generally have a resolution of 800 x 600. Larger SVGA monitors can display 1280 x 1024 / 1600 x 1200.

The Graphic Card color depths are as followed:

* 4-bit / 16 Colors
* 8-bit / 256 Colors
* 16-bit / 65,536 Colors
* 24-bit / 16,777,216 Colors

The memory capacity of most modern video cards ranges from 1 GB to 12 GB. A quick rule you should know is that you should have twice as much system memory as your graphic card has VRAM.

1. 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

Computer Monitors have evolved from 1980s to present day. In the 1980s, display adapters were simple frame-buffers, but later display standards also specified a more extensive set of display functions and software-controlled interface. A number of common resolutions have been used with computers descended from the original IBM PC. Some of these are now supported by other families of personal computers. VGA was capable of displaying the most standard modes featured by IBM-compatible PCs. The IBM display standard was introduced in 1990. In the late 2000s, widescreen LCD monitors have become popular due to movies and games transitioning o high definition (HD). This made standard-width monitors unable to display them correctly as they stretch or crop HD content. However, the empty spaces on the top or bottom are filled with black bars so the emptiness does not distract you from the content you are viewing.

1. Research and summarize the main features and function of External Storage and Backup. Consider the following:
2. Removable media (e.g. floppy disks, CD/DVD-RW, CompactFlash, etc.)
3. USB media (e.g. Memory Stick, External HDD, etc.)
4. Cloud based storage

External Storage are devices that store information or files outside the computer. These devices may permanently attached to the computer or may be removable. USBs have been in use for a long time. USBs are meant to transfer files from one computer to another or to save/carry files in general. Cloud based storage is the most convenient in my opinion. This is because with cloud-based storage, you can save your work on one computer, and login in with the same credentials to access the exact same work on a different computer. Doing this, you don’t even have to carry a USB drive with you.

1. Research and summarize the history of how External Storage and Backup 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

Apple first introduced the concept of the personal computer in the 1980s. These computers generally contained internal hard drive disks or a complicated incarnation of an external hard drive. In 1983, Apple introduced the ProFile external hard drive. This early representation of the external thumb and hard drives known today plugged into the back of Apple units. USBs were introduced in 1994 by seven technology giants. The companies behind USB technology were: Compaq, DEC, IBM, Intel, Microsoft, NEC and Nortel. These companies came together to invent the externa hard drive technology that we use today.

1. Research and summarize the main features and function of Network Connectivity. Consider the following:
2. Connection technology (e.g. Dial-Up, Ethernet, WiFi, BlueTooth, Fibre, etc.)
3. Upload and download speed
4. Security

Network connectivity is a way to discuss how well parts of the network connect to one another. Ethernet cables connect your modem/router directly to your device. All you will need is an extra ethernet port on your modem or router, an ethernet cable, and an ethernet port on the device you wish to connect. Wi-Fi allows internet access do your smart device by wirelessly sending internet signals to your device. Bluetooth allows your device to connect to another device via signals. No wire needed. Bluetooth is commonly used to play music in vehicles by wirelessly connecting your device to your radio via Bluetooth. Based on your service provider and Wi-Fi strength, your download speed and upload speed can either be high (good) or low (bad). Wi-Fi is generally safe unless you are using public internet. Your Wi-Fi usage can be monitored by the public internet provider and they may steal private information. When you use your personal home Wi-Fi, all your searches get saved in a folder by your service provider.

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

In 1995, the transmission speed capacity for Ethernet increased from 10 Mbit/s to 100 Mbit/s. By 1998, Ethernet supported transmission speeds of a Gigabit. Later, higher speeds of up to 400 Gbit/s were added (as of 2018). The ability of Ethernet to scale easily (such as quickly adapting to support new fiber optic cable speeds) is a contributing factor to its continued use.

1. Research and summarize the main features and function of Printer Technology. Consider the following:
2. Printing Technology (e.g. Dot Matrix, Ink Jet, Laser, etc.)
3. Connection Technology (e.g. Parallel Port, USB, WiFi, Network, etc.
4. How printing has changed over the years

In computing, a printer is a peripheral device which makes a persistent human-readable representation of graphics or text on paper. Printers come in many different sizes. Some printers are laser printers that use powdered ink and some are the traditional printers that use liquid ink. You can print something off your device wirelessly or with a wire. Depending on your printer, you can use a USB or your internet to print. Printers used to be huge but nowadays they are half the size they were 20 years ago.

1. Explain and justify the processor and memory requirements for your ‘dream machine’ task. Discuss the following:
2. Minimum and “would be nice” requirements for the Computer Display

**Minimum:** Dell D3218HN

**Would be nice:** ColorEdge CS Series

1. Minimum and “would be nice” requirements for External Storage and Backup

**Minimum:** Seagate 1 TB backup hard drive & a Google Drive account for cloud storage

**Would be nice:** Google Drive Account and Seagate 1TB backup Hard Drive

1. Minimum and “would be nice” requirements for Network Connectivity

**Minimum:** 75 Mbps of internet and an Ethernet Cable

**Would be nice:** 100 Mbps of internet and an Ethernet Cable

1. Minimum and “would be nice” requirements for Printer Technology

**Minimum:** Expression Photo HD XP-15000 Wireless Color Wide-Format Printer

**Would be nice:** Epson Expression Premium ET-7750 EcoTank Wireless Wide-format 5-Color All-in-One Supertank Printer with Scanner, Copier and Ethernet

**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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