**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

Packaging for processors are not very important and are for keeping the processor safe. Processors are small chips and are similar in size. You need a processor that is compatible with the motherboard you choose.

* 1. Processing speed and power

A processor for modern games needs to have high processing speeds (near 4GHZ clock speed) and 4 cores or higher to run games at 60 frames per second or higher.

* 1. Memory speed and size

RAM used should be at least dual channel DDR4 2400MHZ. Modern games need at least 8 GB of RAM but more demanding games require 16 GB of RAM.

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

Processors in the early 90’s were Intel’s Pentium series they only had 1 core and were only around 100MHZ at best.

* 1. Typical processor speed, size, model numbers in the early 2000’s

Processors in the early 2000s were Intel’s Celerons and AMD’s Athlon processors they had processors slightly above 1GHZ. This was also when the first multicore processors were made.

* 1. Typical processor speed, size, model numbers in the current time

Modern processors are the Intel Core series the i3, i5, i7 and i9 9th gen processors. AMD sells their 2nd generation Ryzen 3, 5, and 7 processors. They have 4-8 cores and clock speeds ranging from 3.5 to 4GHZ

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

Motherboard packaging is big because Motherboards are rather large and have all the other parts connected to it. The sizes depend on if you buy ATX, MATX or ITX.

* 1. Speed and size

Intel has these motherboard types H310, B360, Z370 and Z390. AMD Have A420, B450 and X470 motherboards.

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

In the 90s motherboards were AT instead of the ATX series. Like newer motherboards they came in multiple sizes. AT motherboards didn’t have a sleep mode they were either completely powered on or powered off meaning you had to restart the PC every time you turned it off. Motherboards in the 90s used PCI lanes instead of the modern PCI-E.

* 1. Typical speed, size, model numbers in the early 2000’s

In the 2000s motherboards were ATX motherboards. In the early 2000s PCI-E was invented.

* 1. Typical speed, size, model numbers in the current time

Motherboards today are ATX and use PCI-E. Today Motherboards have a lot of things built in like sound and occasionally Wi-Fi, meaning separate cards are not necessary.

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

Ram packaging is small because RAM is not very large. The size of RAM is not very big it is wide but not tall.

* 1. Speed and size

RAM speed is measured in MHZ and size is commonly 8-16GB.

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

RAM in the 90s were only a few KB of memory in the early 90’s.

* 1. Typical speed, size, model numbers in the early 2000’s

In the early 2000s the RAM used was DDR1. The speeds were around 100MHZ. Modules contained around 1 GB of RAM.

* 1. Typical speed, size, model numbers in the current time

RAM today is DDR4, most commonly sold in 8-16GB but are available in up to 64GB per module.

1. Research and summarize the main features and function of Hard Disk Drives (HDD). Consider the following:
   1. Physical packaging shape and size

Hard Drives are rectangular in shape and they are large in size.

* 1. Speed and size

Some Hard Drives are faster than others and they have different storage capacities. Solid State Drives(SSD) are drives that store data faster than Hard Drives.

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

In the early 90’s most HDDs were a few megabytes.

* 1. Typical speed, size, model numbers in the early 2000’s

In the early 2000s HDDs were a few hundred MB or a few GB.

* 1. Typical speed, size, model numbers in the current time

Most HDDs have a couple hundred GB of storage often 1TB

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

My minimum processor requirement would be the i5 9400 and the “would be nice” requirements is the i5 9600K

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

My minimum requirement motherboard would be a B350 motherboard and my “would be nice” requirements is a Z370 motherboard

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

My minimum requirements would be 8GB of DDR4 RAM while my “would be nice” requirements are 16GB of DDR4 RAM.

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

My minimum HDD requirements would be a 1TB HDD while my “would be nice” requirements are a 1TB SSD(Solid State 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)

I will use an LED monitor.

* 1. Display Standards (CGA, VGA, SVGA, XGA, etc.)

The display standard I will use is HDMI.

* 1. Resolution & Colour depth

For resolution I will get a 1440p monitor.

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.)

Has a picture of the card on it and other information about it.

* 1. Speed and frame rate (2D vs 3D)

Frame rate is the number of animation frames. For video games playing at 60 frames per second or higher is important for smoother animations.

* 1. Resolution, colour depth, and memory size

Resolution is the amount of pixels on the screen, most modern Graphics Cards are capable of displaying in 4K or higher and games are most commonly played in 1080p. Most Different Graphics Cards have different amounts and speeds of video memory. Ranging from 2GB on low end cards and 16GB on the high end cards.

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

Monitors in the late 80’s were CRT displays they used VGA cables.

* 1. Display standards and capabilities in the late 1990’s

Monitors in the 90’s still used CRT displays and VGA cables.

* 1. Display standards and capabilities in the 2000’s

Monitors in the late 2000’s have LED and LCD technology. Computers in the early 2000s used VGA ports. Later in the 2000s computers started using HDMI.

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.)

Floppy disks were flat disks that were used in the late 60’s, 70’s, 80’s and 90’s to store data. They stored a couple hundred KB of data. CD’s were round discs used in the 80’s, 90’s and early 2000’s. CD’s were capable of storing. They can hold up to 700MB of data. DVD’s are circular discs that were used to store data in the late 90’s and 2000’s, they can hold up to 17 GB. CompactFlash is a small memory card format to hold data, they could hold up to 512MB of data.

1. USB media (e.g. Memory Stick, External HDD, etc.)

Memory sticks are small USBs that use flash memory to store data. They can store up to 2 terabytes of data. External HDDs are Hard Drives connected to a computer by USB.

1. Cloud based storage

Cloud based storage is a new storage format, where users upload their data onto the cloud. these “clouds” are servers that store your data. You can access this data through any device on

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

Floppy Disks held a couple hundred KB or a few MB at best in the early 90’s.

1. Typical speed, size, model numbers in the early 2000’s

In the early 2000’s people backed up their data on DVD which could store up to 17 GB on a 4 layer disk.

1. Typical speed, size, model numbers in the current time

Today people either use Memory sticks for a small amount of data and external HDDs for large amounts of data. Many people backup their data to Cloud storage as well.

1. Research and summarize the main features and function of Network Connectivity. Consider the following:
2. Connection technology (e.g. Dial-Up, Ethernet, Wi-Fi, Bluetooth, Fibre, etc.)

Dial-up is an old connection technology where your telephone line connects to the internet for slow speeds. Ethernet is a connection technology where the computer is plugged into the Modem through a LAN cable. Wi-Fi is a technology for wireless internet communication where the computer and modem have a wireless communication. Bluetooth is a wireless connection technology most commonly used for connecting wireless peripherals such as mouses, keyboards and headphones. Fiber optic-communication is a new connection technology that sends pulses of light through an optical fiber.

1. Upload and download speed

Upload and download speeds are the speeds at which the computer sends and reads information.

1. Security

Dial-up and Ethernet are secure because of their wired connections. WiFi can be set to require a password and so is Fiber.

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

In the early 90’s going on the internet was done through dial-up internet. They use telephone connections and while using dial-up you could not use the telephone. The speeds were slow and the highest possible speeds were 56kbit/s.

1. Typical speed, size, model numbers in the early 2000’s

In the early 2000’s many people still used dial-up but some people were using DSL and Cable technology to connect to the internet faster.

1. Typical speed, size, model numbers in the current time

Today most people use Cable Modem technology to connect to the internet. A new emerging connection technology is Fiber Optical which offers fast speeds.

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.)

Dot Matrix is a pattern array used to represent characters, symbols and images. Ink Jet printers create images by propelling droplets of ink onto a page. Laser printers produces text and pictures by repeatedly passing a laser beam and uses electrically charged powdered ink called toner.

1. Connection Technology (e.g. Parallel Port, USB, WiFi, Network, etc.)

Parallel Port was a common connection technology that sent information in parallel communication. USB or Universal Serial Bus is a industry standard communication technology, it is used for a variety of purposes such as keyboards, pointing devices, digital still and video cameras, printers, portable media players, disk drives and network adapters to personal computers. A new form of printer connectivity is WiFi, allowing people to print pages wirelessly through the internet.

1. How printing has changed over the years

Printing is easier than ever before with wireless printing and laser printers that quickly print out sheets.

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

My minimum for Computer Display is a 1080p 60hz monitor for smooth animations and good graphics, while my would be nice requirements for a monitor are a 1080p 144hz monitor so I could play at higher frame rates.

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

My minimum requirements would be a 1TB external HDD and my “would be nice” requirements is a 2TB external HDD to store my games and saves.

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

My minimum and “would be nice” requirements are Ethernet because I want a stable, fast connection for online gaming.

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

My minimum and would be nice requirements for Printer technology is none because my computer is designed for gaming

**Level 3: Building Your Dream Machine**

1. Identify the minimum requirements for each component of your dream machine as follows::
   1. CPU processor chip speed and type

[Intel Core i5 9600k](https://www.canadacomputers.com/product_info.php?cPath=4_1210_65&item_id=125960)

* 1. Motherboard type

[MSI MPG Z390 motherboard](https://www.canadacomputers.com/product_info.php?cPath=26_1207_1206_1514&item_id=128689).

* 1. RAM memory speed and size

[Corsair Vengeance LPX 16GB DDR4 RAM](https://www.canadacomputers.com/product_info.php?cPath=24_311_1326&item_id=098183)

* 1. HDD speed and size

[WB Blue 1 TB HDD](https://www.canadacomputers.com/product_info.php?cPath=569_15_1086_210_212&item_id=050727)

* 1. Display Monitor resolution, type, and size

[Acer 25" KG215Q](https://www.canadacomputers.com/product_info.php?cPath=569_22_299&item_id=123163)

* 1. Graphics card resolution and type

Resolution will be 1080p. Graphics card will be [EVGA GeForce GTX 1660 TI](https://www.canadacomputers.com/product_info.php?cPath=43_1200_557_559&item_id=135132)

* 1. Audio card type

Motherboard sound

* 1. Audio Speakers type

Monitor Speakers

* 1. External backup type and size

None

* 1. Network interface requirements

[C2G CAT6 Snagless Shielded Ethernet Network Patch Cable-Blue](https://www.canadacomputers.com/product_info.php?cPath=5_1340_1347_1349&item_id=115746)

* 1. Printing Technology

Nothing

* 1. Other Peripherals (e.g. mouse, keyboard, joystick, etc.)

[Redragon Cobra M711 Gaming Mouse](https://www.canadacomputers.com/product_info.php?cPath=569_21_279_275&item_id=118356)

[Redragon RGB LED Backlit Mechanical Keyboard](https://www.canadacomputers.com/product_info.php?cPath=569_21_273_274&item_id=113170)

[Cooler Master Hyper 212 EVO](https://www.amazon.ca/Cooler-Master-Hyper-212-RR-212E-20PK-R2/dp/B005O65JXI?th=1)

1. Prioritize you list of components from question #1 from those that are essential down to those that would be nice.

GTX 1660 TI > i5 9600k > Corsair Vengeance LPX 16GB DDR4 RAM > MSI Z390 > Acer 25” KG215Q > WD Blue 1TB HDD > Ethernet Cable > Hyper 212 EVO > Mechanical keyboard > Gaming Mouse

1. Establish a target budget (cost) for your dream machine.
   1. Justify your cost based on your projected component needs.

My dream machine would cost $1,361.83 CAD before tax. My costs are necessary because I want to run games at 144 frames per second at 1080p and in order to achieve that consistently I need a powerful CPU and GPU.

* 1. Justify your cost based on a realistic assessment of your application and target user

Gamers want to experience a game in high quality without slowdown and are willing to pay a premium for a better experience.

1. Build your dream machine or locate a ready to buy machine using on-line vendor web sites.
   1. Find at least two sources for your dream machine
   2. Provide a copy of the cost and feature list summary for each source
   3. Explain how the machine from each source matches (or is different) from your ideal configuration.

Suggested on-line computer sources:

* [www.bestbuy.ca/](http://www.bestbuy.ca/)
* [www.dell.com/en-ca](http://www.dell.com/en-ca)
* [www.staples.ca](http://www.staples.ca)
* [www.tigerdirect.ca/](http://www.tigerdirect.ca/)
* [www.canadacomputers.com](http://www.canadacomputers.com)

**Level 4: Sharing Your Dream Machine**

1. Prepare a brochure documenting your dream machine options and choices.
   1. The target audience is other students in the class
   2. You should explain your target task (e.g. game computer) and how this affects configuration choices.
   3. You should explain your configuration choices in greater detail
   4. Your two purchase options should be explained and compared
2. Share your brochure
   1. By uploading it to your repository
   2. By presenting it during the in-class tradeshow (date TBD)
3. Visit and report on other trade show presentations / brochures
   1. Complete the Passport Template (TBD) as you participate in the in-class tradeshow.

**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*** |  |
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| ***Web Surfing Computer*** |  |
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