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1. **a) Why does the computer need to have enough RAM (random access memory)? (Kiệt)**

   Computer needs enough ram because ram will be a memory to store information as well as run applications in your computer such as files in computer or web browsers.

   b) How much random access memory is there in your computer?

   My computer has about 16GB RAM to operate web browsers and desktop applications.

2. **a) What is a hard drive and where is it generally located? (Minh)**

   Hard drive is an electro-mechanical data storage device that stores and retrieves digital data using magnetic storage and one or more rigid rapidly rotating platters coated with magnetic material. The platters are paired with magnetic heads, usually arranged on a moving actuator arm, which read and write data to the platter surfaces. Data is accessed in a random-access manner, meaning that individual blocks of data can be stored and retrieved in any order. HDDS are a type of non-volatile storage, retaining stored data even when powered off. Modern HDDS are typically in the form of a small rectangular box.

   It is usually installed internally in a computer, attached directly to the disk controller of the computer’s motherboard.

b) How much storage space is there on your computer's hard drive?

My computer's storage is 280GB.

3. **Inside the computer case, there is a part that all the major components of the computer are attached to. What is this part called? (Ngọc)**

   Motherboard

4. **Compare and contrast RAM and ROM memory. (Ngọc)**

   - ***Similarities:***

     - *Holds information*: RAM and ROM hold or store information in the form of program instructions for certain data and also as data that can be directly passed to the computer's CPU and I/O controllers and circuitry of the processor

     - *Accessing memory*: both utilize a type of address bus register to identify the specific memory cell or a group of cells which can be accessed at any given interval of time and data line and bus to carry the information being read from the memory of the device.

     - *Binary form:* both of these types of memory devices represent the information present in them as a series of Binary Digits which are also called bits.

     - *Types:* both RAM and ROM are available in several subcategories and each the types will have different benefits and drawbacks and usage requirements which basically depends on their type.

   - ***Differences:***

Difference	*RAM*	*ROM*

Data retention	RAM is a volatile memory which could store the data as long as the power is supplied	ROM is a non-volatile memory which could retain the data even when power is turned off.
Working type	Data stored in RAM can be retrieved and altered.	Data stored in ROM can only be read.
Use	Used to store the data that has to be currently processed by CPU temporarily.	It stores the instructions required during bootstrap of the computer.
Speed	high-speed memory	much slower than the RAM
CPU Interaction	The CPU can access the data stored on it.	The CPU can not access the data stored on it unless the data is stored in RAM
Size and Capacity	Large size with higher capacity	Small size with less capacity
Used as/in	CPU Cache, Primary memory	Firmware, Micro-controllers
Accessibility	The data stored is easily accessible	The data stored is not as easily accessible as in RAM
Cost	Costlier	cheaper than RAM

5. **What are the four measures of a disk drive's efficiency? (**Nghi**)**

    - Data transfer rate
    - Seek time
    - Rotational latency
    - Access time

6. **Distinguish the terms primary storage and secondary storage.** (Đức)

    Primary memory is the main memory of the computer which can be directly

accessed by the central processing unit

Secondary memory refers to the external storage device which can be used to store data or information permanently

7. **Random Access Memory and Read Only Memory are examples of _____** (Đức)

(a) Primary Memory ~~(b) Secondary Memory (c) Auxiliary Memory (d) Both primary and secondary memory~~