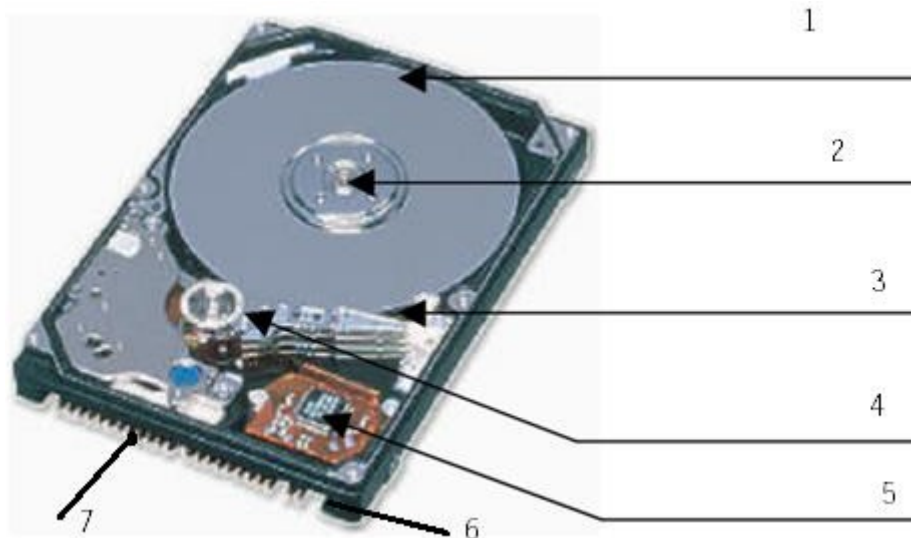
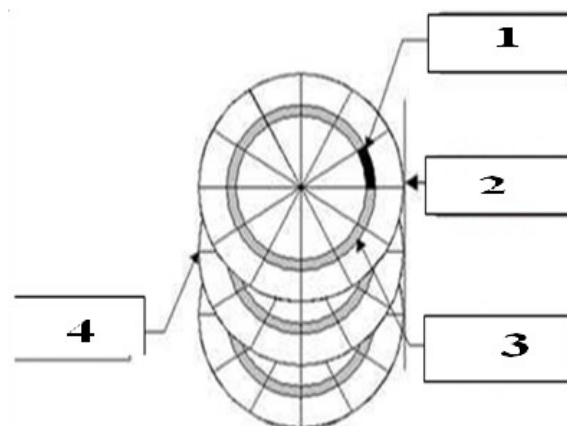


## DW N° 05

**Exercise 01 :** A/- Describe each component of the hard drive represented below.



**B/-** Complete the following diagram by specifying the location of each component:



**C /** What is the capacity of a hard drive with 4 heads, 2 platters, 6 tracks, 6 cylinders, 4 sectors, and data blocks of 8 bytes each? (In this case, a cluster contains one sector).

**D/** A hard drive has a capacity of 1 gigabyte. Given that this hard drive has 8 surfaces (4 platters), 256 tracks per surface, and 64 sectors, what is the size of a data block on this hard drive?

**E/** A hard drive spinning at 240 RPM (Turn Per Minute) has tracks divided into 5 sectors. What is the average time taken to read 2 contiguous data sectors on this hard drive, considering that the average head movement time is 100 ms?

F/ A hard drive spinning at 6000 TPM. Given that the read head takes an average of 10 ms to reach the track to be read, and the average reading time for a data sector located at a random location on the disk is 16 ms, how many sectors does this hard drive have?

**Exercise 02:** (Hard Disk Capacity)

We have a hard disk with 1020 cylinders, 63 sectors per track, 512 bytes per sector, 250 heads, a rotation speed of 7200 revolutions per minute, an average seek time of 8ms, and a minimum seek time of 2ms. Calculate the cylinder size, the capacity of each platter, and the overall disk capacity.

**Exercise 03 :** (Access time)

Reminder: Access time (or average access time) is the average time between the request to read a sector and the availability of the result on the interface: **Average access time = Average seek time + Average latency time + Time to read a sector**

The (average) latency time represents the average wait time once on the correct track. For the IBM GXP 75 series of hard drives, calculate the average access time, knowing that the seek time is 8.5 ms, the number of cylinders is 16383, the number of sectors is 63, each sector contains 512 bytes, and the disk rotation speed is 7200 revolutions per minute.

**Exercise 04 :**

Let's consider 2 disks with the following specifications:

**Disk 1:**

Rotation speed: 7200 RPM  
Sectors per track: 32  
Bytes per sector: 512  
Average seek time: 9 ms  
Minimum seek time: 3 ms  
Number of platters: 128

**Disk 2:**

Rotation speed: 5400 RPM  
Sectors per track: 32  
Bytes per sector: 512  
Average seek time: 4 ms  
Minimum seek time: 2 ms  
Number of platters: 128

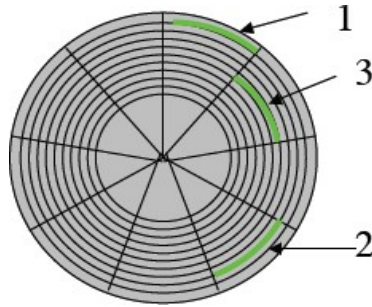
- Calculate the throughput for each disk.
- Calculate the average access time for each disk (to read one sector). Let's have each of these disks read a file of 5 MB scattered across 1000 blocks on the entire hard disk. Calculate the file read time for each disk. What conclusions can be drawn?

**Exercice 05 :** (Importance de l'organisation d'un fichier)

Note: What is a file?

A file is a sequence of sectors.

Order is crucial!



A file is considered "sequential" if all its sectors are placed in the same cylinder, in order. When a cylinder is full, the next neighboring cylinder is used. A file is considered "direct access" if its sectors are scattered in different locations on the disk.

We have a file containing 6,047,744 characters, with each character encoded in 1 byte.

We want to compare the performance of the two disks for both methods of recording files:

- Calculate the average time to read one sector.
- Calculate the number of sectors needed to store the file.
- Calculate the average file read time in both cases (sequential and direct access).
- What are the advantages and disadvantages of the two ways of saving files?
- What is the benefit of having a faster disk?