What does it mean to preempt a process?

Preempt a process means to take a resource away from a process. One such resource is the CPU, and in fact preempts often means to move a process from RUNNING state to READY state. The process involuntarily gives up the CPU.

What is swapping and what is its purpose?

Swapping is a form of memory management. It is moving from/to secondary storage a whole program at a time. Swapping is a fairly close synonym of paging.   
Memory management is a way in which computer can store and retrieve data from secondary storage for use in main memory.

List three general categories of information in a process control block.

Process Identification

Processor state information

Process control information

Why are two modes (user and kernel) needed?

* From a programmer's point of view, the system is the CPU used to execute instructions plus the memory used to hold instructions and data.
* This simplistic view might have been true when one person owned a microcomputer which ran one program at a time, but this is no longer the case.
* Now we have computers which:
* run multiple programs at the same time, and each needs its own memory space.
* switch the CPU quickly between programs to give the illusion that they are running at the same time.
* hold documents for several users, with the expectation that each user can protect their own files.
* allow multiple network connections simultaneously, where each connection may be dealing with sensitive data.
* If every program had unfettered access to the CPU, main memory and the peripheral devices, all concepts of separation of programs and the data in memory, on disk etc. would not exist.
* A program could look at all memory locations, including that of other programs, as well as read all the data on all of the attached disks, and read all the data being sent across the network.
* To prevent this, we need the CPU to have at least two privilege levels.
* In **kernel mode**, the CPU has instructions to manage memory and how it can be accessed, plus the ability to access peripheral devices like disks and network cards. The CPU can also switch itself from one running program to another.
* In **user mode**, access to memory is limited to only some memory locations, and access to peripheral devices is denied. The ability to keep or relinquish the CPU is removed, and the CPU can be taken away from a program at any time.
* Now, all programs will be run in user mode, and this prevents them from accessing the data in other programs, as well as preventing the disk etc.

What is the difference between an interrupt and a trap?

Interrupt is when the process needs some I/O services whereas trap occurs due to some fault or exception in the code.

Trap is actually a software generated interrupt caused either by an error (for example division by zero, invalid memory access etc.), or by a specific request by an operating system service generated by a user program.

The term Interrupt is usually reserved for hardware interrupts**.** Hardware interrupts usually come from many different sources such as timer chip, peripheral devices (keyboards, mouse, etc.), I/O ports (serial, parallel, etc.), disk drives etc.

Give three examples of an interrupt.

1. Interrupt caused by an external device, like click of mouse or keyboard press. This is External Interrupt.
2. Interrupt Caused by an instruction like “Div by 0”. This is called internal Interrupt
3. System error or Power Failure.

What is the difference between a mode switch and a process switch?

A mode switch may occur without changing the state of the process that is currently in running state. Whereas process context switch involves moving the currently executing process out of running state