Information Processing
Lesson Plan: Class 06 / IP / 01

Overall goal of the lesson	Introduction to the topic of "Information Processing"
Prior knowledge required	Basic concepts about comparing similar quantities and objects, natural numbers. Knowledge of decimal numbers (optional) to be able to compare them for equality. Module 1 and 2 of Class 5 of IP completed

MODULE 2: **Module time:** 35 minutes

Goal:	Emphasize sorting as a mode of organization with data samples
Description:	Walk through examples of sorting leading to an algorithm known as "Bubble Sort"
Material required:	**Physical:** Blank worksheets, regular writing pencils, and maybe color pencils/crayons, scratch paper (to do calculation and sorting of numbers) **Electronic: :** PPT – Information Processing for Class 6
Procedure Details:	● Discussion on Recap: ○ In 4th and 5th standard IP class introduced a few concepts ▪ Compression and sorting of data was introduced ▪ Packing stuffed toys in a box, ▪ Encoding messages using repeated characters ▪ Sorting names per alphabetical order ▪ Some sequencing patterns were covered ● As a warm-up exercise, 4 containers that can hold water are displayed ○ The students are asked to re-order them by increasing capacity ○ Clearly, the glass followed by bottle, jar and the tank come in that order ○ We of course assumed some sizes, but those were "safe" assumptions ○ The "data set" that we used was the sizes of all the containers ○ The size is a numerical, and therefore easy to compare and order ○ This leads to simple sorting of 4 numbers, where… ○ Each number represents the size of each container ● Next is the same example of a small class of 10 students ○ We had seen this class and names in the IP period of standard 5 ○ We had then sorted it according to names ○ We recap that this was "alphabetical" sorting based on simple rules where 'A' comes before 'B' and so forth till 'Y' and 'Z' ▪ The learning then was that having a roll number helps find a name quickly instead of having to scan all the names ○ But standard 5 did not teach one table sorted on two columns ▪ Computer Science calls it "keys" ▪ We introduce sorting on "multiple keys" ▪ We just won't confuse students with CS terms like "keys" ▪ Students knowing that two columns are used is good enough ○ We accomplish that by introducing just 2 names to the list of 10 we had ▪ One compares with an existing name and goes below, while the other goes above. (One is "less than" and other is "greater than" in comparison terms for computer science) ○ We strip the table and show in steps how to adjust the new names ○ At the end of this example, students should learn that

	▪ Simple comparison can help sorting ▪ And that more columns (keys) could be employed for sorting a table ● Computer Science has made famous quite a few ways to sort things ○ Each method (or algorithm) serves a purpose ○ Each method is applicable (more efficient) in specific cases of sample sizes ○ Each is however, dependent on a core processing step, namely: ▪ Compare-and-Swap (We call it the "Exchange Step" for ease) ○ We select a random collection of numbered balls and walk through a sorting algorithm ○ The emphasis is using the "Exchange Step" ○ Learning is how we use it ▪ Left to right (for increasing value of sorted collection) ▪ Repeatedly for each pair: 1&2, 2&3, 3&4, and so forth ▪ Repeatedly from left to right till all balls are sorted ● We wrap up with a pointed rationale of why we sort – using the dictionary example
Activities	Various activities are included in the worksheets associated with this lesson. They emphasize one of the common algorithm to sort data (known as the "bubble sort"). This algorithm, like any other, leverages what we are referencing to as the "Exchange Step". To be clear, there is no such term defined in computer science. It was invented for the lesson for easy understanding of the underlying principle, namely compare two items and arrange them according to desired ordering principle. The term "compare-and-swap" is more prevalent than "Exchange step", although it does imply a slightly different meaning. Hence the new term. The activities also include alphabetical sorting. None of the presentation slides get reflected in the worksheets. It is imperative that the students pay complete attention to the slides before moving on to the worksheets. In case some students are uncomfortable with decimal positions in a number when comparing such numbers, have them ignore digits after the decimal (So 76.2 can be assumed to be 76). We hope that need not be the case in most classes. In an event where the class runs out of time for activities in the worksheet, they could be used for homework which needs to NOT be mandatory. It is best left for the curious to complete. (An artist is better off painting instead)
Summary	Summarize the learnings for the students: 1. Sorting is one important way we process data 2. We determine and use alphabetical or numerical sorting based on our data 3. We established that using the basic "Exchange Step", we can sort anything.