Binary Systems
Lesson Plan: Class 05 / P / 02

Overall goal of the lesson: Children will learn the concept of Binary numbers

Prior knowledge required: Basic understanding of the Decimal system.

MODULE 1:
Module time: 35 minutes
Goal: For students to be able to understand the basics of the Binary system
Description: Students will learn the basics how the computers store information using the Binary system
Material required:
Physical:
One copy of the Binary Dots Master worksheet (05-P-2-WS) per child.
One copy of the Binary Worksheet (05-P-2-WS) per child
Electronic:
PPT Presentation as reference to help with teaching the basics of Binary(05-P-2-PPT)
Procedure Summary:

1. Keep the "Dots flash cards" cut out before you begin the class from the worksheet (5-P2-WS)
2. Go over the PowerPoint presentation (5-P2-PPT) with the kids
3. Distribute the worksheet (5-P2-WS) and have the kids cut out the cards
4. Distribute the worksheet (5-P2-WS-Binary) to see how much the kids have understood the concept
   If time permits, have them work on another worksheet (5-P2-WS)

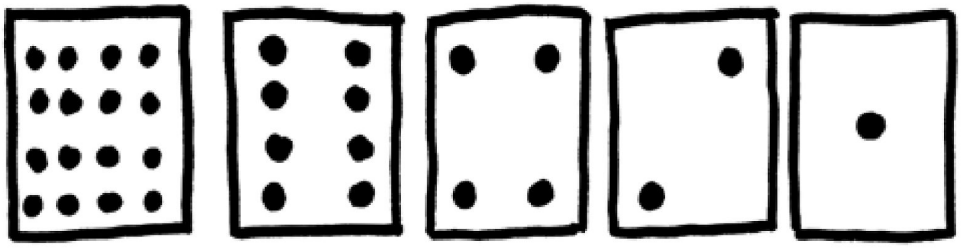
Procedure Details:

1. Revise what kids have learnt the previous class
   - Difference between hardware and software.
   - If they understood the concept of an operating system.
   - The right way to sit while using the computer.
2. Talk briefly about Decimal system that they had learnt last year. The most commonly used number system or the most familiar number system is the Base 10 or the Decimal Number System. Why ten? Probably because we have 10 fingers and it is natural to think in terms of ten or to put things in bundles of tens. So now, if are using our fingers to count till twenty, we are basically counting all our fingers twice. That means we have two bundles of ten fingers making up the count of twenty!
3. Elaborate a bit more about the decimal system.
   Ask the children why three hundred and sixty-five is represented by the digits 3 6 and 5, in that order. Answer is: the digit 3 is in the hundreds place, the digit 6 is in the tens place and the digit 5 is in the unit's place, giving us a total of three hundred and sixty-five i.e.: 10x10x3 + 10x6 + 1x5 = 365.This literally means we have five bundles of one, plus six bundles of ten, plus three bundles of hundred, giving us a total of three hundred and sixty-five. Every digit is assigned a PLACE Value! The units or ones' place has a place value of 1. The tens place has a place value of 10. The hundreds place has a place value of 10x10 = 100.
4. Show the examples of the Decimal system briefly in the PowerPoint
5. Introduce the concept of Binary system (Bi – nar e – ee), Bi means 2. Binary is the way of representing information with only 2 options
6. Binary uses "Base of 2". So then, how is Binary represented as numbers? In the decimal number system, digits are represented as symbols 0 through 9 (0 1 2 3 4 5 6 7 8 9). Binary Digits, also known as Bit, are represented by two symbols 0 (OFF) and 1 (ON).

   Repeat after me: 0 = OFF and 1 = ON.

7. Show the difference between the Decimal system and Binary system using the PPT.

   A. While the decimal numbering system is most common and familiar numbering system in this world, it is not the only system. Place values are bundles of ten.
   B. The Binary Number System has two digits 0 (OFF) and 1 (ON). Place values are bundles of two. All binary numbers are a combination of zeros and ones.
   C. The Binary Number System is the most extensively used system in the modern world because it is the underlying system used by all computers and gadgets in this world.
8. Just for a while keep that information aside, and talk to the kids if they have seen the inside of a computer.
9. Explain that the wires carry information through the machine in the form of electricity. The two options that a computer uses with respect to this electrical information are "off" and "on" or 0 or 1
10. The computer also stores the information as 0 or 1
11. Now, explain to the class about Binary numbers using the Dot flash cards. Make sure to keep the cut outs in the correct order



12. Quiz them about the smallest number of dots possible (answer is 0)
13. Keep going with couple of examples
14. Now insist that, when a binary number card is **not** showing, it is represented by a zero. When it **is** showing, it is represented by a one.
15. Show them couple of examples of how you can represent a number using the binary system and quiz them for couple more.
16. Summarize the class with concept of Binary system and how it is represented in 0s and 1s
17. Distribute the worksheet for them to solve few problems

Assessment:
Recap of the Binary system learnt in 4th grade and the awareness about how the computer can understand only 0s and 1s

Information Broadcast: In Computer Science, the children learnt the basics of Binary system