**Level 1: Presentation Notes**

1. Number systems used in Computer Science
   1. List the main features of the Decimal System



* 1. List the main features of the Binary System

* 1. List the main features of the Octal System

* 1. List the main features of the Hexadecimal System

1. Compare and contrast the Decimal and Binary systems

|  |  |  |
| --- | --- | --- |
| **Criteria** | **Decimal System** | **Binary System** |
| Digits  Used |  |  |
| Addition Example |  |  |
| Powers of  Base |  |  |
| Value of 111 |  |  |

1. Convert the following binary numbers to decimal:
2. Convert the following decimal numbers to binary:
3. Add the following binary numbers. (verify your answers using decimal)

|  |  |
| --- | --- |
| a) | b) |
| c) | d) |

1. List the main features of the following Computer Memory Structures:
   1. Bit
   2. Byte
   3. Word
   4. Integer Data Type
   5. Double Word

**Level 2: Research Questions**

1. The Intel 8085 microprocessor was a first generation processor that was used in many early game systems and personal computers. Google “8085 microprocessor architecture” to answer these questions.
   1. Year Introduced

* 1976
  1. Size of data bus (in bits)
* 8 bit
  1. Largest data number (in binary and decimal)
* Binary: 0-8
* Decimal: 255
  1. Size of address bus (in bits)
* 16 bits
  1. Largest memory address (in binary and decimal)
* Binary: 0-64
* 1.8

1. The Intel 8086 microprocessor was the processor used in the first IBM PCs running the DOS operating system. Google “8086 microprocessor architecture” to answer these questions.
   1. Year Introduced

* 1978
  1. Size of data bus (in bits)
* 16 bit
  1. Largest data number (in decimal)
* 65535
  1. Size of address bus (in bits)
* 20 bits
  1. Largest memory address (in decimal)
* 255

1. The Intel 80286 microprocessor a common processor used in IBM PCs running the Windows operating system. Google “80286 microprocessor architecture” to answer these questions.
   1. Year Introduced

* 1982
  1. Size of data bus (in bits)
* 16 bit
  1. Largest data number (in decimal)
* 65535
  1. Size of address bus (in bits)
* 24 bits
  1. Largest memory address (in decimal)
* 1 mb
* 16777215

1. The modern PCs run either a 32 bit or 64 bit Windows operating system. Google “32 vs 64 bit” to answer these questions.
   1. How do these systems differ in data capacity? (explain using bits)

* 32 bit can only have 4gb while 64 bit can have 16gb
  1. How do these systems differ in memory capacity? (explain using bits)
* 32 bit can handle a limited amount of RAM 4gb or less. 64 bit can utilize much more RAM than 32
  1. How do these systems differ in hardware requirements?
* 32 bit is usually on more low end computers and 64 bit you would want on higher end computers

1. Research and explain how negative (-) numbers are represented using bits and how they are stored in computer memory.

* Since a computer can only show information in bits you have to use 0 as a negative and 1 as a positive

1. Research and explain how floating point (decimal) numbers are represented using bits and how they are stored in computer memory.

* Eight digits are used to store floating point number
* 8 bits represent E and 24 represent F

**Level 3: Sample Program**

1. Modify the following sample Python program to print out the digits in:
   1. Binary

('Digit ', 1, ' is : ', '0')

('Digit ', 2, ' is : ', '1')

* 1. Octal

'Digit ', 1, ' is : ', '3')

* 1. Hexadecimal

('Digit ', 1, ' is : ', '1')

('Digit ', 2, ' is : ', '2')

('Digit ', 3, ' is : ', '4')

('Digit ', 4, ' is : ', '3')

number = input("Enter a 4 digit decimal number:")

index = 0

for char in number :

index += 1

print("Digit ", index, " is : ", char)