

Chapter-2:

Number System-An Introduction

let's workout

NUMBER SYSTEM – FULL SOLUTION (QUESTION + ANSWER)

A. Tick (✓) the correct option

Q1. _____ is an incorrect Octal number.

a. 603 b. 804 c. 107 d. 165

Answer: b. 804

Q2. In the Hexadecimal number system, the letter E represents _____.

a. 13 b. 14 c. 15 d. 16

Answer: b. 14

Q3. In Binary addition, $1 + 1$ equals to _____.

a. 0 b. 1 c. 2 d. 10

Answer: d. 10

Q4. To convert a Decimal number into Binary number, divide the number by _____.

a. 2 b. 8 c. 10 d. 5

Answer: a. 2

Q5. Each binary digit is called a _____.

a. Byte b. Hexa c. Nibble d. Bit

Answer: d. Bit

B. Fill in the blanks

Q1. The base of Binary number system is _____.

Answer: 2

Q2. The numeric value of _____ is 13 in Hexadecimal number system.

Answer: D

Q3. Octal Number system consists of _____ digits.

Answer: 8

Q4. _____ number system is understood by the computer system.

Answer: Binary

Q5. The right most digit of a number is called the _____ significant digit.

Answer: Least

C. Write T for true and F for false

Q1. You cannot perform arithmetical operations on binary numbers.

Answer: F

Q2. The decimal number system consists of 10 digits, i.e., 0 to 9.

Answer: T

Q3. To convert binary to decimal, you multiply the number with an increasing power of 10.

Answer: F

Q4. The hexadecimal number system consists of digits 0 to 10 and A to E.

Answer: F

Q5. The place value depends on the position of the digit in the number.

Answer: T

D. Answer the following questions

Q1. Define number system. Name the different types of number systems used in a computer.

Answer:

A number system is a method of representing numbers using digits.

Types of number systems:

- Binary (Base 2)
- Decimal (Base 10)
- Octal (Base 8)
- Hexadecimal (Base 16)

Q2. What is the difference between Octal and Hexadecimal number systems?

Answer:

Octal system has base 8 and uses digits 0–7.

Hexadecimal system has base 16 and uses digits 0–9 and A–F.

Q3. What do you understand by the least and most significant digits? Explain with an example.

Answer:

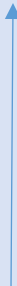
- Least Significant Digit (LSD): Rightmost digit
- Most Significant Digit (MSD): Leftmost digit

Example: In 345
MSD = 3, LSD = 5

4. Convert Decimal to Binary, Octal, Hexadecimal

(a) $(65)_{10}$

Binary:

Divide by 2 

$$65 \rightarrow 32 \text{ r-1}$$

$$32 \rightarrow 16 \text{ r-0}$$

$$16 \rightarrow 8 \text{ r-0}$$

$$8 \rightarrow 4 \text{ r-0}$$

$$4 \rightarrow 2 \text{ r-0}$$

$$2 \rightarrow 1 \text{ r-0}$$

$$1 \rightarrow 0 \text{ r-1}$$

☞ Binary = 1000001_2

Octal:

$$65 \div 8 = 8 \text{ r-1} \quad \uparrow$$

$$8 \div 8 = 1 \text{ r-0}$$

$$1 \div 8 = 0 \text{ r-1}$$

☞ Octal = 101_8

Hex:

$$65 \div 16 = 4 \text{ r-1}$$

☞ Hex = 41_{16}

(b) $(236)_{10}$

Binary:

$$236 \rightarrow 118 \text{ r-0} \quad \uparrow$$

$$118 \rightarrow 59 \text{ r-0}$$

$$59 \rightarrow 29 \text{ r-1}$$

$$29 \rightarrow 14 \text{ r-1}$$

$$14 \rightarrow 7 \text{ r-0}$$

$$7 \rightarrow 3 \text{ r-1}$$

$$3 \rightarrow 1 \text{ r-1}$$

$$1 \rightarrow 0 \text{ r-1}$$

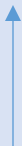
☞ Binary = 11101100_2

Octal:

$$236 \div 8 = 29 \text{ r-}4$$

$$29 \div 8 = 3 \text{ r-}5$$

$$3 \div 8 = 0 \text{ r-}3$$



☞ Octal = **354₈**

Hex:

$$236 \div 16 = 14 \text{ r}12 \text{ (C)}$$

☞ Hex = **EC₁₆**

5. Convert

a. $(10111010)_2 \rightarrow$ Decimal

$$= 128 + 32 + 16 + 8 + 2$$

☞ **186₁₀**

b. $(502)_8 \rightarrow$ Decimal

$$= 5 \times 64 + 0 \times 8 + 2$$

☞ **322₁₀**

c. $(4082)_{10} \rightarrow$ Binary

☞ **111111110010₂**

d. $(2190)_{10} \rightarrow$ Octal

☞ **4116₈**

e. $(41B6)_{16} \rightarrow$ Decimal

$$= 4 \times 4096 + 1 \times 256 + 11 \times 16 + 6$$

☞ **16822₁₀**

f. $(804)_{10} \rightarrow$ Hex

☞ **324₁₆**

6. Check conversions

(Reconvert back to verify – all correct ✓)

7. Binary Addition

a.

$$\begin{array}{r} 10101 \\ + 00111 \\ \hline 11100 \end{array}$$

b.

☞ **1100111010**

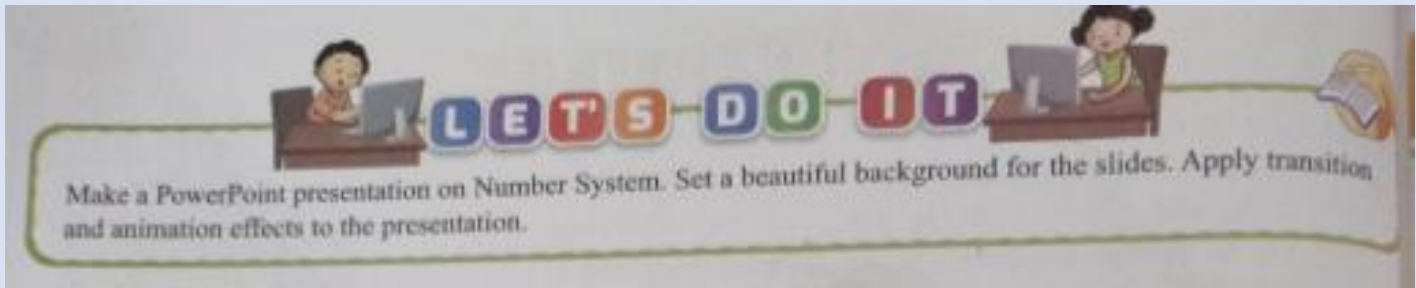
8. Binary Subtraction

a.

$$10011 - 01010 = \mathbf{01001}$$

b.

$$11001001 - 01100110 = \mathbf{01100011}$$



☞ LET'S DO IT

Make a PowerPoint presentation on Number System.

Answer (Content for PPT):

Slide 1: Title Slide

Topic: Number System

Name, Class, Date

Slide 2: What is Number System?

A number system is a way to represent numbers using digits.

Slide 3: Types of Number Systems

- Binary (Base 2)
- Decimal (Base 10)
- Octal (Base 8)
- Hexadecimal (Base 16)

Slide 4: Binary System

Digits: 0, 1

Used in computers

Slide 5: Decimal System

Digits: 0–9

Used in daily life

Slide 6: Octal System

Digits: 0–7

Shortcut of binary

Slide 7: Hexadecimal System

Digits: 0–9, A–F

Used in programming

Slide 8: Conversion Example

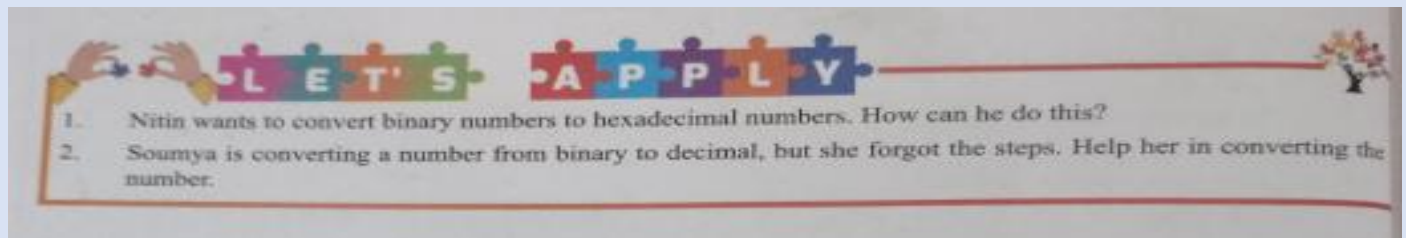
Example: $65_{10} = 1000001_2$

Slide 9: Uses of Number Systems

- Computers
- Programming
- Digital electronics

Slide 10: Thank You

☞ Apply **background, transitions, and animations** (Fade, Zoom, etc.)



LET'S APPLY

Q1. Nitin wants to convert binary numbers to hexadecimal numbers. How can he do this?

Answer:

Steps to convert Binary → Hexadecimal:

1. Group binary digits into sets of 4 (from right side).
2. Convert each group into its hexadecimal equivalent.

Example:

10101110_2

$= 1010 \quad 1110 \quad [1010 \rightarrow A \quad \text{and} \quad 1110 \rightarrow E]$

= A E

☞ Answer: AE_{16}

Q2. Soumya is converting a number from binary to decimal, but she forgot the steps. Help her.

Answer:

Steps to convert Binary \rightarrow Decimal:

1. Write powers of 2 from right to left.
2. Multiply each digit with its power.
3. Add all values.

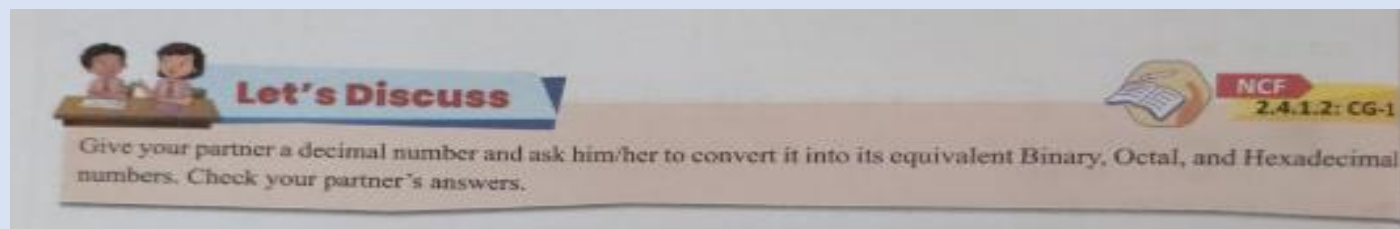
Example:

1011_2

$= (1 \times 2^3) + (0 \times 2^2) + (1 \times 2^1) + (1 \times 2^0)$

$= 8 + 0 + 2 + 1$

$= 11_{10}$



LET'S DISCUSS

Give your partner a decimal number and ask to convert into Binary, Octal, and Hexadecimal.

Answer (Example):

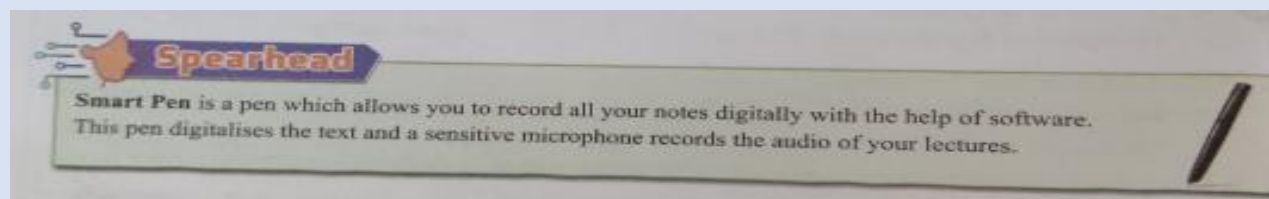
Take number: 45_{10}

Binary: 101101_2

Octal: 55_8

Hexadecimal: $2D_{16}$

☞ Students can exchange and verify answers.



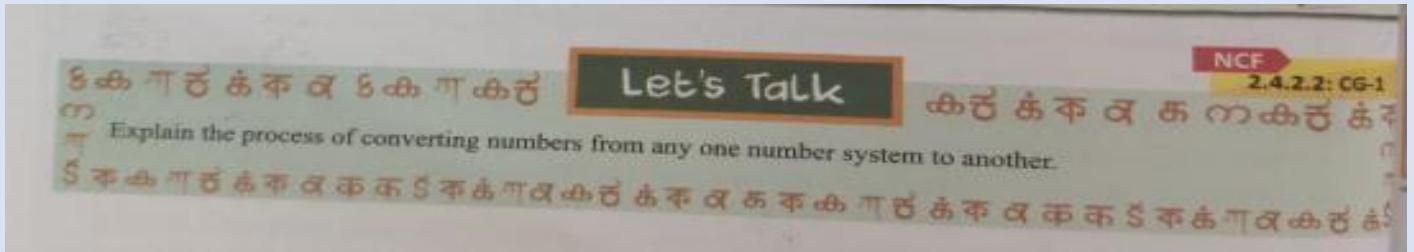
💡 SPEARHEAD

Smart Pen explanation

Answer:

A Smart Pen is a digital pen that records writing and audio.

- Converts handwritten notes into digital form
- Records voice using microphone
- Helps in revision and learning



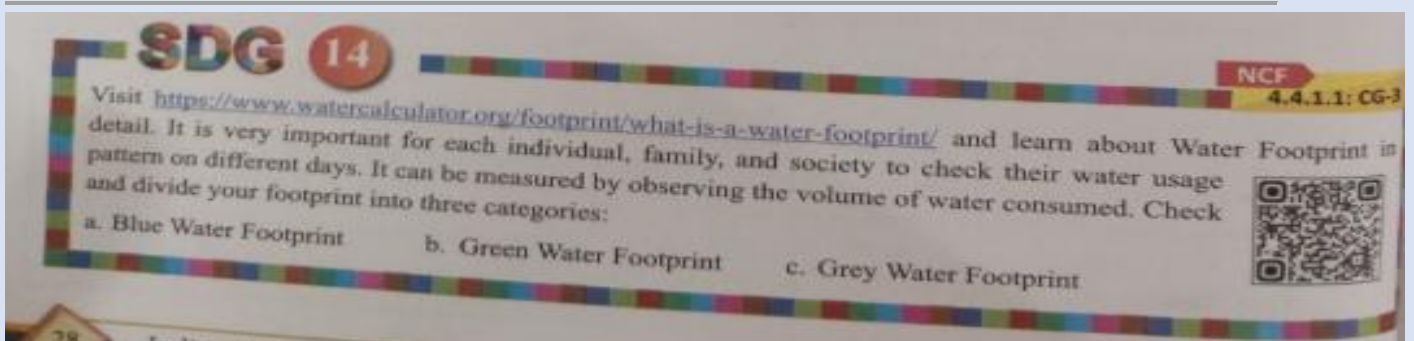
🗣️ LET'S TALK

Explain the process of converting numbers from one number system to another.

Answer:

1. **Decimal** → **Other systems**
Divide repeatedly by base (2, 8, 16)
2. **Other systems** → **Decimal**
Multiply digits with powers of base
3. **Binary** ↔ **Octal**
Group in 3 digits
4. **Binary** ↔ **Hexadecimal**
Group in 4 digits

☞ These methods help easy conversion between systems.



SDG 14 – WATER FOOTPRINT

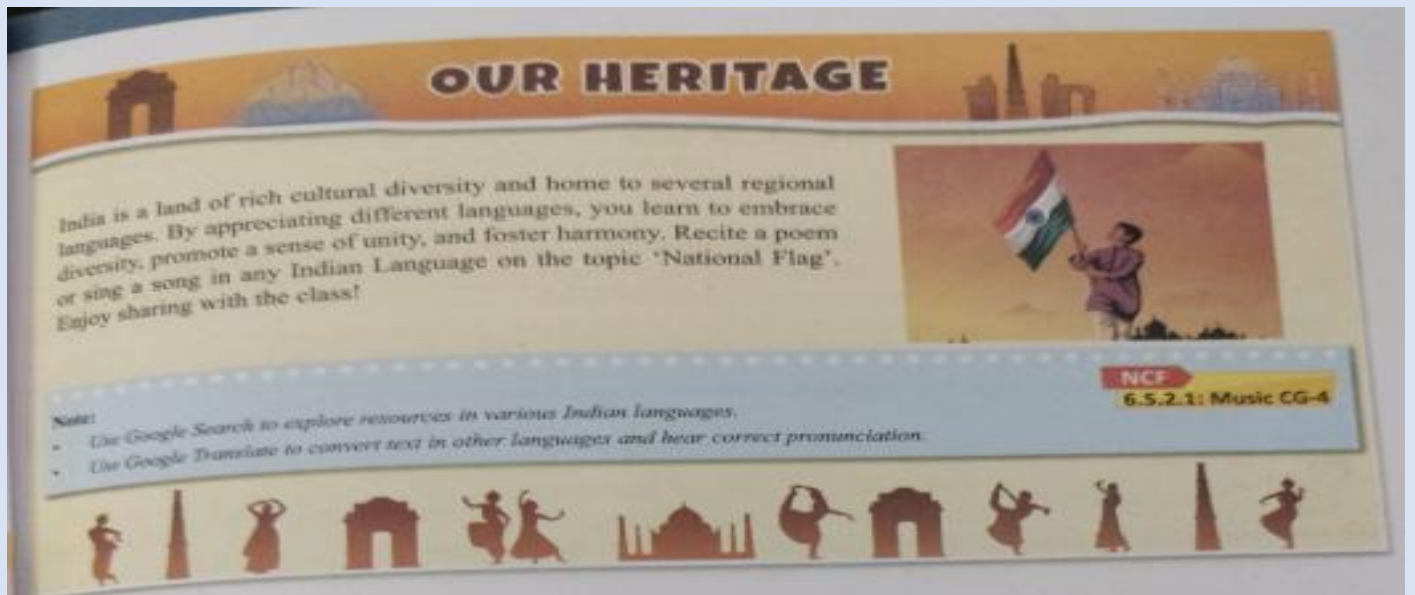
Answer:

Water footprint means total water used by a person.

Types:

- **Blue Water Footprint:** Surface/ground water used
- **Green Water Footprint:** Rainwater used
- **Grey Water Footprint:** Polluted water

☞ It helps in saving water and managing usage.



IN OUR HERITAGE

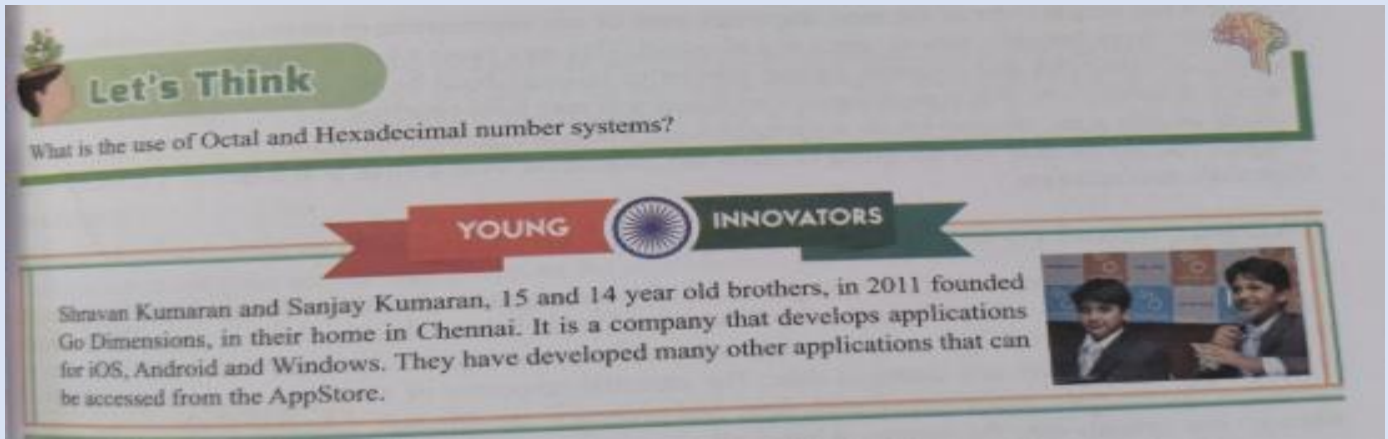
Activity Answer:

Students can:

- Recite a poem on National Flag
- Sing a patriotic song
- Use any Indian language

Example lines:

“Our flag flies high with pride,
Saffron, white and green side by side.”



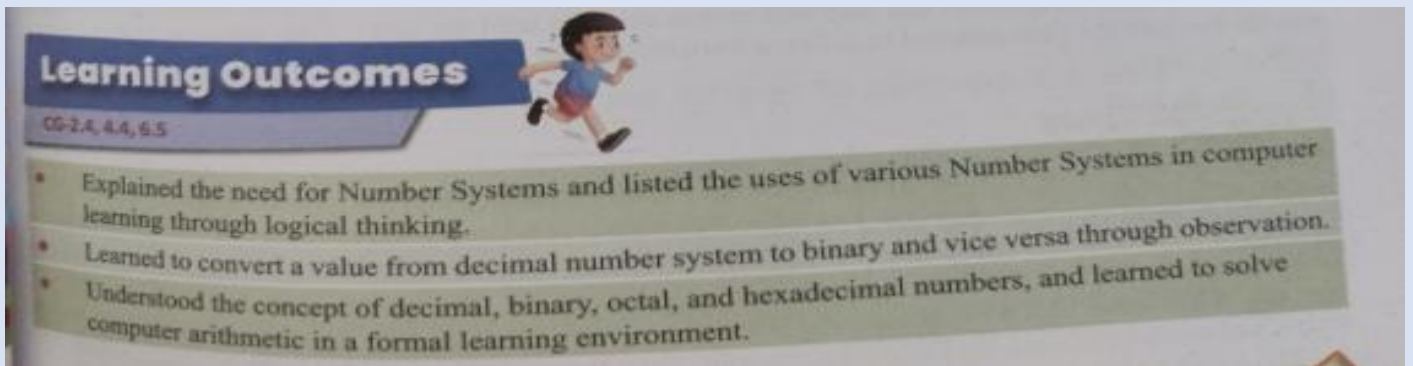
YOUNG INNOVATORS

Answer (Learning):

Shruvan and Sanjay Kumaran started a company at a young age.

Lesson:

- Age is not a barrier
- Innovation and creativity are important
- Technology can create opportunities



LEARNING OUTCOMES

Answer:

Students have learned:

- Importance of number systems
- Conversion between number systems
- Binary, Octal, Decimal, Hex concepts
- Logical thinking and problem solving