Number Bases Assessment Worksheet

Introduction

This worksheet is designed to assess your understanding of different number bases, including binary, decimal, and hexadecimal. You will have the opportunity to practice converting between these bases, performing arithmetic operations, and applying the number base system to simple computer programming concepts.

Section 1: Multiple Choice Questions

Choose the correct answer for each question.

1. What is the binary representation of the decimal number 12?
    a. a) 1100
    b. b) 1110
    c. c) 1000
    d. d) 1010
2. Which of the following is a correct conversion of the hexadecimal number A2 to decimal?
    a. a) 162
    b. b) 172
    c. c) 182
    d. d) 192
3. What is the result of the arithmetic operation 2 (base 5) + 3 (base 5)?
    a. a) 10 (base 5)
    b. b) 12 (base 5)
    c. c) 15 (base 5)
    d. d) 20 (base 5)

Section 2: Short Answer Questions

Show your work and explain your reasoning for each question.

1. Explain the difference between binary and decimal number systems. Provide an example of each. (5 points)

2. Convert the decimal fraction 0.5 to binary. Show your work and explain your reasoning. (5 points)

3. Describe a real-world application of the number base system in computer programming. (10 points)

Section 3: Project-Based Task

Design a simple computer program that uses the number base system to solve a problem. Choose a programming language and provide a brief explanation of your code. The program should demonstrate an understanding of number bases and their application in computer programming.

> **Example Program:**
>
> A simple computer program that uses the number base system to solve a problem is a program that converts decimal numbers to binary. The program can use a loop to divide the decimal number by 2 and append the remainder to the binary representation.

Section 4: Conversion Practice

Convert the following numbers to the specified base:

1. Decimal 25 to binary
2. Hexadecimal 1A to decimal
3. Binary 1010 to decimal

Section 5: Arithmetic Operations

Perform the following arithmetic operations in the specified base:

1. 2 (base 5) + 3 (base 5)
2. 4 (base 2) x 5 (base 2)
3. 10 (base 10) - 3 (base 10)

Conclusion

This worksheet is designed to assess your understanding of different number bases and their applications. Remember to show your work and explain your reasoning for each question. Good luck!

Answer Key

The answer key is provided for reference only and should not be given to students until after they have completed the worksheet.

Section 1: Multiple Choice Questions

1. b) 1110
2. a) 162
3. a) 10 (base 5)

Section 2: Short Answer Questions

1. Example answer: The binary number system uses only two digits, 0 and 1, while the decimal number system uses ten digits, 0-9. For example, the binary number 1010 represents the decimal number 10.
2. Example answer: To convert 0.5 to binary, we can use the following steps: 0.5 x 2 = 1.0, 1.0 x 2 = 2.0, etc. The binary representation of 0.5 is 0.1.
3. Example answer: The number base system is used in computer programming to represent data and perform operations. For example, the binary number system is used to represent machine code, while the hexadecimal number system is used to represent memory addresses.

Section 3: Project-Based Task

Example answer: A simple computer program that uses the number base system to solve a problem is a program that converts decimal numbers to binary. The program can use a loop to divide the decimal number by 2 and append the remainder to the binary representation.

Section 4: Conversion Practice

1. Decimal 25 to binary: 11001
2. Hexadecimal 1A to decimal: 26
3. Binary 1010 to decimal: 10

Section 5: Arithmetic Operations

1. 2 (base 5) + 3 (base 5) = 10 (base 5)
2. 4 (base 2) x 5 (base 2) = 100 (base 2)
3. 10 (base 10) - 3 (base 10) = 7 (base 10)