# Introduction to Number Bases Homework Sheet

**Student Name:** _____

**Class:** _____

**Due Date:** _____

## Introduction and Instructions

### Introduction to Number Bases

The objective of this homework assignment is to reinforce your understanding of number bases, specifically focusing on converting decimal fractions from different bases to base 10. By the end of this assignment, you will be able to convert decimal fractions from binary, ternary, and quaternary bases to base 10.

### Instructions

1. Read each question carefully and make sure you understand what is being asked before you start working on the problem.
2. Use the space provided to write your answers and show your work.
3. Check your work once you have completed all the questions to ensure accuracy.
4. Ask for help if needed.

**Binary to Decimal Conversion**

Convert the following binary numbers to decimal (base 10) and show your work:
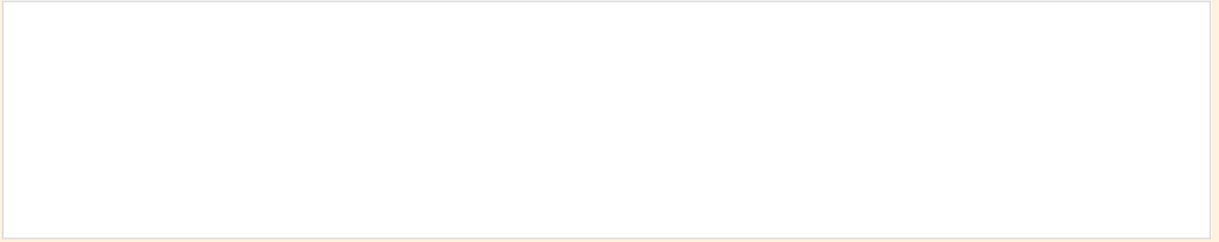
1. 1010

2. 1101

3. 1001

**Ternary to Decimal Conversion**

Convert the following ternary numbers to decimal (base 10) and explain how the base of a number affects its decimal equivalent:

1. 212

2. 101

3. 220

**Quaternary to Decimal Conversion**

Convert the following quaternary numbers to decimal (base 10) and discuss the challenges and benefits of working with different number bases:

1. 123

2. 310

3. 212

## Part 2 - Applying Conversion Techniques

**Mixed Base Conversion**

Convert the following mixed base numbers to decimal (base 10) and compare the decimal equivalents:

1. Binary: 1111

2. Ternary: 222

3. Quaternary: 321

**Real-World Applications**

Research and list 3 real-world applications where different number bases are used and explain how understanding number bases is crucial in these applications.

## Extension Activities

**Choose any combination:**

1. Create your own conversions by generating 3 decimal fractions and converting them into binary, ternary, and quaternary bases.

2. Solve a number base-themed puzzle or play a game that involves converting between different bases and reflect on how this activity reinforced your understanding of number bases.

## Success Criteria and Parent/Guardian Notes

**Success Criteria**

To successfully complete this assignment, ensure you:

- Accurately convert decimal fractions from binary, ternary, and quaternary bases to base 10.
- Demonstrate understanding of the conversion process through clear explanations and work.
- Complete all parts of the assignment, including the main activities and any chosen extension activities.
- Show evidence of critical thinking and problem-solving skills.

**Parent/Guardian Notes**

To support your child in completing this assignment:

- Encourage independence but be available to provide guidance if needed.
- Discuss the concept of number bases and their real-world applications to deepen their understanding.
- Help your child manage their time effectively to ensure the assignment is completed within the given timeframe.
- Review and provide constructive feedback to reinforce their learning.

## Conclusion and Reflection

**Reflect on your learning:**

Reflect on what you have learned about number bases and how you can apply this knowledge in real-world situations. What challenges did you face, and how did you overcome them? What would you like to learn more about regarding number bases?