C++ Recursion Program Instructions

This C++ program demonstrates the use of recursion to solve simple real-world problems. The program includes four parts: Grocery List, Change Calculator, Task Scheduler, and Countdown Timer.

Instructions for Each Section:

1. Grocery List:

- The program will ask you how many items are in your grocery list.

- You will input the name of each item in the list.

- The program will print the list in reverse order using recursion.

Steps:

- When prompted, enter the number of items in your grocery list.

- Then, for each item, enter its name when prompted.

- After entering all items, the program will display the list in reverse order.

2. Change Calculator:

- The program will calculate the minimum number of coins needed to make a given amount (in cents).

- It uses U.S. coin denominations: quarters (25 cents), dimes (10 cents), nickels (5 cents), and pennies (1 cent).

Steps:

- Enter the amount (in cents) you need to make change for.

- The program will calculate and display the minimum number of coins needed for that amount.

3. Task Scheduler:

- The program simulates a task scheduler, where tasks may have dependencies (prerequisite tasks).

- It uses recursion to determine the correct order in which tasks must be completed, starting with the prerequisites.

Steps:

- Enter the task you want to complete (e.g., "Prepare Dinner").

- Input the number of prerequisite tasks (dependencies).

- For each prerequisite, enter its name when prompted.

- The program will then print the tasks in the order they must be completed (starting with prerequisites).

4. Countdown Timer:

- The program will count down from a given number to zero using recursion.

- It will print each number followed by an ellipsis (e.g., "5... 4... 3...") until it reaches zero.

Steps:

- Enter the starting number for the countdown.

- The program will print the countdown, ending with the message "Time's up!"

Key Concepts you should Use:

- Recursion: The program uses recursion to repeatedly call functions, breaking down the task until a base condition is met.

- Input: The program relies on user input for items in the grocery list, change amount, task dependencies, and countdown start number.

- Output: The program displays results based on the user's input, printing lists, coin counts, task orders, and countdown sequences.

Notes:

- Grocery List: The program prints items in reverse order due to the recursive nature of the function.

- Change Calculator: It efficiently calculates the minimum coins by reducing the amount with each recursive call.

- Task Scheduler: It ensures tasks are completed in the correct order by first handling dependencies (prerequisites).

- Countdown Timer: The countdown works by repeatedly calling itself until the countdown reaches zero.

Sample Output:

```
--- Grocery List ---
How many items do you have in your grocery list? 5
Your Grocery List:
Enter item 5: lettuce
Enter item 4: Onions
Enter item 3: tomatoes
Enter item 2: potato
Enter item 1: cilanthro
- cilanthro
- potato
- tomatoes
- Onions
- lettuce

--- Change Calculator ---
Enter an amount in cents: 74
Minimum coins needed for 74 cents: 8

--- Task Scheduler ---
Enter the task you want to complete: Prepare Dinner
How many prerequisites does Prepare Dinner have? 2
Task Completion Order:
Enter prerequisite 2 for Prepare Dinner: Buy Grocery
Enter prerequisite 1 for Buy Grocery: Cook Rice
Completing task: Cook Rice
Completing task: Buy Grocery
Completing task: Prepare Dinner

--- Countdown Timer ---
Enter a countdown starting number: 25
25...
24...
23...
22...
21...
20...
19...
18...
17...
16...
15...
14...
13...
12...
11...
10...
9...
8...
7...
6...
5...
4...
3...
2...
1...
Time's up!
```