Python Fundamentals: The Grand Assignment

Welcome to your first major Python assignment! This homework is designed to help you master some of the most important building blocks of programming. You will be using variables, different data types, and a variety of operators to solve problems and create your own simple programs.

Instructions:
Complete each task in the order they are presented. Write your code in a single Python file, adding comments to explain your thought process for each section.

Task 1: My Personal Profile

This task focuses on creating variables and using the print() function to display information.

Concepts to practice:

- print()
- Variables
- Strings (str) and Integers (int)
- The len() function

Instructions:

1. Create a variable called your_name and assign it your full name as a string.
2. Create a variable called hometown and assign it the name of your hometown as a string.
3. Create a variable called favorite_number and assign it an integer value.
4. Use the len() function to find the number of characters in your your_name variable. Store this result in a new variable called name_length.
5. Print a single sentence that uses all the variables you created. For example: "Hello, my name is John Doe, I'm from New York, and my lucky number is 7."
6. On a new line, print a sentence that tells us the length of your name. For example: "The length of my name is 8 characters."

Task 2: The Magic of Numbers

This task will give you hands-on experience with all the core arithmetic operators.

Concepts to practice:

- Arithmetic operators: +, -, *, /, //, **, %

Instructions:

1. **Addition & Subtraction:** Create two variables, num1 and num2, with any integer values. Print the sum and the difference of these two numbers.

2. **Multiplication & Division:** Create a variable price with a value of 5.75 and a variable quantity with a value of 12. Calculate the total cost by multiplying them and print the result. Then, calculate the price of a single item if the total cost was $100 for 8 items, and print the result.
3. **Floor Division (//):** Imagine you have 30 candies to share equally among 7 friends. Use floor division to find out how many whole candies each friend receives. Print the result.
4. **Exponentiation (**):** Calculate the square of 10 and the cube of 3. Print both results on separate lines.
5. **Modulo (%):** The modulo operator gives you the remainder after division. Use it to check if a number is even or odd. Create a variable my_number with an integer value. If my_number % 2 is 0, the number is even. Otherwise, it's odd. Print a sentence that states whether your number is even or odd.

Task 3: Interactive Type Casting

In this task, you'll use the input() function to get information from the user and then use type casting to work with the data correctly.

Concepts to practice:

- input()
- Type casting: str(), int(), float()

Instructions:

1. Use the input() function to ask the user for the name of their favorite book. Store the response in a variable called book_title.
2. Use the input() function to ask the user for the year the book was published. Store the response in a variable called year_published. **Remember that input() always returns a string!**
3. Try to subtract 5 from the year_published variable. You will get an error.
4. Fix the error by using the int() function to convert year_published into an integer. Store the result in a new variable, published_five_years_ago.
5. Print a sentence that says: "The book '[book title]' was published in [year] and 5 years ago it would have been [result]."

Task 4: The Grand Finale Project

Now, let's combine everything you've learned into a single, interactive program.

Instructions:

1. Use the input() function to ask the user for their first name and store it in a variable.
2. Ask for their age and store it.
3. Ask for their favorite subject in school and store it.
4. Use the len() function to get the length of their first name. Store this value.
5. Use int() to convert the user's age into an integer.

6. Perform the following calculation: (age ** 2) + len(first_name). Store the result in a variable called calculation_result.
7. Print a final, friendly summary message that uses all the variables and the calculated result. The message should combine strings and numbers using type casting where needed.

Example Output:
"Hello, Jane! You are 16 years old and love Chemistry. Your name has 4 letters, and our special calculation for you resulted in 260!"
Good luck, and remember to save your work!