Assignments: For Loops Learning Path

1. Counting in a Loop

Objective: Understand the basic structure of a for-loop.
Task:
Write a program that prints the numbers 1 through 10 on separate lines.

Guidance for students:

- Think about what three components go inside a for-loop: *initialization*, *condition*, and *increment*.
- Ask yourself: What's the starting number? When should it stop? By how much should it step?

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2. Summing Numbers

Objective: Explore how for-loops can calculate and store values.
Task:
Write a program that finds the sum of numbers from 1 to 100.

Guidance:

- Instead of printing, store results in a variable (e.g., `total`).
- Add the loop variable to this running total each iteration.
- At the end, print the total.
- Question to consider: How does your result connect to the arithmetic series formula?

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3. Patterns with Stars

Objective: Practice nested for-loops.
Task:
Write a program that prints a right-angled triangle made of `*`, like this (5 rows):

```
*
**
***
****
*****
```

Guidance:

- A loop helps print each row. Another loop controls how many stars in the row.
- Think: The row number tells you how many times to print `*`.
- Challenge extension: Invert the triangle.

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4. Multiplication Table

Objective: Apply loops to generate structured output.
Task:
Write a program that prints the multiplication table (1 through 10).

Guidance:

- Use **nested loops**: one for the rows, one for the columns.
- Decide: Should you print results aligned in a grid?
- Extension question: How can you format the table neatly using `\t` (tab) or string formatting?

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5. Word Analyzer

Objective: Apply loops to process text (strings).
Task:
Write a program that takes a word or sentence as input, then:

1. Counts the number of vowels in it.
2. Reverses the word/sentence using a loop.
3. Prints the result in both normal and reversed forms, along with the vowel count.

Guidance:

- Remember: a string can be *treated like a sequence*, so you can loop over its characters.
- Ask: How do you check if a character is a vowel? (Hint: membership test `"a" in "aeiou"`).
- To reverse, loop backwards from the last character to the first.
- Bonus thinking: How would it change if we also counted words, not just letters?