

# Coding Starters: A Formal Learning Module

## 1. Introduction to Coding

Coding, also known as programming, is the process of giving instructions to a computer to perform tasks. These instructions are written in programming languages designed for humans to communicate with machines. Learning to code builds problem-solving skills, logical thinking, and creativity.

## 2. Introduction to Algorithms

An algorithm is a step-by-step set of instructions designed to solve a problem or complete a task. Algorithms are the foundation of all computer programs. They must be clear, precise, and efficient.

### Characteristics of Algorithms:

- *Definiteness* – Each step must be clear and unambiguous.
- *Finiteness* – The process must end after a specific number of steps.
- *Input* – Algorithms receive data or information.
- *Output* – Algorithms produce results.
- *Effectiveness* – Each step must be simple enough to be carried out.

### Example Algorithm: Making a Sandwich

1. Get two slices of bread.
2. Spread peanut butter on one slice.
3. Spread jelly on the other slice.
4. Put the slices together.
5. Serve.

## 3. Introduction to Scratch

Scratch is a block-based visual programming language designed for beginners. It uses drag-and-drop coding blocks to help learners understand basic programming concepts without needing to type code.

#### **Main Scratch Block Categories:**

- *Motion* – Moves the sprite (e.g., 'move 10 steps').
- *Looks* – Changes appearance (e.g., 'say Hello').
- *Sound* – Plays audio effects.
- *Events* – Starts actions (e.g., 'when green flag clicked').
- *Control* – Loops and conditions (e.g., 'repeat 10').
- *Sensing* – Detects interactions (e.g., touching objects).
- *Operators* – Mathematical or logical operations.
- *Variables* – Stores information.

#### **Example Scratch Program:**

When the green flag is clicked:

- Move 10 steps
- Say 'Hello, world!' for 2 seconds
- Repeat 5 times: turn 15 degrees

## **4. Introduction to Python Turtle**

Python Turtle is a beginner-friendly graphics library that introduces programming concepts through drawing. It allows learners to control a "turtle" that moves on the screen based on code commands.

#### **Basic Commands:**

- *forward(x)* – Moves the turtle forward by x units.
- *backward(x)* – Moves backward by x units.
- *right(angle)* – Turns the turtle right by a certain angle.
- *left(angle)* – Turns the turtle left.
- *penup()* – Lifts the pen so it does not draw.
- *pendown()* – Places the pen down to start drawing.

#### **Example 1: Drawing a Square**

```
from turtle import *
```

```
for i in range(4):
    forward(100)
    right(90)
```

### **Example 2: Drawing a Star**

```
from turtle import *
for i in range(5):
    forward(150)
    right(144)
```

## **5. Coding Concepts for Beginners**

- 1. Sequencing** – The order in which instructions are executed.
- 2. Loops** – Repeating instructions multiple times.
- 3. Variables** – Storing and updating information.
- 4. Conditionals** – Making decisions based on conditions.
- 5. Functions** – Grouping code into reusable blocks.

## **6. Benefits of Learning Coding Early**

- Improves problem-solving and logic
- Enhances creativity and innovation
- Builds foundational digital literacy
- Encourages persistence and critical thinking
- Opens pathways to STEM careers

## **Conclusion**

Coding introduces students to the world of problem-solving, creativity, and computational thinking. Through algorithms, Scratch programming, and Python Turtle, learners gain the foundational skills needed to explore more advanced programming concepts in the future.