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CURRICULUM OUTLINE COMPUTER SCIENCE FUNDAMENTALS: EXPRESS

A Guide for Computer Science Fundamentals: Express

COMPUTER SCIENCE FUNDAMENTALS: EXPRESS

9-18 YEARS

MODULE 1

UNIT 1	**SEQUENCING**

➢ **LESSON 1: Programming with Angry Birds**

  ○ **DESCRIPTION :** In this skill-building lesson, students will develop sequential algorithms to move a bird from one side of a maze to the pig on the other side. To do this, they will stack code blocks together in a linear sequence, making them move straight, turn left, or turn right.

    ■ Video: Maze Intro - Programming with Blocks
    ■ Skill Building
    ■ Challenge
    ■ Practice
    ■ Prediction
    ■ Practice
    ■ Challenge

➢ **LESSON 2: Debugging in Maze**

  ○ **DESCRIPTION :** In this skill-building lesson, students will encounter pre-written code that contains mistakes. They will need to step through the existing code to identify errors.

    ■ Video: Debugging with Scrat
    ■ Skill Building
    ■ Challenge
    ■ Prediction
    ■ Practice

➢ **LESSON 3: Collecting Treasure with Laurel**

  ○ **DESCRIPTION :** In this skill-building lesson, students will continue to develop their understanding of algorithms and debugging. With a new character, Laurel the Adventurer, students will create sequential algorithms to get Laurel to pick up treasure as she walks along a path.

    ■ Video: The Collector
    ■ Skill Building
    ■ Challenge
    ■ Practice
    ■ Prediction
    ■ Practice

➢ **LESSON 4: Creating Art with Code**

  ○ **DESCRIPTION :** In this skill-building lesson, students will take control of the Artist to complete drawings on the screen.

    ■ Video: Artist Intro with JR Hildebrand
    ■ Skill Building
    ■ Challenge
    ■ Practice
    ■ Prediction

MODULE 1

SPRITES

➢ **LESSON 1: Swimming Fish in Sprite Lab**

   ○ **DESCRIPTION :** Students will program a simple animated underwater scene in this skill-building lesson.

     ■ Video: Introducing Sprite Lab
     ■ Prediction
     ■ Skill Building
     ■ Video: How to Make a Sprite
     ■ Practice
     ■ Free Play

➢ **LESSON 2: Making Sprites**

   ○ **DESCRIPTION :** In this skill-building lesson, students will work through a series of programming levels on the computer, finishing with an open-ended "free play" task where they can build whatever they like. Students will write programs and learn about the two concepts at the heart of Sprite Lab: sprites and behaviors.

     ■ Exploration: Sample Apps
     ■ Skill Building
     ■ Practice
     ■ Free Play: Make a Scene

MODULE 1

UNIT 3	EVENTS

➢ **LESSON 1: Sprites in Action**

  ○ **DESCRIPTION :** In this skill-building lesson, students will work through a series of programming levels on the computer, finishing with an open-ended "free play" task where they can build whatever they like. Students will write programs that respond to timed events and user input.

  ■ Prediction
  ■ Video: Sprites in Action
  ■ Skill Building
  ■ Practice
  ■ Free Play: Make an Interactive Scene

➢ **LESSON 3: Dance Party**

  ○ **DESCRIPTION :** In this skill-building lesson, students will program an interactive dance party.

  ■ Video: Dance Party Warm Up
  ■ Practice
  ■ Video: Dance Party Events
  ■ Events
  ■ Video: Dance Party Measures
  ■ Measures
  ■ Video: Dance Party Properties
  ■ Properties
  ■ Video: Dance Party Party On!
  ■ Free Play

➢ **LESSON 2: Virtual Pet with Sprite Lab**

  ○ **DESCRIPTION :** Students will create an interactive Virtual Pet that looks and behaves how they wish in this mini-project lesson. Students will use Sprite Lab's "Costumes" tool to customize their pet's appearance. They will then use events, behaviors, and other concepts they have learned to bring their project to life.

  ■ Exploration
  ■ Mini-Project: Create a Virtual Pet
  ■ Free Play

MODULE 1

UNIT 4 — LOOPS

➢ **LESSON 1: Loops with Rey and BB-8**

  ○ **DESCRIPTION :** This skill-building lesson has students using loops to help the Star Wars character BB-8 efficiently traverse a maze.

    ■ Video: Programming with Rey and BB-8
    ■ Practice
    ■ Prediction
    ■ Video: Repeat Blocks with BB-8
    ■ Skill Building
    ■ Challenge
    ■ Practice
    ■ Prediction
    ■ Practice

➢ **LESSON 2: Mini-Project: Sticker Art**

  ○ **DESCRIPTION :** This mini-project lesson builds on the understanding of loops. Students will create unique artwork with the Artist.

    ■ Mini-project: Sticker Design
    ■ Free Play

➢ **LESSON 3: Nested Loops in Maze**

  ○ **DESCRIPTION :** In this skill-building lesson, students will learn how to program a loop inside of another loop.

    ■ Practice
    ■ Video: Nested Loops with the Bee
    ■ Prediction
    ■ Practice
    ■ Challenge
    ■ Practice
    ■ Prediction

➢ **LESSON 4: Snowflakes with Anna and Elsa**

  ○ **DESCRIPTION :** This mini-project lesson takes students through a series of exercises to create snowflake images using characters from the Frozen movies.

    ■ Skill Building
    ■ Practice

MODULE 1

UNIT 5	CONDITIONALS

➢ **LESSON 1: Looking Ahead with Minecraft**

○ **DESCRIPTION :** This skill-building lesson gives students the chance to practice concepts that they have learned up to this point and get their first experience with conditionals!

■ Skill Building
■ Challenge
■ Free Play

➢ **LESSON 3: While Loops in Farmer**

○ **DESCRIPTION :** In this skill-building lesson, students will be working to fill holes and dig dirt in Farmer, but they will not know the size of the holes or the height of the mounds of dirt. To solve these puzzles, students will use a new kind of loop.

■ Skill Building
■ Video: While Loops with the Farmer
■ Prediction
■ Skill Building
■ Challenge
■ Practice
■ Prediction

➢ **LESSON 2: If/Else with Bee**

○ **DESCRIPTION :** In this skill-building lesson, your class will continue to code with conditionals, allowing them to write code that functions differently depending on the specific conditions the program encounters.

■ Video: Conditionals: If Statements
■ Prediction
■ Skill Building
■ Video: Conditionals: If and If/Else Statements
■ Skill Building
■ Prediction
■ Challenge
■ Practice

➢ **LESSON 4: Conditionals in Minecraft: Voyage Aquatic**

○ **DESCRIPTION :** In this context-setting lesson, students will get the chance to practice content that they have learned up to this point, as well as getting a sneak peek at conditionals!

■ Video: Minecraft: Voyage Aquatic Introduction
■ Skill Building
■ Video: Minecraft: Voyage Aquatic Repeat Until
■ Skill Building
■ Video: Minecraft: Voyage Aquatic Conditionals
■ Skill Building
■ Video: Minecraft: Voyage Aquatic Congratulations
■ Free Play

MODULE 1

➢ **LESSON 5: Until Loops in Maze**

    ○ **DESCRIPTION :** In this skill-building lesson, students will learn about until loops. Students will build programs that have the main character repeat actions until they reach their desired stopping point.

        ■ Skill Building
        ■ Video: Repeat Until Statements
        ■ Prediction
        ■ Skill Building
        ■ Challenge
        ■ Practice
        ■ Prediction

➢ **LESSON 6: Harvesting with Conditionals**

    ○ **DESCRIPTION :** Students will practice while loops, until loops, and if / else statements. All of these blocks use conditionals. By practicing all three, students will learn to write complex and flexible code.

        ■ Video: Harvesting with Conditionals
        ■ Skill Building
        ■ Practice
        ■ Challenge
        ■ Practice
        ■ Prediction

MODULE 1

UNIT 6 — FUNCTIONS

➢ **LESSON 1: Functions in Minecraft**

○ **DESCRIPTION :** In this skill-building lesson, students will begin to understand how functions can be helpful!

- Video: Minecraft - The Agent
- Skill Building
- Video: Minecraft - Repeat Loops
- Skill Building
- Video: Minecraft - Functions
- Skill Building
- Video: Minecraft - Congratulations
- Free Play

➢ **LESSON 3: Functions with Artist**

○ **DESCRIPTION :** In this skill-building lesson, students will use functions with the Artist.

- Prediction
- Practice
- Challenge
- Practice
- Prediction
- Free Play

➢ **LESSON 2: Functions with Harvester**

○ **DESCRIPTION :** In this skill-building lesson, students will use conditionals with functions to harvest crops in Harvester.

- Practice
- Video: How to Create a Simple Function
- Practice
- Challenge
- Practice
- Prediction

MODULE 1

UNIT 7	VARIABLES

➢ **LESSON 1: Text and Prompts**

  ○ **DESCRIPTION :** In this skill-building lesson, students will get practice with variables in Sprite Lab.

   ■ Prediction
   ■ Video: Text and Prompts
   ■ Skill Building
   ■ Practice

➢ **LESSON 3: Using Variables with the Artist**

  ○ **DESCRIPTION :** In this skill-building lesson, students will explore the creation of repetitive designs using variables in the Artist environment. Students will learn how variables make code easier to write and easier to read. After guided puzzles, students will end in a free play level to show what they have learned and create new designs.

   ■ Prediction
   ■ Video: Variables in Artist
   ■ Skill Building
   ■ Free Play

➢ **LESSON 2: Counting with Variables**

  ○ **DESCRIPTION :** In this skill-building lesson, students will use variables to track a value that changes over time, like a counter. This lesson also includes a short mini-project in which students create a simple game.

   ■ Prediction
   ■ Skill Building
   ■ Exploration: Clicker Game
   ■ Mini-Project: Clicker Game

➢ **LESSON 4: Variables with the Bee**

  ○ **DESCRIPTION :** This skill-building lesson will help illustrate how variables can make programs more dynamic by allowing values to change while the code is running.

   ■ Skill Building
   ■ Practice

MODULE 1

UNIT 8   FOR LOOPS

➢ **LESSON 1: For Loops with Bee**

     ○ **DESCRIPTION :** This skill-building lesson focuses on for loops and using an incrementing variable to solve more complicated puzzles.

          ■ Review
          ■ Exploration: For Loops
          ■ Video: For Loops
          ■ Prediction
          ■ Skill Building
          ■ Practice

➢ **LESSON 2: For Loops with Artist**

     ○ **DESCRIPTION :** In this skill-building lesson, students practice "for" loops with Artist. Students will complete puzzles to create complex designs and unique art.

          ■ Video: For Loops
          ■ Exploration
          ■ Skill Building
          ■ Free Play

MODULE 1

| UNIT 9 | END OF COURSE PROJECT |

➢ **LESSON 1: End of Course Project**

   ○ **DESCRIPTION :** This project lesson takes students through the process of designing, developing, and showcasing new projects!

      ■ Example Projects
      ■ Create your project