Course E

Overview
Course E in CS Fundamentals was tailored to the needs of students in the fourth grade.

At this point, students should be growing in their confidence with using basic programming concepts and are ready to start using them to solve more novel problems. Throughout this course, students will learn to identify when to apply and combine the many concepts they've learned in previous courses. Students will begin with some light review, followed by a deep dive into the idea of functions. For many, the lessons in Course E will provide the first puzzles where difficult concepts are mixed together, making it one of the most challenging courses in the series.

Because of the complexity of Course E, it is important to be consistent with expectations from the very beginning. With fourth graders, it is advised that students are encouraged to work together to find solutions rather than relying on help from the teacher or another experienced supervisor. Students should be empowered to try multiple techniques and should be given praise for persistence and for helping others.

Ultimately, Course E will set the foundation for Course F in the fifth grade. This means that it is as critical for students to understand the ideas behind each puzzle as it is for them to successfully solve it. For this reason, you might want to show students how to use peer interaction or journaling to help with difficult puzzles. Mainly, they should be able to ask and answer four questions:

- What does the puzzle want me to do?
- What did I try to make that happen?
- Where did it go wrong?
- What might be the next thing I could try?

Core concepts:

- Sprites
- Digital Citizenship
- Nested Loops
- Functions
- Impacts of Computing

Attitudinal goals:

- There are often many ways to solve a problem.
- Reflecting on past problems helps me solve new ones.
- Programming is creative.

Key teaching tips:

- Talk with students before you begin about how they may experience frustration.
- Use pair programming and encourage students to help each other.
- Require students to make a first attempt at problem solving before asking for help.
- Remind students of the importance of persistence.
- Encourage students to use a journal during and after activities.
- Promote an environment of cross-team collaboration for group activities and projects.

Course E: Lesson Outlines

Online lessons are in regular text and unplugged lessons are **bolded**.

Concept Chunk	#	Lesson Name	Description
Ramp Up	1	Sequencing in Maze	Students will practice sequencing and debugging before adding new skills.
	2	Drawing with Loops	This lesson gets students thinking about why loops are better than longhand.
	3	Conditionals in Minecraft: Voyage Aquatic	Students will get the chance to practice ideas that they have learned up to this point, as well as getting a sneak peek at conditionals.
	4	Conditionals with the Farmer	This lesson introduces students to `while` loops and `if / else` statements.
Sprites	**5**	**Simon Says**	In this lesson, students will play a game intended to get them thinking about the way commands need to be given to produce the right result. This will help them more easily carry over to the Sprite Lab programming environment in the upcoming lessons.
	6	Swimming Fish with Sprite Lab	In this lesson, students will learn about the two concepts at the heart of Sprite Lab: sprites and behaviors.
	7	Alien Dance Party with Sprite Lab	Using Sprite Lab, students create their own alien dance party with interactions between characters and user input.
Digital Citizenship	**8**	**Private and Personal Information**	Created by Common Sense Education, this lesson is about the difference between information that is safe to share online and information that is not.
	9	About me with Sprite Lab	By creating an interactive poster in Sprite Lab, students will apply their understanding of sharing personal and private information on the web.
	10	**Digital Sharing**	Students will learn the proper way to use content that is not their own.
Nested Loops	11	Nested Loops in Maze	In this online activity, students will have the opportunity to push their understanding of loops to a whole new level.
	12	Fancy Shapes using Nested Loops	Students will create intricate designs using Artist. By continuing to practice nested loops with new goals, students will see more uses of loops in general.
	13	Nested Loops with Frozen	This lesson will take students through a series of exercises to help them create their own portfolio-ready images.
Functions	**14**	**Songwriting**	This lesson will help students intuitively understand why combining chunks of code into functions can be such a helpful practice.
	15	Functions in Minecraft	Students will begin to understand how functions can be helpful in this fun and interactive Minecraft adventure.
	16	Functions with Harvester	Students will use functions to harvest crops in Harvester. This lesson will push students to use functions in the new ways by combining them with `while` loops and `if / else` statements.
	17	Functions with Artist	Students will be introduced to using functions with the Artist to create and modify magnificent images.
Impacts of Computing	18	**Designing for Accessibility**	In this lesson, students will learn about accessibility and the value of empathy through brainstorming and designing accessible solutions for hypothetical apps.
Project	19	End of Course Project	Students will be given their own space to create their project with either Artist or Sprite Lab.