CodeHS

World of Computing Course Syllabus
1 semester for middle school (45 contact hours)

Course Overview and Goals

The World of Computing course is a first-year computer science course introducing the basics of programming with Karel the Dog, and the history and impact of computing. Students will learn to code using blocks to drag and drop, but they can switch between blocks and text as desired.

With a unique focus on creativity, problem-solving and project-based learning, World of Computing gives students the opportunity to explore several important topics of computing using their own ideas and creativity to develop an interest in computer science that will foster further endeavors in the field.

Learning Environment: The course utilizes a blended classroom approach. The content is a mix of web-based and physical activities. Students will write and run code in the browser, create digital presentations, and engage in in-person collaborative exercises with classmates. Teachers utilize tools and resources provided by CodeHS to leverage time in the classroom and give focused 1-on-1 attention to students.

Programming Environment: Students write and run programs in the browser using the CodeHS online editor. Students will be able to write both text-based and block-based programs in Karel. Students gain programming experience early on in the course that will enable them to explore the rest of the course topics through computational thinking practices.

Quizzes: At the end of each unit, students take a summative multiple choice unit quiz that assesses their knowledge of the concepts covered in the unit.

Prerequisites: The World of Computing course is designed for complete beginners with no previous background in computer science. The course is highly visual, dynamic, and interactive, making it engaging for those new to computer science.

More information: Browse the content of this course at https://codehs.com/course/25827

Course Breakdown

Unit 1: Karel Adventures 1 (2-3 weeks/10-15 hours)

Students learn the basics of JavaScript as they follow Karel the Dog on a fun-filled adventure.

Browse the full content of this unit at https://codehs.com/course/25827/explore/module/35823

Objectives / Topics Covered	• Syntax • Commands • Debugging • Looping • Conditionals • Comments

Example Assignments / Labs	• Karel's Coding Environment
	  ○ Example Exercise: *Walk Around the Pond*
	  Karel loves to take strolls around the pond! In this program, Karel should walk all around the edge of the pond. Some code has been written for you.
	  Step 1: Run the code to see where Karel ends up.
	  Step 2: Write the code to move Karel across the top of the pond.
	  Step 3: Write the code to move Karel across the left side of the pond. Make sure Karel finishes facing right.
	• Karel Error Messages
	  ○ Example Exercise: *Debug #1*
	  In the editor is a buggy program for the problem outlined below. Find the bug and fix it.
	• The Rabbit Chase
	  ○ Example Exercise: *Riley's Escape*
	  Program Karel to create an ORANGE bridge over the stream to chase Riley (represented by a gray square) using the `paint()` command. The bridge must be built over the shallow (lighter blue) water.
	• Lost in Space
	  ○ Example Exercise: *Asteroid Field*
	  It looks like there is an asteroid field in between Karel and Mars! Help Karel to destroy each asteroid. Program Karel to use if statements and conditions to paint each asteroid (orange square) black.

Unit 2: Karel Adventures 2 (2 weeks/10 hours)

Students build on their learning from Karel Adventures 1 to learn about functions and program planning as they follow Karel the Dog on a fun-filled adventure.

Browse the full content of this unit at https://codehs.com/course/25827/explore/module/35824

Objectives / Topics Covered	• Control Structure • Flowcharts • Conditional Loops • Conditional Statements • Nested Loops • Functions • Top Down Design • RGB Color Model

Example Assignments / Labs	• Quest for the Rosetta Stone
	  ○ Example Exercise: *Pick Up the Hat 1*
	  Before heading off to Egypt, Karel must get her hat! Move Karel across the row. If Karel is on an orange square (her hat!), Karel should paint the square blue to pick up the hat.
	  ○ Example Exercise: Escape the Scarab Room
	  Help Karel make it out of the Scarab room! Your Task: Your program should use multiple control structures to complete these tasks:
	  Karel should move all the way across the hall.
	  If Karel comes to a barrier, Karel should move to the other side of the hall. Once on the other side, Karel should continue moving until Karel comes to another barrier.
	• A Day at the Park
	  ○ Example Exercise: *Karel Clean Up*
	  For this exercise, you are going to help Karel pick up all the dropped balls to take them to the park and hide them for the scavenger hunt. There are multiple Karel worlds of different sizes, so you will need to use a `while` loop to get you to the end, and inside the while loop you will need an `if` statement to pick up a ball if one is present.
	• Karel Adventures 2: Evaluation
	  ○ Example Exercise: *Collect the Tennis Balls*
	  In this challenge, you will combine all of the coding skills you have learned with Karel to write a program that has Karel pick up all of the tennis balls. Your program should work in all three worlds.
	  Your program should incorporate the following:
	  Multiple functions to help break down the program, for loops, while loops, and if-statements.

Unit 3: Exploring Computing (2 weeks/10 hours)

Students explore different technologies and the impact they have on our world.

Browse the full content of this unit at https://codehs.com/course/25827/explore/module/35825

Topics Covered	• History of Computing • Software • Hardware • Cloud Computing • Internet of Things • Ethics and Legal Considerations • The Future of Computing

Example Assignments	• History of Computing
	  ○ Example Exercise: *Jigsaw: Computer Interaction Over the Decades*
	  In this activity, you are going to work in small groups to research what it was like to interact with computers over the various decades. You will split into groups of 4 people to start. Once in your group, decide who will research which decades:
	  Early 1970s and earlier
	  1980s (Focus on earlier to mid part of the decade)
	  1990s/Early 2000s
	  Late 2000s and later
	• Cloud Computing
	  ○ Example Exercise: *Cloud or Physical?*
	  In this exercise, you need to decide if a clue sounds more like cloud computing or more like physical computing. Drag each clue to the box you think it belongs in and then check your results.
	• Hardware
	  ○ Example Exercise: *Brainstorm: New Computer Components*
	  In this activity, you are going to work with a partner to brainstorm 3 new components for a computer. It can be an entirely new idea or an improvement of an existing component. As you think about your ideas, think about how you interact with a computer and also the physical hardware of computers. For each idea, answer the following questions: What is it? Does it replace something, or is it an additional item? If it replaces something, what is it replacing? How will this be helpful in the future?

Unit 4: Exploring Code with Karel (2 weeks/10 hours)

Students learn the basics of programming by giving Karel the Dog commands in a grid world.

Browse the full content of this unit at https://codehs.com/course/25827/explore/module/35826

Objectives / Topics Covered	• Commands • Comments • Debugging • Functions • Decomposition

	● Looping ● Conditionals ● Conditional Loops ● Top Down Design
Example Assignments / Labs	● Karel's World ○ Example Exercise: *Karel's Evening Walk* Take Karel on a walk around the north side of the pond. Remember the directions Karel can face and write a program to move Karel along the path from one edge of the world to the other. Karel should be facing south at the end of the path. But wait! Karel noticed a missing tennis ball laying on the path. Go ahead and let Karel pick it up along the walk. ● Functions ○ Example Exercise: *Spinning Karel* Create a function to program Karel to spin each time Karel lands on a ball. Some starter code has already been added for you. ● For Loops ○ Example Exercise: *Tennis ball in Each Corner* Write a program that tells Karel to put a tennis ball in each corner of the world and end back at the starting position facing right or east. Be sure to use at least one for loop in your program! Two would be even better! ● While Loops ○ Example Exercise: *Path to Dog House* Karel needs to stay on the pathway to get to the dog house. Make sure Karel continues moving until inside the dog house. Use at least 3 functions (provided to you), include 1 while loop, use at least 2 conditionals, use 1 if/else statement and 1 nested if statement, and include at least 2 sets of comments that describe your code. ● Karel Challenges ○ Example Exercise: Super Tennis Ball Clean Up The dog parks are a complete mess. There are tennis balls all over the place, and Karel needs to clean them up. Karel will start in the bottom left corner of each dog park world facing east. Karel should clean up all of the tennis balls in each dog park world. This program should be general enough to work on any size world with tennis balls in any location. Once each dog park world is clean, Karel needs to return to the lower-left corner of the park and face east or to the right.