Texas Tech Apps (6th Grade)

Middle School (80 Contact Hours)

Course Overview and Goals

Texas Tech Apps (6th Grade) course introduces 6th grade students to programming and computer science through engaging, interactive lessons with Karel the Dog and Tracy the Turtle. Students develop creativity and problem-solving skills while learning coding basics, debugging, and Python concepts like loops, functions, and variables. The course also explores real-world topics including cybersecurity, cloud computing, digital citizenship, and data analysis.

Learning Environment

The course utilizes a blended classroom approach. The content is a mix of web-based and physical activities. Each module of the course is broken down into lessons. Lessons are composed of short video tutorials, interactive learning pages, quizzes, explorations, simulations, and free-response prompts.

Technology Requirements

To complete all activities and exercises in this course, students must have access to the 3rd party sites and tools listed here: Texas Tech Apps (6th Grade) Course Links.

Prerequisites

The Texas Tech Apps (6th Grade) 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/26022/overview.

Course Breakdown

Module 1: Karel Adventures 1 (2 weeks/10 hours)

Students are introduced to 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/26022/explore/module/36131

Topics Covered	• Syntax • Commands • Debugging

	• Looping • Conditionals • Comments

Example Assignments	• 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.

Module 2: Tracy's World (1 week/5 hours)

Students are introduced to turtle graphics as they explore the world of Tracy the Turtle and learn how to write commands she can follow. They also look into the history of programming languages, examining their evolution and the unique features that distinguish different languages.

Browse the full content of this unit at https://codehs.com/course/26022/explore/module/36132

Topics Covered	• What is a command? • How do we communicate with computers? • Moving Tracy • Drawing circles • History of programming languages • Why is Python such a popular language? • Tracy's coordinate system

Example Assignments	• Commands
	  ○ Drawing simple graphics
	  ■ Example Exercise: Caterpillar
	  Combine multiple commands to write a program that has Tracy draw 5 circles in a row
	• Programming Languages
	  ○ Learn about characteristics of programming languages
	  ■ Example Exercise: Programming Language Hierarchy
	  Drag and drop programming languages into a hierarchy based on characteristics of the language

Module 3: Moving Tracy (1 week/5 hours)

Students build on the commands they have learned to instruct Tracy around all parts of her world and use for loops to make their code more efficient.

Browse the full content of this unit at https://codehs.com/course/26022/explore/module/36133

Topics Covered	• Testing your own Tracy programs • Turning Tracy at right angles • For loops • Using coordinates and angles to move Tracy's position

Example Assignments	• Turning Tracy
	  ○ Learn how to use the left and right commands to let Tracy explore more of her world
	  ■ Example Exercise: 4 Columns
	  Write a program that will have Tracy split her world into 4 columns by drawing 3 vertical lines 100 pixels apart
	• For Loops
	  ○ For loops execute the code inside the loop a set number of times.
	  ■ Example Exercise: Row of Circles
	  In this program, Tracy should draw a row of circles across the width of the canvas using a for loop.
	• Turning Tracy Using Angles
	  ○ Any angle can be used to have Tracy draw shapes with diagonal lines.
	  ■ Example Exercise: Hexagon
	  Write a program, using for loops, that has Tracy draw a hexagon on the canvas.

Module 4: Designing and Communicating Solutions (2 weeks/10 hours)

Students explore useful ways to break down large problems to write readable and successful programs.

Browse the full content of this unit at https://codehs.com/course/26022/explore/module/36134

Objectives / Topics Covered	• Commenting your code • Naming rules in Python • Functions • Artistic commands • Adding text • Top down design

Example Assignments / Labs	• Commenting Your Code
	  ○ Commenting is important to make sure your code is understandable to yourself and others.
	  ■ Example Exercise: Circle Pyramid with Comments
	  Take your Circle Pyramid program from earlier and add comments to explain what your program is doing.
	• Functions
	  ○ Teach Tracy new commands by grouping a set of commands that can be called with one line of code.
	  ■ Example Exercise: Shape Stack
	  Give Tracy instructions to draw a tower of squares and circles from the bottom to the top of the canvas.
	• Artistic Commands
	  ○ There are many ways to get creative with the graphics Tracy draws, such as using color, filling in shapes, and leaving trails with varying thicknesses.
	  ■ Example Exercise: Kid's Shapes Toy
	  Write a program to have Tracy draw a representation of a popular toy used to teach children shapes and colors. There should be 4 different shapes with 4 different colors.
	• Adding Text
	  ○ Text can be added to the canvas using the **`write`** command
	  ■ Example Exercise: Baseball Diagram
	  Label the parts of the baseball field.
	• Top Down Design
	  ○ Solve large Tracy problems by breaking them down into smaller, more manageable problems.
	  ■ Example Exercise: Bubble Wrap 2.0
	  In this program, Tracy will add highlights to each bubble from our Bubble Wrap example program. Use top down design to break this large problem into smaller pieces!

Module 5: Controlling Tracy with Variables (3 weeks/15 hours)

Students learn about data types and how variables can be used in their Tracy programs. They also begin to learn how to manipulate strings in their programs, and learn how to add user interaction to their programs through user input and mouse click events.

Browse the full content of this unit at https://codehs.com/course/26022/explore/module/36135

Objectives / Topics Covered	• Variables • Data types • Strings • User input • Parameters • Clickable interaction • Debugging • The value of i in for loops

Example Assignments / Labs	• Variables
	  ○ Variables are used to store and manipulate values in our programs.
	  ■ Example Exercise: Dartboard
	  Write a program that uses variables to draw a dart board which consists of 4 concentric circles that each increase in radius by 25 pixels.
	• Data Types
	  ○ In this course, we will look at 4 data types: Strings, Integers, Floating Point Numbers, and Booleans
	  ■ Example Exercise: Categorizing Variables
	  Write variable values in their correct data type category.
	• Strings
	  ○ Strings can be manipulated using string methods.
	  ■ Example Exercise: Text Messaging
	  Edit the contents of a text conversation between you and a friend using string methods.
	• User Input
	  ○ We can use input from a user to control certain commands in our code and make our programs more personalized.
	  ■ Example Exercise: Four Corners
	  User input will dictate the length of the sides of a square. Squares of the indicated size will be drawn in each corner of the canvas.
	• Parameters
	  ○ Parameters can be used to customize functions to make them more reusable.
	  ■ Example Exercise: Colorful Caterpillar
	  Use parameters to draw a caterpillar with 8 body circles of 4 different colors.

	• Clickable Interaction
	  ○ Users can interact with Tracy programs using their mouse.
	  ■ Example Exercise: Click Counter
	  Each time the user clicks the canvas, update and display the number of times the screen has been clicked.
	• Extended Loop Control
	  ○ The value of i in a for loop is actually a variable! It can be altered and used to control commands in our code.
	  ■ Example Exercise: Dart Board Using i
	  Alter your previous Dart Board program to use the value of i to control the circle's radius instead of a separate variable.

Module 6: The Design Process (1-2 weeks/5-10 hours)

Students are introduced to the Design Process as they apply the concepts they have learned so far by completing a project where they will use Tracy to depict a common cycle.

Browse the full content of this unit at https://codehs.com/course/26022/explore/module/36136

Objectives / Topics Covered	• The Design Process • Review all concepts through this point

Example Assignments / Labs	• Who Uses the Design Process?
	  ○ Click on each industry to find out how they use the design process!
	• Research and Brainstorm
	  ○ In this activity, you'll explore different types of cycles (like the water cycle or rock cycle) and choose one to show using code.
	• Code your Cycle!
	  ○ Use all of the commands, artistic effects, and control structures we've learned so far to bring your sketched image to life on Tracy's canvas. Wherever possible, minimize and clean up your code using for loops and functions.

Module 7: 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/26022/explore/module/36137

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.
	• Cloud Computing
	  ○ Example Exercise: *Local Storage vs Cloud Storage?*
	  ■ Explore the difference between local and cloud storage, then test your knowledge with a fun review game!
	• The Future of Computing
	  ○ Example Exercise: *Design the Computer of Tomorrow*
	  ■ In this exercise, you are going to design The Computer of Tomorrow. You will want to consider everything you have learned in this unit as far as where computers have come from and where things are going.

Module 8: Exploring Digital Citizenship (2 weeks/10 hours)

Students learn about Internet etiquette and how to stay safe on the world wide web.

Browse the full content of this unit at https://codehs.com/course/26022/explore/module/36138

Topics Covered	• Digital Footprint • Cyberbullying • Internet Safety • Privacy & Security • Information Literacy • Copyright • Hacking Ethics • Cyber Hygiene

Example Assignments	• Digital Footprint and Reputation
	  ○ *Building a Positive Digital Footprint*
	  ■ Spend some time reflecting on you and your friends' social media activity. Give an example of a social media post that builds a positive digital footprint. How does the post build a positive digital footprint? Give an example of a social media post that builds a negative digital footprint. How does the post build a negative digital footprint? Thinking about your digital footprint, are you going to make any changes in what you post on social media? How about what you write to share in a group message? Why or why not?
	• Internet Safety

	○ *Scenario: School Stranger* ■ You begin to receive direct messages on Instagram from a person you don't recognize. They claim to go to your school, and they know a lot of information about your classes and teachers. They also follow a lot of your classmates, so you believe them. After a bit, they start asking questions about you and your friends. What steps should you take to respond to this situation? ● Information Literacy ○ *Evaluate the Source 1* ■ Take a look at this resource, and consider the following questions: What evidence do you see that this source is credible? What evidence do you see that makes you question the source's credibility? Is this a credible source?

Module 9: Exploring Data and Spreadsheets (2 weeks/10 hours)

Students learn about data, spreadsheets, then complete a project where they use a device to collect and analyze data to find an answer to a question they have.

Browse the full content of this unit at https://codehs.com/course/26022/explore/module/36139

Topics Covered	● Data as a Resource ● Using Databases ● Introduction to Spreadsheets ● Sort and Filter ● Statistical Measures ● Models ● Visualizing Data
Example Assignments	● Sort and Filter ○ *Influential Women* ■ In this exercise, students will learn about remarkable women who have made significant contributions in fields like Science, Literature, and Environmentalism, while having the opportunity to sort and filter data to uncover interesting facts and connections about these inspiring figures. ● Statistical Measures ○ *Mammal Statistics* ■ In this exercise, students will explore data on common mammals while calculating the mean, median, and mode of various data points to derive meaningful insights. ● Visualizing Data ○ *Create a Dashboard* ■ In this exercise, students will explore running analytics data and create an engaging running dashboard, a

	powerful tool that consolidates essential information and data visualizations in one place. ● Project: Tell Your Story ○ *Draft a Design* ■ For this activity, students will take time to explore data storytelling designs and draft their own story. They can create their infographic directly in the spreadsheet or sketch their design on paper, in PowerPoint, or using a program of their choice.