Ranger Robot Engineering and Computer Science Curriculum Overview

Exploring
THE SECRET CODE
with Ranger

Exploring Robotics

Instructor Guide

TOP SECRET
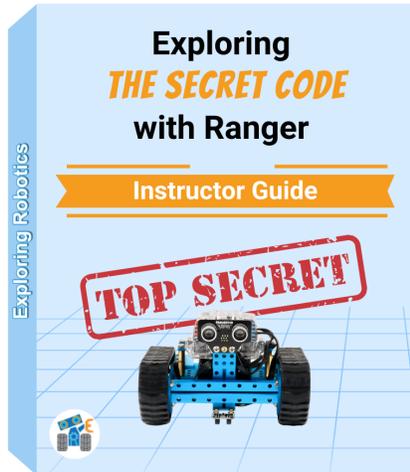
FOR GRADES: 6th - 10th   **AGES:** 11 - 16

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 # OF LESSONS: 8 Units broken into 21 Missions

CLASS TIME: Avg of 2 hrs per Mission

TOTAL HRS: 40 hrs (The curriculum is modular and can be varied based on time available, student background knowledge and interest).

STANDARDS: All of CSTA K-12 Level 2 also NGSS Engineering and Math

STUDENT/ROBOT RATIO: 1:1, 2:1, or 3:1

HANDS-ON LABS FOR: STEM/STEAM, Physical Science, Engineering, Computer Science (Coding), Math courses, Makerspaces, or Camps (Virtual or Face-to-Face)

PURPOSE: Empower students to excel in 21st Century skills and empower teachers to teach Integrated STEM, NGSS engineering, and CS coding concepts in one course. This curriculum will help teachers prepare and teach an elective course or a Science or CS/STEM unit. This curriculum can also be used for virtual programs, after-school programs, summer camps, clubs, home schools and Makerspaces. Educators can use this guide and the lessons in this curriculum to establish a student-centered learning environment and develop 21st century skills: Critical Thinking, Creativity, Collaboration, and Communication.

LEVEL: Beginner, no prior experience in robots, engineering or coding is required of students or teachers. Teachers can use the comprehensive step-by-step lessons to learn coding and engineering just before students. All materials needed to facilitate the lessons are included to reduce teacher prep time.

MATERIALS:
Robot Kit: MakeBlock mBot Ranger 3-in-1 Programmable Building Robotic Kit
Software: MakeBlock and mBlock 5 App
Device: PC, Chromebook, or Tablet (Android or iOS)
Notebook: Engineering Notebook for each student (physical 25+ pages or digital)

Exploring The Secret Code with Ranger

Discover the Secret Code Challenge incorporates the pillars of Computational Thinking; Pattern Recognition, Abstraction, Algorithms, and Decomposition. The curriculum provides activities, lessons, and challenges fully integrated with Science, Technology, Engineering, and Math.

Science - Physics Concepts for Force and Motion
Technology - Computer Science, Coding, Sensors, and Controls
Engineering - Mechanical, Electrical, Computer, and Design Thinking
Math - Algebra, Geometry, and Trigonometry

Overall the activities and experiences build skills in Computational Thinking through the Engineering Design Process. The activities and challenges integrate the problem solving process with math, logic, sequences, and coding to complete the missions. It is engaging and exciting while exposing the value of understanding foundational concepts in STEM.

To find and execute the Secret Code, a **PC, Chromebook, Tablet, or device that can use the mBlock 5 program** is required.

Curriculum Overview

Exploring The Secret Code with Ranger Curriculum is divided into an Introduction, 7 Units, a total of 21 Missions and the Secret Code Challenge. Each of the Units use the 5Es (Engage, Explore, Explain, Elaborate, Evaluate) model for teaching. Activities are based on "Hands-On Minds-On" and discovery-problem based learning. Inquiry, curiosity, and understanding are the guiding force behind the overall structure.

This Curriculum can be used as the basis of a rigorous, entry-level elective course that introduces students to STEM, engineering, and computer science or as supplemental materials for an inquiry science course. Exploring Robotics with Ranger centers around hands-on activities that the students will complete with a robot. During this process they will not only operate the robot to accomplish a challenge but will also learn new vocabulary, learn about technical concepts and sensors, create algorithms and programs, solve problems, perform math calculations, gather and communicate about data, and learn science and engineering concepts.