

9 Week Engineering Focus Scope and Sequence

Week 1 - Introduction

Weekly Summary: You will be introduced to the VEX IQ (2nd gen) Kit and learn how pieces are used together to create different shapes. This builds your spatial reasoning skills before moving into your first engineering challenge.

STEM Lab Units / Activities	Description
Scavenger Hunt Activity	Use the Interactive Parts Poster to learn more about the VEX IQ (2nd gen) Kit and find all the pieces described.
Get In Shape Activity	VEX IQ connectors allow limitless options to connect beams and plates. Follow the challenges in the activity to create different shapes using the VEX IQ pieces and connectors.
Hang Out Activity	VEX IQ beams and plates make up the structure of most builds. Students are challenged to build a device that hangs out the largest distance off of their desk.

Extra Challenge: complete the [Advanced Scavenger Hunt](#).

complete the Level Ups within each Activity and share the [Can You Name that Part? Activity](#).

Notebook:

1. Title “Scavenger Hunt” list answers (part names) for items a-j
2. Title “Hang Out Activity” Sketch and **record the length (data)** of your “hanging device.”

Week 2 - Robot Soccer Introduction

Weekly Summary: Explore how to use the Controller to drive the Simple Clawbot to grab, pass, and score the most points in a Robot Soccer competition.

STEM Lab Units / Activities	Description
Robot Soccer Lesson 1: Introduction	Students will build the VEX IQ Simple Clawbot and ensure the Controller and Battery is charged.
Driver Configurations Activity	Students will test their robot driving skills with four different driving configurations. Note that this activity shows a BaseBot, but can be completed with the Simple Clawbot that students are building.

Extra Challenge: practice your driving skills with [Block Party activity](#).

Notebook:

1. Title “Robot Soccer: Intro” Sketch and Label 8-10 parts of the **Simple Clawbot**
2. Title “Driver Config” Keep a detailed record of each configuration (Left Arcade, Right Arcade, Split Arcade, Tank Drive) you tested and **how long it took (data)** to lap the cube using that. Check page 2 of the activity, “config” to help with your notebooking.
3. Reflection: What was the most challenging part of your first build? How did you overcome it?

Week 3 - Robot Soccer Lesson 2

Weekly Summary: Learn about passive and active manipulators as well as intake designs before competing in a one-on-one Robot Soccer challenge.

STEM Lab Units / Activities	Description
Robot Soccer Lesson 2: Manipulators	Students will learn about passive and active manipulators as well as intake designs before competing in a one-on-one Robot Soccer challenge.

Extra Challenge: Time yourself and come up with a plan to remove *all* four cubes from the Field within **one minute** in the [Manipulators in Motion Practice Activity](#)

Notebook: **Title “Manipulators”**

Hint “Open Lesson Summary”

1. Define Manipulator
2. Sketch/label types: “Passive example” and “Active example”
3. Define and design an “Intake”
4. Define “Motor Group”
5. One benefit of “Motor Group”

Week 4 - Robot Soccer Lessons 3 and 4

Weekly Summary: You will compete in the Robot Soccer Competition, then reflect on your learning experience and related STEM careers.

STEM Lab Units / Activities	Description
Robot Soccer Lesson 3: Competition	Students will plan for the final Robot Soccer Competition and compete!
Robot Soccer Lesson 4: Conclusion	Students will reflect on their learning with the debrief conversation and connect the Unit to related STEM Careers.

Extra Challenge:

- Have students complete multiple choice board options for their chosen career in the Conclusion lesson to extend the Unit.
 - [Career Choice Board](#)

Notebook:

1. Title: Robot Soccer Competition: List rules, scoring, your strategies (How will you score the most points AND stop your opponent from scoring)
2. Title: Robot Soccer Reflection: Rate yourself and explain (Questions on page 2 Lesson 3: Competition)

Week 5 - Up and Over Introduction

Weekly Summary: You will build the Clawbot and get ready to compete in the Up and Over Competition. You will practice driving the robot with the *Controller* and use the *arm and claw*.

STEM Lab Units / Activities	Description
Up and Over Lesson 1: Introduction	Students will build the VEX IQ Clawbot and ensure the Controller and Battery is charged.
Navigate the Maze with Driver Control	Students will practice their driving skills as they navigate through a maze using driver control. Note that the activity shows a BaseBot, but can be completed with the Clawbot students build.
Defend the Castle Activity	Students will practice controlling the arm and claw of the robot using the Controller.

Extra Challenge:

- Design mazes in your engineering notebooks and share them with another group to challenge them to solve the maze and drive through.
- Complete the 'LEVEL UP' options within each activity.

Notebook:

1. List instructions on how to pair your controller to your brain
2. Sketch/Label your Clawbot. List and describe two abilities of your new Clawbot.

Week 6 - Up and Over Lesson 2

Weekly Summary: You will learn about claws and how an effective claw works before applying that to engineer a claw for the Grab and Go challenge.

STEM Lab Units / Activities	Description
Up and Over Lesson 2: Claw Design	Students will learn about claw design and scouting to design their own claw to better compete in the Grab and Go challenge activity.

Extra Challenge:

- Have students who say they are 'done' add an additional cube to the field. How does their claw design change if they need to move multiple cubes at one time?
 - [Improve Your Claw Practice Activity](#)

Notebook:

1. Document “Claw Practice Activity”

Week 7 - Up and Over Lesson 3

Weekly Summary: Students will learn about different elements and types of robotic arms in order to design their own robot arm and stack as many cubes as possible in the Stacked Up challenge.

STEM Lab Units / Activities	Description
Up and Over Lesson 3: Arm Design	Students will learn about different elements and types of robotic arms in order to design their own robot arm. They will design their arm in their engineering notebook before creating their design using the VEX IQ Kit.

Extra Challenge:

- Looking for ways to test out your arm and claw designs after the Practice activity, use the [Forward, Lift, Reverse Activity](#). Note that the activity shows a Simple Clawbot, but can be completed with the Clawbot that you have built.

Notebook:

- Define “Robotic Arm” Sketch and list Pro/Con of each Robotic Arm type: Swing Arm, 4-bar, Reverse 4-bar

Week 8 - Up and Over Lesson 4

Weekly Summary: You will learn about motor groups and how they can be used to increase power on a robot design.

STEM Lab Units / Activities	Description
Up and Over Lesson 4: Motor Groups	Students will learn about motor groups and how they can be used to increase power on a robot design. This can be used in conjunction with the arm or claw changes on the robot. Students will also learn about strategies for choosing a driver in competitions.

Extra Challenge:

- To apply additional force to the arm and have greater lifting power, begin exploring mechanical advantage through gear ratios and the [How Big are Your Teeth](#) Activity.

Notebook:

1. Document the “Over the Barrier” activity

Week 9 - Up and Over Lessons 5 and 6

Weekly Summary: You will compete in the Up and Over Competition, then reflect on your learning experience and related STEM careers.

STEM Lab Units / Activities	Description
Up and Over Lesson 5: Competition	Students will plan for the final Up and Over Competition and compete!
Up and Over Lesson 6: Conclusion	Students will reflect on their learning with the debrief conversation and connect the Unit to related STEM Careers.

Extra Challenge:

- Have students complete multiple choice board options for their chosen career in the Conclusion lesson to extend the Unit.
 - [Career Choice Board](#)

Notebook:

1. Draw the “Engineering Design Process”
2. Lesson 5 “Reflect”
3. Answer Lesson 6 Reflection questions

You Made it!

Try out some awesome Vex IQ Activities! [Click here](#)

Filter By Subject

☐ Coding
☐ Controller
☐ Engineering
☐ Math
☐ Science

You can filter by subject...try “Coding” activities

Notebook:

1. Summarize each activity
2. Rate yourself on the following scale and why

Use this table to help you determine which category you fall under.

Expert	I feel that I fully understood the concept and could teach this to someone else.
Apprentice	I feel that I understood the concept enough to compete in the challenge.
Novice	I feel that I did not understand the concept and did not know how to complete the challenge.