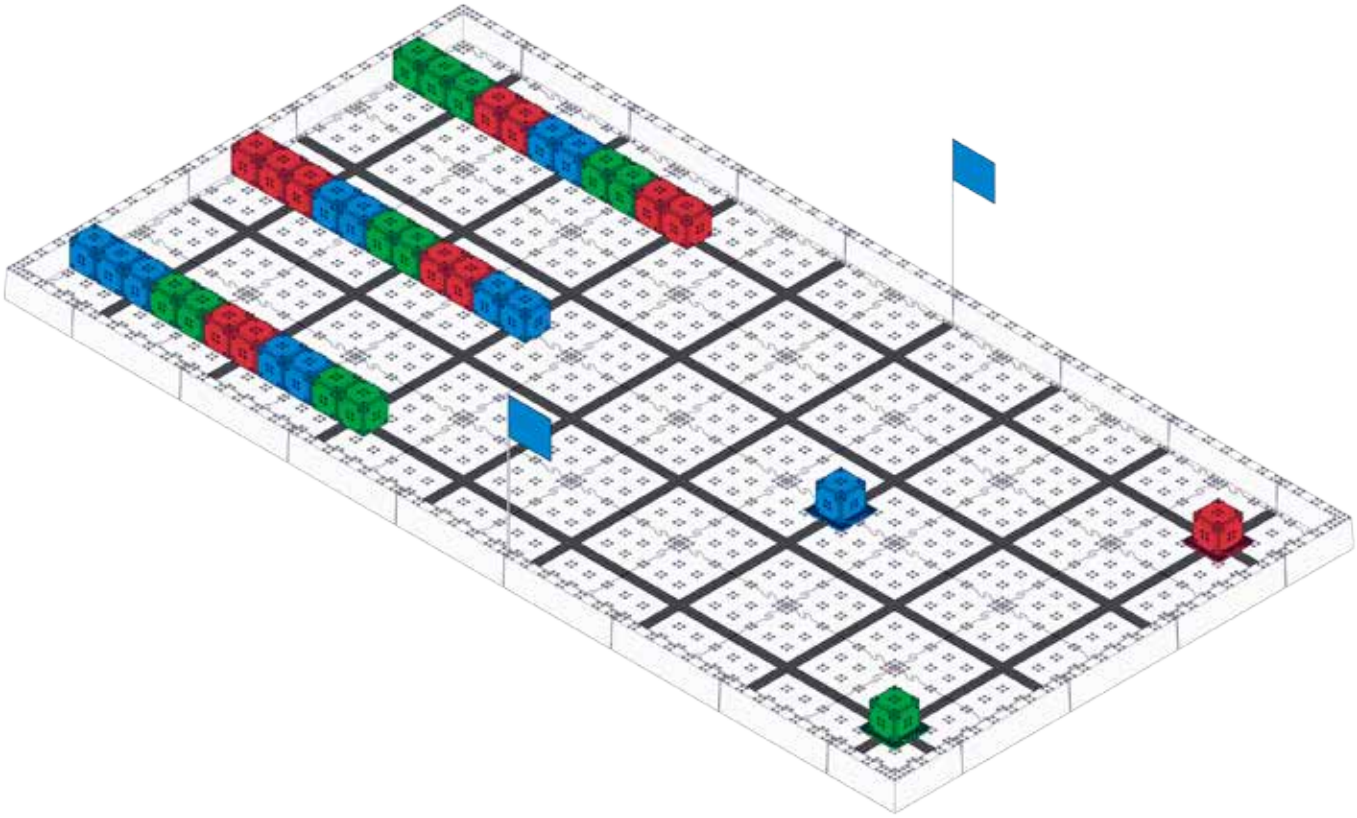
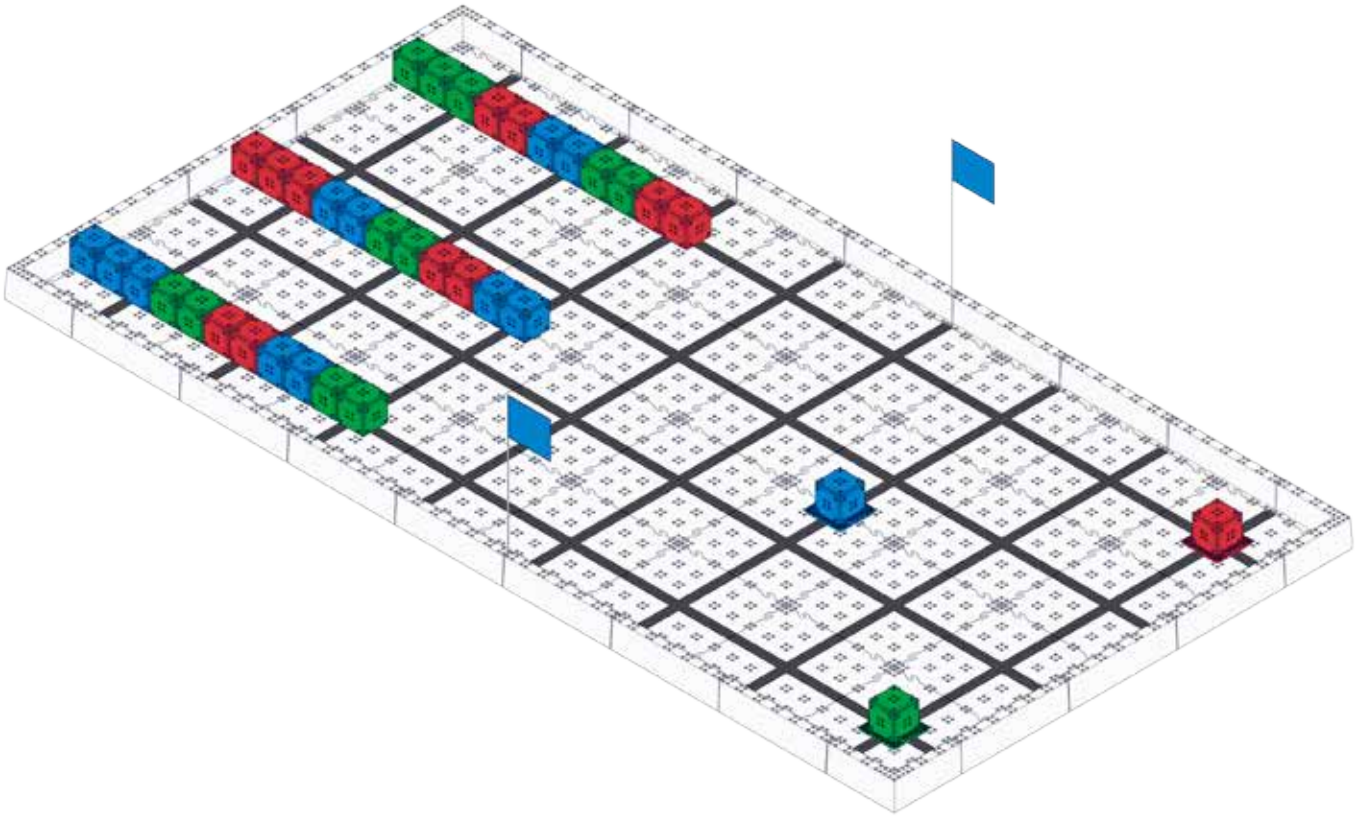
Highrise Programming Challenge





L.1

Highrise Programming Challenge

Unit Overview:

Feel the excitement of robotics competition as you apply you skills and knowledge from previous units to build a challenge-ready autonomous robot capable of completing Programming Skills matches in the VEX IQ Challenge game.

Unit Content:

- Challenge Overview
- Challenge Rules (http://www.vexiq.com/Highrise)

Note: Your teacher may also decide to use a different VEX IQ Challenge Game for this unit or a game of their own creation. See your teacher for details.

Unit Activities:

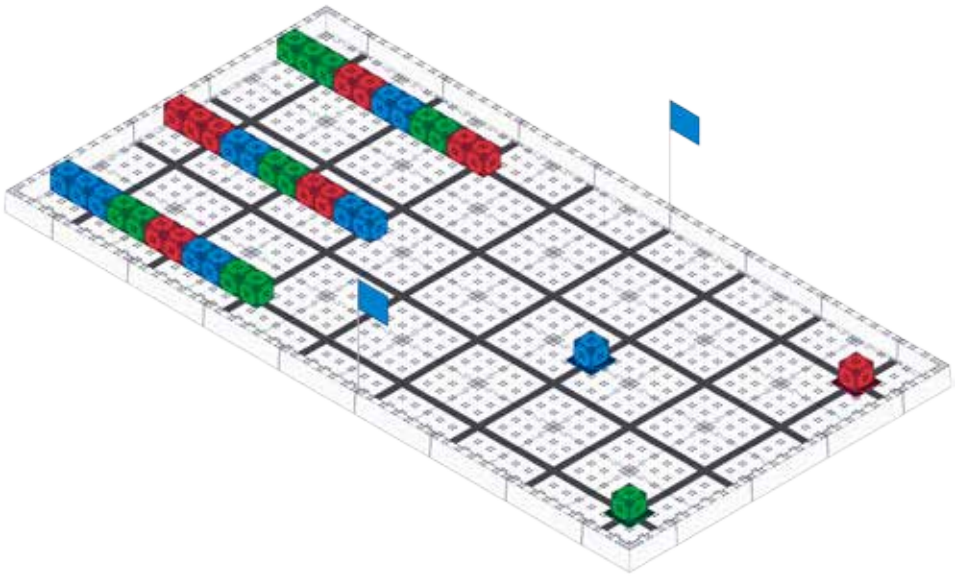
- Challenge Robot Build (or use of robot from Unit H) and Programming using Robot Challenge Evaluation Rubric
- Completion of Idea Book Pages (or Engineering Notebook) with robot build, programming and testing

Note: Separate copies and/or printouts of activities may be used for student work. Please see your teacher BEFORE writing in this guide. Visit www.vexiq.com/curriculum to download and print PDFs of all exercises!

L.2

Challenge Overview

Whether you're going to attend an official VEX IQ Challenge Event, host your own event, or just play the game in your classroom, it's time to design and build a robot for a full autonomous robotics game! Use your knowledge of the VEX IQ platform and all you've learned in previous lessons to create a VEX IQ robot for the Programming Skills Challenge portion of the VEX IQ Challenge Game, Highrise!



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The Game Rules:

All of the rules for playing the game and other important information can be found at the VEX IQ Challenge Highrise page: www.vexiq.com/Highrise

Important Notes

- Your teacher will need to obtain the Highrise Field & Game Elements and VEX IQ Challenge Field for this unit OR obtain just the Highrise Field & Game Elements and create a similar field from easy to obtain items.

- Alternatively, your teacher could get creative and challenge you to design and build for a brand new game that they design.

- If you've already built a robot for the teleoperated portions of the Highrise Challenge, you only need to add sensors and then program your robot to complete the challenge autonomously!

Idea Book Page: The Engineering Notebook

You are provided with an Idea Book Page in this unit that can be used to develop a full Engineering Notebook. Use as many of these pages as you need to document your robot ideas, builds, fixes, changes, and improvements for the game challenge. Alternatively, teachers and students are encouraged, when comfortable, to use the Robotics Engineering Notebook (provided to registered VEX IQ Challenge teams and also sold separately) for this purpose instead.

Robot Challenge Evaluation Rubric:

This rubric can be used to assess your challenge robot in up to eleven technical and non-technical categories. No matter how your teacher chooses to use the rubric, it will be obvious that your PROCESS and your PRODUCT (robot) are equally important.

L.4

Robot Challenge Evaluation Rubric

Evaluation Criteria	Expert = 4	Proficient = 3	Emerging = 2	Novice = 1	Assessment	Comments
Design & Process Criteria						
Creating Viable Solutions to the stated Challenge	Multiple, well developed solutions exist meeting all critical criteria	Multiple solutions are evident & one is developed meeting majority of criteria	Multiple, undeveloped solutions are evident	A solution that may or may not be developed is evident		
Simple and/or Complex Systems	All simple and/ or complex systems are identified & function efficiently	Functioning simple and/ or complex systems exist	Multiple simple systems exist that may function	One functioning simple system exists (e.g. drivetrain only)		
Design Process (documented in Idea Book or Engineering Notebook)	Formal design process utilized, documented & enhances efficiency	Formal design process utilized and fully documented	Formal design process utilized consistently	Some evidence that formal design process was utilized		
Utilization of Resources (materials and parts, information and instructions, people, and time)	Resources used within constraints, efficiency maximized, environmental harm minimized	Resources utilized to maximize efficiency	Evidence that some resources utilized meeting intended purpose	A few resources (e.g. tools & materials) utilized randomly		
Technical Criteria						
Programming (Autonomous and/ or teleoperated)	Efficiency evident in all programming	Consistency evident in one or more parts of programming	Functional, but inconsistent programming	Programming incomplete or rarely functional		
Control Systems	Completely functional and consistent control systems	Consistently functional control systems	Functional, but inconsistent control systems	Non-functional or incomplete control systems		
Electrical Systems	Battery charged. Wire routing safe, efficient, & completely functional	Battery charged. Wire routing safe & consistently functional	Functional, but inconsistent (battery or wiring issues)	Non-functional or incomplete (battery and wiring issues)		
Mechanical Systems	Completely functional and consistent mechanical systems	Consistently functional mechanical systems	Functional, but inconsistent mechanical systems	Non-functional or incomplete/ unsafe mechanical systems		
Unifying Themes (This area emphasizes the Interaction of Science, Technology, & Human Endeavor)						
Communication (written, electronic and/or oral as defined by the teacher)	Sophisticated and highly efficient communication for all audiences	Purposeful, consistent, effective communication	Purposeful, fairly consistent communication	Communication very inconsistent and lacks purpose		
Teamwork	Integrated teamwork that maximizes outcomes is evident	Teammates fully define roles, goals, & work together	Teammates partially define roles, goals, & work together	Participants function separately within a group		
Creativity	Robot is unique, imaginative, and functional	Robot is unique and/or imaginative in multiple ways	Robot clearly shows a unique and/ or imaginative element	Unique and/ or imaginative element(s) unclear		

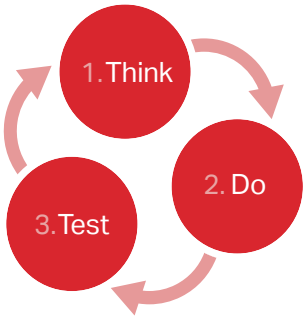
Rubric Adapted from Rubric and Evaluation Criteria for Standards-Based Robotics Competitions & Related Learning Experiences – TSA, 2005

L.5

Idea Book Page: The Engineering Notebook

Student Name(s): _____

Teacher/Class: _____ Date: _____ Page #: _____



Use as many of these pages as you need to document your robot ideas, build, fixes, changes, and improvements for the game challenge. Remember the "Think-Do-Test Loop" you learned in the My First Robot Unit. Number each page and use the space as you see fit for ideas, notes, observations, drawings with labels, calculations, and more. Alternatively, teachers and students are encouraged, when comfortable, to use the Robotics Engineering Notebook (P/N 276-3023, provided to registered VEX IQ Challenge teams and also sold separately) for this purpose instead.

Remember: Problems ARE NOT failures, they are an expected part of the design process!