Mobile Robotics Technology

2025-26 Game Manual for Middle School Teams
Presented by: The Robotics Education & Competition Foundation
Adapted from: VEX IQ Competition Mix & Match

In Partnership with: VEX Robotics and REC Foundation

Disclaimer: References to VEX IQ game play rules/updates are provided for context only and do not supersede or replace the requirements outlined in the current national SkillsUSA Technical Standards and/or national competition updates.

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OVERVIEW

Students who participate in Mobile Robotics Technology engage in the Engineering Process and demonstrate their ability to keep and maintain an engineering notebook. Students will be judged based on their robot in design, construction, and programming, along with the quality of their notebook, and their ability to communicate their design process to the judges. Students will show the result of their preparation by performing tasks in both autonomous and driver control functions. The game that will be played is an adaptation of the VEX IQ Challenge (VIQC) Mix & match Robot Skills Challenge. Students can participate in both VIQC and SkillsUSA using the same robot and engineering notebook. The key difference is that SkillsUSA focuses on the ability of students to create a robot that performs exceptionally at a given task, whereas VIQC is a teamwork-based program that focuses on collaborating with other teams along with game strategy in a tournament structure of competition. Students in SkillsUSA should focus on designing, building and programming a robot to perform well, knowing that there are no other robots on the field that may help their robot or might get in the way.

ELIGIBILITY

Eligibility (Team of Two)
Open to a team of two active SkillsUSA members. Each state may send one middle school.

Middle School:
Students who may be interested in pursuing coursework in a career and technical education engineering program or a program that integrates robotics, engineering, or pre-engineering techniques as an integral component of the instructional program.

CLOTHING REQUIREMENT

Class E: Competition Specific — Business Casual
- Official SkillsUSA white polo shirt
- Black dress slacks or black dress skirt (knee-length minimum)
- Black closed-toe dress shoes

Note: Wearing socks or hose is no longer required. If worn, socks must be black dress socks and hose must be either black or skin-tone and seamless/nonpattern.
These regulations refer to clothing items that are pictured and described at www.skillsusastore.org. If you have questions about clothing or other logo items, call 844-875-4557.

Note: Competitors must wear their official competition clothing to the competition orientation meeting.

SkillsUSA NLSC Robot Rules

<NLSC-R1> Building Robots during the Competition at SkillsUSA NLSC.

Teams will NOT be required to fully disassemble their robot at the start of the competition or bring a fully disassembled robot to the competition. All Robot Rules must be adhered to. All applicable limitations are listed in the Robot Equipment section of this game manual. You must provide your own robot parts.

<NLSC-R2> Teams may use any programming language. Teams must come to competition with a laptop for programming their Robot. The laptop must have the programming software already installed and licensed. Some programming software options can be found here.

https://www.vexrobotics.com/vexiq/resources/programming

THE GAME

VEX IQ Robotics Competition (VIQRC) Mix & Match is played on a 6' x 8' rectangular Field, set up as illustrated in the figures throughout this manual.

The primary objectives of the game are to build Stacks out of Pins and Beams, and Place Stacks in Goals. Additional Pins are introduced to the Field by Drive Team Members at the Load Zone. Points are awarded based on how many Pins and Beams are Connected, how many colors are included in each Stack, and for Stacks that match the color of the Goal.

Teams may also compete in Robot Skills Matches, where one (1) Robot tries to score as many points as possible with a slightly different set of rules. See Section 4 for more information.

The REC Library article titled "How to Navigate a Game Manual" describes the conventions and organizational structure used in this game manual, and may help you understand and interpret this Game Manual.

Note: The illustrations in this section of the Game Manual are intended to provide a general visual understanding of the game. Teams should refer to official field specifications, found in Appendix A, for exact field dimensions, a full field bill of materials, and exact details of field construction.
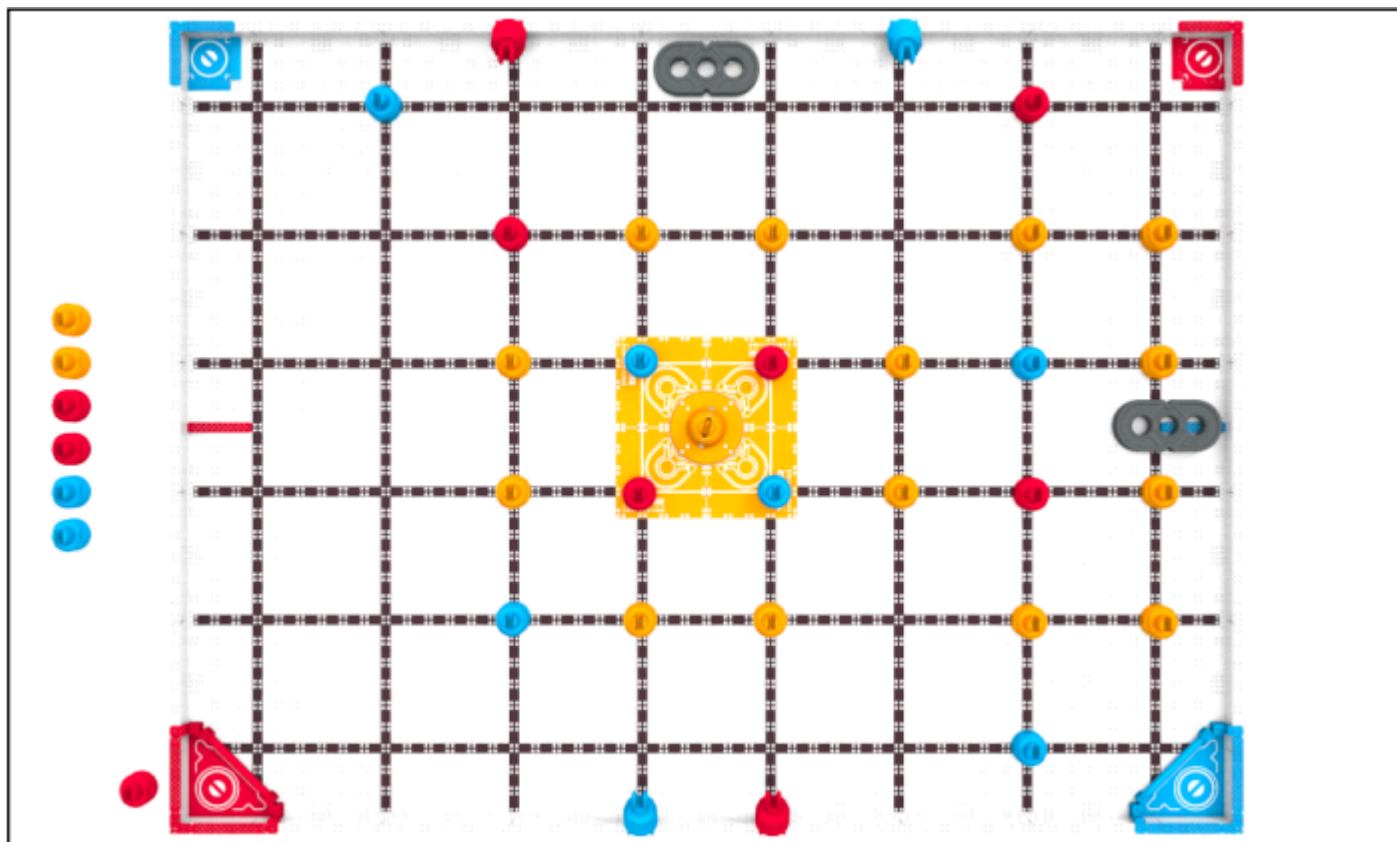
Figure RSC3-1: *The Field Configuration for a VIQRC Mix and Match Robot Skills Match.*

General Definitions

Adult - Anyone who is not a *Student* or another defined term (e.g., *Head Referee*).

Alliance - A pre-assigned grouping of two (2) *Teams* that are paired together during a given *Teamwork Challenge Match*.

Alliance Score - Points scored in a *Teamwork Challenge Match* that are awarded to both *Teams*.

Disablement - A penalty applied to a *Team* for a safety *Violation*. During *Disablement*, a *Team* is no longer allowed to operate their *Robot*, and the *Drivers* will be asked to place their Controller down. A *Disablement* is not the same as a *Disqualification*.

Disqualification - A penalty applied to a *Team* for a rule *Violation* (see <GG6> for more details). If a *Team* receives a *Disqualification* in a *Match*, the *Head Referee* will notify the *Team* of their *Violation* at the end of the *Match*. At the *Head Referee's* discretion, repeated *Violations* and/or *Disqualifications* for a single *Team* may lead to its *Disqualification* for the entire event.

Driver - A *Student Team* member who stands in the *Driver Station* and is responsible for operating and controlling that *Team's Robot*. Up to two *Team* members may fulfill this role in a given *Match* (see <GG1>), and there is no requirement that the same *Students* serve as *Drivers* in multiple *Matches*.

Driver Station - A region beside the *Field* where the *Drivers* must remain during their *Match* unless legally interacting with their *Robot*. The *Driver Stations* are represented by the red and blue lines in Figure FO-3.

Drive Team Members - The two *Drivers* and one Loader who participate in a given *Match* as representatives of their *Team*. No *Student* may fill more than one role on a Drive Team in the same *Match*.
- *Driver* 1 - Drives the *Robot* until the mid-*Match* Driver switch (see <GG11>)
- *Driver* 2 - Drives the *Robot* after the mid-*Match* Driver switch (see <GG11>)
- Loader - Introduces *Scoring Objects* into the *Field* for the whole *Match*

Field - The entire playing *Field*, being six (6) *Field* tiles wide by eight (8) *Field* tiles long (totaling forty-eight (48) *Field* tiles), including the *Field Perimeter*.

Field Element - The *Field Perimeter*, *Floor*, PVC pipes, and VEX IQ pieces which comprise and/or are attached to the *Field*.

Field Perimeter - The outer part of the *Field*, made up of four (4) outside corners and twenty-four (24) straight sections.

Floor - The interior flat part of the playing *Field*, made up of the forty-eight (48) *Field* tiles that are within the *Field Perimeter*.

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Game Design Committee (GDC) - The creators of VIQRC Mix & Match, and authors of this Game Manual. The GDC is the only official source for rules clarifications and Q&A responses; see Section 1.

License Plate - A physical component on the *Robot* that displays the *Team's* VEX IQ Robotics Competition number. Each *License Plate* must have a length and height of 3.5" x 1.5" (88.9mm x 38.1mm) and must not exceed a width of 0.25" (6.35mm) per <R6>.

Match - A set time period, consisting of *Autonomous Periods* and/or *Driver Controlled Periods*, during which *Teams* play a defined version of Mix & Match to earn points. See Sections 3 & 4.

- **Autonomous Period** - A time period during which *Robots* operate and react only to sensor inputs and/or commands pre-programmed by the *Students* into the *Robot* control system.

- **Driver Controlled Period** - A time period during which *Drivers* operate their *Robot*.

Match Type	Participants	Autonomous Period (m:ss)	Driver Controlled Period (m:ss)
Teamwork Challenge	One *Alliance*, on one *Field*, made up of two *Teams*, each with one *Robot*	None	1:00
Driving Skills Match	One *Team*, with one *Robot*	None	1:00
Autonomous Coding Skills Match	One *Team*, with one *Robot*	1:00	None

Robot - A machine that has passed inspection, designed by *Student Team* members to execute one or more tasks autonomously and/or by remote control from *Drivers*.

Student - Anyone born after May 1, 2010 (i.e., who will be 15 or younger at VEX Worlds 2026). Eligibility may also be granted based on a disability that has delayed education by at least one year. *Students* are the individuals who design, build, repair, and program the *Robot* with minimal *Adult* assistance.

- **Elementary School Student** – Any *Student* born after May 1, 2013 (i.e., who will be 12 or younger at VEX Worlds 2026). *Elementary School Students* may "play up" and compete as *Middle School Students*.

- **Middle School Student** - Any eligible *Student* that is not an *Elementary School Student*.

Team
- A Team is classified as an Elementary School Team if all members are Elementary School Students.
- A Team is classified as a Middle School Team if any member is a Middle School Student, or if the Team is made up of Elementary School Students who declare themselves as "playing up" as Middle School Students by registering their Team as a Middle School Team.
- Once a Team has competed in an event as a Middle School Team, that Team may not change to an Elementary School Team for the remainder of the season. If a Team mistakenly registers as an Elementary School Team but is ineligible for that age group, their registration may be revised mid-season with RSM assistance; all prior qualifications for the season will be lost.
- Teams may be associated with schools, community/youth organizations, or a group of neighborhood Students.

In the context of this Game Manual, Teams contain three types of Student roles related to Robot build, design, and coding. See <G2> and <G4> for more information. Adults may not fulfill any of these roles.
- **Builder** - The Student(s) on the Team who assemble(s) the Robot. Adults are permitted to teach the Builder(s) associated concepts, but should never work on the Robot.
- **Coder** - The Student(s) on the Team who write(s) the computer code that is downloaded onto the Robot. Adults are permitted to teach the Coder(s) associated concepts, but should never work on the code that goes on the Robot.
- **Designer** - The Student(s) on the Team who design(s) the Robot to be built for competition. Adults are permitted to teach the Designer(s) associated concepts, but should never work on the design of the Robot.

Violation - The act of breaking a rule in the Game Manual.

- **Minor Violation** - A *Violation* which does not result in a *Disqualification*.
  - Accidental, momentary, or otherwise non-*Score Affecting Violations* are usually *Minor Violations*.
  - *Minor Violations* usually result in a verbal notification from the *Head Referee* during the *Match*, whi should serve to inform the *Team* that a rule is being Violated before it escalates to a *Major Violatio*

- **Major Violation** - A *Violation* which results in a *Disqualification*.
  - Unless otherwise noted in a rule, all *Score Affecting Violations* are *Major Violations*.
  - If noted in the rule, egregious or strategic *Violations* or intentional actions that result in *Violations* may also be *Major Violations*.
  - Multiple *Minor Violations* within a *Match* or tournament may escalate to a *Major Violation* at the He *Referee's* discretion or as specified in a rule.

- **Score Affecting** - A *Violation* which improves an *Alliance's* score at the end of a *Match*.
  - Multiple *Violations* within a *Match* can cumulatively become *Score Affecting*.
  - When evaluating whether a *Violation* was *Score Affecting*, *Head Referees* will focus primarily on an *Robot* actions that were directly related to the *Violation*.
  - Determining whether a *Violation* was *Score Affecting* can only be done once the *Match* is complet and the scores have been calculated. 15

Some rules include *Violation* Notes in red italicized text to denote special circumstances or provide additional clarifications. If no *Violation* Notes are found in a given rule, then it should be assumed that the default definitions above apply.

To determine whether a *Violation* may have been *Score Affecting*, check whether the *Violation* directly contributed to increasing the score of the *Match*. If it did not increase the *Alliance's* score, then the *Violation* was not *Score Affecting*, and it was very likely a *Minor Violation*.
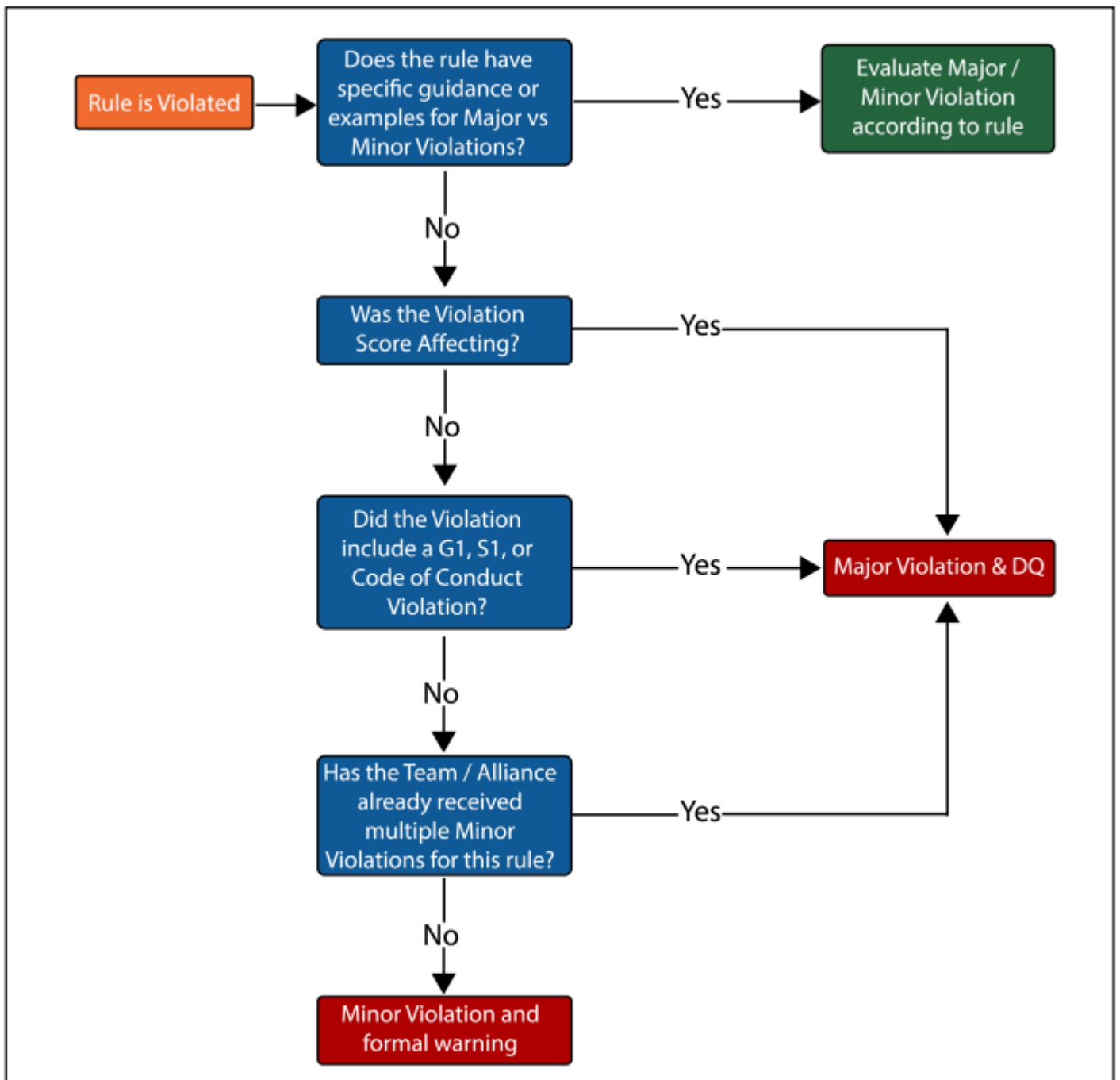
See the following flowchart for more information.

Figure V-1: *The process for determining whether or not an infraction should result in a Major Violation or Minor Violation.*

Game-Specific Definitions

Connected - A *Scoring Object* status. See <SC3>.

Cleared - A *Starting Pin* status. See <SC7>.

Goal - A place where *Stacks* can be *Placed*. There are four (4) varieties of *Goal* in VIQRC Mix & Match:

● **Square Goal** - A segment of the *Floor* in a corner of the long side of the *Field* opposite from the audience. Each *Square Goal* is bordered by the inside of the *Field Perimeter* and the inside edges of the VEX IQ pieces connected to the *Floor*. Each *Square Goal* has a color, red or blue, determined by its VEX IQ pieces and PET sheet. Each *Square Goal* can hold a maximum of one (1) *Placed Stack*.

● **Floor Goal** - A segment of the *Floor* in the center of the *Field* surrounding the *Standoff Goal*. The *Floor Goal* is defined by the center, white-outlined portion of the PET sheet connected to the *Floor* underneath the *Standoff Goal*, and includes that white line. The *Floor Goal* can hold a maximum of four (4) *Placed Stacks*.

● **Triangle Goal** - A segment of the *Floor* in a corner of the long side of the *Field* closest to the audience. Each *Triangle Goal* is bordered by the inside of the *Field Perimeter* and the inside of the PVC pipe that spans the corner of the *Field*. Each *Triangle Goal* has a color, red or blue, determined by its VEX IQ pieces, PVC pipe, and PET sheet. Each *Triangle Goal* can hold a maximum of three (3) *Placed Stacks*.

● **Standoff Goal** - The orange plastic structure mounted to the center of the *Field* with IQ pins or screws.
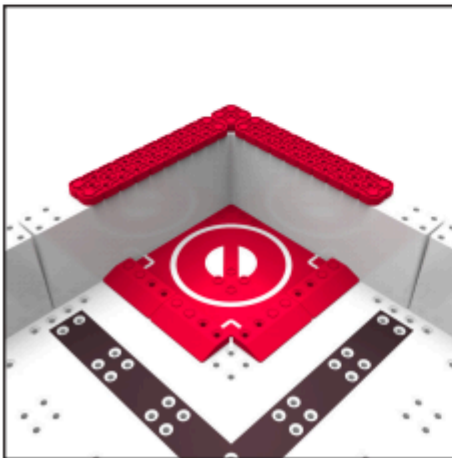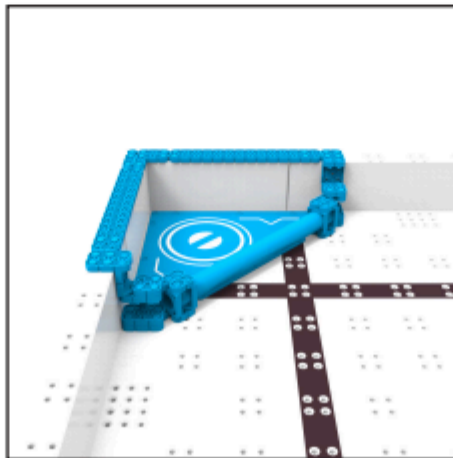

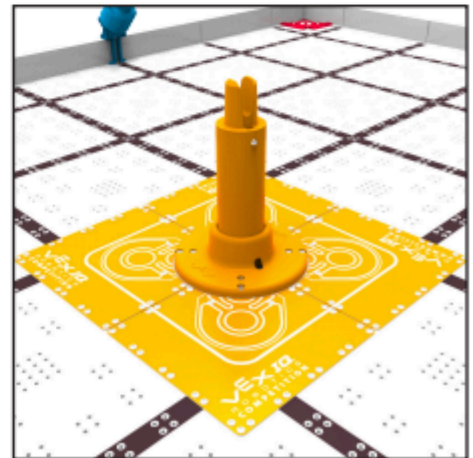*Figure G-1: A Square Goal.*

Figure G-2: A Triangle Goal.

Figure G-3: A Floor Goal and Standoff Goal.

Load - The act of legally introducing a *Pin* or *Beam* into the *Field*. See <SG6>.

Load Zone - A red or blue VEX IQ beam that is attached to the *Field* with VEX IQ pins. The *Load Zone* is intended to receive *Scoring Objects* from a human Loader.
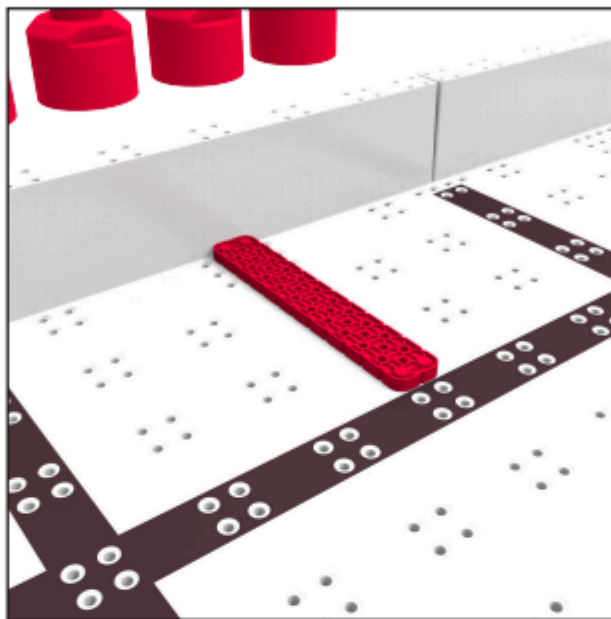
Figure LZ-1: *A Load Zone.*

Matching Goal - A scoring bonus. See <SC6>.

Placed - A *Stack* status. See <SC5>.

Preload - A *Pin* that is *Loaded* into a *Robot* prior to a *Match*. See <SG5>.

Scoring Object - A plastic object that can be added to a *Stack*. There are two types of *Scoring Objects* in VIQRC Mix & Match:

- **Pin** - An orange, blue, or red roughly cylindrical object with a diameter of approximately 3.15" (80mm), height of 4.5" (116mm), and a weight of approximately 2.5 ounces (71g).
- **Beam** - A gray, roughly rectangular object with a size of 9.88" (251mm) x 4.88" (124mm) x 1.97" (50mm) and a weight of approximately 6 ounces (170g).
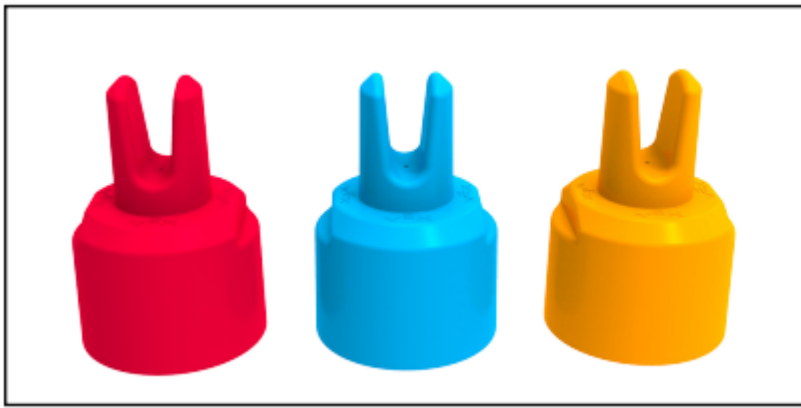
Figure SO-1: Red, blue, and orange Pins
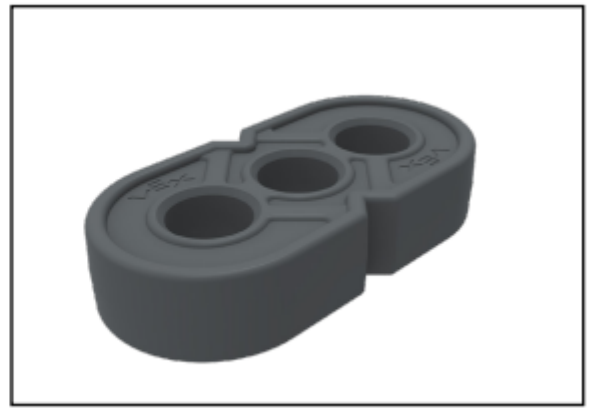
Figure SO-2: A Beam

Stack - A set of two or more *Connected Scoring Objects.*
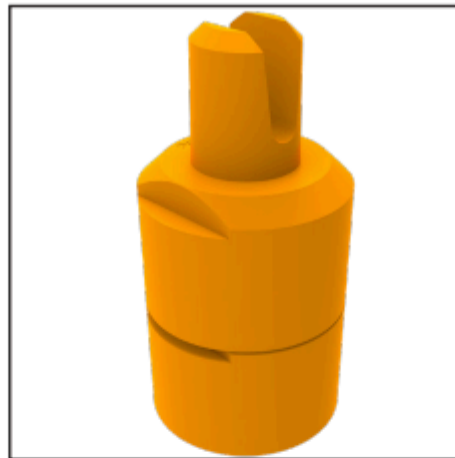
Figure S-1: A Stack of two Pins.

Starting Pin - A *Pin* that begins the *Match* on a *Starting Pin Support.*

Starting Pin Support - One of four (4) red or blue structures, built out of VEX IQ parts, that is attached to the *Field Perimeter*. Each *Starting Pin Support* holds a *Pin* of its color at the beginning of the *Match*, and until the *Pin* is removed by a *Robot*.
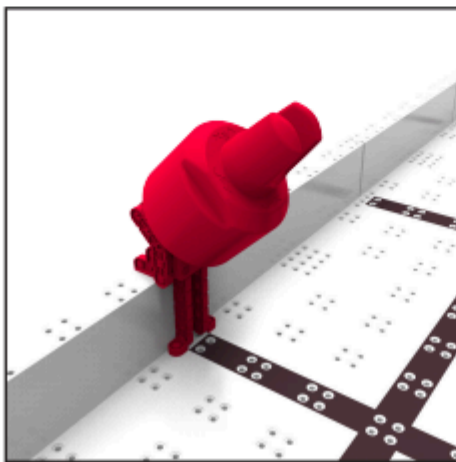
Figure SPS-1: A Starting Pin.
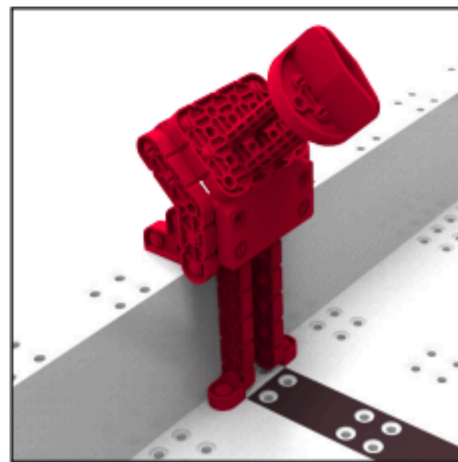
Figure SPS-1: A Starting Pin Support.

Scoring

Each *Connected Pin*	1 Point
Each *Connected Beam*	10 Points
Each 2-color *Stack*	5-Point Bonus
Each 3-color *Stack*	15-Point Bonus
Each *Matching Goal* bonus	10-Point Bonus
Each *Stack Placed* on the *Standoff Goal*	10-Point Bonus
Each *Cleared Starting Pin*	2 Points
Each *Robot* in contact with *Scoring Objects* at the end of the *Match*. See <SC8>.	2 Points

<SC1> All scoring statuses are evaluated **after the Match ends**, once all *Scoring Objects*, *Field Elements*, and *Robots* on the *Field* come to rest. See rule <GG12> for more information and *Violation* details.

a. Referees should avoid contacting or moving *Scoring Objects* as much as possible while evaluating Scoring statuses. If an object must be moved to evaluate the status of another object, its status must be agreed upon by all *Teams* and the *Head Referee*, and noted or recorded, before it is moved.

<SC2> All scoring statuses are evaluated **visually by a Head Referee**, to the best of their ability within the context of a given *Match*/event.

a. Referees and other event staff are not allowed to review any videos or pictures from the *Match*. See <T3>.

b. If there is a concern regarding the score of a *Match*, only the *Drive Team Members* from that *Match*, not an *Adult*, may share their questions with the *Head Referee*. See <T3>.

<SC3> **A Scoring Object can be Connected to another Scoring Object** to form a *Stack*. To qualify as *Connected*, the resulting *Stack* must be roughly vertical (i.e., the *Stack* goes 'up' and not sideways) and cannot be in contact with a *Robot*.

a. *Scoring Objects* can be *Connected* in two ways: up from the *Floor* or *Standoff Goal*, or up from a *Beam*.

b. A *Pin* is *Connected* if it is fully nested with another *Scoring Object* and neither the *Pin* nor the resulting *Stack* is touching a *Robot*.

c. A *Beam* is *Connected* if it is fully nested to one or more *Connected Pins* and/or the *Standoff Goal* and is not touching a *Robot*.

   i. A *Beam* cannot be *Connected* to another *Beam*.

   ii. A *Beam* may be *Connected* to up to three (3) *Pins* simultaneously if all *Pins* are fully nested with the *Beam*.

   iii. Each *Pin* that is *Connected* directly to a *Beam* is considered to be part of a separate *Stack*, and a *Beam* may count as a color in up to three (3) *Stacks* simultaneously.

Note: Scoring Objects cannot count as Connected or Placed in Goals if they are not vertical. Scoring Objects that end the Match 'knocked down' or 'tipped' within the Field, or that are not Connected to other Scoring Objects, can only count toward the 2 points earned for a Robot that ends the Match in contact with 2 or more Scoring Objects.

Note 2: A pair of Scoring Objects is considered fully nested if there's no perceptible gap between the two objects, and neither object is being pushed away from the other by an external force or surface.

> **Significant Q&As:**
> - Q&A 2664 - Multiple scoring scenarios; Beam on floor generally leads to non-nested Pins
> - Q&A 2669 - Scoring example with a Beam supported by the perimeter
> - Q&A 2679 - A Beam can earn points if it's Connected to the Standoff Goal with no Pins

<SC4> A *Stack* that includes more than one color (blue, red, orange, or gray) of *Scoring Object* receives **additional points based on the number of colors** in that *Stack*, up to three colors.

<SC5> A *Stack* is considered **Placed in a Goal** at the end of the *Match* if it meets all of the following criteria.

a. There are at least two (2) *Connected Scoring Objects* in the *Stack*.

b. No part of the *Stack* is contacting a *Robot*.

c. The *Stack* meets one of the following criteria:

    i. The *Stack* is entirely within the center outline that defines the *Floor Goal* (maximum of four (4) *Stacks*).

    ii. The *Stack* is entirely within a *Square Goal* (maximum of one (1) *Stack* per *Goal*).

    iii. The *Stack* is entirely within a *Triangle Goal* (maximum of three (3) *Stacks* per *Goal*).

    iv. The *Stack* is *Connected* to the *Standoff Goal* or (via a *Beam*) to another *Stack* that is *Placed* on the Standoff Goal (maximum of one (1) *Stack* without including a *Beam*, or three (3) *Stacks* if all share a Beam).

<SC6> A *Stack* earns a **Matching Goal** bonus when one or more of the following criteria is met:

a. The *Stack* is *Placed* in a *Goal* with a color that matches the bottom *Pin* in that *Stack*.

b. The *Stack* is *Connected* to a *Beam*.

Each *Stack* can earn a maximum of one (1) *Matching Goal* bonus.

> **Significant Q&As:**
> - Q&A 2665 - One Pin connected to a Beam counts as a Stack
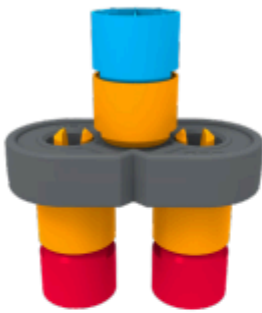
<SC7> A Starting Pin is Cleared if no part of its *Starting Pin Support* is within the volume of the *Pin* at the end of the *Match*.

<SC8> A *Robot* will receive 2 points for **ending the Match in contact with Scoring Objects** in the following scenarios:
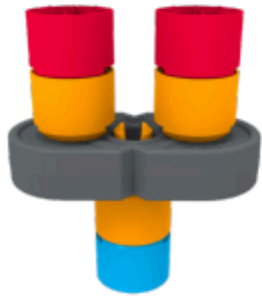
a. The *Robot* is directly contacting two or more *Scoring Objects*.

b. The *Robot* is directly contacting a *Scoring Object* that is fully nested with one or more additional *Scoring Objects*.

Scoring Examples

<SE1> All *Scoring Objects* in this example are *Connected*, and none are *Placed* in a *Goal*. This example is scored as 6 *Connected Pins*, 1 *Connected Beam*, and three 3-color *Stacks* with a *Matching Goal* Bonus.

Scoring Category	Points	Quantity	Subtotal
Connected Pin	1 point	6	6
Connected Beam	10 points	1	10
3-color *Stack*	15 points	3	45
Matching Goal Bonus	10 points	3	30
Total Points for this example			91

<SE2> All *Scoring Objects* in this example are *Connected*, and none are *Placed* in a *Goal*. This example is scored as 6 *Connected Pins*, 1 *Connected Beam*, and three 3-color *Stacks* with a *Matching Goal* Bonus.

Scoring Category	Points	Quantity	Subtotal
Connected Pin	1 points	6	6
Connected Beam	10 points	1	10
3-color *Stack*	15 points	3	45
Matching Goal Bonus	10 points	3	30
Total Points for this example			91

<SE3> The top *Stack* in this example is not *Connected* to the *Beam*, but all other *Scoring Objects* are *Connected*; none are *Placed* in a *Goal*. This example is scored as 6 *Connected Pins*, 1 *Connected Beam*, two 3-color *Stacks* with a *Matching Goal* Bonus, and one 2-color *Stack* not *Placed* in a *Goal*.

Scoring Category	Points	Quantity	Subtotal
Connected Pin	1 point	6	6
Connected Beam	10 points	1	10
2-color Stack	5 points	1	5
3-color Stack	15 points	2	30
Matching Goal Bonus	10 points	2	20
Total Points for this example			71

23
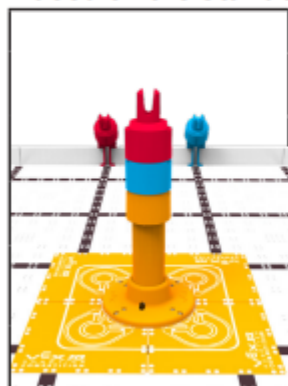
<SE4> The *Beam* in this example is not *Connected*, but all of the *Pins* are; no *Stacks* are *Placed* in a *Goal*. This example is scored as 4 *Connected Pins* and two 2-color *Stacks* not *Placed* in a *Goal* and not *Connected* to a *Beam*.

Scoring Category	Points	Quantity	Subtotal
Connected Pin	1 point	4	4
Connected Beam	10 points	0	0
2 -color Stack	5 points	2	10
Total Points for this example			14

<SE5> Because none of these *Pins* are vertical, nothing in this example counts as *Connected* or as a *Stack*. No other points are scored. This example would not receive a score.

Scoring Category	Points	Quantity	Subtotal
Connected Pin	1 point	0	0
Connected Beam	10 points	0	0
3-color Stack	15 points	0	0
Matching Goal Bonus	10 points	0	0
Total Points for this example			0
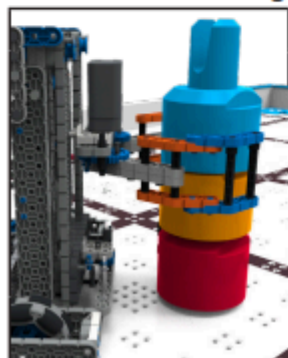
<SE6> The *Pins* in this example are *Connected*, *Placed* in a *Matching Goal*, and *Placed* on the *Standoff Goal*. This example is scored as 3 *Connected Pins*, one 3-color *Stack* with a *Matching Goal* Bonus, and *Placed* on the *Standoff Goal*.

Scoring Category	Points	Quantity	Subtotal
Connected Pin	1 point	3	3
3-color *Stack*	15 points	1	15
Matching Goal Bonus	10 points	1	10
Stack Placed on the *Standoff Goal*	10 points	1	10
Total Points for this example			38

<SE7> All *Scoring Objects* in this example are *Connected*, and all three *Stacks* are *Placed* on the *Standoff Goal* via the *Connected Beam*. This example is scored as 6 *Connected Pins*, 1 *Connected Beam*, three 3-color *Stacks* with a *Matching Goal* Bonus and three *Stacks Placed* on the *Standoff Goal*.

Scoring Category	Points	Quantity	Subtotal
Connected Pin	1 point	6	6
Connected Beam	10 points	1	10
3-color *Stack*	15 points	3	45
Matching Goal Bonus	10 points	3	30
Stack Placed on the *Standoff Goal*	10 point	3	30
Total Points for this example			121
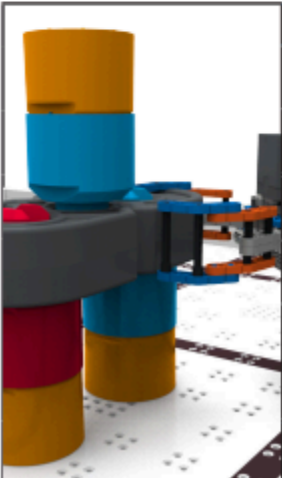
<SE8> The *Pins* in this example are nested together, but part of the *Stack* is in contact with a *Robot* at the end of the *Match*. None of the *Pins* qualify as *Connected*. This example is scored as a *Robot* in contact with *Scoring Objects* at the end of the *Match*.

Scoring Category	Points	Quantity	Subtotal
Connected Pin	1 point	0	0
3-color *Stack*	15 points	0	0
Robot in contact with *Scoring Objects* at the end of the *Match*	2 points	1	2
Total Points for this example			2

<SE9> All of the *Scoring Objects* in this example are nested together, but a *Pin* in one of the *Stacks* is in contact with a *Robot* at the end of the *Match*. The *Pins* in the one *Stack* that is in contact with the *Robot* do not qualify as *Connected* to each other or to the *Beam*. This example is scored as 4 *Connected Pins*, 1 *Connected Beam*, two 3-color *Stacks* with a *Matching Goal* Bonus, and a *Robot* in contact with *Scoring Objects* at the end of the *Match*.

Scoring Category	Points	Quantity	Subtotal
Connected Pin	1 point	4	4
Connected Beam	10 points	1	10
3-color Stack	15 points	2	30
Matching Goal Bonus	10 points	2	20
Robot in contact with Scoring Objects at the end of the Match	2 points	1	2
		Total Points for this example	66

<SE10> All of the *Scoring Objects* in this example are nested together, but the *Beam* is in contact with a *Robot* at the end of the *Match*. Because the *Beam* is part of all three *Stacks*, none of the *Scoring Objects* qualify as *Connected*. This example is scored as a *Robot* in contact with *Scoring Objects* at the end of the *Match*.

Scoring Category	Points	Quantity	Subtotal
Connected Pin	1 point	0	0
Connected Beam	10 points	0	0
3-color Stack	15 points	0	0
Matching Goal Bonus	10 points	0	0
Robot in contact with Scoring Objects at the end of the Match	2 points	1	2
		Total Points for this example	2

Safety Rules

<S1> Stay safe, don't damage the Field. If, at any time, the *Robot* operation or *Team* actions are deemed unsafe or have damaged any *Field Elements* or *Scoring Objects*, the offending *Team* may be *Disabled* and/or *Disqualified* at the *Head Referee's* discretion. The *Robot* will require re-inspection before it may again take the *Field*.

> Note: Teams may not step onto the Field at any time. If a Team's Robot requires stepping onto the Field during pre-Match setup, this will be considered a Violation of <S1>, <GG3>, and/or <SG1>. The Team's Robot may be removed from the current Match at the Head Referee's discretion.

> Violation Notes: Major Violations should be reported to and/or discussed with the Event Partner during the event, and should be reported to the REC Foundation Rules and Conduct Committee following the event.

<S2> Students must be accompanied by an Adult. No *Student* may attend a VEX IQ Robotics Competition event without a responsible *Adult* supervising them. The *Adult* must obey all rules and be careful to not violate *Student*-centered policies, but must be present for the full duration of the event in the case of an emergency. *Violations* of this rule may result in removal from the event.

> Violation Notes: <S2> Violations should be reported to the Event Partner during the event, and should be reported to the REC Foundation Rules and Conduct Committee following the event.

<S3> Each Student Team member must have a completed participant release form on file for the event and season. A *Student Team* member cannot participate in an event without a completed release form on file.

General Rules

<G1> Treat everyone with respect. All *Teams* are expected to conduct themselves in a respectful and professional manner while competing in VEX IQ Robotics Competition events. If a *Team* or any of its members (*Students* or any *Adults* associated with the *Team*) are disrespectful or uncivil to event staff, volunteers, or fellow competitors, they may be *Disqualified* from a current or upcoming *Match*. *Team* conduct pertaining to <G1> may also impact a *Team's* eligibility for judged awards. Repeated or extreme *Violations* of <G1> could result in a *Team* being *Disqualified* from an entire event, depending on the severity of the situation.

This rule exists alongside the REC Foundation Code of Conduct. *Violation* of the Code of Conduct can be considered a *Major Violation* of <G1> and can result in *Disqualification* from a current *Match*, an upcoming *Match*, an entire event, or (in extreme cases) an entire competition season. The Code of Conduct can be found here.

More information regarding the event Code of Conduct process can be found at the RECF Library.

We all can contribute to creating a fun and inclusive event experience for all event attendees. Some examples include:

> When dealing with difficult and stressful situations, it is…
>
> - Okay for *Teams* to be gracious and supportive when your *Alliance* partner makes a mistake.
> - Not okay for *Teams* to harass, tease, or be disrespectful to your *Alliance* partner when a *Match* does not go your way.
>
> When a *Team* does not understand a *Match* ruling or score, it is…
>
> - Okay for *Drive Team Members* to consult with a *Head Referee* to discuss a ruling per the process outlined in <T3> in a calm and respectful manner.
> - Not okay for *Drive Team Members* to continue arguing with the *Head Referee* after a decision has been finalized, or for *Adults* to approach a *Head Referee* with ruling/scoring concerns.
>
> When *Teams* are getting ready for an upcoming *Match*, it is…
>
> - Okay for *Teams* in an *Alliance* to develop a game strategy that utilizes the strengths of both *Robots* to cooperatively solve the game.
> - Not okay for one *Team* in an *Alliance* to ask another *Team* to sit in a corner during the *Match* or to intentionally play beneath their abilities.

Violation Notes: Any Violation of <G1> may be considered a Major Violation and should be addressed on a case-by-case basis. Teams at risk of a <G1> Major Violation due to multiple disrespectful or uncivil behaviors will usually receive a "final warning", although the Head Referee is not required to provide one. All <G1> Major Violations/Disqualifications should be reported to and/or discussed with the Event Partner during the event, and should be reported to the REC Foundation Rules and Conduct Committee following the event.

<G2> VIQRC is a student-centered program. *Adults* should not make decisions about the *Robot's* build, design, or gameplay, and should not provide an unfair advantage by providing 'help' that is beyond the *Students'* independent abilities. *Students* must be prepared to demonstrate an active understanding of their *Robot's* design, construction, and programming to judges or event staff. *Students* should build, design, and code the *Robot* with minimal *Adult* involvement.

> Some amount of *Adult* mentorship, teaching, and/or guidance is an expected and encouraged facet of VEX competitions. No one is born an expert in robotics! However, obstacles should always be viewed as teaching opportunities, not problems for an *Adult* to solve for the *Team*.
>
> When building or designing the *Robot*, it is...
> - Okay for an *Adult* to help a *Student* consider why something failed, so it can be improved.
> - Not okay for an *Adult* to provide step by step instructions or photos for the *Student* to copy.
>
> When a mechanism falls off, it is...
> - Okay for an *Adult* to help a *Student* consider why it failed, so it can be improved.
> - Not okay for an *Adult* to investigate or put the *Robot* back together.
>
> When a *Team* encounters a complex programming concept, it is...
> - Okay for an *Adult* to guide a *Student* through a flowchart to understand its logic.
> - Not okay for an *Adult* to write a premade command for that *Student* to copy / paste.
>
> During *Match* play, it is...
> - Okay for an *Adult* to provide cheerful, positive encouragement as a spectator.
> - Not okay for an *Adult* to explicitly shout step-by-step commands from the audience.

This rule operates in tandem with the REC Foundation Student Centered Policy, which is available in the REC Library for *Teams* to reference throughout the season.

Violation Notes: Potential Violations of this rule will be reviewed on a case-by-case basis. By definition, all Violations of this rule become Score Affecting as soon as a Robot which was built or programmed by an Adult scores points in a Match. All reported and/or suspected <G2> Violations should be reported to the Event Partner during the event, and should be reported to the REC Foundation Rules and Conduct Committee following the event.

<G3> Use common sense. When reading and applying the various rules in this document, please remember that common sense always applies in the VEX IQ Robotics Competition.

> Some examples may include:
> - If there is an obvious typographical error (such as "per <T5>" instead of "per <GG5>"), this does not mean that the error should be taken literally until corrected in a future update.

- Understand the realities of the VEX IQ *Robot* construction system. For example, if a *Robot* could hover above the *Field* for a whole *Match*, that would create loopholes in many of the rules. But… they can't. So… don't worry about it.

- When in doubt, if there is no rule prohibiting an action, it is generally legal. However, if you have to ask whether a given action would violate <S1>, <G1>, or <T1> then that's probably a good indication that it is outside the spirit of the competition. On the other hand, if there's not a rule that makes a *Robot* part legal, it's not allowed.

- In general, *Teams* will be given the "benefit of the doubt" in the case of accidental or edge-case rules infractions. However, there is a limit to this allowance, and repeated or strategic infractions will still be penalized.

<G4> Each Student can only belong to one Team, and all work must represent the skill level of the Students on the Team. Each *Team* must include *Drive Team Members*, *Coder*(s), *Designer*(s), and *Builder*(s); many also include notebooker(s). No *Student* may fulfill any of these roles for more than one VEX IQ Robotics Competition *Team* in a given competition season. *Students* may have more than one role on the *Team* (e.g., the *Designer* may also be the *Builder*, the *Coder*, and a *Drive Team Member*).

a. The *Team's* design, *Robot*, coding, strategy, and ongoing work must represent the skill level of the *Students* currently on the *Team*.

   i. *Teams* may be inspired by a *Robot* found online but must avoid academic dishonesty and should not copy a *Robot* that has been provided for them. This includes use of instructions provided by *Adults* or educational facilities.

   ii. *Teams* may use *Robot* plans provided by VEX Robotics or the REC Foundation, but are encouraged to use these *Robots* only as a starting point that *Students* modify, improve, or replace as their skills increase.

b. *Team* members may only move from one *Team* to another for non-strategic reasons outside of the *Team's* control.

   i. Examples of permissible moves may include, but are not limited to, changing schools, conflicts within a *Team*, or combining/splitting *Teams*.

   ii. Examples of strategic moves in *Violation* of this rule may include, but are not limited to, one *Coder* "switching" *Teams* in order to program multiple *Robots*, or one *Student* writing the engineering notebook for multiple *Teams*.

   iii. If a *Student* leaves a *Team* to join another *Team*, <G4> still applies to the *Students* remaining on the previous *Team*. For example, if a *Coder* leaves a *Team*, then that *Team's Robot* must still represent the skill level of the *Team* without that *Coder*. One way to accomplish this would be to ensure that the *Coder* teaches or trains a "replacement" *Coder* in their absence.

   Points ii and iii are intended to represent real-world situations that are found in industry engineering. If a vital member of a professional engineering team were to suddenly leave, the remaining members of the team should still be capable of working on / maintaining their project.

General Game Rules

<GG1> Drivers drive your Robot, and stay in the Driver Station. During a *Match*, *Robots* may only be operated by that *Team's Drivers* and/or software running on the *Robot's* control system. Each *Team* may have up to three (3) *Drive Team Members* at the *Match*: two (2) *Drivers*, and one (1) Loader. All *Drive Team Members* must remain in their *Driver Station*, except when legally interacting with their *Robot* per <GG10>.

a. *Drive Team Members* are prohibited from any of the following actions during a *Match*:

   i. Using any sort of communication device in the *Driver Station*. Non-headphone devices with communication features turned off (e.g. a phone in airplane mode or a walkie talkie turned off) are allowed. If communication features are needed for translation apps during post-*Match* discussions, it should not be considered a *Violation*.

   ii. Standing or sitting on any sort of object during a *Match*, regardless of whether the *Field* is on the *Floor* or elevated, except as required by an official accommodation request that has been approved by the REC Foundation.

   iii. Using additional materials to simplify the game challenge during a *Match*.

   iv. To ensure that *Drive Team Members* are aware of verbal calls during a *Match* (as an application of rules <T1>, <G1>, <S1>, and <G3>), powered headphones, earbuds, and/or passive earpieces connected to electronic devices cannot be worn/used in the *Driver Station* except as required by an official accommodation request that has been approved by the REC Foundation.

> Point iii is intended to refer to non-*Robot*-related items that directly influence gameplay, such as using a ramp to assist with the *Load Zone*. Provided no other rules are violated, and the items do not pose any safety or *Field* damage risks, the following examples are not considered *Violations* of <GG1>:
>
> - Materials used before or after a *Match*, such as a pre-*Match* alignment aid
> - Strategic aids, such as a whiteboard or clipboard
> - Earplugs, gloves, or other personal accessories

Note: Drive Team Members are the only Team members that are allowed to be in the Driver Station during a Match. Adults (other than event staff) are not permitted to be in the Driver Station during a Match.

Violation Notes: Major Violations of this rule are not required to be Score Affecting, and could invoke Violations of other rules, such as <G1>, <G2>, or <GG11>.

<GG2> A Team's Robot should attend every Match. The *Team's Robot* must report to the *Field* for the *Team's* assigned *Match*, even if the *Robot* is not functional. If the *Robot* is not at the *Field* at the start of a *Match*, that *Team* is considered a "no show" and will receive zero (0) points. The other *Team* in the *Alliance* will still play and receive points for the *Match*.

a. *Teams* are expected to participate in all scheduled *Qualification Matches* and, if they're ranked high enough to be included in a Finals *Alliance, Finals Matches*. Failure to attend scheduled *Matches* may be considered a *Violation* of <G1> and the Code of Conduct. *Teams* that do not participate in any *Qualification Matches* cannot be considered for Judged Awards. 32

<GG3> Robots on the field must be ready to play. When a *Team* puts their *Robot* on the *Field*, it must be prepared to play (i.e., batteries charged, sized within the starting size constraint, etc.).

a. *Robots* must be placed on the *Field* promptly. Repeated failure to do so could result in a *Violation* of <G1> and/or removal of the *Robot* from the current *Match* at the *Head Referee's* discretion.

b. If a *Robot* is not placed on the *Field* prior to the start of a *Match*, it cannot be placed on the *Field* during that *Match*.

> The definition of the word "promptly" is at the discretion of the *Event Partner* and *Head Referee*, who will consider event schedule, previous *Violations* or delays, etc. As a general guideline, five seconds to check *Robot* alignment would be acceptable, but five minutes to assemble multiple parts together would not.

<GG4> Hands out of the Field. During a *Match, Drive Team Members* are prohibited from making intentional contact with any *Field Element, Robot*, or *Scoring Object* that has been introduced to the *Field*, except for the allowances in <GG10>, <RSC5>, and/or <SG6>.

a. *Drive Team Members* are not permitted to break the plane of the *Field Perimeter* at any time during the *Match*, apart from the actions described above or while *Loading* a *Pin* as described in rule <SG6>.

b. Transitive contact, such as contact with the *Field Perimeter* that causes the *Field Perimeter* to contact *Field Elements* or objects inside of the *Field*, could be considered a *Violation* of this rule.

Note: Any concerns regarding Field Element or Scoring Object starting positions should be raised with the Head Referee prior to the Match. Team members may never adjust Scoring Objects or Field Elements themselves.

<GG5> Match Replays are allowed, but rare. *Match* replays (i.e., playing a *Match* over again from its start) are at the discretion of the *Event Partner* and *Head Referee*, and will only be issued in the most extreme circumstances. Some examples that may warrant a *Match* replay are as follows (note that this is not an exhaustive list):

a. *Score Affecting* "Field fault" issues.

    i. *Scoring Objects* not being reset before the *Match* starts.

    ii. *Field Elements* detaching or moving beyond normal tolerances, not a result of *Robot* interactions.

b. *Score Affecting* game rule issues.

    i. A *Field* is reset before the score is determined.

    ii. A *Match* is run before its scheduled time without a *Team*.

<GG6> Disqualifications. A *Team* that is issued a *Disqualification* in a *Qualification Match* receives zero (0) points for the *Match*. The other *Team* on their *Alliance* will still receive points for the *Match*.

a. In *Finals Matches*, *Disqualifications* apply to the whole *Alliance*, not just one *Team*. An *Alliance* that receives a *Disqualification* in a *Finals Match* will receive zero (0) points.

b. A *Team* that receives a *Disqualification* in a *Robot Skills Match* will receive a score of zero (0).

<GG7> Timeouts. There are no timeouts in VIQRC tournaments.

<GG8> Keep your Robot together. *Robots* may not intentionally detach parts or leave mechanisms on the *Field* during any *Match*.

a. Parts that become unintentionally detached from the *Robot* are no longer considered to be part of the *Robot* and can be either left on the *Field* or collected by a *Drive Team Member* during a *Robot* reset using <GG10>.

<GG9> Don't damage the Field. *Robot* interactions which damage the *Field* or any *Field Elements* are prohibited. For the purpose of this rule, "damage" is defined as anything which requires repair in order to begin the next *Match*, such as causing part of a *Goal* to detach from the *Field*.

> *Teams* are responsible for the actions of their *Robots* at all times, especially when interacting with the *Goals*. If a *Team* chooses to repeatedly ram full-speed into a *Field Element*, it will be hard to convince a *Head Referee* that any damage caused was "accidental."

Violation Notes:

- *In most cases, accidental Field damage should only be considered a Minor Violation*
- *Egregious, intentional, or repeated accidental/Minor Violations may escalate to a Major Violation at the Head Referee's discretion*

a

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<GG10> Handling the Robot mid-match is allowed under certain circumstances. If a *Robot* goes completely outside the playing *Field*, gets stuck, tips over, or otherwise requires assistance, the *Drive Team Members* may retrieve & reset their *Robot*. To do so, the *Team* must do the following:

a. Signal the Referee by placing their VEX IQ Controller on the ground.

b. Any *Scoring Objects* being controlled by the *Robot* while being handled must be removed from the *Field*, and can be returned by a Loader in accordance with <SG4>.

   i. In the context of this rule, "controlled" implies that the *Robot* was manipulating the *Scoring Object*, and not simply touching it. For example, if the *Scoring Object* would move with the *Robot* either vertically or while turning, then the *Robot* is "controlling" that *Scoring Object*.

c. The *Robot* must be placed back into a legal position that meets the criteria listed in clauses a,b, c, & d of <SG1>. If any *Scoring Objects* are preventing the *Robot* from being legally placed, they should be removed from the *Field* and reintroduced by a Loader in accordance with <SG4>.

d. Swapping one set of parts for another, or adding new pieces to a *Robot* mid-*Match* during a <GG10> or <RSC5> interaction is considered a *Violation* of the intent and spirit of this rule. Repairing a *Robot*, or reattaching parts of the *Robot* that fall off during a *Match*, is allowed.

e. As described in rule <S1>, *Students* cannot step into the *Field* at any time during a *Match*. If the *Drive Team Members* cannot reach the *Robot* due to the *Robot* being in the center of the *Field*, they may ask the *Head Referee* to pick up the *Robot* and hand it to the *Drive Team Members* for placement according to the conditions above.

   Violation Notes: This rule is intended to allow Teams to fix damaged Robots or help get their Robots "out of trouble." Strategically exploiting this rule may be considered a Minor Violation or Major Violation at the Head Referee's discretion.

<GG11> A Team's two Drivers switch Controllers midway through the Match. In a given *Match*, up to two (2) *Drivers* may be in the *Driver Station* per *Team*. The two *Drivers* must switch their controller between thirty-five seconds (0:35 on the *Match* timer) and twenty-five seconds (0:25 on the *Match* timer) remaining in the *Match*.

a. No *Driver* shall operate a *Robot* for more than thirty-five (35) seconds.

b. The second *Driver* may not touch their *Team's* controls until the controller is passed to them.

c. Once the controller is passed, the first *Driver* may no longer touch their *Team's* controls.

d. A *Driver* cannot also be a Loader in the same *Match*.

e. If a Drive Team for a *Match* only has two members, one must serve as the *Driver* until the mid-*Match Driver* switch. The second *Drive Team Member* may serve as either the 2nd *Driver* (after the mid-*Match Driver* switch) or the Loader for the full *Match*, but cannot fill both roles. If the 2nd *Driver* position is unfilled, the *Robot's* operation (even prewritten commands) must cease after the first thirty-five (35) seconds of the *Match*.

f. If only one *Drive Team Member* is present, the *Robot's* operation (even prewritten commands) must cease after the first thirty-five (35) seconds of the *Match* and the *Team* will not have a Loader during that *Match*.

Violation Notes: At a minimum, any Violation of this rule is considered a Minor Violation. Whether it escalates to a Major Violation or not is dependent upon the Head Referee's judgment regarding:

- *Prior Violations*
- *Any Score Affecting actions that were a direct result of the Violation, such as the first Driver scoring additional points after 35 seconds of driving or a Driver also serving as a Loader in the same Match.*

<GG12> Don't Start Before the Timer, and Stop Moving at the end of the Match. *Driver* inputs and *Robot* may not begin before the *Match* timer starts, and must cease at the end of the *Match*, when the timer reaches 0:00.

a. A pre-programmed routine which causes *Robot* motion to start before the *Match* or continue after the end of the *Match* would violate this rule.

b. Any scoring which takes place after the *Match* due to *Robots* continuing to move will not count toward the score and is a *Violation* of this rule.

> It is expected that many Mix & Match *Matches* will have last-second "buzzer-beater" moments. The key moment occurs when the timer display shows 0:00. At many events, a buzzer sound will also play at T=0:00; however, the *Field* timer display takes precedence in the event of any audio discrepancies.
> If a *Stack* is released from a *Robot* before this moment, it will be allowed to finish its path and the score will be calculated once it comes to rest. However, if it is released after this moment (i.e., the *Robot* was still moving past T=0:00) it will not count and the *Team* will receive a *Violation* as described below.
>
> In cases where a last-second scoring attempt is "too close to call," *Teams* will generally be given the "benefit of the doubt" and the score will be counted. *Teams* are advised to *Place* and release *Stacks* a second or two before the timer reaches zero to avoid the need for referee judgment calls.

<GG13> Ending a Match early. If an *Alliance* wants to end a *Qualification Match* or a *Finals Match* early, both *Teams* must signal the referee by ceasing all *Robot* motion and placing their controllers on the ground. The referee will then signal to the *Teams* that the *Match* is over and will begin to tally the score. If the *Match* is a tiebreaker *Finals Match* for first place, then the *Match Stop Time* will also be recorded (see <T14b>).

Section 4 - Robot Skills Challenge

Overview

In this challenge, *Teams* will compete in sixty-second (one minute) *Matches* in an effort to score as many points as possible. These *Matches* consist of *Driving Skills Matches*, which are entirely *Driver* controlled, and *Autonomous Coding Skills Matches*, which are autonomous with limited human interaction. *Teams* will be ranked based on their combined score in the two types of *Robot Skills Matches*.

The *Robot Skills Challenge* is an optional event for all *Teams*. *Teams* who do not compete will not be penalized in *Qualification Matches* or *Finals Matches*. However, participation in the *Robot Skills Challenge* may impact eligibility for judged awards at the event.

At events that include *Qualification Matches*, *Teams* may only participate in the Robot Skills Challenge if they also participate in the *Qualification Matches*. See rule <T15>.

Robot Skills Challenge Definitions

All definitions from previous sections of the manual apply to the *Robot Skills Challenge*, unless otherwise specified.

Driving Skills Match - A *Driving Skills Match* consists of a sixty-second (one minute) *Driver Controlled Period*. There is no *Autonomous Period*. *Teams* can elect to end a *Driving Skills Match* early as described in rule <RSC8> if they wish to record a *Skills Stop Time*.

Autonomous Coding Skills Match - An *Autonomous Coding Skills Match* consists of a sixty-second (one minute) *Autonomous Period*. There is no *Driver Controlled Period*. *Teams* can elect to end an *Autonomous Coding Skills Match* early if they wish to record a *Skills Stop Time*.

Robot Skills Match - A *Driving Skills Match* or *Autonomous Coding Skills Match*.

Skills Stop Time - The time remaining in a *Robot Skills Match* when a *Team* ends the *Match* early.

a. If a *Team* does not end the *Match* early, they receive a default *Skills Stop Time* of 0.

b. The moment when the *Match* ends early is defined as the moment when the *Robot* and *Scoring Objects* have come to a rest and the *Driver* has provided the agreed upon visual and audio signal to the Referee. See <RSC8> for more details.

c. If a Tournament Manager display is being used for field timing, then the *Skills Stop Time* is the time shown on the display when the *Match* is ended early (i.e., in 1-second increments).

d. If a manual timer is being used that counts down to 0 with greater accuracy than 1-second increments, then the time shown on the timer should be rounded up to the nearest second. For example, if the *Robot* is *Disabled* and the timer shows 25.2 seconds, then the *Skills Stop Time* should be recorded as 26.

Robot Skills Challenge Rules

<RSC1> Standard rules apply in most cases. All rules from previous sections apply to the *Robot Skills Matches*, unless otherwise specified in this section.

> *Violation Notes:*
>
> - *Violations of <GG>, <SG>, and <RSC> rules that occur during a Robot Skills Match should only affect the outcome of that Match and should not be considered when determining whether a Violation has been repeated during the event.*

<RSC2> Scoring Robot Skills Matches. For each *Robot Skills Match*, *Teams* are awarded a score based on the standard scoring rules.

<RSC3> Robot and Field setup for Skills Matches. The *Robot* and *Field* are set up the same as a *Teamwork Challenge Match*, with the following modifications:

a. The layout of *Scoring Objects* for a Mix & Match *Robot Skills Match* differs from the layout for Teamwork Challenge *Matches*, as shown in Figure RSC3-1.

b. The blue *Load Zone* is not used in *Robot Skills Matches*. *Scoring Objects* of any color may be introduced into the red *Load Zone* only. This includes any *Scoring Object* that is reintroduced after leaving the *Field* during the *Match*.
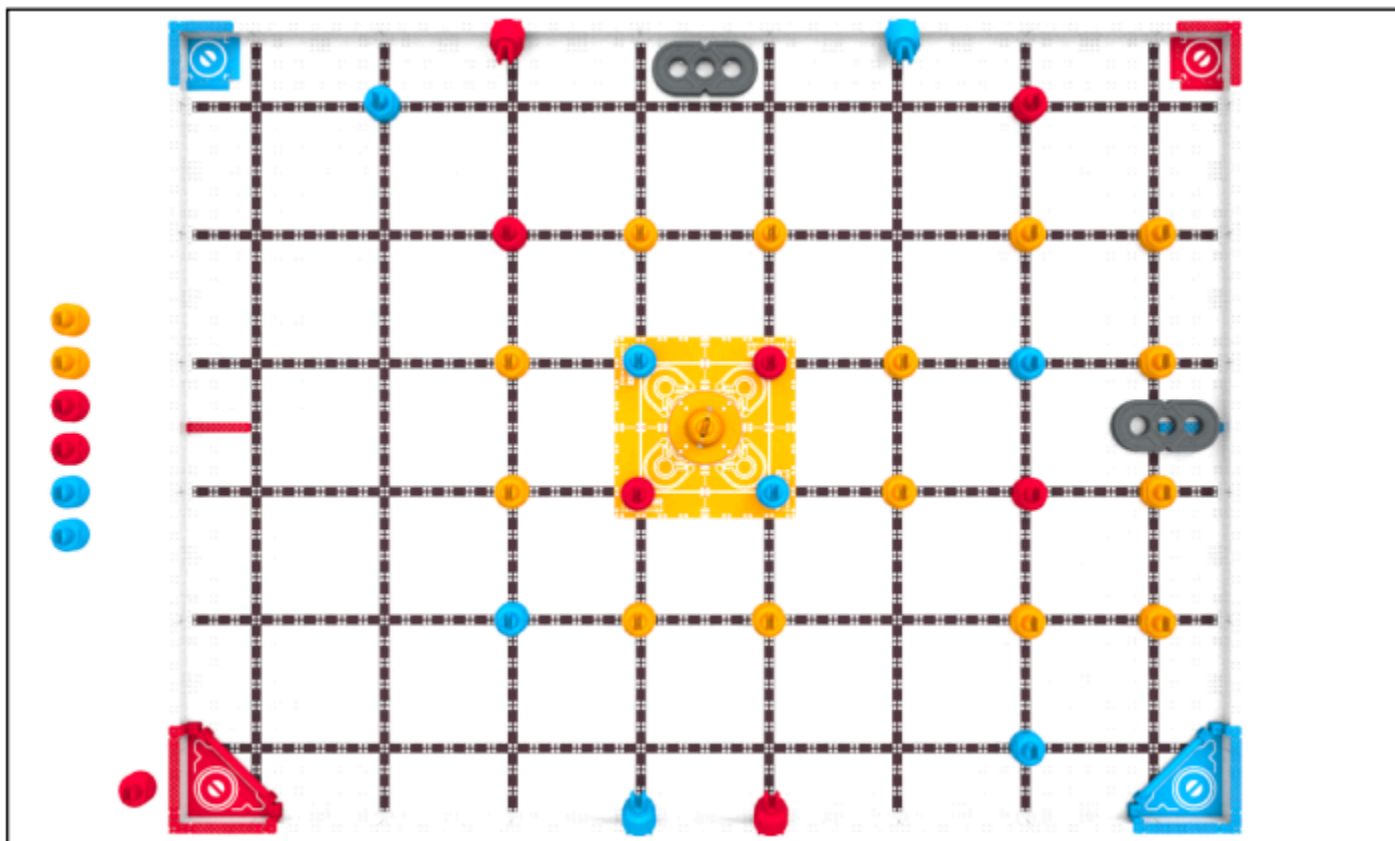
Figure RSC3-1: *The Field Configuration for a VIQRC Mix and Match Robot Skills Match.*

<RSC4> Loader and Driver differences. All criteria listed in <SG6> apply as written (e.g., a Loader cannot put a *Scoring Object* into a *Load Zone* if there's already a *Scoring Object* there). *Loading* is modified as follows:

a. In both *Driving Skills Matches* and *Autonomous Coding Skills Matches*, any *Driver* who is not currently Driving the *Robot* may also serve as a Loader (i.e., a *Team* may have one, two, or three Loaders at any given time).

b. The blue *Load Zone* is not used in *Robot Skills Matches*, and *Scoring Objects* may only be introduced into the red *Load Zone*. This includes any *Scoring Object* that is reintroduced after leaving the *Field* during the *Match*.

c. Any *Scoring Object* that leaves the *Field* during a *Robot Skills Match* should be given to the *Team's* human Loader for reintroduction at the red *Load Zone*, regardless of that object's color.

d. *Drive Team Members* must remain in the red *Driver Station* during *Driving Skills Matches*, except when legally interacting with their *Robot* per rule <GG10>.

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<RSC5> Handling Robots during an Autonomous Coding Skills Match. A *Team* may handle their *Robot* as many times as desired during an *Autonomous Coding Skills Match*.

a. Upon handling the *Robot*, it must be immediately brought back to a legal starting position.

   i. *Drive Team Members* may reset or adjust the *Robot* as desired from this position, including pressing buttons on the Robot Brain or activating sensors.

   ii. Any *Scoring Objects* being controlled by the *Robot* while being handled must be removed from the *Field*, and can be reintroduced by a Loader in accordance with <SG6> and <RSC4>.

   iii. As described in rule <S1>, *Students* cannot step into the *Field* at any time during a *Match*. If the *Drive Team Members* cannot reach the *Robot* due to the *Robot* being in the center of the *Field*, they may ask the *Head Referee* to pick up the *Robot* and hand it to the *Drive Team Members* for placement according to the conditions above.

b. During an *Autonomous Coding Skills Match*, *Drivers* may move freely around the *Field*, and are not restricted to the *Driver Station* when not handling their *Robot*.

   i. The rest of <GG1>, which states that *Drive Team Members* are not allowed to use any communication devices during their *Match*, still applies.

   ii. An intent of this exception is to permit *Drivers* who wish to "stage" *Robot* handling during an *Autonomous Coding Skills Match* to do so without excessive running back and forth to the *Driver Station*.

> This rule is an explicit exception to rules <GG4> and the Violation Note for <GG10>, and may be used as part of a *Team's* strategy for *Autonomous Coding Skills Matches*.
>
> *Driving Skills Matches* are still governed by <GG4> & the Violation Note for <GG10>, especially for strategic *Violations*.

<RSC6> Starting an Autonomous Coding Skills Match. *Drivers* must start a *Robot's Autonomous Coding Skills Match* routine by pressing a button on the Robot Brain or manually activating a sensor. Because there is no VEX IQ Controller hand-off, only one (1) *Driver* is required for an *Autonomous Coding Skills Match* (though *Teams* may still have two (2) if desired).

a. Pre-*Match* sensor calibration is considered part of the standard pre-*Match* setup time (i.e., the time when the *Team* would typically be turning on the *Robot*, moving any mechanisms to their desired legal start position, etc.).

b. Pressing a button on the VEX IQ Controller to begin the routine is not permitted. To avoid any confusion, *Teams* are advised not to bring controllers to *Autonomous Coding Skills Matches*.

> In accordance with <GG3>, *Teams* should be mindful of event schedules and set their *Robot* up as promptly as possible. The definition of "prompt" is at the discretion of the *Event Partner* and *Head Referee*, and could depend on things like how much time is left for the Skills Challenge *Field*(s) to be open, how many *Teams* are waiting in line, etc. As a general guideline, three seconds to calibrate a Gyro Sensor would be acceptable, but three minutes to debug a program would not.

<RSC7> **Autonomous means "no humans."** During an *Autonomous Coding Skills Match, Drive Team Members* are not permitted to activate any controls on their VEX IQ Controller, and cannot manually trigger sensors (including the Vision Sensor) in any way, even without touching them.

<RSC8> **Skills Stop Time.** If a *Team* wishes to end their *Robot Skills Match* early, they may elect to record a *Skills Stop Time*. This is used as a tiebreaker for *Robot Skills Challenge* rankings. A *Skills Stop Time* does not affect a *Team's* score for a given *Robot Skills Match*. *Drivers* and field staff must agree prior to the *Match* on the signal that will be used to end the *Match* early.

a. As noted in the definition of *Skills Stop Time*, the moment when the *Match* ends early is defined as the moment when the *Robot* and *Scoring Objects* have come to a rest and the *Driver* provides the agreed upon visual and audio signal to the *Scorekeeper Referee*.

b. *Teams* who intend to attempt a *Skills Stop Time* must "opt-in" by verbally confirming with the *Scorekeeper Referee* prior to the *Robot Skills Match*. If no notification is given prior to the start of the *Match*, then the *Team* forfeits their option to record a *Skills Stop Time* for that *Match*.

c. This conversation should include informing the *Scorekeeper Referee* which *Driver* will signal the stop. The *Match* may only be ended early by a *Driver* for that *Match*.

d. The agreed-upon signal to stop the *Match* must be both verbal and visual, such as *Drivers* crossing their arms in an "X" or placing their VEX IQ Controller on the ground.

e. It is recommended that the *Driver* also provides a verbal notice that they are approaching their *Skills Stop Time*, such as counting out "3-2-1-stop."

f. If a *Team* runs multiple *Robot Skills Matches* in a row, they must reconfirm their *Skills Stop Time* choice with the *Scorekeeper Referee* prior to each *Match*.

g. Any questions regarding a *Skills Stop Time* should be reviewed and settled immediately following the *Match*. <T1> and <T3> apply to *Robot Skills Matches*.

Tournament Rules

<T1> **Head Referees have ultimate and final authority on all gameplay and robot ruling decisions during the competition.**

a. *Scorekeeper Referees* score the *Match*, and may serve as observers or advisers for the *Head Referees*, but may not determine any *Violations* directly.

b. When issuing a *Disqualification* or *Violation* to a *Team*, the *Head Referee* should attempt to notify the *Team* as the *Violation* occurs, and after the *Match* must provide the rule number of the specific rule that has been Violated and record the *Violation* in the Match Anomaly Log.

c. *Major Violations* of the REC Foundation Code of Conduct and other rules related to the Code of Conduct require additional escalation beyond the *Head Referee's* initial ruling, including (but not limited to) investigation by REC Foundation representatives. Rules <S1>, <S2>, <G1>, <G2>, <G4>, and <R4> are the rules for which this escalation may be required.

d.   *Event Partners* may not overrule a *Head Referee's* gameplay or *Robot* decisions.

e.   Every *Qualification Match* and *Finals Match* must be watched by a certified *Head Referee*. *Head Referees* may only watch one *Match* at a time; if multiple *Matches* are happening simultaneously on separate *Fields*, each *Field* must have its own *Head Referee*. *Head Referees* must follow the rules in this game manual and the Q&A, and must make rulings consistent with the intent of the game manual and Q&A.

f.   At a minimum, every *Robot Skills Match* must be watched by a trained *Scorekeeper Referee*, who may only watch one *Match* at a time. If multiple *Robot Skills Matches* are happening simultaneously on separate *Fields*, each *Field* must have its own *Scorekeeper Referee*. A certified *Head Referee* must be available at the event to explain a rule, *Disqualification*, *Violation*, or other penalty to *Teams* in *Robot Skills Matches* as needed in support of the *Scorekeeper Referees* at skills *Fields*.

> Note from the VEX GDC: The rules contained in this Game Manual are written to be enforced by human *Head Referees*. Many rules have "black-and-white" criteria that can be easily checked. However, some rulings will rely on a judgment call from this human *Head Referee*. In these cases, *Head Referees* will make their calls based on what they and the *Scorekeeper Referees* saw, what guidance is provided by their official support materials (the Game Manual and the Q&A), and most crucially, the context of the *Match* in question.
>
> The VEX IQ Robotics Competition does not have video replay, our *Fields* do not have absolute sensors to count scores, and most events do not have the resources for an extensive review conference between each *Match*.

<T2> Head Referees must be qualified. VEX IQ *Head Referees* must have all of the following qualifications:

a.   Be at least 16 years of age.

b.   Be approved by the *Event Partner*.

c.   Be an REC Foundation Certified VIQRC *Head Referee* for the current season. Visit the REC Library for more details.

d.   Cannot be the *Event Partner* or a Judge Advisor for the event.

   Note: Scorekeeper Referees must be at least 15 years of age, and must be approved by the Event Partner.

<T3> The Drive Team Members are permitted to immediately appeal the Head Referee's ruling.
If *Drive Team Members* wish to dispute a score or ruling, they must stay in the *Driver Station* until the *Head Referee* talks with them. The *Head Referee* may choose to meet with the *Drive Team Members* at another location and/or at a later time so that the *Head Referee* has time to reference materials or resources to help with the decision. Once the *Head Referee* announces that their decision has been made final, the issue is over and no more appeals may be made (see rule <T1>).

a. Referees are not permitted to review any photo or video *Match* recordings when determining a score or ruling.

b. *Head Referees* are the only individuals permitted to explain a rule, *Disqualification*, or *Violation* to the *Teams* in a *Teamwork Challenge Match*. *Teams* should never consult other field personnel, including *Scorekeeper Referees*, regarding a ruling clarification.

c. Event attendees should not record audio or video of *Teams'* discussions with *Head Referees* or other event volunteers.

Communication and conflict resolution skills are an important life skill for *Students* to practice and learn. In VEX IQ Robotics Competitions, we expect *Students* to practice proper conflict resolution using the proper chain of command. *Violations* of this rule may be considered a *Violation* of <G1> and/or the Code of Conduct.

<T4> The Event Partner has ultimate authority regarding all non-gameplay decisions during an event. The Game Manual is intended to provide a set of rules for successfully playing VIQRC Mix & Match; it is not intended to be an exhaustive compilation of guidelines for running a VEX IQ Robotics Competition event. Rules such as, but not limited to, the following examples are at the discretion of the *Event Partner* and should be treated with the same respect as the Game Manual:

- Venue access
- Pit spaces
- Health and safety
- *Team* registration and/or competition eligibility
- *Team* conduct away from competition *Fields*

> This rule exists alongside <G1>, <S1>, and <G3>. Even though there isn't a rule that says "do not steal from the concession stand," it would still be within an *Event Partner's* authority to remove a thief from the competition.

<T5> Be prepared for minor field variance. *Field Element* tolerances may vary from nominal by up to ±0.5" [12.7mm], unless otherwise specified. *Teams* are encouraged to design their *Robots* accordingly. Please make sure to check Appendix A for more specific nominal dimensions and tolerances.

> The *Field* and *Field Elements* are designed to be assembled and disassembled multiple times each year. *Event Partners* store and transport *Fields* between events, and the individuals setting up the *Field* at one event may differ from those at the next. While every effort will be made to ensure minimal variance, *Teams* should expect that any *Field* may be slightly different than another, and prepare accordingly. Just because something works on one *Field* does not fully guarantee it will work on the next, and is not enough evidence alone to determine if a *Field* is out of tolerance.

<T6> Fields and Field Elements may be repaired at the Event Partner's discretion. All competition *Fields* and other *Field Elements* at an event must be set up in accordance with the specifications in Appendix A and/or other applicable support materials. Minor aesthetic customizations or repairs are permitted, provided that they do not impact gameplay (see <T4>).

Examples of permissible modifications include, but are not limited to:

a. Replacing a damaged or missing VEX IQ component with an identical part of any color.

b. Elevating the playing *Field* off of the *Floor* (common heights are 10" to 24" [254mm to 609.6mm]).

c. Using off-the-shelf PVC to replace a damaged or missing pipe.

<T7> Fields at an event must be consistent with each other. There are many types of permissible aesthetic and/or logistical modifications that may be made to competition *Fields* at the *Event Partner's* discretion. If an event has multiple *Teamwork Challenge Fields*, they must all incorporate the same permissible/applicable modifications. For example, if one *Field* is elevated, then all *Teamwork Challenge Fields* must be elevated to the same height.

Examples of these modifications may include, but are not limited to:

● Elevating the playing *Field* off of the *Floor* (common heights are 12" to 24" [30.5cm to 61cm])

● Field display monitors

● *Field Perimeter* decorations (e.g., LED lights, sponsor banners attached to risers)

   Note: If an event has dedicated Fields for Robot Skills Matches, there is no requirement for them to have the same consistent modifications as the Teamwork Challenge Fields. See <T16> for more details.

<T15> Skills Match Schedule. *Teams* play *Robot Skills Matches* on a first-come, first-served basis. Each *Team* will get the opportunity to play exactly three (3) *Driving Skills Matches* and three (3) *Autonomous Coding Skills Matches*.

Teams should review the event agenda and their *Match* schedule to determine when the best possible time is to complete their *Robot Skills Matches*. If the *Robot Skills Challenge* area closes before a *Team* has completed all six (6) *Robot Skills Matches*, but it is determined that there was adequate time given, then the *Team* will automatically forfeit those unused *Matches*.

<T17> Skills Rankings at events. *Teams* will be ranked at an event based on the following scores and tiebreakers:

a. Sum of highest *Autonomous Coding Skills Match* score and highest *Driving Skills Match* Score.

b. Highest *Autonomous Coding Skills Match* score.

c. Second-highest *Autonomous Coding Skills Match* score.

d. Second-highest *Driving Skills Match* score.

e. Highest sum of *Skills Stop Times* from a *Team's* highest *Autonomous Coding Skills Match* and highest *Driving Skills Match* (i.e., the *Matches* in point 1).

f. Highest *Skills Stop Time* from a *Team's* highest *Autonomous Coding Skills Match* (i.e., the *Match* in point 2).

g. Third-highest *Autonomous Coding Skills Match* score

h. Third-highest *Driving Skills Match* score.

i. If the tie cannot be broken after all above criteria (i.e., both *Teams* have the exact same scores and *Skills Stop Times* for each *Autonomous Coding Skills Match* and *Driving Skills Match*), then the following ordered criteria will be used to determine which *Team* had the "best" *Autonomous Coding Skills Match*:

    i. Points for *Stacks* in the *Standoff Goal*

    ii. Points from *Matching Goal* Bonus

    iii. Points for 2-color and 3-color *Stacks*

j. If the tie still cannot be broken, the same process in the step above will be applied to the *Teams'* highest *Driving Skills Matches*.

k. If the tie still isn't broken, the *Event Partner* may choose to allow *Teams* to have one more deciding *Match*, or both *Teams* may be declared the winner.

Description

Every *Robot* must pass a full inspection before being cleared to participate in the VEX IQ Robotics Competition. This inspection will ensure that all *Robot* rules and regulations are met. Initial inspections will typically take place during *Team* check-in / practice time. Every *Team* should use the rules below as a guide to pre-inspect their *Robot* and ensure that it meets all requirements.

Comprehensive lists of legal and illegal VEX IQ Robotics Competition parts can be found in the VEX IQ Robotics Competition Legal Parts and VEX IQ Robotics Competition Illegal Parts supplements. These documents are updated as needed if/when new VEX IQ parts are released, and may not coincide with scheduled Game Manual updates.

Inspection Rules

<R1> One Robot per Team. Each *Team* can only bring one (1) *Robot* to a given event. Though it is expected that *Teams* will make changes to their *Robots* at the event, a *Team* is limited to only one (1) *Robot*, and a given *Robot* may only be used by one (1) *Team*. The VEX IQ system is intended to be a mobile robotics design platform. As such, a VEX IQ Robotics Competition *Robot*, for the purposes of the VEX IQ Robotics Competition, has the following subsystems:

- Subsystem 1: Mobile robotic base including wheels, tracks, or any other mechanism that allows the *Robot* to navigate the majority of the flat playing *Field* surface. For a stationary *Robot*, the robotic base without wheels would be considered Subsystem 1.

- Subsystem 2: Power and control system that includes a VEX IQ legal battery, a VEX IQ control system, and associated Smart Motors for the mobile robotic base. Also includes the VEX IQ pneumatic air pump and solenoids if used on the *Robot*.

- Subsystem 3: Additional mechanisms (and associated Smart Motors) that allow manipulation of *Scoring Objects* or navigation/manipulation of *Field Elements*.

Given the above definitions, a minimum *Robot* for use in any VEX IQ Robotics Competition event (including Skills Challenges) must consist of subsystems 1 and 2 above. Thus, if you are swapping out an entire subsystem 1 or 2, you have now created a second *Robot* and are no longer legal.

a. *Teams* may not compete with one *Robot* while a second is being modified or assembled at a competition.

b. *Teams* may not have an assembled second *Robot* on hand at a competition that is used to repair or swap parts with the first *Robot*.

c. *Teams* may not switch back and forth between multiple *Robots* during a competition. This includes using different *Robots* for *Robot Skills Matches*, *Qualification Matches*, and/or *Finals Matches*.

d. Multiple *Teams* may not use the same *Robot*. Once a *Robot* has competed under a given *Team* number at an event, it is "their" *Robot*; no other *Teams* may EVER compete with it.

> The intent of <R1a>, <R1b>, and <R1c> is to ensure an unambiguous level playing field for all *Teams*. *Teams* are welcome (and encouraged) to improve or modify their *Robots* between events, or to collaborate with other *Teams* to develop the best possible game solution.

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<R2> Robots must represent the Team's skill level. The *Robot* must be designed, built, and programmed by members of the *Team*. *Adults* are permitted to mentor and teach design, building, and programming skills to the *Students* on the *Team*, but may not design, build, or program that *Team's Robot*.

> In VIQRC, we expect *Adults* to teach fundamental *Robot* principles like linkages, drivetrains, and manipulators, then allow the *Students* to determine which designs to implement and build on their *Robot*.
>
> Similarly, *Adults* are encouraged to teach the *Students* how to code various functions involving applicable sensors and mechanisms, then have the *Students* program the *Robot* from what they have learned.

<R3> Robots must pass inspection. The *Team's Robot* must pass inspection before being allowed to participate in any *Matches*. Noncompliance with any *Robot* design or construction rule will result in removal from *Matches* or *Disqualification* of the *Robot* at an event until the *Robot* is brought back into compliance, as described in the following subclauses.

a. Significant changes to a *Robot*, such as a partial or full swap of Subsystem 3, must be re-inspected before the *Robot* may compete again.

b. All possible functional *Robot* configurations must be inspected before being used in competition.

c. *Teams* may be asked to submit to spot inspections by *Head Referees*. Refusal to submit will result in *Disqualification*.

d. If a *Robot* is determined to not be legal before a *Match* begins and cannot be brought into compliance before the scheduled *Match* start time, the *Robot* will be removed from the *Field*. The *Robot* may remain at the *Field* so that the *Team* does not get assessed a "no-show" (per <GG2>).

e. *Robots* which have not passed inspection (i.e., that are in *Violation* of one or more *Robot* rules) will not be permitted to play in any *Matches* until they have done so. <GG3> will apply to any *Matches* that occur until the *Robot* has passed inspection.

f. If a *Robot* has passed inspection, but is later found to be in *Violation* of a *Robot* rule during or immediately following a *Match*, then they will be *Disqualified* from that *Match* and <R3d>/<GG3> will apply until the *Violation* is remedied and the *Team* is re-inspected. This is the only *Match* that will be affected; any prior *Matches* that have already been completed will not be revisited. <R3d> will apply until the *Violation* is remedied and the *Team* is re-inspected.

g. All inspection rules are to be enforced at the discretion of the *Head Referee* within a given event. *Robot* legality at one event does not automatically imply legality at future events. *Robots* which rely on "edge-case" interpretations of subjective rules, such as whether a decoration is "non-functional" or not, should expect additional scrutiny during inspection.

<R4> There is a difference between accidentally and willfully violating a Robot rule. Any *Violation* of *Robot* rules, accidental or intentional, will result in a *Team* being unable to play until they pass inspection (per <R3d>).

However, *Teams* who intentionally and/or knowingly circumvent or violate rules to gain an advantage over their fellow competitors are in *Violation* of the spirit and ethos of the competition. Any *Violation* of this sort should be considered a *Violation* of <G1> and/or the REC Foundation Code of Conduct.

A *Team* that circumvents a *Robot* rule for a competitive advantage should receive an immediate *Disqualification* for the current *Match* and be reported to the *Event Partner* for discussion with the REC Foundation Regional Support Manager. As a result of that discussion, the *Team* may be *Disqualified* from the event. The *Violation* should also be reported to the REC Foundation Rules and Conduct Committee following the event.

<R5> Robots must fit within an 11″ x 20″ x 15″ (279.4mm x 508mm x 381.0mm) volume.

a. *Teams* using more than one possible *Robot* configuration at the beginning of *Matches* must tell the inspector(s) and have the *Robot* inspected in all configurations. Rule <R3c> will apply if a *Robot* is placed in an uninspected configuration (i.e., will not be permitted to play until re-inspected, but will not be considered a "no-show").

b. A *Team* may NOT have its *Robot* inspected in one configuration and then place it in an uninspected configuration at the start of a *Match*.

Figure R5-1: The approximate size that a Robot should start the Match in.
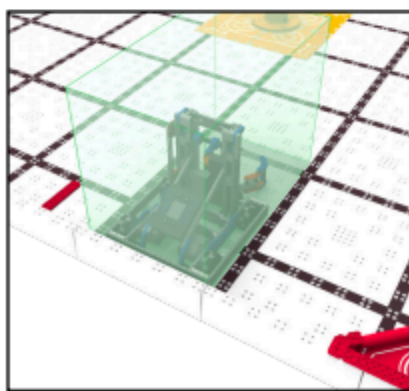
<R6> Officially registered Team numbers must be displayed on Robot License Plates. To participate in an official VEX IQ Robotics Competition Event, a *Team* must first register on RobotEvents.com and receive a VEX IQ Robotics Competition *Team* number.

This *Team* number must be legibly displayed on exactly two (2) VEX IQ Robotics Competition *License Plates* on opposing sides of the *Robot*. *Teams* may use the official VEX IQ Robotics Competition License Plate (VEX Part Number 228-7401) or a plain paper version of matching size, such as this template in the REC Library.

a. *License Plates* are considered functional components, and must meet the requirements of all *Robot* rules.

b. *License Plates* must be clearly visible at all times. For example, *License Plates* must not be in a position that would be easily obstructed by a *Robot* mechanism during standard *Match* play.

c. Additional *License Plates* cannot be used on the *Robot* for any purpose.

Figure R6-1: *A VEX IQ Robotics Competition License Plate with a VEX IQ Robotics Competition Team Number written upon it.*

<R7> Let it go after the Match is over. *Robots* must be designed to permit easy removal of *Scoring Objects* from their *Robot* without requiring that the *Robot* have power or remote control after the *Match* is over.

<R8> Robots have one Brain. *Robots* are limited to one (1) VEX IQ Robot Brain. Any other microcontrollers or processing devices are not allowed, even as non-functional decorations.

This includes microcontrollers that are part of other VEX product lines, such as VEX Cortex, VEX EXP, VEXpro, VEX CTE, VEX RCR, VEX V5, VEX GO, or VEX Robotics by HEXBUG*. This also includes devices that are unrelated to VEX, such as Raspberry Pi or Arduino devices.

a. If using a first generation VEX IQ Brain, *Robots* must use one (1) VEX IQ 900 MHz radio, VEX IQ 2.4 GHz radio, or VEX IQ Smart Radio in conjunction with their VEX IQ Robot Brain. The VEX IQ Brain and VEX IQ Controller may not be physically connected during a *Match*, and may only communicate through the radio.

b. Additional Robot Brains cannot be used on the *Robot* (even Robot Brains that are not connected).

<R9> Keep the power button accessible. The on/off button on the VEX IQ Robot Brain must be accessible without moving or lifting the *Robot*. All screens and/or lights must also be easily visible by competition personnel to assist in diagnosing *Robot* problems.

> This rule is in place to ensure the safety of both competitors and field staff. In the event that a *Robot* needs to be quickly powered off—whether due to a malfunction, entanglement, or other safety concern—it is crucial that the power button remains easily accessible. This allows competitors and/or field personnel to safely Disable the *Robot* without putting their hands near moving parts or other hazards inside the *Robot*. Additionally, keeping screens and indicator lights visible helps officials diagnose issues efficiently, minimizing downtime and ensuring a smooth competition experience.

<R10> Firmware. *Teams* must use VEXos version 2.2.1 or newer on Gen1 Brains, or VEXos version 1.0.8 or newer on Gen2 Brains. The latest firmware can be found at https://link.vex.com/firmware. Custom firmware modifications are not permitted.

a. The minimum version requirement is subject to change over the course of the season.

b. When the minimum version is updated, *Teams* have a two week (14 calendar day) grace period from the time the minimum version is changed to update their firmware to the latest minimum version.

c. VEX Robotics reserves the right to deem any firmware update critical, and remove the allowable grace period.

<R11> Motors. *Robots* may use up to six (6) VEX IQ Smart Motors.

a. Additional motors cannot be used on the *Robot* (even motors that aren't connected).

<R12> Batteries. The only allowable sources of electrical power for a VEX IQ Robotics Competition *Robot* are one (1) VEX IQ Robot Battery (first or second generation) or six (6) AA batteries via the Robot AA Battery Holder (228-3493).

a. Additional batteries cannot be used on the *Robot* (even batteries that aren't connected).

b. *Teams* are permitted to have an external power source (such as a rechargeable battery pack) plugged into their VEX IQ Controller during a *Match*, provided that this power source is connected safely and does not violate any other rules (such as <GG1>).

   Note: Although it is legal, the Robot AA Battery Holder (228-3493) is not recommended for use in the VEX IQ Robotics Competition.

<R13> One Controller per Robot. No more than one (1) VEX IQ Controller may control a single *Robot*.

a. No physical or electrical modification of the Controller is allowed under any circumstances.

   i. Attachments which assist the *Drivers* in holding or manipulating buttons/joysticks on the IQ Controller are permitted, provided that they do not involve direct physical or electrical modification of the Controller itself.

b. No other methods of controlling the *Robot* (light, sound, etc.) are permissible.

   i. Using sensor feedback to augment *Driver* control (such as motor encoders or the Vision Sensor) is permitted.

   ii. See <RSC5>, <RSC6>, and <RSC7> for more information about operating the *Robot* during *Autonomous Coding Skills Matches*.

<R14> Robots are built from the VEX IQ product line. *Robots* may be built ONLY from official *Robot* components from the VEX IQ product line, unless otherwise specifically noted within these rules.

a. Official VEX IQ products are ONLY available from VEX Robotics. To determine whether or not a product is "official" and legal for competition use, consult the following sources:

   i.   VEX IQ Robotics Competition Legal Parts Appendix

   ii. VEX IQ Robotics Competition Illegal Parts Appendix

   iii. www.vexiq.com

b. If an inspector or *Head Referee* questions whether something is an official VEX IQ component, the *Team* will be required to provide documentation that proves the component's source. Such documentation may include receipts, part numbers, or other printed documentation.

c. Only VEX IQ components specifically designed for use in *Robot* construction are allowed. Using additional components outside their typical purpose is against the intent of the rule (i.e., please don't try using VEX IQ apparel, *Team* or event support materials, packaging, *Field Elements*, or other non-*Robot* products on a VEX IQ Robotics Competition *Robot*).

d. Official Robotics components from the VEX IQ product line that have been discontinued are still legal for *Robot* use. However, *Teams* must be aware of <R14b>.

e. Additional VEX IQ products that are released during the season are legal for use, unless otherwise noted on their product pages.

f. VEX IQ Smart Cables may only be used for connecting legal electronic devices to the VEX IQ Robot Brain.

   Note: A comprehensive list of legal VEX IQ parts can be found in the VEX IQ Robotics Competition Legal Parts Appendix, at https://www.vexrobotics.com/iq/competition/viqc-current-game. *This Appendix is updated as needed if/when new VEX IQ parts are released, and may not coincide with scheduled Game Manual updates.*

<R15> Prohibited items. The following types of mechanisms and components are NOT allowed:

a. Those that could potentially damage *Field Elements* or *Scoring Objects*.

b. Those that could potentially damage or entangle other *Robots*.

c. Grease, oil, graphite, and/or any other lubricant or plastic additive.

d. Tape and/or any other material that adheres to or changes a legal part, other than non-functional decorations as permitted by <R17>.

e. Products from the VEX 123, VEX V5, VEX CTE, VEX EXP, Cortex, or VEXpro product lines, unless specifically allowed by a clause of <R16>.

f. Electrical components from the VEX Robotics by HEXBUG* product line.

g. Electrical components from the VEX GO product line.

h. 3D printed parts for any purpose, including non-functional decorations.

i. Additional illegal parts are listed in the VEX IQ Robotics Competition Illegal Parts Appendix, at https://link.vex.com/ docs/viqrc/illegal-parts. This Appendix is updated as needed, and may not coincide with scheduled Game Manual updates.

<R16> Legal Non-VEX IQ components. *Robots* are allowed to use the following additional "non-VEX IQ" components:

a. Rubber bands that are identical in length and thickness to those included in the VEX IQ product line (#32, #64, #117B, & #170).

b. ⅛" metal shafts from the VEX V5 product line.

c. Other products from the VEX V5 product line that are also cross-listed as part of the VEX IQ product line are legal. A "cross-listed" product is one which can be found in both the VEX IQ and VEX V5 sections of the VEX Robotics website.

d. Mechanical/structural components from the VEX Robotics by HEXBUG* product line are legal for *Robot* construction.

e. Mechanical/structural components from the VEX GO product line are legal for *Robot* construction.

f. Aerosol-based cooling/freeze spray may be used to assist in cooling motors. *Teams* using freeze spray or similar products in ways that may reasonably be deemed unsafe could be subject to <S1> *Violations*.

g. Cleaners, disinfectants, and/or sanitizers may be used to assist in cleaning *Robots*, parts, components, etc. VEX Robotics recommends these procedures for cleaning/disinfecting/sanitizing *Robot* parts.

<R17> Decorations are allowed. *Teams* may add non-functional decorations, provided that they do not affect *Robot* performance in any significant way or affect the outcome of the *Match*. These decorations must be in the spirit of the competition. Inspectors and *Head Referees* will have final say in what is considered "non-functional." Unless otherwise specified below, non-functional decorations are governed by all standard *Robot* rules.

a. Decorations must be in the spirit of an educational competition.

b. To be considered "non-functional," any decorations must be backed by legal materials that provide the same functionality. For example, a giant decal cannot be used to prevent *Scoring Objects* from falling out of the *Robot* unless it is backed by VEX IQ material. A simple way to check this is to determine if removing the decoration would impact the performance of the *Robot* in any way.

The HEXBUG brand is a registered trademark belonging to Spin Master Corp

c. The use of non-toxic paint is considered a legal non-functional decoration. However, any paint being used as an adhesive or to impact how tightly parts fit together would be classified as functional.

> *Teams* should be mindful of any non-functional decorations which could risk "distracting" an *Alliance* partner *Robot's* Vision Sensor or other sensors.

<R18> Pneumatics. *Robots* using parts from the VEX IQ Pneumatics Kit (228-8795) must satisfy all of the following criteria:

a. No more than two (2) Air Tanks, including any that aren't connected.

b. No more than (1) Air Pump, including any that aren't connected.

c. No additional parts that are not included in the VEX IQ Pneumatics Kit (e.g., unofficial tubing or fittings).

There is no limit on the number of Pneumatic Cylinders or Pneumatic Solenoids that may be used, provided that no other rules are violated. There are no restrictions on running the Air Pump prior to (or during) *Matches*.

> The intent of <R18a> is to limit *Robots* to the air pressure stored in two Air Tanks, as well as the normal working air pressure contained in any Pneumatic Cylinders and tubing on the *Robot*. *Teams* may not use other elements for the purposes of storing or generating air pressure.
>
> Using Pneumatic Cylinders or additional tubing solely for additional air storage is in *Violation* of the spirit of this rule. Similarly, using Pneumatic Cylinders and/or tubing without an actual pneumatic system (e.g., Air Tanks and/or a Air Pump) is also in *Violation* of the spirit of this rule.

<R19> Modifications of parts. Parts may NOT be modified unless specifically listed as an exception in this rule. Examples of illegal modifications include, but are not limited to, bending, cutting, sanding, gluing, lubricating, taping, and melting. The following exceptions are the only legal modifications of parts:

a. Cutting metal VEX IQ or VEX V5 shafts to custom lengths.
b. Bending parts which are intended to be flexible, such as string, rubber bands, or thin plastic sheets.
c. Cutting VEX IQ pneumatic tubing to custom lengths.
d. Tying knots to shorten or connect string or rubber bands.

SkillsUSA NLSC Robot Rules

<NLSC-R1> Building Robots during the Competition at SkillsUSA NLSC.

Teams will NOT be **required to <u>fully</u> disassemble their robot at the start of the competition or bring a fully disassembled robot to the competition.** All Robot Rules must be adhered to, but teams will not be limited to use the quantity of parts in those specific kits. All applicable limitations are listed in the Robot Equipment section of this game manual. You must provide your own robot parts.

<NLSC-R2> Teams may use any programming language. Teams must come to competition with a laptop for programming their Robot. The laptop must have the programming software already installed and licensed. Some programming software options can be found here.
https://www.vexrobotics.com/vexiq/resources/programming

DESIGN PROCESS

Judges must use the Design Rubric to evaluate the teams' design process. A record of all teams submitting notebooks shall be kept by the Judge Advisor. The Rubric comes in two (2) pages. The first page is for the Engineering Notebook, and the second page is for the Design Interview. Teams competing in national Mobile Robotics Technology must **submit a digital engineering notebook** as one of their pre-conference online submission requirements.

- Submit a **digital version** of their engineering notebook in the **Competitor Materials Portal**.
- Online submission must be completed by **May 22, 2026, at 5 p.m. ET.**

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- Submission may be provided as **either** a PDF file or a shareable link to a digital engineering notebook. If submitting a shareable link, it must be set to allow access to anyone with the link.

Teams are **NOT** required to also bring a copy of their **engineering notebook** to the competition, but it is encouraged if you plan to reference the notebook during the on-site interviews.

Judges will not accept electronic notebooks on laptops, thumb drives, or cloud-based servers.

Engineering Notebooks

The Engineering Notebook is a way for teams to document how the VEX Robotics Competition experience has helped them to better understand the engineering design process while also practicing a variety of critical life skills including project management, time management, brainstorming, and teamwork. Bound notebooks are preferred by Judges and are given a 3-point bonus on the Design Rubric.

Each notebook is created through a concerted effort by a team to document their design decisions.

Engineering is an iterative process whereby students recognize and define a problem, brainstorm and work through various stages of the design process, test their designs, continue to improve their designs, and continue the process until a solution has been identified. During this process, students will come across obstacles, encounter instances of success and failure, and learn many lessons. It is this iterative process that students should document in their Engineering Notebook.

The Engineering Notebook is an opportunity to document everything a team does throughout the design process. Students should include a number of items in their Engineering Notebook including:

- A table of contents
- Team meeting notes as they relate to the design process
- Design concepts, sketches and pictures
- Notes from competitions regarding observations that should be considered in the next iteration of their design
- Programming improvements or significant modifications
- CAD drawings of their Robot and/or specific elements of their Robot.
- Team members' observations and thoughts on their design
- Team organization practices as they relate to their design process
- Other documentation that a team finds useful as related to their robot's design

The team should also document their project management practices including their use of personnel, financial, and time resources.

Teams competing in national Mobile Robotics Technology must **submit a digital engineering notebook** as one of their pre-conference online submission requirements.

- Submit a **digital version** of their engineering notebook in the **Competitor Materials Portal**.
- Online submission must be completed by **May 22, 2026, at 5 p.m. ET.**
- Submission may be provided as **either** a PDF file or a shareable link to a digital engineering notebook. If submitting a shareable link, it must be set to allow access to anyone with the link.

Teams are **NOT** required to also bring a copy of their **engineering notebook** to the competition, but it is encouraged if you plan to reference the notebook during the on-site interviews.

Judges will not accept electronic notebooks on laptops, thumb drives, or cloud-based servers.

Design Interview

All teams will be interviewed by Judges who will ask them questions about their robot and design process. Teams should bring their robot with them to the interview. Judges will fill out page 2 of the Design Rubric and give teams a score based on the responses of the team members. Teams are not to prepare a slide presentation such as Power Point for this interview and should be prepared to talk about their robot without any written notes such as cards or written outlines.

Appendix G contains the Design Award Rubric and Design Interview Rubric.

Programming Interview

All teams will be interviewed by Judges who will ask questions about the coding and programming process. Teams should bring their robot, laptop and programming cable with them to the interview. Judges will use the following interview process rubric to determine the knowledge of the programmer and quality of the written code.

Appendix G contains the Programming Interview questions.

Appendix G contains the Programming Interview Scorecard.

SAFETY POINTS

All teams are expected to be safe in the competition area. Students will start with 90-points in Safety and will be deducted 10-points for every instance of a safety violation. The minimum score is zero.

Students will be notified immediately upon each instance of a safety violation. Examples of Safety violations are as follows.

- General horseplay (running, throwing objects, pushing others)
- Not wearing shoes (except when walking on foam tiles)
- Using teeth as a tool (other than eating)
- Leaving equipment in aisles (creating trip hazards)

Note: Eye protection is not required in Junior Mobile Robotics Technology unless cutting metal shafts.

Overall Professionalism

Teams will be evaluated on their professionalism throughout the competition. This evaluation will consider the following criteria:

1. **Team Conduct**:
   - Teams must demonstrate respect towards referees, event staff, other teams, and spectators at all times.
   - Unsportsmanlike behavior, including excessive arguing, or disruptive actions, will result in a deduction of professionalism points or potential disqualification.
2. **Collaboration and Communication**:
   - Students should exhibit clear, respectful, and effective communication, both within their team and with alliance partners.
3. **Preparation and Organization**:
   - Teams should arrive on time, with all equipment ready for the competition.

- ○ Maintenance of a clean and orderly workspace is expected.

TEAM RANKING

Teams will be given a total score based on the Professional Development Test, Engineering Notebook (Page 1 of the Design Rubric), CAD drawings, the Design Interview (Page 2 of the Design Rubric), the Programming Interview, the team's highest Programming Skills Score, the team's highest Driving Skills Score, and the Team's Safety Score. Teams are ranked by the sum of their weighted scores in these categories.

All teams will be given the same number of Robot Skills Matches to be determined by the Competition Organizer. At SkillsUSA NLSC, each team will get three (3) chances for Programming Skills and three (3) chances for Driving Skills. Only the highest Programming Skills score and the highest Driving Skills score will be used to determine rankings.

In the case of ties, the tie will be broken by looking at the following in order.

1. Engineering Notebook Score
2. Team's highest Programming Skills Score
3. Team's highest Driving Skills Score

Appendix F contains the Mobile Robotics Technology Overall Scorecard.

MOBILE ROBOTICS TECHNOLOGY
APPENDIX G

CAD Drawings MUST be printed and submitted separately to receive any points.

CAD Drawings

(Keep separate from Engineering Notebook Score)

1 point = Has a minimum of 1 CAD Drawing

2-3 points = CAD Drawing(s) include scale and measurements.

4-5 points = Detailed CAD Drawings for entire robot with scale and measurements

CAD Score_____

Engineering Notebook Rubric (Page 1 of 2)

Judge Name _____

Directions: Determine the point value that best characterizes the content of the Engineering Notebook for that criterion. Write that value in the column to the right. This rubric is to be used for all Engineering Notebooks regardless of format (physical or digital). Please refer to Section 5 of the Guide to Judging for information on how to use this rubric.

Note: Any student-centered or academic honesty concerns, such as plagiarism, should be brought to the attention of the Judge Advisor and/or Event Partner.

CRITERIA	PROFICIENCY LEVEL			
ENGINEERING DESIGN PROCESS	**EXPERT** (4-5 POINTS)	**PROFICIENT** (2-3 POINTS)	**EMERGING** (0-1 POINTS)	POINTS
IDENTIFY THE PROBLEM / DESIGN GOAL(S)	Clearly identifies the problem / design goal(s) in detail at the start of each design process cycle. This can include elements of game strategy, robot design, or programming, and should include a clear definition and justification of the design goal(s), criteria, and constraints.	Identifies the problem / design goal(s) at the start of each design cycle but is lacking details or justification.	Does not identify the problem / design goal(s) at the start of each design cycle.	_____
BRAINSTORM SOLUTIONS	Explores several different solutions with explanation. Citations are provided for ideas that came from outside sources such as online videos or other teams.	Explores few solutions. Citations provided for ideas that came from outside sources.	Does not explore different solutions or solutions are recorded with little explanation.	_____
SELECT BEST SOLUTION	Fully explains the "why" behind design decisions in each step of the design process for all significant aspects of a team's design.	Inconsistently explains the "why" behind design decisions.	Minimally explains the "why" behind design decisions.	_____
BUILD AND PROGRAM THE SOLUTION	Records the steps the team took to build and program the solution. Includes enough detail that the reader can follow the logic used by the team to develop their robot design, as well as recreate the robot design from the documentation.	Records the key steps to build and program the solution but lacks sufficient detail for the reader to follow their process.	Does not record the key steps to build and program the solution.	_____
ORIGINAL TESTING OF SOLUTIONS	Records all the steps to test the solution, including test results. Testing methodology is clearly explained, and the testing is done by the team. Original testing results are explained and conclusions are drawn from that data.	Records the key steps to test the solution. Testing methodology may be incomplete, or incomplete conclusions are recorded.	Does not record steps to test the solution. Testing or results are borrowed from another team's work.	_____
REPEAT DESIGN PROCESS	Shows that the design process is repeated multiple times to work towards a design goal. This includes a clear definition and justification of the design goal(s), its criteria, and constraints. The notebook shows setbacks that the team learned from, and shows design alternatives that were considered but not pursued.	Design process is not often repeated for design goals or robot/game performance. The notebook does not show alternate lines of inquiry, setbacks, or other learning experiences.	Does not show that the design process is repeated. Does not show setbacks or failures, or seems to be curated to craft a narrative.	_____

NOTES:

Engineering Notebook Rubric (Page 2 of 2)

ENGINEERING NOTEBOOK FORMAT AND CONTENT	EXPERT (4-5 POINTS)	PROFICIENT (2-3 POINTS)	EMERGING (0-1 POINTS)	POINTS
INDEPENDENT INQUIRY	Team shows evidence of independent inquiry from the beginning stages of their design process. Notebook documents whether the implemented ideas have their origin with students on the team, or if students found inspiration elsewhere.	Team shows evidence of independent inquiry for some elements of their design process. Ideas and information from outside the team are documented.	Team shows little to no evidence of independent inquiry in their design process. Ideas from outside the team are not properly credited. Ideas or designs appear with no evidence of process.	____
USABILITY & COMPLETENESS	Records the entire design and development process with enough clarity and detail that the reader could recreate the project's history. Notebook has recent entries that align with the robot the team has brought to the event.	Records the design and development process completely but lacks sufficient detail. Documentation is inconsistent with possible gaps.	Lacks sufficient detail to understand the design process. Notebook has large gaps in time, or does not align with the robot the team has brought to the event.	____
ORIGINALITY & QUALITY	Cited content is kept to relevant information and all content not original to the team longer than a paragraph is located in appendices to the Engineering Notebook. Information originating from outside the team is always properly cited in the notebook with the source and date accessed. Most or all Engineering Notebook content is original to the submitting team members.	Content is mostly kept to relevant information. Information originating from outside the team is properly credited. Cited content is paraphrased with some original content describing the team's design process.	Non-original content is excessive, is not kept in appendices, and/or is not cited. Plagiarised content should be noted to the JA pursuant to the REC Foundation Code of Conduct process.	____
ORGANIZATION / READABILITY	Entries are logged in a table of contents. There is an overall organization to the document that makes it easy to reference, such as color coded entries, tabs for key sections, or other markers. Notebook contains little to no extraneous content that does not further the engineering design process.	Entries are logged in a table of contents. There is some organization to the document to enhance readability. Notebook contains some extraneous content that does not further the design process, but it does not severely impact readability.	Entries are not logged in a table of contents, and there is little adherence to a system of organization. Excessive extraneous content makes the notebook difficult to read, use, or understand.	____
RECORD OF TEAM & PROJECT MANAGEMENT	Provides a complete record of team and project assignments; contains team meeting notes including goals, decisions, and building/programming accomplishments; design cycles are easily identified. Resource constraints including time and materials are noted throughout. Notebook has evidence that documentation was done in sequence with the design process. Entries include dates and names of contributing students.	Records most of the information listed at the left. Level of detail is inconsistent, or some aspects are missing. There are significant gaps in the overall record of the design process. Notebook may have inconsistent evidence of dates of entries and student contributions.	Does not record the design process in a way that shows team progress. There are significant gaps or missing information for key design aspects. Notebook has little evidence of dates of entries and student contributions.	____
INNOVATE AWARD NOTES (optional): 🖉				TOTAL POINTS ____

🔖 All judging materials are strictly confidential. They are not shared beyond the Judges and Judge Advisor and shall be destroyed at the end of the event.

Professional Dress

(Add this to the Design Interview Score)

As the students walk into the interview, check to see if their shirts are fully tucked in.

Add 5 points if BOTH students have their shirts fully tucked in.

Professional Dress Score_____

(5 or 0)

▌Team Interview Rubric

Team # _____   Grade Level ☐ ES | ☐ MS | ☐ HS | ☐ University

Judge Name _____

Directions: Determine a point value that best characterizes the content of the Team Interview for that criterion.

CRITERIA	PROFICIENCY LEVEL			POINTS
	EXPERT (4-5 POINTS)	**PROFICIENT** (2-3 POINTS)	**EMERGING** (0-1 POINTS)	
ENGINEERING DESIGN PROCESS *All Awards*	Team shows evidence of independent inquiry from the beginning stages of their design process. This includes brainstorming, testing, and exploring alternative solutions.	Team shows evidence of independent inquiry for some elements of their design process.	Team shows little to no evidence of independent inquiry in their design process.	___
GAME STRATEGY *Design, Innovate, Create, Amaze*	Team can fully explain their entire game strategy including game analysis.	Team can explain their current strategy with limited evidence of game analysis.	Team did not explain game strategy, or strategy is not student-directed.	___
ROBOT DESIGN *Design, Innovate, Build Create, Amaze*	Team can fully explain the evolution of their robot design to the current design.	Team can provide a limited description of why the current robot design was chosen, but shows limited evolution.	Team did not explain robot design, or design is not student-directed.	___
ROBOT BUILD *Innovate, Build, Create, Amaze*	Team can fully explain their robot construction. Ownership of the robot build is evident.	Team can describe why the current robot design was chosen, but with limited explanation.	Team did not explain robot build, or build is not student-directed.	___
CREATIVITY / ORIGINALITY *Innovate, Create*	Team can describe creative aspect(s) of their robot with clarity and detail.	Team can describe a creative solution but the answer lacks detail.	Team has difficulty describing a creative solution or gives minimal response.	___
TEAM AND PROJECT MANAGEMENT *All Awards*	Team can explain how team progress was tracked against an overall project timeline. Team can explain management of material and personnel resources.	Team can explain how team progress was monitored, and some degree of management of material and personnel resources.	Team cannot explain how team progress was monitored or how resources were managed.	___
TEAMWORK, COMMUNICATION, PROFESSIONALISM *All Awards*	Both team members contribute to explanations of the design process, game strategy, and other work done by the team.		Only 1 team member contributes to explanations of the design process, game strategy, and other work done by the team.	___
RESPECT, COURTESY, POSITIVITY *All Awards*	Team consistently interacts respectfully, courteously, and positively in their interview.	Team interactions show signs of respect and courtesy, but there is room for improvement.	Team interactions lack respectful and courteous behavior.	___
SPECIAL ATTRIBUTES & OVERALL IMPRESSIONS *Judges, Inspire*	Does the team have any special attributes, accomplishments, or exemplary effort in overcoming challenges at this event? Did anything stand out about this team in their interview? Please describe: ✎			TOTAL POINTS ___

All judging materials are strictly confidential. They are not shared beyond the Judges and Judge Advisor and shall be destroyed at the end of the event.

Mobile Robotics Programming Interview Questions.

This interview has 3 sections. For each section please read all instructions and questions before assessing the team.

Section 1: General Programming Information (Maximum 20 pts)

For this section you will be asking the team general information about their program. This section will make sure teams have come prepared for their interview.

1. **Did the team bring a laptop with their code and their robot?**

No (0 pts)		Yes (5 pts)	

2. **The team can provide an overview of what their program is designed to accomplish, (in a few sentences).**

No (0 pts)		Yes (10 pts)	

3. **Tell us about a career or industry that requires knowledge of programming?**

No (0 pts)		Yes (5 pts)	

Section 2: Program Design and Fluency (Maximum 55 pts)

In this section you will ask the team to walk you through their code. Ask the team to start at the very beginning and explain the program until the robot stops. Read all questions beforehand because you will need to assess the program after the walk through is complete. The following questions are for the judge and should not be asked to the team.

4. **Did the program use variables instead of hard coding numbers and include justifications for their use? (e.g., when they set the speed of the motor, is it a number or a variable)?**

1 pt	7 pt	15 pt
The program did not include any variables.	The program contained a mix of variables and hard coded values. Variables may not be organized.	The program used variables for all or most opportunities. Variables were organized and named in a meaningful way.

5. **Did the program contain advanced programing structures like loops and if else statements?**

1 pt	7 pt	15 pt
The program did not contain any loops or if else statements.	The program only had a few loops or if/else structure. Some parts of the code were reused in loops but others were programmed linearly.	The program contained many loops and if/else structures.

6. **Is the code formatted in an organized manner?**

1 pt	5 pt	10 pt
The program did not follow any kind of format. Code was not properly indented or spaced in a neat fashion.	Most or some of the code was formatted. There are areas where code could have been formatted a little better. Limited comments included	The entire code base is formatted with lots of comments organizing their code.

7. **How did the team conduct the walkthrough of their code?**

1 pt	5 pt	10 pt	15 pt
The team showed zero or minimal knowledge of their program. They were not able to articulate what their program does or where it starts.	The team was able to walk you through the program. Students read the comments verbatim and were not able to explain more than what was already written in the program. The team was unsure about how some of the code worked in some sections.		The team was able to explain all parts of their program. The team used proper terminology when talking about their program. The team was able to explain their code without having to read the comments verbatim.

Section 3: Smart Programming (Maximum 25 pts)

In this section you will be asking the team specific questions about their program. The judge will assess the team on how well they answer each question.

8. **Ask the team how many sensors are on their robot that they programmed.**

1 pt	2 pt	3 pt	4 pt	10 pt
The team uses no sensors on their robot.	The team uses a moderate amount of sensors (1 - 3).			Team used a large amount of sensors (4+).

9. **Find a sensor on the team's robot or one they mentioned in the question above. An example could be an Encoder in the Smart Motor. Ask the team to show you where in their code that they use this sensor. Is the team able to explain and show you how they used the sensor?**

1 pt	7 pt	15 pt
The team did not use any sensors or could not find how they used the sensor in their code.	The team struggled to find where they used the sensor in their code, and/or was only able to explain how they used the sensor by reading comments in that section. The team did not fully understand what data was being collected by the sensor and how it was used by the program.	The team was able to quickly find the sensor in their program. They were able to explain in great detail how the program uses the data from the sensor.

SCORECARD

Team Number _____

Programming Interview

Total Score _____

_____ 1. (5) Did the team bring a laptop with their code and their robot?

_____ 2. (10) The team can provide an overview of what their program is designed to accomplish.

_____ 3. (5) Tell us about a career or industry that requires knowledge of programming?

_____ 4. (15) Did the program use variables instead of hard coding numbers?

_____ 5. (15) Did the program contain advanced programing structures like loops and if else statements?

_____ 6.. (10) Is the code formatted in an organized manner?

_____ 7. (15) How did the team conduct the walkthrough of their code?

_____ 8. (10) Ask the team how many sensors are on their robot that they programmed.

_____ 9. (15) Find a sensor on the team's robot or one they mentioned in the question above. Is the team able to

explain and show you how they used the sensor?

_____ **Total Score (100)**

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Team Number _____

(1-minute matches)

Highest Score _____

Trial 1	
	Trial 1 Score: [ ]
Trial 2	
	Trial 2 Score: [ ]
Trial 3	
	Trial 3 Score: [ ]

Team Number _____

(1-minute matches)

Highest Score _____

Trial 1

Trial 1 Score: [   ]

Trial 2

Trial 2 Score: [   ]

Trial 3

Trial 3 Score: [   ]

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Team Number _____

Mobile Robotics Technology Overall Scorecard (**State Conference**)

Scoring Category	Max Score (Raw x Weight)	Raw Score	Weight	Total Score
Overall Professionalism	25 x 1 = 25		1	
Engineering Notebook	50 x 4 = 200		4	
CAD Drawings	5 x 5 = 25		5	
Design Interview	50 x 4 = 200		4	
Programming Interview	100 x 1 = 100		1	
Highest Autonomous Coding Skills Score	200 x 1 = 200		1	
Highest Driving Skills Score	300 x 1 = 300		1	
Safety Points	50 x 1 = 50		1	
Total Points	**1000**	**N/A**	**N/A**	

Used for tie breaking purposes only:

_____ Engineering Notebook Score

_____ Team's Highest Autonomous Coding Skills Score

_____ Team's highest Driving Skills Score

Mobile Robotics Technology Overall Scorecard (**National Leadership & Skills Conference**)

Scoring Category	Max Score (Raw x Weight)	Raw Score	Weight	Total Score
Professional Development Test	25 x 1 = 25		1	
Engineering Notebook	50 x 4 = 200		4	
CAD Drawings	5 x 5 = 25		5	
Design Interview	50 x 4 = 200		4	
Programming Interview	100 x 1 = 100		1	
Highest Autonomous Coding Skills Score	200 x 1 = 200		1	
Highest Driving Skills Score	300 x 1 = 300		1	
Safety Points	50 x 1 = 50		1	
Total Points	**1000**	**N/A**	**N/A**	

Used for tie breaking purposes only:

_____ Engineering Notebook Score

_____ Team's Highest Autonomous Coding Skills Score

_____ Team's highest Driving Skills Score