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Section 1
The Game

Game Description

Matches are played on a Field set up as illustrated in the figures throughout. The Robot Skills Challenge and the Teamwork Challenge use the exact same setup for the Field Elements, but the Game Elements are arranged differently.

In the Teamwork Challenge, an Alliance of two (2) Robots, operating under driver control, work together in each Match.

In the Robot Skills Challenge, one (1) Robot attempts to score as many points as possible. These Matches consist of Driving Skills Matches, which will be entirely Driver Controlled, and Programming Skills Matches, which will be Autonomous with limited human interaction.

The object of the game is to attain the highest score by Scoring and Stacking Risers in Goals, Completing Rows, and Completing Stacks.

Figure 1: Starting configuration of the Field for a VEX IQ Challenge Rise Above Match.
Each VEX IQ Challenge (2020-21 Rise Above) Match includes the following game elements:

- Twenty-seven (27) Risers
  - Nine (9) Orange Risers
  - Nine (9) Purple Risers
  - Nine (9) Teal Risers

*Figure 2:* Overhead view of Field for a Teamwork Match. The Driver Station and Starting Positions are highlighted.
Figure 3: Overhead view of Field for a Robot Skills Match. The Robot Starting Positions are highlighted.
Game Definitions

**Adult** – Anyone who is not a **Student**.

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

**Alliance Score** – Points scored in a **Teamwork Match** awarded to both **Teams**.

**Autonomous** – A **Robot** that is operating and reacting only to sensor inputs and to commands pre-pro-grammed by the **Students** into the Robot control system. The **Robot** is operating without input from a VEX IQ Controller.

**Builder** – The **Student(s)** on the team who assemble(s) the **Robot**. An **Adult** cannot be the **Builder** on a **Team**. **Adults** are permitted to teach the **Builder** associated concepts, but may never be working on the **Robot** without the **Builder** present and actively participating.

**Completed Row** – A **Row Status**. A **Completed Row** is when all three (3) **Goals** in the **Row** have at least one **Scored Riser** and all **Scored Risers** in the **Row** are of uniform color.

![Figure 4: A Completed Row](image)

![Figure 5: A Non-Completed Row](image)

**Completed Stack** - A **Goal Status**. A **Completed Stack** is when the **Goal** is part of a **Completed Row** and has exactly three (3) **Scored Risers**. Each **Goal** can only count as one (1) **Completed Stack**.
**Designer** – The Students(s) on the Team who design(s) the Robot to be built for competition. An Adult cannot be the Designer on a Team. Adults are permitted to teach the Designer associated concepts, but may never be working on the design of the Robot without the Designer present and actively participating.

**Disablement** – A penalty applied to a Team for a rule violation. During Disablement, a Team is no longer allowed to operate their Robot, and the Drivers will be asked to place their Controller on the ground. A Disablement is not the same as a Disqualification.

**Disqualification** – A penalty applied to a Team for a rule violation (see <T11> for more details). If a Team is Disqualified 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 Disqualifications for a single Team may lead to its Disqualification for the entire event.
Driver – The 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 <G7>).

Driver Controlled – A Robot operating under the control of a Driver.

Driver Station – The region behind the Field, where the Drivers must remain during their Match unless legally interacting with their Robot.

Field – The entire playing Field, being six (6) field tiles wide by eight (8) field tiles long totalling forty-eight (48) field tiles, surrounded by the field perimeter consisting of four (4) outside corners and twenty-four (24) straight sections.

Field Element – The field perimeter, Floor, and VEX IQ elements attached to the Field.

Floor – The interior part of the playing Field made up of the field tiles that is within the field perimeter.

Goal – One of the nine (9) 3-dimensional volumes extending upwards from the Floor that are used to Score Risers. The blue VEX IQ elements form a perimeter around the base of each Goal. The VEX IQ elements are not considered part of the Goal.

License Plate – A physical component on the Robot that has the Team’s VEX IQ Challenge number displayed. The 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 <R4>.
**Match** – A Driving Skills Match, Programming Skills Match, or Teamwork Match.
- **Driving Skills Match** – A Driver Controlled period that is sixty seconds (1:00) long with only one (1) Robot on the Field.
- **Programming Skills Match** – An Autonomous period that is sixty seconds (1:00) long with only one (1) Robot on the Field.
- **Skills Match** – A Driving Skills Match or Programming Skills Match.
- **Teamwork Match** – A Driver Controlled period that is sixty seconds (1:00) long with one (1) Alliance on the Field.

**Programmer** – The Student(s) on the Team who write(s) the computer code that is downloaded onto the Robot. An Adult cannot be the Programmer on a Team. Adults are permitted to teach the Programmer associated concepts, but may never be working on the code that goes on the Robot without the Programmer present and actively participating.

**Riser** – An orange, purple or teal right octagonal prism with a width of 7” (177.8mm) and a height 8.75” (222.25mm).

**Robot** – A machine that has passed inspection, designed to execute one or more tasks autonomously and/or by remote control from a human operator.

**Row** - Three (3) Goals that make up a straight line. There are a total of eight (8) Rows.
Scored – A Riser status. A Riser is Scored at the end of the Match if it is not touching a Robot and meets the criteria of being either a Base Riser or a Stacked Riser.

- **Base Riser** - A Riser status. A Riser is considered a Base Riser if it meets the following criteria at the end of the Match.
  1. Contacting the Floor within the Goal.
  2. The octagonal faces are parallel with the Floor, i.e. the Riser is upright and not sitting on top of the VEX IQ elements surrounding the base of the Goal.
  3. Not contacting the Floor outside of the Goal.

- **Stacked Riser** - A Riser status. A Riser is considered a Stacked Riser if it meets the following criteria at the end of the Match.
  1. The octagonal faces are parallel with the Floor, i.e. the Riser is upright.
  2. The bottom octagonal face is contacting the top octagonal face of a Base Riser or a Stacked Riser. For the purposes of this definition, “top” refers to the octagonal face furthest from the Floor, and “bottom” refers to the octagonal face closest to the Floor.

**Note**: Each Goal may only contain up to three (3) Scored Risers, up to one (1) Base Riser and (2) Stacked Risers.
Starting Positions – The two (2) designated 11” x 19” (279.4mm x 482.6mm) volumes of the Field where Robots must start the Match. Starting Positions are bounded by the inner edges of the long black lines, outer edge of the short black line, and the inner edge of the field perimeter. See Figure 2 for more details.

Student – Anyone born after May 1, 2005 (i.e. who will be 15 or younger at VEX Worlds 2021). 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, 2008 (i.e. who will be 12 or younger at VEX Worlds 2021). Elementary School Students may “play up” and compete as a Middle School Student.

• Middle School Student – Any eligible Student that is not an Elementary School Student.

Team – Two or more Students make up a Team. A Team is classified as an Elementary School Team if all members are Elementary School Students. A Team is classified as Middle School if any members are Middle School Students, or 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 declared and playing as a Middle School Team, that Team may not change back to a Elementary School Team for the remainder of the season. Teams may be associated with schools, community/youth organizations, or a group of neighborhood Students.
Scoring

- A **Base Riser** is worth one (1) point.
- A **Stacked Riser** is worth one (1) point.
- A **Completed Row** is worth three (3) points.
- A **Completed Stack** is worth thirty (30) points.

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 **Risers**, the offending **Team** may be Disabled and/or Disqualified at the referees’ discretion. The **Robot** will require re-inspection before it may again take the **Field**.

General Game Rules

**<G1> Treat everyone with respect.** All **Students** and **Adults** associated with a **Team** are expected to conduct themselves in a respectful and positive manner while participating in the VEX IQ Challenge. If **Team** members are disrespectful or uncivil to staff, volunteers, or fellow **Teams** at an event, the **Team** may be Disqualified from their current or upcoming **Match**. Judges may also consider team conduct and ethics when determining awards.

In all aspects of the VEX IQ Challenge program, the **Students** make the decisions and do the work with **Adult** mentorship. The VEX community prides itself on being a positive learning environment where no one is bullied, harassed, or berated. **Teams** avoid placing unnecessary stress upon **Students** and/or event volunteers; instead, challenging situations are viewed as teachable moments to model positive behaviors and good sportsmanship.

This rule exists alongside the REC Foundation Code of Conduct. Violation of the Code of Conduct can be considered a 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 at [http://link.roboticseducation.org/recf_codeofconduct](http://link.roboticseducation.org/recf_codeofconduct)

**<G2> VEX IQ is a student-centered program.** **Adults** may assist **Students** in urgent situations, but **Adults** may never work on or program a **Robot** without **Students** on that **Team** being present and actively participating. **Students** must be prepared to demonstrate an active understanding of their **Robot**’s construction and programming to judges or event staff.
Some amount of Adult mentorship, teaching, and/or guidance is an expected and encouraged facet of the VEX IQ Challenge. No one is born an expert in robotics! However, obstacles should always be viewed as teaching opportunities, not tasks for an Adult to solve without Students present and actively participating.

When a mechanism falls off, it is...
...okay for an Adult to help a Student investigate why it failed, so it can be improved.
...not okay for an Adult to 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 pre-made 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 on the REC Foundation website for Teams to reference throughout the season:

Violation of this rule could be considered a violation of <G1> and/or the REC Foundation Code of Conduct.

<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 Challenge.

<G4> Pre-match setup. At the beginning of a Match, each Robot must meet the following criteria:

1. Only be contacting the Floor and/or the field perimeter.
2. Fit within an 11” x 19” (279.4mm x 482.6mm) area, bounded by the Starting Positions.
3. Be no taller than 15” from the Floor.

Figure 17: Two Robot in a legal Match Starting Configuration.
An offending Robot will be removed from the Match at the Head Referee’s discretion. They will not receive a Disqualification, but they will not be permitted to play in the Match.

Note: Robots must be placed on the field promptly. Repeated failure to do so could result in a violation of <G1>.

The exact definition of the term “promptly” is at the discretion of the Head Referee and the Event Partner, who will consider event schedule, previous warnings or delays, etc. Once the Match starts, expansion is unlimited.

**<G5> The Robot must represent the skill level of the Team.** Each Team must include Drivers, Programmer(s), Designer(s), and Builder(s). No Student may fulfill any of these roles for more than one VEX IQ Challenge Team in a given competition season. Students may have more than one role on the team, e.g. the Designer can also be the Builder, the Programmer and a Driver.

a. Team members may 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, illness, 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 Programmer “switching” Teams in order to write the same program for multiple Robots, or one Student writing the Engineering Notebook for multiple Teams.
   iii. If a Student leaves a Team to join another Team, <G5> still applies to the Students remaining on the previous Team. For example, if a Programmer leaves a Team, then that Team’s Robot must still represent the skill level of the Team without that Student. One way to accomplish this would be to ensure that the Programmer teaches or trains a “replacement” Programmer in their absence.

b. Within a single event, a Driver may only drive for one (1) Team. If a Team attends an event with only one (1) Driver in attendance, then that Team is granted an allowance to use another qualified Driver from the Event. This substitute Driver is given an exemption for this event and may only Drive for this one Team at that event. Once the event is over, the substitute Driver will go back to his or her original Team. This exception is only granted if a Team has one (1) Driver in attendance due to reasons outside of the Team’s control, such as illness.

c. When a Team qualifies for a Championship event (e.g., States, Nationals, Worlds, etc) the Students on the Team attending the Championship event are expected to be the same Student on the Team that was awarded the spot. Students can be added as support to the Team, but may not be added as Drivers or Programmers for the Team.
   i. An exception is allowed if one (1) Driver and/or one (1) Programmer on the Team cannot attend the event. The Team can make a single substitution of a Driver or Programmer for the Championship event with another Student, even if that Student has competed on a different Team. This Student will now be on this new Team and may not substitute back to the original Team.

Violations of this rule will be evaluated on a case-by-case basis, in tandem with the REC Foundation Student Centered Policy as noted in <G2>, and the REC Foundation Code of Conduct as noted in <G1>.
<G6> Be prepared to play. Teams must be prepared to play when they bring their Robots to the Field. For example, Teams must ensure that their batteries are charged and their VEX IQ Controller is paired with their Robot before placing the Robot on the Field.

<G7> Drivers switch Controllers midway through the Match. In a given Match, only two (2) Drivers may be in the Driver Station per Team. No Driver shall operate a Robot for more than thirty-five seconds (0:35). The two Drivers must switch their controller between twenty-five seconds (0:25) and thirty-five seconds (0:35) remaining in the Match. The second Driver may not touch his/her Team’s controls until the controller is passed to him/her. Once the controller is passed, the first Driver may no longer touch his/her Team’s controls.

Violations of this rule will result in a warning for minor offenses that do not affect the Match. Score affecting offenses will result in a Disqualification. Teams who receive multiple warnings may also receive a Disqualification at the Head Referee’s discretion.

Note 1: If only one Driver is present (i.e. the Team has not exercised the allowance in <G7b>), this rule still applies, and he or she must cease Robot operation after thirty-five seconds (0:35).

Note 2: Drivers are the only Team members that are allowed to be in the Driver Station. No Adults are permitted in the Driver Station.

<G8> Drivers drive your Robot, and stay in the Driver Station. During a Match, Robots may only be operated by that Team’s Drivers. Drivers must remain in their Driver Station, except when legally interacting with their Robot as per <G17>. Drivers are not allowed to use any communication devices while in the Driver Station. Devices with communication features turned off (e.g. a phone in airplane mode) are allowed.

<G9> Hands out of the Field. Drivers are prohibited from making intentional contact with any Field Element, Riser, or Robots during a Match, except for the allowances in <G17> and/or <RSC5>.

Minor violations of this rule that do not affect the Match will result in a warning. Score affecting offenses will result in a Disqualification. Teams that receive multiple warnings may also receive a Disqualification at the Head Referee’s discretion.

Note: Accidental contact may result in a warning, Disqualification, or Disablement at the Head Referee’s discretion.

<G10> Keep Risers in the Field. Risers that leave the Field during a Match will not be returned. “Leaving the Field” means that a Riser is outside of the Field Perimeter and no longer in contact with the Field, Field Elements, other Risers, or Robots.

If a Riser is on its way out of the Field (as determined by the Head Referee), but is deflected back into the field by a Driver, field monitor, ceiling/wall, or other external factor, <G9> would apply. This Riser should be considered “out of the field” and removed by the Head Referee.

If the redirection occurred due to contact with a Driver, it will be at the Head Referee’s discretion whether <G8> or <G9> should apply.
<G11> **When it’s over, it’s over.** Scores will be calculated for all *Matches* immediately after the *Match* is complete, and once all *Robots* and *Risers* on the *Field* come to rest.

- Referees or other event staff are not allowed to review any videos or pictures from the *Match*, per <T1b>.
- If there is a concern regarding the score of a *Match*, only the *Drivers* from that *Match*, not an *Adult*, may share their questions with the referee.
- This rule’s intent is for *Driver* inputs and *Robot* motion to cease at the end of the *Match*. A pre-programmed routine which causes *Robot* motion to continue after the end of the *Match* would violate the spirit of this rule. Any Scoring which takes place after the *Match* due to *Matches* continuing to move will not count.

<G12> **Keep your Robot together.** *Robots* may not intentionally detach parts or leave mechanisms on the *Field* during any *Match*. If an intentionally detached component or mechanism affects game play, the *Team* may be Disqualified at the *Head Referee*’s discretion. 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 *Driver* (utilizing <G17>).

<G13> **Don’t damage the Field or Risers.** *Robots* may not grasp, grapple, or attach to any *Field Elements*. Strategies with mechanisms that react against multiple sides of a *Field Element* in an effort to latch or clamp onto said *Field Element* are prohibited.

While *Robots* are permitted to grasp, grapple, or attach to *Risers*, *Robots* which cause damage to *Risers* would be considered in violation of this rule and/or <S1>.

The intent of this rule is to prevent *Robots* from unintentionally damaging the *Field* or *Risers*. Minor violations of this rule that do not affect the *Match* will result in a warning. Score affecting offenses will result in a *Disqualification*. *Teams* that receive multiple warnings may also receive a *Disqualification* at the *Head Referee*’s discretion.

<G14> **Let go of Risers after the Match is over.** *Robots* must be designed to permit easy removal of *Risers* from their *Robot* without requiring that the *Robot* have power or remote control after the *Match* is over.

<G15> **Be prepared for minor field variance.** Field tolerances may vary by as much as ±1” unless otherwise specified. *Teams* must design *Robots* accordingly.

<G16> **Match Replays are allowed, but rare.** Match replays are at the discretion of the *Event Partner* and *Head Referee*, and will only be issued in the most extreme circumstances.

<G17> **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 *Team*’s *Drivers* may retrieve & reset the *Robot*. To do so, they must:

1. Signal the Referee by placing their VEX IQ Controller on the ground.
2. Move the *Robot* to any legal *Starting Positions*. 
3. Any Risers being controlled by the Robot while being handled must be removed from the Field. Controlled requires that the Robot was manipulating the Riser and not simply touching it, e.g. if the Riser moves with the Robot either vertically or while turning, the Robot is controlling the Riser.

4. Any Risers in the Starting Positions where the Robot is being placed must be removed from the Field.

If the Drivers cannot reach the Robot due to the Robot being in the center of the field, the Drivers may ask the referee to pick up the Robot and hand it to the Drivers for placement according to the conditions above.

This rule is intended so Teams can fix damaged Robots or help get their Robots “out of trouble.” It is not intended for Teams to use as part of a strategy to gain an advantage during a Match. If a Head Referee sees Teams strategically exploiting this rule, they may be Disqualified from said Match.

<G18> This manual will have four scheduled updates. All rules in this manual are subject to change on the following dates: May 25, 2020, August 17, 2020, December 1, 2020, and March 26, 2021. Each version is official and must be used in official VIQC events until the release of the newest version making the previous version void. Areas of focus for each update are as follows:

a. The May update will include rule changes from input from the community that post questions and responses on the official Q&A.

b. The August update will include rule changes to improve game play from early season events along with input from the community that post questions and responses on the official Q&A.

c. The December update will include clarifications that were posted on the official Q&A.

d. The March update will be specific to the VEX World Championship.

<G19> The Q&A system is an extension of this Game Manual. All Teams must adhere to all VEX IQ Challenge Rules as they are written and must abide by the stated intent of the rules. Every Team has the opportunity to ask for official rules interpretations in the VEX IQ Challenge Question & Answer System.

All responses in this Q&A system should be treated as official rulings from the VEX IQ Challenge Game Design Committee, and they represent the correct and official interpretation of the VEX IQ Challenge Rules. The Q&A system is the only source for official rulings and clarifications.

The VEX IQ Challenge Question & Answer System can be found at https://www.robotevents.com/VIQC/2020-2021/QA
Section 2  
The Robot

Description

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

Inspection Rules

<R1> One Robot per Team. Only one (1) Robot will be allowed to participate per Team at 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 (1) Team. The VEX IQ system is intended to be a mobile robotics design platform. As such, a VEX IQ Challenge Robot, for the purposes of the VEX IQ Challenge, 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.

• Subsystem 3: Additional mechanisms (and associated Smart Motors) that allow manipulation of Risers or navigation of Field obstacles.

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

a. Teams may not participate with one Robot while a second is being modified or assembled.
b. Teams may not switch between multiple Robots. This includes using different robots for Skills Challenge and Qualification / Elimination Matches.
c. Multiple Teams may not use the same Robot during a competition or season. Once a Robot has competed under a given Team number at an event, it is “their” Robot - no other Team may compete with it for the duration of the competition season.
d. Robots which have not passed inspection (i.e. who are in violation of one or more Robots rules) will not be permitted to play in any Matches until they have done so. <T10> will apply to any Matches that occur until the Robot has passed inspection.
e. If a Robot has passed inspection, but is later found to be in violation of a Robot rule during a Match, then they will be Disqualified from that Match and <R1d> will apply until the violation is remedied and the Team is re-inspected.
The intent of <R1a>, <R1b>, and <R1c> are 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.

However, a Team who brings and/or competes with two separate Robots at the same tournament has diminished the efforts of a Team who spent extra design time making sure that their one Robot can accomplish all of the game’s tasks. A multi-team organization that shares a single Robot has diminished the efforts of a multi-team organization who puts in the time, effort, and resources to undergo separate individual design processes and develop their own Robots.

To help determine if a robot is a “separate Robot” or not, use the Subsystem definitions found in <R1>. Above that, use common sense as referenced in <G3>. If you can place two complete and legal Robots on a table next to each other, then they are two separate Robots. Trying to decide if changing a pin, a wheel, or a motor constitutes a separate robot is missing the intent and spirit of this rule.

**<R2> Robots must be a representation of the skill level of the team.** 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 VIQC, we expect Adults to teach different linkages, drive-trains, and manipulator applications to the Students, then allow the Students to determine which designs to implement and build on their Robot. Adults are encouraged to teach the Students how to code various functions involving applicable sensors, 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 Disqualification of the Robot at an event until the Robot is brought back into compliance.

  a. If significant changes are made to a Robot, it must be re-inspected before it will be allowed to participate in a Match. This can be done by the Head Referee before the start of the Match.
  b. If a Robot has multiple functional configurations, all possible configurations must be inspected before being used in competition.
  c. Teams may be requested to submit to random inspections by event personnel during the event. Refusal to submit will result in Disqualification.
  d. Referees or inspectors may decide that a Robot is in violation of the Robot rules. In this case, the Team in violation will be Disqualified and the Robot will be barred from the Field until it passes re-inspection.

**<R4> Only registered Teams may compete in the VEX IQ Challenge.** To participate in an official VEX IQ Challenge Event, a Team must first register on robotevents.com. Upon registering they will receive their VEX IQ Challenge Team Number and two (2) VEX IQ Challenge License Plates. Every Robot must have at least one (1) VEX IQ Challenge License Plate displayed with their VEX IQ Challenge Team Number clearly written or printed upon it.

  a. License Plates must fulfill 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. License Plates other than the official VEX IQ Challenge License Plate (VEX Part Number 228-3193) may be used.
   i. Any unofficial License Plates used must be the same length and height as the official License Plate (3.5” x 1.5” [88.9mm x 38.1mm]). They must not exceed the width of the official License Plate (0.25” [6.35mm]).
   ii. Templates for a temporary License Plate can be found on https://www.roboticseducation.org/downloads/
   iii. Unofficial License Plates are considered non-functional decorations, and must therefore meet all of the criteria listed in <R8>. 3D printed License Plates are permitted within these rules.

Figure 18: A VEX IQ Challenge License Plate with a VEX IQ Challenge Team Number written upon it.

<R5> Starting configuration. At the start of each Match, the Robot must be able to satisfy the following constraints:

   a. Only be contacting the Floor and/or the Field Perimeter.
   b. Fit within an 11” x 19” (279.4mm x 482.6mm) area, bounded by the Starting Positions.
   c. Be no taller than 15” from the Floor.

<R6> The starting configuration will be inspected. The starting configuration of the Robot at the beginning of a Match must be the same as a Robot configuration inspected for compliance, and within the maximum allowed size.

   a. Teams using more than one Robot configuration at the beginning of Matches must tell the Inspector(s) and have the Robot inspected in its largest configuration(s).
   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.

<R7> 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 & official VEX Resellers. To determine whether a product is “official” or not, consult www.vexiq.com.
   b. If an Inspector or event official questions whether something is an official VEX IQ component, the Team will be required to provide documentation to an Inspector that proves the component’s source. Such types of documentation include receipts, part numbers, or other printed documentation.
c. Only the 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 Challenge Robot).

d. Products from the VEX V5, Cortex, or VEXpro product line cannot be used for Robot construction. Products from the VEX 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.

e. Mechanical/structural components from the VEX Robotics by HEXBUG product line are legal for Robot construction. However, electrical components from the VEX Robotics by HEXBUG product line are illegal for Robot construction.

f. Mechanical/structural components from the VEX GO product line are legal for Robot construction. However, electrical components from the VEX GO product line are illegal for Robot construction.

g. 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 <R7b>.

h. 3D printed components, such as replicas of legal VEX IQ parts or custom designs, are not legal for Robot use.

i. Additional VEX IQ products that are released during the season are legal for use.

Note: A comprehensive list of legal parts can be found in the VEX IQ Challenge Legal Parts Appendix, at https://www.vexrobotics.com/vexiq/competition/viqc-current-game. This Appendix is updated as needed if/when new VEX IQ parts are released, and may not coincide with the scheduled Game Manual updates in <G18>.

<R8> Non-VEX IQ components. Robots are allowed to use the following additional “non-VEX IQ” components:

a. Appropriate non-functional decorations, provided that these do not affect the Robot performance in any significant way or affect the outcome of the Match. These decorations must be in the spirit of the event. Inspectors will have the final say in what is considered “nonfunctional”.

i. Any decorations must be backed by legal materials that provide the same functionality, (i.e. if your Robot has a giant decal that prevents Risers from falling out of the Robot, the decal must be backed by VEX IQ material that also prevents the Risers from falling out).

ii. 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.

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

c. ⅛” metal shafts from the VEX V5 product line.

<R9> Microcontroller. Robots are limited to ONE (1) VEX IQ Robot Brain.

a. Robot Brains, microcontrollers, or other electronic components that are part of the VEX Robotics by HEXBUG, VEX GO, VEX V5, VEX 123, or VEXpro product lines are not allowed.

i. The Robot AA Battery Holder (228-3493) is the only exception to this rule, per <R12>

b. 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.
c. The only legal method of driving the Robot during Teamwork Matches and Driving Skills Matches is the VEX IQ Controller.

**<R10> Motors.** Robots may use up to six (6) VEX IQ Smart Motors.

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

**<R11> Batteries.** The only allowable sources of electrical power for a VEX IQ Challenge Robot is one (1) VEX IQ Robot Battery or six (6) AA batteries via the Robot AA Battery Holder (228-3493).

  a. Additional batteries cannot be used on the Robot (even ones 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 **<G6>**).

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

**<R12> Firmware.** Teams must have their VEX IQ firmware (VEXos) up to date. Teams can download the latest version of VEXos at [www.vexiq.com/vexos](http://www.vexiq.com/vexos).

**<R13> Modifications of parts.** Parts may NOT be modified. Examples of modifications include, but are not limited to, bending, cutting, sanding, gluing, or melting.

  a. Cutting metal VEX IQ or VEX V5 shafts to custom lengths is permitted. This is the only legal exception to this rule.

Teams should remember to prioritize student safety at all times if attempting to cut metal shafts. Adult assistance in the spirit of **<G2>** is a must-have, and sharp edges must be sanded or otherwise rounded off.

Similarly, any use of power tools in a pit space while at an event must be discussed with the Event Partner in advance. Even if used in a safe capacity, there is still a possibility of violating venue / event rules, or causing alarm for nearby teams. If used without significant regard for safety, it could be considered a violation of the REC Foundation Code of Conduct.

**<R14> Prohibited items.** The following types of mechanisms and components are NOT allowed:

  a. Those that could potentially damage Field Elements or Risers.
  b. Those that could potentially damage other Robots.
  c. Those that pose an unnecessary risk of entanglement.

**<R15> Passing Inspection.** A Robot is deemed successfully inspected when it has been recorded as “passed” by an Inspector.
Section 3
The Tournament

Description

The VEX IQ Challenge encompasses both the Teamwork Challenge and the Robot Skills Challenge. This section determines how the Teamwork Challenge and Robot Skills Challenge are to be played at a given event.

Awards may be given to top Teams in each format, as applicable. Awards may also be given for overall performance in the judged criteria. Please review the Awards Appendix for more details, available in the VEX IQ Challenge (2020-21 Rise Above) section of www.vexrobotics.com or www.roboticseducation.org.

Tournament Definitions

Event Partner - The VEX IQ Challenge tournament coordinator who serves as an overall manager for the volunteers, venue, event materials, and all other event considerations. Event Partners serve as the official liaison between the REC Foundation, the event volunteers, and event attendees.

Finals Match – A Teamwork Match used to determine the Teamwork Challenge champions.

Head Referee - An impartial volunteer responsible for enforcing the rules in this manual as written. Head Referees are the only people who may discuss ruling interpretations or scoring questions with Teams at an event.

Match Stop Time – The time remaining (i.e. displayed on the timer or audience display) in a tiebreaker Finals Match when an Alliance ends the Match early by placing their controllers on the ground. The Match Stop Time is rounded down to the nearest even number. For example, if controllers are set down when the displayed time is 13 seconds, the Match Stop Time is recorded as 12 seconds. If an Alliance does not finish the Match early, they receive a default Match Stop Time of 0 seconds.

Practice Match – A non-scored Match used to provide time for Teams to get acquainted with the official playing Field.

Qualifying Match – A Teamwork Match used to determine the event rankings.


Teamwork Challenge – A portion of the VEX IQ Challenge. The Teamwork Challenge consists of Teamwork Matches. The Teamwork Challenge includes Qualifying Matches and Finals Matches, and may include Practice Matches.
Tournament Rules

<T1> The Head Referee has ultimate authority on ruling decisions during the competition.

- **Head Referees** must have the following qualifications.
  1. Be at least 16 years of age
  2. Be approved by the Event Partner
  3. Contain the following attributes:
     1. Thorough knowledge of the current game and rules of play
     2. Effective decision making
     3. Attention to detail
     4. Ability to work effectively as a member of a team
     5. Ability to be confident and assertive when necessary
     6. Strong communication and diplomacy skills
  4. If an event qualifies teams directly to VEX Worlds, the **Head Referee** must be an REC Foundation Certified VIQC **Head Referee** for the current season.

- **Head Referees** may not review any photo or video Match recordings to determine a score or ruling.

- **Head Referees** are the only people permitted to explain a rule, **Disqualification** or warning to the **Teams**.

- The **Head Referee** must give the rule number of the rule violated when issuing a **Disqualification** or warning to a **Team**.

**Note**: Scorekeeper Referees score the **Match**, serve as observers for the **Head Referees** and advise the **Head Referee**, but should not communicate any rules or infractions directly to the **Teams**. Scorekeeper Referees must be at least 15 years of age.

<T2> The Drivers are permitted to immediately appeal the Head Referee's ruling. If the Drivers wish to dispute a score or ruling, those **Drivers** must stay in the **Driver Station** until the **Head Referee** talks with them. The **Head Referee** may choose to meet with the **Drivers** 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 his or her decision has been made final, the issue is over and no more appeals may be made. The **Event Partner** may not overrule the **Head Referee's** decision.

Violations of this rule may result in the team being **Disqualified** from the **Match** in question and/or the event and is up to the discretion of the **Head Referee**.

<T3> Teamwork Matches. During **Teamwork Matches**, two (2) **Teams** form an **Alliance** that will play on the **Field**.

- **Qualifying Match Alliances** are randomly selected.
- **Finals Match Alliances** are assigned as follows:
  1. The first and second ranked **Teams** form an **Alliance**
  2. The third and fourth ranked **Teams** form an **Alliance**
  3. And so on, until all **Teams** participating in **Finals Matches** have formed **Alliance**.

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Timeouts. There are no timeouts in Qualifying Matches or Finals Matches.

Ending a Match early. If an Alliance wants to end a Qualifying 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, then the Match Stop Time will also be recorded.

Practice Matches may be played at some events, but are not required. If Practice Matches are run, every effort will be made to equalize practice time for all Teams.

Qualifying Matches will occur according to the official match schedule. This schedule will indicate Alliance partners, Qualifying Match time, and, if the event has multiple Fields, which Field the Qualifying Match will be played on.

Note: The official Match schedule is subject to changes at the Event Partner’s discretion.

Each Team will be scheduled Qualification Matches as follows.

a. When in a tournament, the tournament must have a minimum of four (4) Qualifying Matches per Team. The suggested amount of Qualifying Matches per Team for a standard tournament is six (6) and up to ten (10) for a championship event.

b. When in a league, there must be at least three (3) league ranking sessions and each session must have a minimum of two (2) Qualifying Matches per Team. The suggested amount of Qualifying Matches per Team for a standard league ranking session is four (4). Event Partners may choose to have Qualifying Matches as part of their championship session.

Teams are ranked by their average Qualifying Match scores.

a. When in a tournament, every Team will be ranked based on the same number of Qualifying Matches.

b. When in a league, every Team will be ranked based on the number of Matches played. Teams that participate in less than 60% of the total Matches available will be ranked below Teams that participate in at least 60% of the total Matches available, e.g. if the league offers 3 ranking sessions with 4 Qualifying Matches per Team, Teams that participate in 8 or more Matches will be ranked higher than Teams who participate in 7 or fewer Matches. Being a no-show to a Match that a Team is scheduled in still constitutes participation for these calculations.

c. A certain number of a Team’s lowest Qualifying Match scores will be excluded from the rankings based on the quantity of Qualifying Matches each Team plays. Excluded scores do not affect participation for leagues.

<table>
<thead>
<tr>
<th>Number of Qualifying Matches per Team</th>
<th>Number of excluded Match scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between four (4) and seven (7)</td>
<td>1</td>
</tr>
<tr>
<td>Between eight (8) and eleven (11)</td>
<td>2</td>
</tr>
<tr>
<td>Between twelve (12) and fifteen (15)</td>
<td>3</td>
</tr>
<tr>
<td>Sixteen (16) or more</td>
<td>4</td>
</tr>
</tbody>
</table>

Table 1: Matches that will be “dropped” from a Team’s final average Qualifying Match scores.
d. In some cases, a Team will be asked to play an additional Qualifying Match. The extra Match will be identified on the Match Schedule with an asterisk and will not impact the Team’s ranking (or participation for leagues). Teams are reminded that <G1> is always in effect and Teams are expected to behave as if the additional Qualifying Match counted.

e. Ties in Team ranking are broken by:
   i. Removing the Team’s lowest score and comparing the new average score.
   ii. Removing the Team’s next lowest score and comparing the new average score (on through all scores).
   iii. If the Teams are still tied, the Teams will be sorted by random electronic draw.

<T10> Be at your match on time. If no member of a Team is present in the Driver Station at the start of a Driver Station, 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.

<T11> Disqualifications. A Team that is Disqualified in a Qualifying 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 is Disqualified in a Finals Match will receive zero (0) points.

<T12> Teams playing in Finals Matches. The number of Finals Matches, and therefore the number of Teams who will participate in Finals Matches, is determined by the Event Partner. Events that qualify teams directly to VEX Worlds must have a minimum of five (5) Finals Matches if there are ten (10) or more Teams in attendance.

<T13> Finals Match Schedule. Finals Matches are played sequentially, starting with the lowest ranked Alliance. Each Alliance will participate in one (1) Finals Match. The Alliance with the highest Finals Match score is the Teamwork Challenge champion.

   b. Alliances are ranked by their Finals Match score. The highest scoring Alliance is in first place, the second highest scoring Alliance is in second place, etc.
   c. Ties for first place will result in a series of tiebreaker Finals Matches, starting with the lower seeded Alliance. The Alliance with the highest tiebreaker Finals Match score will be declared the Teamwork Challenge champion.
      i. If the tiebreaker Finals Match scores are tied, the Alliance with the higher Match Stop Time will be declared the winner.
      ii. If the Match Stop Time is also tied, a second series of tiebreaker Finals Matches will be played. If this second series of tiebreaker Finals Match is also tied, then the higher seeded Alliance will be declared the winner.
   d. If there is a tie for a place other than first, the higher seeded Alliance will receive the higher rank.
Example 1: *Alliance* 6 and *Alliance* 3 are tied for first place. During the tiebreaker *Finals Match*, *Alliance* 6 scores 13 points and has a *Match Stop Time* of 12 seconds. *Alliance* 3 scores 13 points and has a *Match Stop Time* of 10 seconds. *Alliance* 6 is the *Teamwork Challenge* winner.

Example 2: *Alliance* 4 and *Alliance* 5 are tied for third place. *Alliance* 4 is the third place winner and *Alliance* 5 is the fourth place winner.

In this way, the lower ranked *Alliance* must “overcome” the higher ranked *Alliance* in order to become the *Teamwork Challenge* champion.

**<T14> Elevated Fields.** At many events, the playing *Field* will be placed on the ground. Some events may choose to elevate their *Fields*. At the 2021 VEX Robotics World Championship, the *Fields* will be 18” high.

**<T15> Students must be accompanied by an Adult.** No *Student* may attend a VIQC 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 at the event in the case of an emergency.

**Robot Skills Challenge Rules**

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

**<RSC2> Skills Field Layout.** For each *Skills Match*, the *Field* will be setup as shown in the diagram below. All of the *Goals* are in the same locations and only the *Risers* have been rearranged on the *Field*.

**Note:** Some Risers (highlighted below) will start Skills Matches while resting on top of the VEX IQ pieces that make up a *Goal*. This applies to (3) Orange Risers, (3) Teal Risers, and (5) Purple Risers.

![Figure 19: The Robot Skills Challenge Field Layout](image-url)
Skills Scoring and Ranking at events. For each Skills Match, Teams are awarded a score based on the standard rules and scoring rules. Team will be ranked based on the sum of their highest Programming Skills Match score and highest Driving Skills Match score.

a. If two Teams are tied for the highest score, the tie will be broken by looking at both Team’s’ next highest Programming Skills Match score. If the Teams remain tied, the tie will be broken by looking at both Team’s’ next highest Driving Skills Match score. This process will repeat until the tie is broken. If a Team only plays one or two (1 or 2) of their available Programming or Driving Skills Matches, their score for the unattempted Match(es) will be considered a score of zero (0) when determining the winner of ties.

b. If the tie cannot be broken (i.e. both Teams have the exact same scores for each Programming Skills Match and Driving Skills Match), then the following ordered criteria will be used to determine which team had the “best” Programming Skills Match:
   i. Points for Completed Stack
   ii. Points for Completed Row
   iii. Points for Stacked Riser
   iv. Points for Base Riser

c. If the tie still cannot be broken, the same process in the step above will be applied to the Team’s’ highest Driving Skills Match.

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

Skills Rankings Globally. Teams are ranked based on their Robot Skills scores globally based on the following tiebreakers.

a. Highest Robot Skills score (combined Programming and Driving Skills Score from a single event)
b. Highest Programming Skills score
c. Highest Driving Skills score
d. Earliest posting of the Highest Programming Skills score, i.e. the first team to post a score ranks ahead of other teams that post the same score at a later time.
e. Earliest posting of the Highest Driving Skills score, i.e. the first team to post a score ranks ahead of other teams that post the same score at a later time.

Skills Starting Positions. During Skills Matches, Robots may be placed in either of the two (2) Starting Positions on the Field.

Skills Match Schedule. Teams play 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) Programming 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 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.
<RSC7> Handling Robots during a Programming Skills Match. A Team may handle their Robot as many times as desired during a Programming Skills Match.

a. Upon handling the Robot, it must be immediately brought back to any legal Starting Positions.
   i. Driver may reset or adjust the Robot as desired from this position, including pressing buttons on the Robot Brain or activating sensors.

b. Any Riser being controlled by the Robot while being handled must be removed from the Field. Controlled requires that the Robot was manipulating the Riser and not simply touching it, e.g. if the Riser moves with the Robot either vertically or while turning, the Robot is controlling the Riser.

c. Any Riser contacting the chosen Starting Positions (as to where the Robot is placed) must be removed from the Field for the remainder of the Match.

d. During a Programming 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 <G8>, which states that Drivers 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 a Programming Skills Match to do so without excessive running back and forth to the Driver Station.

Note: This rule only applies to Programming Skills Match. Driving Skills Matches are still governed by <G17>, especially for strategic violations.

<RSC8> Starting a Programming Skills Match. Drivers must start a Robot’s Programming 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 Programming Skills Match (though Teams may still have two (2) if desired). <G7> still applies to any Driver participating in the Match.

a. Pre-match sensor calibration is considered part of the standard pre-match setup time, i.e. the time when 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.

In accordance with <G6>, Team 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 Team 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.