VEX ROBOTICS COMPETITION KITS

V5 Robot Competition Kits

These starter kits contain everything you need to build your first robot for the VEX Robotics Competition. Using lightweight aluminium structural parts and high-strength gears and sprockets, the kits are tailored to building a robot that can stand up to the rigour of the competition environment.

All kits contain everything required to build and control a robot including a V5 robot brain, motors, controller and battery.

Competition Starter Kit

- 4 motors
- 700+ structural parts
- 200+ motion parts

70-8196 **£699.99**

Competition Super Kit

- 8 motors
- Vision sensor
- 2000+ structural parts
- 800+ motion parts

70-8197 **£1199.99**

Tower Takeover Game Elements Kits

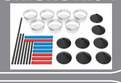
To make a complete set of game elements, you will require 2x 70-0136, 1x 70-0137 and 1x 70-0138

Game Element Kit

70-0136
£119.99

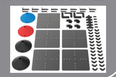
Field Element Kit 1

70-0137
£79.99



Field Element Kit 2

70-0138
£79.99



Elements only, Field Perimeter and Tiles sold separately

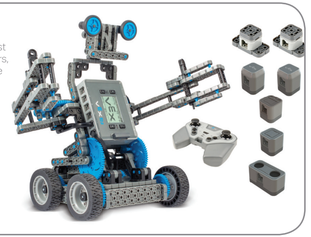
For a full range of add-on and spare parts, visit **www.rapidonline.com/vex**

VEX IQ COMPETITION KITS

Super Kit

The Super Kit contains everything you need for your first competition robot including programmable brain, motors, sensors, lots of structural and mechanical parts, remote control, and all batteries and chargers. Everything is completely reusable year after year.

- Over 850 structural and motion components
- VEX IQ Brain
- VEX IQ Joystick and Radios
- 4x Smart motors
- 7x Sensors (2x Touch LEDs, colour sensor, distance sensor, gyro sensor, 2x bumper switches)
- All batteries, chargers and connecting cables
- Storage bin and tray for organised storage of all parts

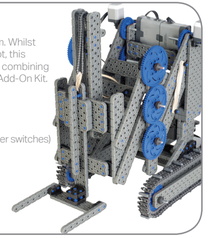


70-7891 **£269.99**

Challenge Team Bundle

The VEX IQ Challenge Team Bundle is the ultimate kit for starting a VEX IQ Team. Whilst the VEX IQ Super Kit contains enough parts to build your first competition robot, this Challenge Team Bundle allows you to take your designs to the ultimate level by combining a VEX IQ Super Kit with an additional Competition Add-On Kit and a Foundation Add-On Kit.

- Thousands of structural and motion parts
- VEX IQ Brain
- VEX IQ Joystick and radios
- 6 Smart Motors (the maximum number allowed for the VEX IQ Challenge)
- 7 Sensors (2x Touch LEDs, colour sensor, distance sensor, gyro sensor, 2x bumper switches)
- 16 Wheels (including omni-directional)
- Chain and Sprocket Kit
- Tank Tread/Intake Kit
- All batteries, chargers and connecting cables
- 2 Storage bins and trays for organised storage of all parts



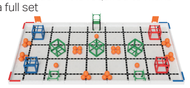
70-7953 **£399.99**

Squared Away Game Elements Kits

70-0132 – contains a complete set of orange balls **£15.00**

70-0131 – contains all other game elements **£64.99**

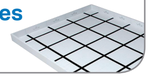
One of each kit is required to make a full set



Elements only, Field sold separately.

Full Field Perimeter and Tiles

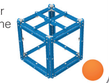
70-7935
£174.99



Squared Away Scoring Element Kit

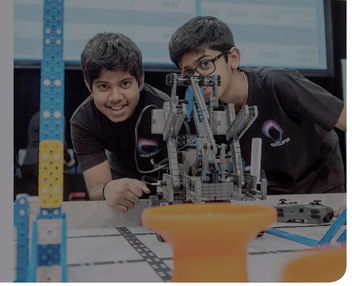
Ideal for spares or for practice. Contains one orange ball and one cube kit.

70-0133
£8.99



For a full range of add-on and spare parts, visit **www.rapidonline.com/vexiq**

HOW DOES COMPETITION ROBOTICS SUPPORT STEM?



STEM is a term that we hear a lot, both in education and in industry. More recently, the term seems to be linked with so many educational projects and products and often that relationship can seem tenuous. So how does a competition robotics program like the VEX IQ Challenge or VEX Robotics Competition support STEM learning?

Science

Energy changes and transfer, forces and friction, balanced and unbalanced forces and electricity are all key scientific concepts that are vital to building a competition robot.

Technology

Electronics

Robots have sensors to interact with its environment and microcontrollers to process the data.

Programming

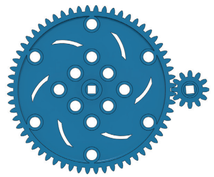
The microcontroller processes data from the sensors and controls the motors or other actuators. Students must create a computer program (code) in graphical or text-based languages in order for the robot to perform a task.

What is the gear ratio?

The small gear has 12 teeth
The large gear has 60 teeth

60/12 = 5 which means for every 5 rotations of the small gear, the large gear will rotate once.

We can call this a 5:1 (five-to-one) reduction.



How far will my robot travel?

Wheel diameter = 63.7mm
Wheel radius = 31.85mm
Circumference = πd or 2πr

π x 63.7 = 200mm

so for each complete rotation of the wheel, the robot will move 200mm

Engineering

Educational robotics uses two main branches of engineering – mechanical engineering and electronic engineering. Both require the application of maths, science and experimentation to devise, test and analyse solutions. Competition robotics takes this a step further by giving a real problem to solve and an environment in which to test the solutions to the limit.

Mathematics

Robotics provides a practical application for maths showing how a number of fundamental maths concepts can be used in the real world including algebra, ratios, proportions, geometry, probability, statistics and more.

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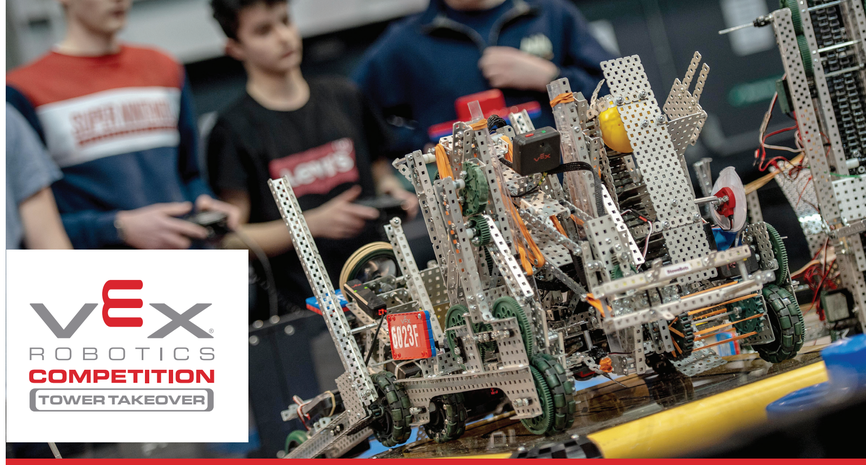
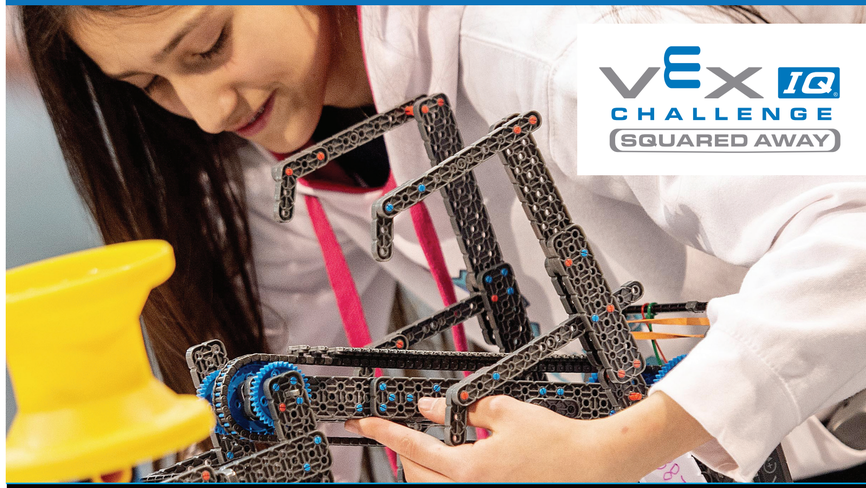


VEX ROBOTICS COMPETITION TOWER TAKEOVER

2019-2020



VEX IQ CHALLENGE SQUARED AWAY

Rapid — 40 YEARS — 1979-2019

We bring STEM to life
www.rapidonline.com

Rapid Education part of the CONRAD Group

VEX Robotics Competition – Tower Takeover

The 2019-20 VEX Robotics Competition is here! Introducing "Tower Takeover".

THE AIM OF THE GAME

Tower Takeover is played on a 12'x12' square field configured as shown. Two Alliances – one "red" and one "blue" – composed of two teams each, compete in matches consisting of a fifteen second Autonomous Period, followed by a one minute and forty-five second Driver Controlled Period.

The object of the game is to attain a higher score than the opposing alliance by building stacks of scoring cubes in the goals. Teams can change the points value of each colour cube by adding them to or removing them from the towers placed around the field.

For ages 11 to 18

EXPERT'S VIEW

Chris Calver, Education Manager at Rapid and VEX Robotics Competition referee gives his opinion on the 2019/20 challenge.

"This game is going to take strategy to a new level because of the way that the scoring works. It means that the points value of each colour cube is not certain until the match ends. This means alliance "A" could think that their higher stacks of cubes are going to win the match, only to find in the dying seconds that alliance "B" managed to lower the points value of the cubes in "As" stack and increase the value of the cubes in their own stack, tipping the match in "B's" favour. It's going to make for some hectic final seconds whilst teams try to maximise their scores.

The Autonomous Line remains, and I am massively in favour of this. It means that teams will need to stay in their own half of the field during the autonomous period so everyone can focus on delivering high quality autonomous routines. Once the driver control period starts, teams can roam the whole field freely. There are no expansion limits so robots can grow as large as they like both horizontally and vertically during the match. Anyone brave enough to try a wallbot? For me, wallbots are a non-starter in this game as they can't cross the field in autonomous, but team designs always surprise me and I am sure someone will come up with something special.

Winning autonomous gives you a six-point bonus this year rather than the four in Turning Point and as well as the points, you'll also receive two extra purple cubes as match loads. These could be vital in tipping the balance in your favour. Descoring cubes from your opposition's stacks is illegal, but removing cubes from the Neutral Towers to flip the balance of scores is perfectly OK. No interfering with cubes in the opposition's Alliance Tower though!

As with last season, it's alliances of two and single match eliminations (often known as Best of One or BO1). Got to say I do miss the Best of Three knockouts but there is a certain air of drama that BO1 produces so bring it on!

Good luck to everyone for the season ahead."

HOW TO TAKE PART

Firstly, you'll need to get some VEX equipment to build your robot with. For new teams, we recommend the Competition Super Kit. There are several different options when it comes to programming, all of which are completely free to use. To discuss the best option for you, contact our education team.

Finally, you'll need to register your team at **www.robotevents.com**. Robot Events is the organisation that manages team registrations for the VEX Robotics Competition and VEX IQ Challenge globally and is not part of Rapid.

Registration costs £100 for the first team and £50 for any additional teams. When you register, you'll be sent a sample of the game elements that you need to design your robot around.

Once you are registered, you can use Robot Events to find competitions that are local to you and sign up to take part.

To find out more about how to get involved, visit **www.rapidonline.com/VEX** or contact **education@rapidonline.com**

VEX IQ Challenge – Squared Away

The 2019-20 VEX IQ Challenge is "Squared Away".

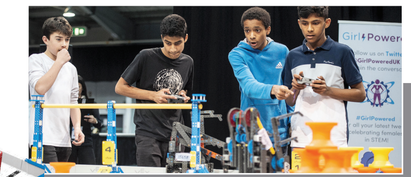
THE AIM OF THE GAME

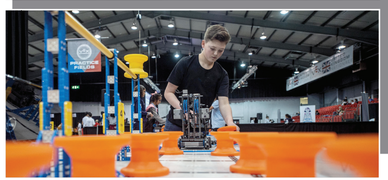
Squared Away is played on a 4' by 8' rectangular field configured as shown. Two teams compete together as an alliance in 60-second long Teamwork Challenge matches, working collaboratively to score points.

Teams also compete in two additional challenges – Driver Skills where one team scores as many points as possible using a controller and Programming Skills where one robot runs autonomously without any driver inputs.

The object of the game is to score as many points as possible by placing the orange balls either on or inside cubes and by scoring the cubes into the corner goals or on platforms.

For ages 8 to 14





EXPERT'S VIEW

Rapid's Chris Calver gives his first thoughts on the VEX IQ Squared Away Game.

"These balls look familiar! Looking at the specifications for them, I would say that they are identical to the balls from Bank Shot for those that remember back to the 2015 game. That means that they are lightweight, hard and hollow-kind of like a huge ping-pong ball.

There is no limit to the number of balls or cubes that a robot can carry or manipulate at any one time so there is an opportunity for teams to build robots that collect a lot of balls from the field. Because balls can be scored by placing them inside or on top of a cube and cubes can be scored either with or without balls inside or on them, there is a lot of flexibility in the way that teams can score. Also note that two of the green cubes start "upside down" so stacking balls on these will probably need them to be flipped over.

For teams that have competed before, something worth noting is that the dimensional constraints have changed slightly this year. All previous games have allowed the robot to hang over to the outer edge of the field perimeter (20" length) which was basically a legacy rule to make the IQ Clawbot legal for competition. This year you may not overhang the field wall so the robot size limit is now 19" length, 11" wide and 15" high – the Clawbot might need modifying to be legal if you are planning on using that design as a basis to work from. You are also not allowed to expand in height this year so watch these designs and keep within the dimensional constraints."

HOW TO TAKE PART

Firstly, you'll need to get some VEX IQ equipment to build your robot with. For new teams, the VEX IQ Super Kit contains everything you need so is the ideal starting point. You'll also need some programming software – VEXcode Blocks is a Scratch 3.0-based graphical programming language for PC, Mac and Chromebook. An iOS and Android version will also be available later in 2019. Finally, you'll need to register your team at **www.robotevents.com**. Robot Events is the organisation that manages team registrations for the VEX Robotics Competition and VEX IQ Challenge globally and is not part of Rapid. Registration costs £100 for the first team and £50 for any additional teams. When you register, you'll be sent a sample of the game elements that you need to design your robot around. Once you are registered, you can use Robot Events to find competitions that are local to you and sign up to take part. To find out more about how to get involved, visit **www.rapidonline.com/VEXIQ** or contact **education@rapidonline.com**