VEX & Qualcomm

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VEX Robotics encommpasses aspects that are different to STEM careers, yet, there are significant aspects VEX Robotics and STEM careers have in common. In a rapidly advancing period of STEM fields and careers, VEX Robotics plays a crucial role in helping students prepare for their future by using and learning from the process of engineering design.

Why choose Qualcomm?

My first “new” smartphone was what got me interested in robotics in the first place. As I explored into what is inside phones, my curiosity led me to learn more about semiconductors. Researching about semiconductors of diverse smartphone manufacturers, such as Samsung, Xiaomi, Oppo and Vivo, I encountered about Qualcomm, a multinational corporation known for designing and manufacturing semiconductors and wireless telecommunication technologies that is used widely among famous smartphone manufacturers such as Samsung, Xiaomi, Oppo, Vivo as well as Motorola and Asus. For example, currently, Qualcomm’s flagship Snapdragon 8 Series is dominating the premium Android smartphone market and almost all smartphones use Qualcomm’s modem. Using this VEX online challenge as an opportunity to learn more about Qualcomm such as its design cycle, similarities and differences between VEX Robotics, I decided to choose Qualcomm.

Credit: The Toy Insider

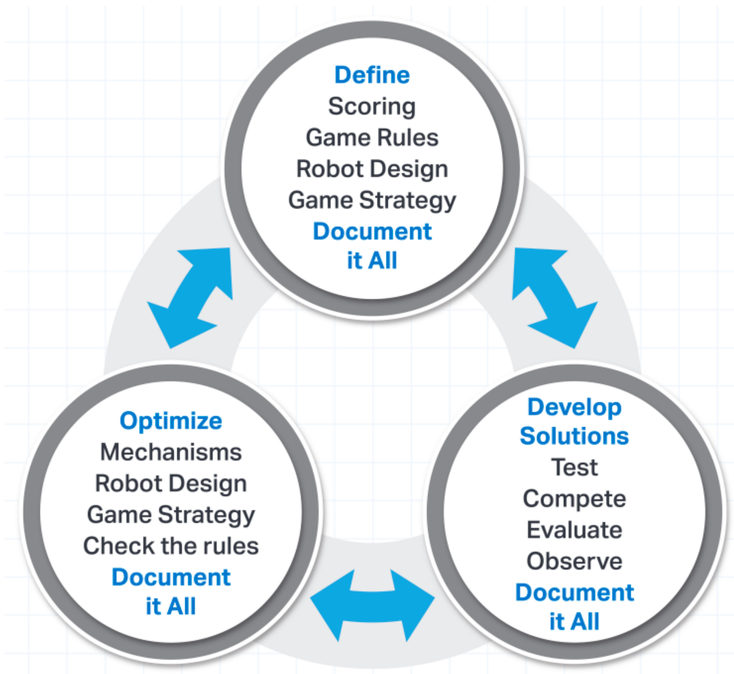
Credit: www.qualcomm.com

Design Process in VEX Robotics and Qualcomm

VEX Robotics

In VEX Robotics, we also follow a **five phase** design cycle that comprise:

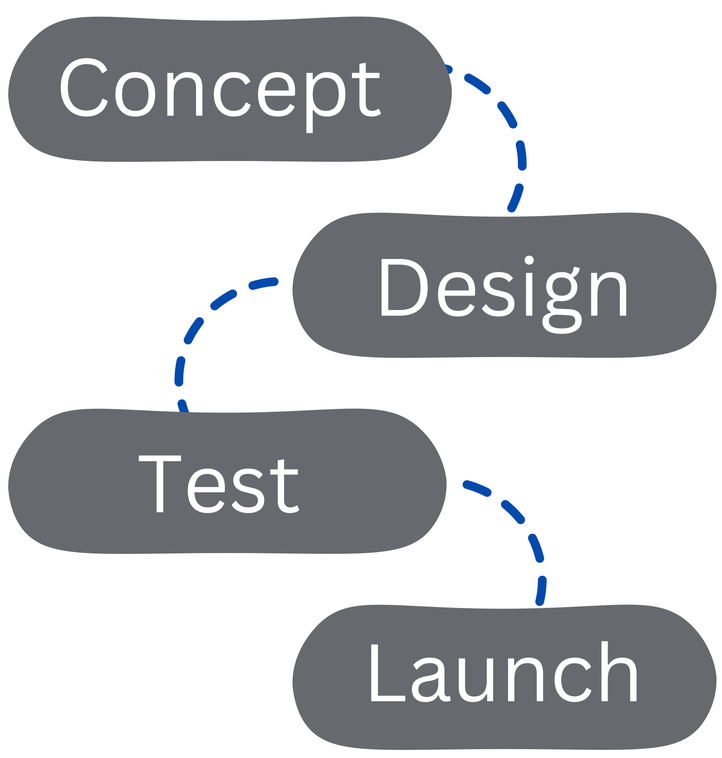
- Identify the Challenge & Set Goals
- Brainstorm & Diagram
- Choose a Solution & Make a Plan
- Build & Program
- Test the Solution



Qualcomm

Fortunately enough, my teammate's father, Mr. Chang was a system on chip semiconductor design engineer and currently is a product marketing senior director at Qualcomm. I interviewed him about the design cycle in Qualcomm. He said that Qualcomm's design cycle consists of **four main phases** which is:

- Concept
- Design
- Test
- Launch



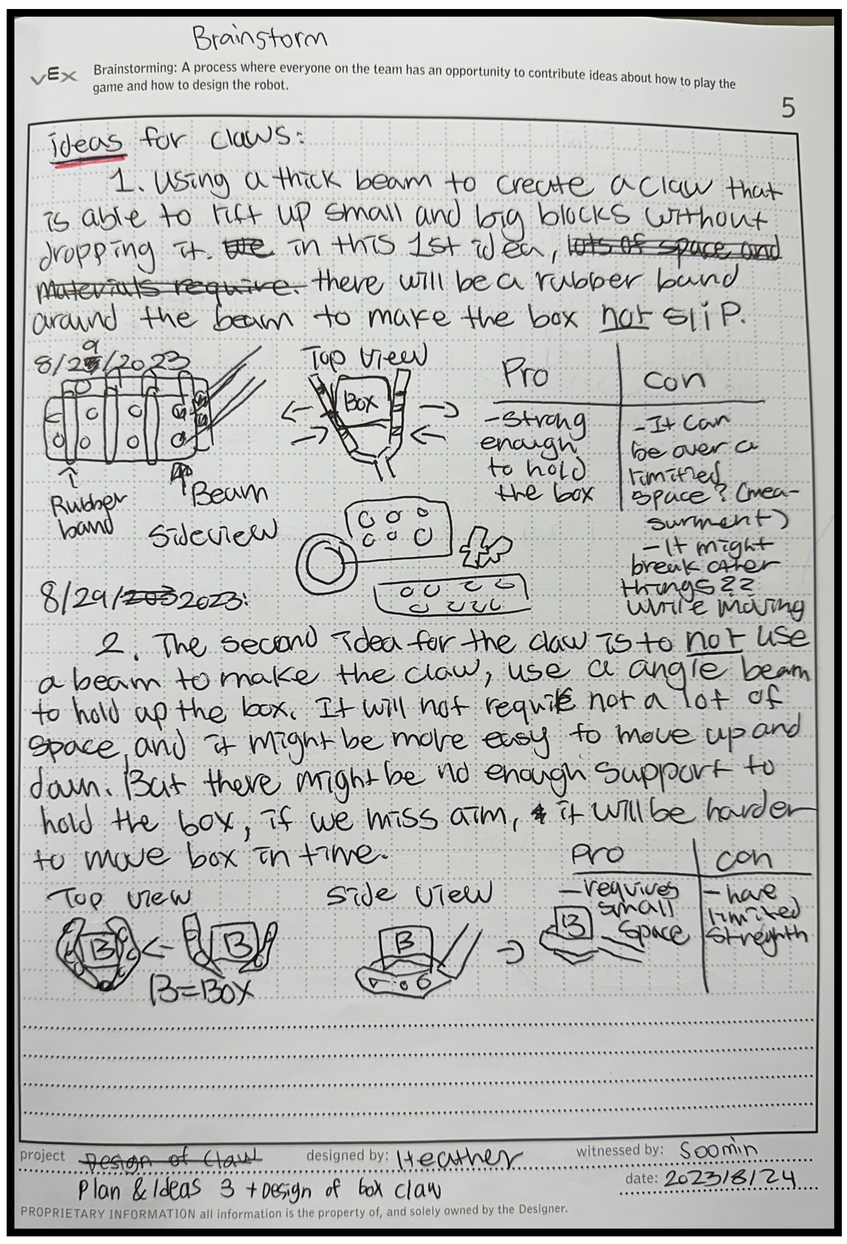
VEX Robotics

In VEX Robotics, during the phase **Identify the Challenge & Set Goals** and **Brainstorm & Diagram**, the team should break down the challenge into smaller parts that needs to be done to be successful in the game. Such as thinking of an approach that would work best and methods for earning points while following the game rules and sizing guides. Then we should start brainstorming possible ideas or solution to complete the game.

Qualcomm

According to Mr Chang in Qualcomm during the phase **Concept**, Qualcomm identify the market needs, customer requirements and technology trends that drive the creation of the new products.

VEX Robotics	Both	Qualcomm
• Think of ways to score points	• Requirements (rules, size limits, market needs)	• Think of ways to please customers ○ trends


Brainstorm

VEX Brainstorming: A process where everyone on the team has an opportunity to contribute ideas about how to play the game and how to design the robot.

5

ideas for claws:

1. Using a thick beam to create a claw that is able to lift up small and big blocks without dropping it. ~~We~~ in this 1st idea, ~~lots of space and materials require.~~ there will be a rubber band around the beam to make the box not slip.

8/29/2023

Pro	Con
-Strong enough to hold the box	-It can be over a limited space? (measurment) -It might break other things if while moving

~~8/29/2023~~ 2023:

2. The second idea for the claw is to not use a beam to make the claw, use a angle beam to hold up the box. It will not requir not a lot of space and it might be more easy to move up and down. But there might be no enough support to hold the box, if we miss aim, & it will be harder to move box in time.

Pro	Con
-requires small space	-have limited strength

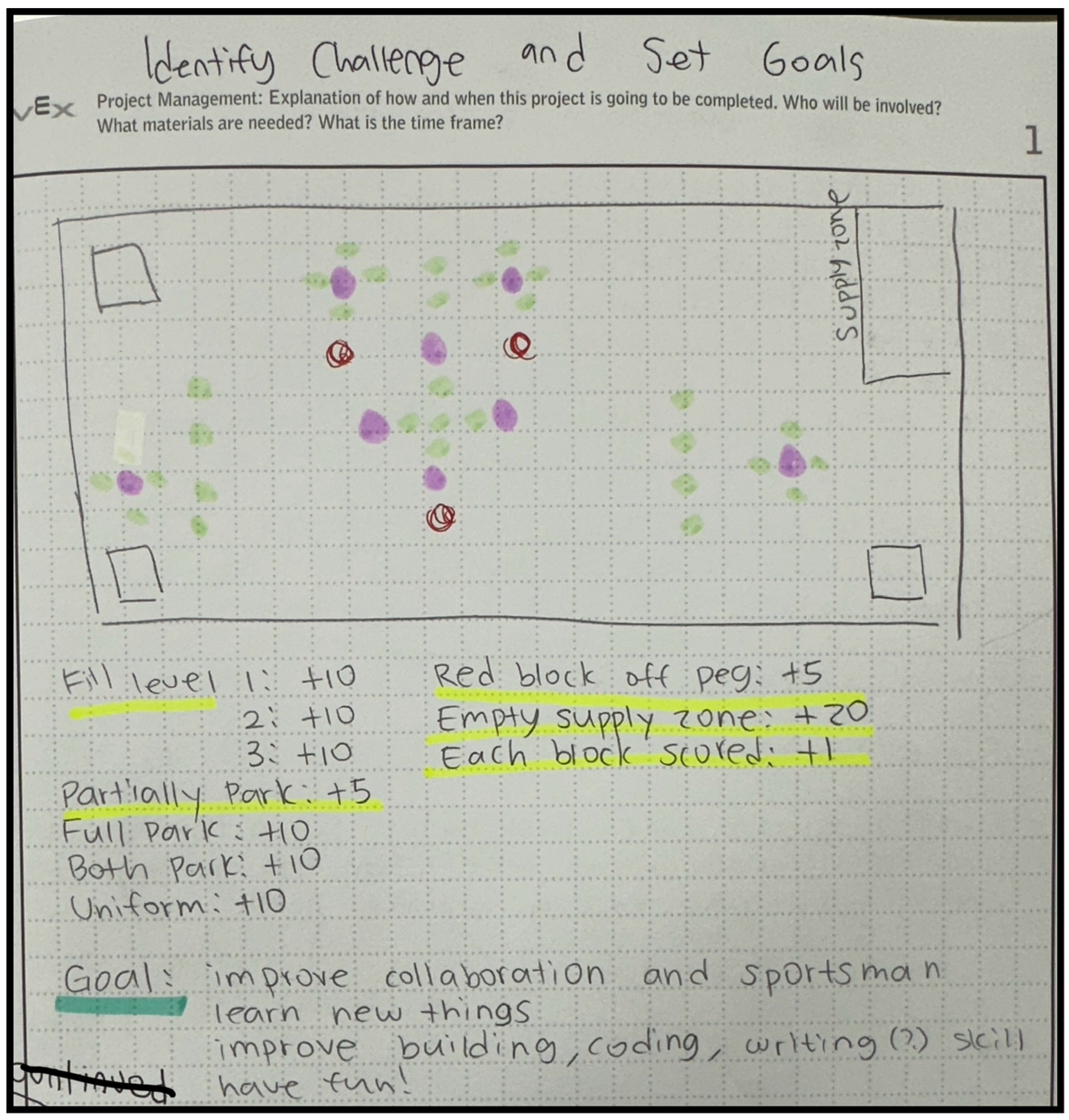
project ~~Design of Claw~~ Plan & Ideas 3 + Design of box claw

designed by: Heather

witnessed by: Soomin

date: 2023/8/24

PROPRIETARY INFORMATION all information is the property of, and solely owned by the Designer.


Identify Challenge and Set Goals

VEX Project Management: Explanation of how and when this project is going to be completed. Who will be involved? What materials are needed? What is the time frame?

1

Fill level 1: +10
2: +10
3: +10

Partially Park: +5
Full Park: +10
Both Park: +10
Uniform: +10

Red block off peg: +5
Empty supply zone: +20
Each block scored: +1

Goal: improve collaboration and sportsman
learn new things
improve building, coding, writing (?) skill
~~continued~~ have fun!

From our (30597A) engineering notebook

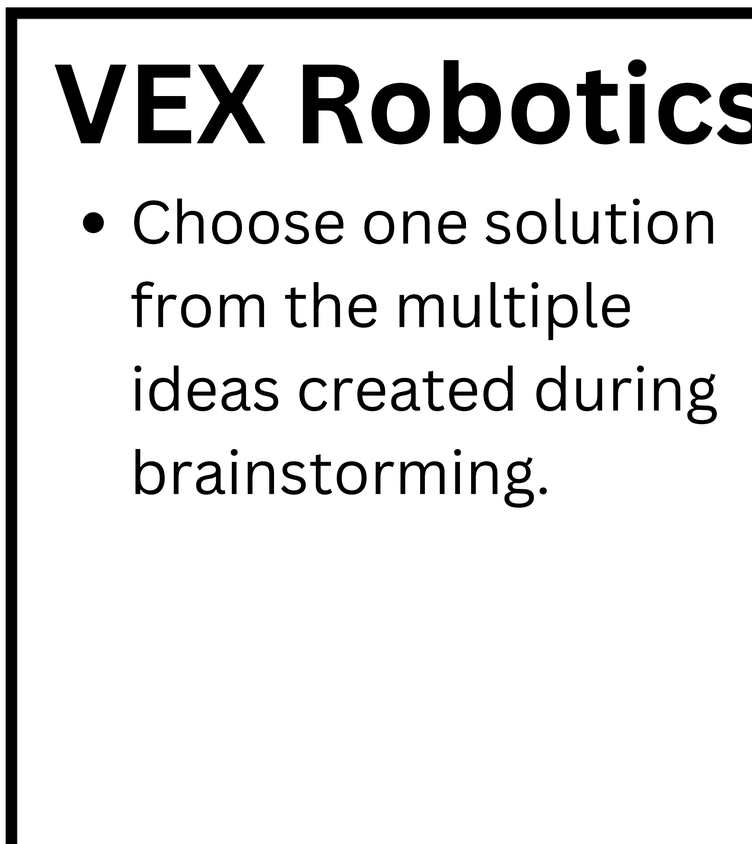
VEX Robotics

In VEX Robotics, during the phase **Choose a Solution & Make a Plan** and **Build & Program**, the team chooses one of the idea from the several ideas created previously from brainstorming. Then the team starts building and programming the robot. Although it differs from teams to teams, each member of the team has their main job for efficiency. For instance in our team, Bo and Soomin are the main builder and Rory is the main programmer. Nevertheless, we still contribute to both building and driving and collaborate together to meet our goal.

Qualcomm

During the **Design** phase, Qualcomm develops the technical specifications, architecture, and implementation of the selected concepts by working closely with its ecosystem of device manufacturers, network operators, software developers, and content providers to ensure the best possible user experiences and performance. Each employee has a specific role and responsibility, and they contribute to the overall goals and vision of the company.

VEX Robotics	Both	Qualcomm
• Choose one solution from the multiple ideas created during brainstorming.	• Have specific goals but still collaborate to meet our goals	• Build and code the chosen concepts



Program

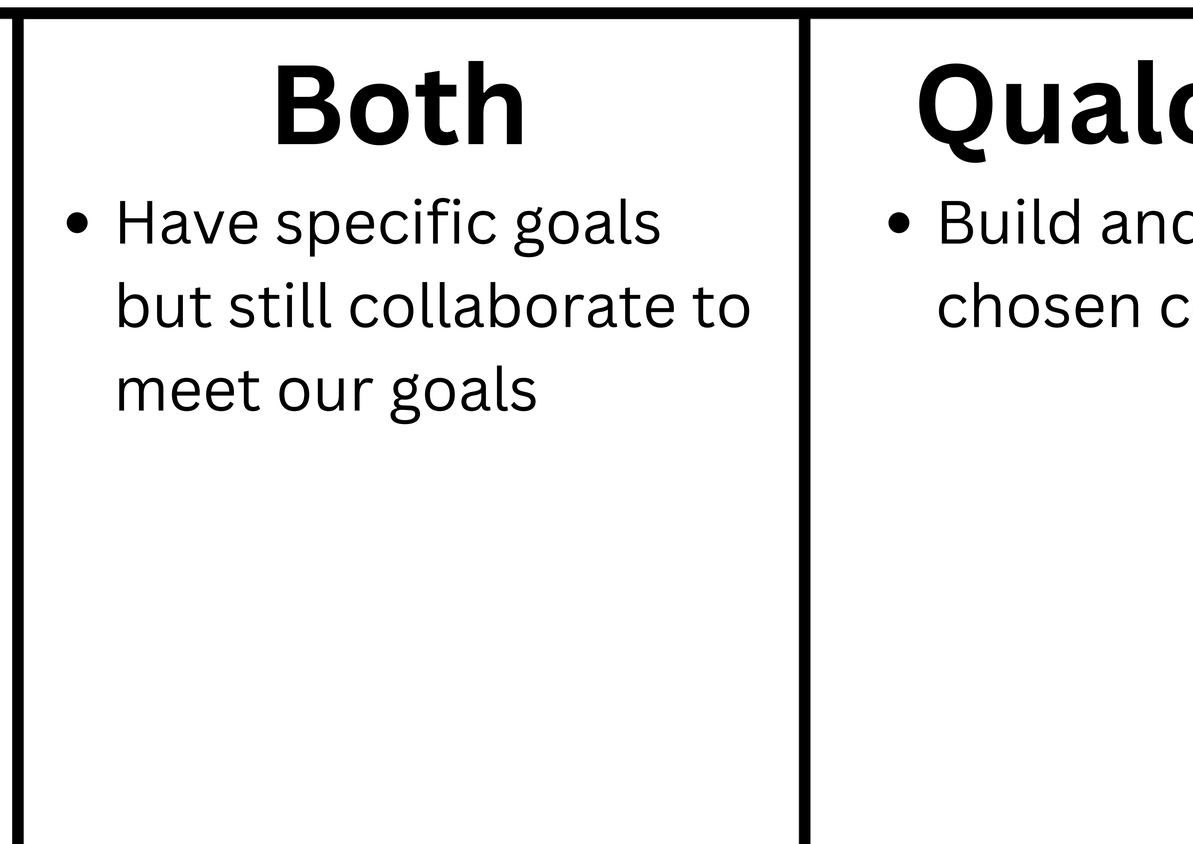
Ocean Engineers solve problems related to the sea. They design all types of marine equipment from dams to deep sea vehicles.

19

```
110
111  # system event handlers
112  if controller.axisA.changed:
113      drivetrain.set_drive_velocity(100, PERCENT)
114      drivetrain.drive(FORWARD)
115  elif controller.axisC.changed:
116      drivetrain.set_turn_velocity(100, PERCENT)
117  if controller.buttonFUp.pressed:
118      Intake.set_velocity(100, PERCENT)
119      Intake.spin(FORWARD)
120  elif controller.buttonFDown.pressed:
121      Intake.stop()
122
123  controller.buttonLUp.pressed(onevent_controllerbuttonLUp_pressed_0)
124  controller.buttonLDown.pressed(onevent_controllerbuttonLDown_pressed_0)
125
126  # add 15ms delay to make sure events are registered correctly.
127  wait(15, MSEC)
```

```
1  #region VEXcode Generated Robot Configuration-
93
94  def onevent_controllerbuttonLUp_pressed_0():
95      while controller.buttonLUp.pressing()
96          BL.spin(FORWARD)
97          BR.spin(FORWARD)
98          BL.set_max_torque(100, PERCENT)
99          BR.set_max_torque(100, PERCENT)
100     BL.stop()
101     BR.stop()
102 def onevent_controllerbuttonLDown_pressed_0():
103     while controller.buttonLUp.pressing()
104         BL.spin(REVERSE)
105         BR.spin(REVERSE)
106         BL.set_max_torque(100, PERCENT)
107         BR.set_max_torque(100, PERCENT)
108     BL.stop()
109     BR.stop()
```

For the drivetrain, I used if and elif to control because I thought using functions will just make codes longer. To control the arms, I used while loop to ~~conte~~ detect is the button pressed or not to ~~double~~ simplify the code.



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Choose Solution

We picked design #1 for the claw.

Because...

- Design 1 was able to accurately collect the blocks from the supply zone
- Even though it might take some time collecting every single block, ~~it~~ this ~~claw can~~ design of the claw can ensure to be accurate enough to reach further enough for every single blocks.
- The claw would be attatched to the top of the robot, so the robot wouldn't have weight leaned to only one side of the robot. Instead, ~~it~~ this design of claw would be able to equally spread the weight of the claw.

From our (30597A) engineering notebook

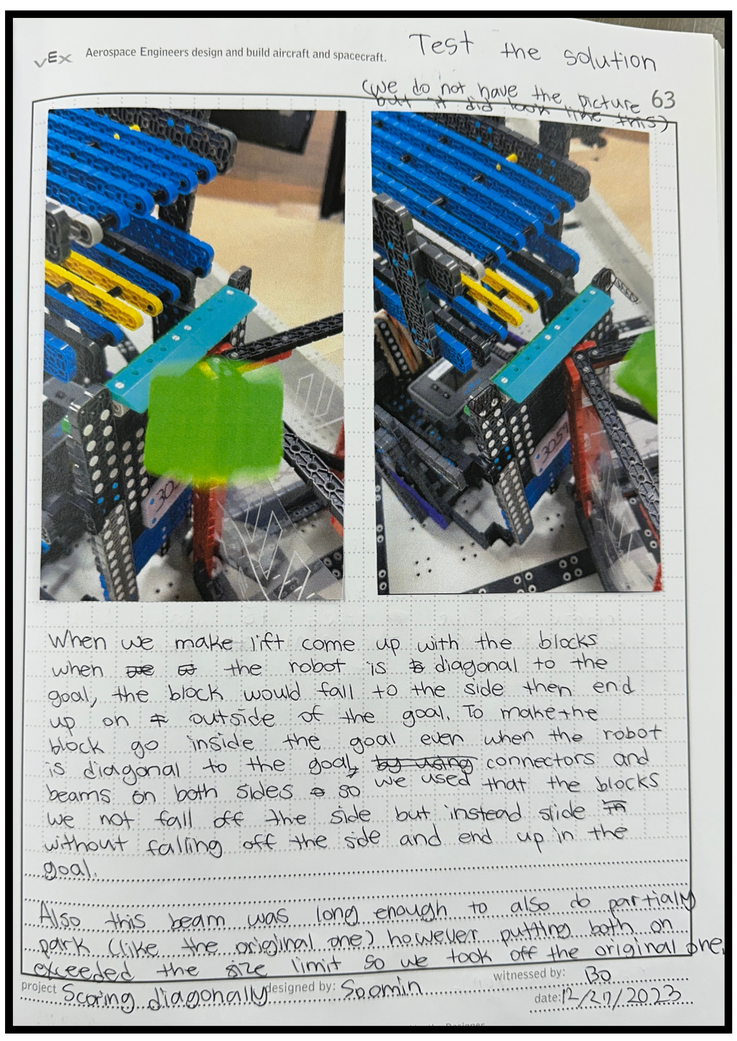
VEX Robotics

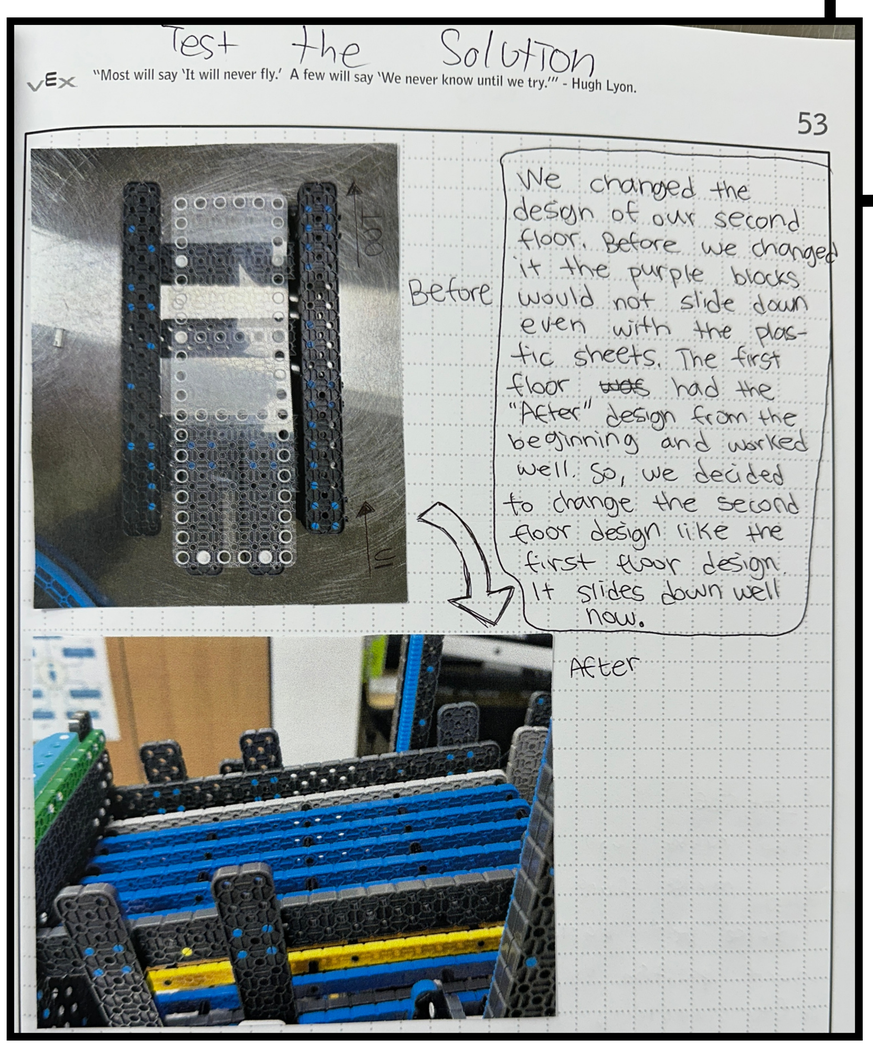
In VEX Robotics, during the phase **Test the Solution**, the team tests their robot in terms of the building and/or the programming to see what works or does not work by running the robot on the field or running the motor to see if a part works.

Qualcomm

During the **Test** phase, Qualcomm validates the functionality, quality, and reliability of its products and solutions. Qualcomm conducts various tests and simulations, such as hardware board design, integration, verification, and optimization. Then during the **Launch** phase, Qualcomm delivers its products and solutions to the market, and provides ongoing support and updates. Qualcomm also monitors the feedback and performance of its products and solutions, and identifies areas for improvement and enhancement.

VEX Robotics	Both	Qualcomm
• Although we do not have a phase called launch and do not produce any products or solutions, we use and run the robots for the competitions	• Tests the robot/ product (to see if it functions) by conducting simulation/test run	• In addition to checking functionality, checks quality and reliability • Also conduct tests that include hardware board design, integration, verification, and optimization • Has a phase called launch where they deliver products and solutions to the market





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How VEX Robotics Prepare Students for Future Careers

Even if it is not STEM related future careers, VEX Robotics can prepare students for their future careers for a multiple reason.

First, as VEX Robotics requires teamwork within their and other teams, it helps student develop their social interactions skills such as collaboration, communication and respect. For example, in VEX IQ teamwork challenges, which is when two teams collaborate to earn points, students learn and develop social interaction skills by respectfully communicating and collaborating. Similarly, these social interaction skills are vital, in students' future careers. As we work with other employees, it is crucial to be respectful at all times while being able to communicate clearly.

Secondly, like the design process used in VEX Robotics and Qualcomm are similar, other careers use an similar process which means that using the design process in VEX Robotics will prepare students for following them in the future too.

Teamwork Challenge at South Korea Nationals Competition