



Skills Targets

Indiana 4-H Robotics Challenge

The function of this document is to provide you with an idea of what youth skills we would like to see in each age division. This is not an all-inclusive list, but will give you some ideas as you create learning opportunities for youth.

Our number one goal is that are youth learn skills that they can continue to build upon. We have found that youth who are given opportunity to self-drive their learning, have become successful in the robotics program as well as other STEM programs.

Not all of these skills will be used at each or every challenge, but this will be a basic list to have youth work toward. We also realize that youth will gain these skills as they progress through the age division as well. Set goals for your group. As much as we love competition, remember the main reason we have a 4-H Robotics Challenge is to exhibit our learning and STEM knowledge throughout the year!

We also have resources available for each volunteer to help with this mastery. These recourses are located at: <https://extension.purdue.edu/4h/Pages/volunteerResources.aspx>.

Quick Tips for Volunteers:

1. Design your club meetings where youth are taking the lead. Let them figure out how to do something. Even if it means failing!
2. Use the Lego Educator or Vex Programming Learning Guide. Let the youth follow these tools so that they are active in their learning. This means that when they get stuck, they will have something to go back to figure out their mistakes or how to fix a problem.
3. Let youth teach youth. Use your teams to teach others. You should be a mentor, not the lecturer. Successful programs come from youth who buy in and get excited about the learning aspect.
4. Connect to careers. As much as we love a good contest, remember that our main goal is to interest youth in STEM. This is why we strive to have year round learning in 4-H Robotics Clubs. Go on a field trip, have 4-H'ers meet real life engineers that do what they are interested in. Make it a wide variety of career options too!
5. Let them fail. We know that this is the hardest part, but probably the most important. It is ok if a youth tries to program their robot to do something, but doesn't get it correct!
6. Let your youth guide the learning. Ask them what they are interested in, have them create the challenges, you would be surprised how much even 3rd graders have an idea what they are interested in!



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Indiana 4-H Robotics Challenge

Basic LEGO:

- Basic driving
 - Forward
 - backward
 - turning
- Basic sensor use
 - color sensor (difference in color for things like following a line/detecting a line)
 - Touch sensor (change in direction or stopping,
 - Basic ultrasonic sensor (stopping, detection of distance).
- Arm movement (basic)
- Loops

Advanced LEGO:

- Advanced driving
 - measured distance
 - multi-layer moves (adding multiple moves in one, using different motors)
- Intermediate sensor use
 - color sensing
 - multiple color detection
 - use of color to find an object, etc.,
 - touch sensing
 - use of touch for change of direction
 - operation of movement,
 - ultrasonic sensing
 - distance
 - combining or use ultrasonic to trigger an action (basic uses)
 - Basic Gyro
- Arm movement (intermediate)
 - With sensors or more advanced operations
- Loops and basic switches

VEX:

- Advanced driving
 - measured distance
 - multi-layer moves (adding multiple moves in one, using different motors)
 - Using multiple types of calculation to create movement
- Advanced sensor use
 - color sensing
 - multiple color detection
 - use of color to find an object, etc.,
 - Switches
 - touch sensing
 - use of touch for change of direction
 - operation of movement
 - Switches
 - ultrasonic sensing
 - distance
 - combining or use ultrasonic to trigger an action (basic uses)
 - advanced Gyro
- Arm Movement (advanced)
- Data analytics
- Switches with Data Analytics



Extension