FIRST® LEGO® League Challenge – Learning Progression

The *FIRST*® LEGO® League **Challenge** learning progression below outlines the differences in student learning outcomes for the program by grade level. This chart articulates the sequencing of learning that is expected with participation in that grade level. Learning could also occur as a result of multiple years of participation in *FIRST* programming. The chart is written as a checklist that reflects clearly articulated learning expectations from the perspective of the student. It can be used to validate or assess that students are demonstrating age-appropriate outcomes, knowledge and skills that are neither too advanced nor too rudimentary. This progression could be repurposed as a student-facing document to be used as a reflection of learning upon completion of the *FIRST* LEGO League Challenge experience.

I have been CHALLENGED to achieve - checklist for *FIRST*® LEGO® League Challenge

	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8
	Year 1	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Science	Using my Challenge mission models and robot, I construct evidence to explain the speed of an object, make observations about the transformation of energy and apply scientific ideas to design, test and refine a device that converts energy from one form to another.	Observing my robot and its movement, I can explain how force is generated and how gravity impacts the movement of my robot. I design my robot to interact with mission models to take advantage of using the transfer of energy to successfully complete missions.	Using my robot and mission models, I can apply Newton's laws of motion, provide evidence about an object's motion, correlate the relationship between energy, mass and speed of the robot, and identify when energy is transferred to or from the robot.	I plan investigations to provide evidence or solve a problem that involves changing an object's motion, I ask questions to determine the strength of electric and magnetic forces and I present arguments that includes using drawings or diagrams to explain the operation of a technical object.	I incorporate when applicable simple machines, technological systems, force and motion, energy transformation of energy and use a step by step process to create a technical solution.
Math	Using a motor to turn an object, I understand than an angle turn is measured in degrees, classify two dimensional figures, and recognize a line of symmetry.	When determining the distance my robot needs to travel on the challenge mat, I use addition, subtraction, multiplication and division of fractions to correctly program my robot to	I use angles to help determine how my robot needs to turn in order to solve missions. I use rate such as speed of my robot and a ratio of speed and distance to solve robot missions.	I can use calculations and rational numbers to describe situations, use algebraic principles and equations to analyze my robot's performance or related to my innovation project research.	I use more complex arithmetic to an algebraic solution that is used to model or prove robot performance, data, or analysis of research. I provide graphs or

		navigate to the mission model.			models proving these calculations. I can draw models at scale and accurately represent geometric shapes.
Reading	I use context to self-correct STEM word recognition, refer to details and examples in the engineering notebook when explaining the meaning of the text.	I integrate information from both the robot game rulebook and engineering notebook to draw inferences and quote the text. I can answer questions about the rules and activities in the program quickly.	I can figure out the meaning of words and phrases in the engineering notebook by thinking about how they are used.	I can refer to the engineering notebook or robot game rulebook to support my thoughts and give an unbiased summary of the information. I use written, audio or multimedia to impact the importance of information in a presentation.	I can locate and judge variations in robot game rulebook or engineering notebook compared to my teams' actions. I can evaluate and explain the advantages and disadvantages of presenting information in various formats and determine the best way to present to my audience.
Engineering Design	I incorporate specific criteria for success and reflect on the materials, time or cost, I plan and carry out tests to identify aspects of the robot design and innovation project model that can be improved.	I can articulate how the design solutions meet specific criteria and constraints given in the engineering notebook or robot game rulebook. We create a model or prototype to test and make modifications based on the testing outcomes.	I evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.	I evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem, as a team we create our own criteria and constraints.	I evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem, as a team we create our own criteria and constraints. I analyze data from tests to determine similarities and differences among design solutions and combine into new solutions.

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Computer Science	I create block-based programming algorithms using variables, perform number calculations on variables, construct programs to accomplish a task both independently and collaboratively, and classify or arrange groups of items based on the attributes or actions.	I create a variety of block-based algorithms that can achieve the same result, and I increate variables to determine values and operations. I understand how my robot communicates with my computing device to receive my program and how that program works to send and receive messages to the robot.	My robot programs include an added level of complexity to combine conditions in logical relationships. New variables are used to create robot behaviors to produce varying outputs.	My robot programs include added level of complexity to combine conditions in logical relationships. New variables are used to create robot behaviors to produce varying outputs. I recognize that for data collection surveys and sensor data some data are subjectively evaluated.	My robot programs include added level of complexity to combine conditions in logical relationships. New variables are used to create robot behaviors to produce varying outputs. I recognize that for data collection surveys and sensor data some data are subjectively evaluated.