TRUE ROBOTICS

INTRODUCTION TO ROBOTICS WITH AXLE

GRADES 6–8

This document lists the Kentucky learning standards addressed by Introduction to Robotics with Axle, True Robotics' grades 6–8 robotics curriculum. Standards are grouped by subject and grade level, with codes and wording as published by the Kentucky Department of Education.

38	8	8	54
MATH	SCIENCE	CS	TOTAL STANDARDS

MATHEMATICS

38 STANDARDS

Based on the Kentucky state standards

GRADE	CODE	STANDARD
6	KY.6.NS.1	Interpret and compute quotients of fractions and solve word problems involving division of fractions by fractions.
6	KY.6.NS.8	Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.
6	KY.6.EE.5	Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.
6	KY.6.EE.6	Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or depending on the purpose at hand, any number in a specified set.
6	KY.6.EE.7	Solve real-world and mathematical problems by writing and solving equations of the form x + p = q and px = q for cases in which p, q and x are all nonnegative rational numbers.
6	KY.6.EE.9	Use variables to represent two quantities in a real-world problem that changes in relationship to one another;
6	KY.6.G.1	Find the area of right triangles, other triangles, special quadrilaterals and polygons by composing into rectangles or decomposing into triangles and quadrilaterals; apply these techniques in the context of solving real-world and mathematical problems.
6	KY.6.G.2	Find the volume of a right rectangular prism with rational number edge lengths. Apply the formulas V = lwh and V = Bh to find volumes of right rectangular prisms with rational number edge lengths in the context of solving real-world and mathematical problems.

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GRADE	CODE	STANDARD
6	KY.6.SP.1	Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers.
6	KY.6.SP.2	Understand that a set of numerical data collected to answer a statistical question has a distribution which can be described by its center, spread and overall shape.
6	KY.6.SP.5c	Summarize numerical data sets in relation to their context, such as by: Determining quantitative measures of center (median and/or mean) to describe distribution of numerical data.
6	KY.6.SP.5d	Summarize numerical data sets in relation to their context, such as by: Describing distributions of numerical data qualitatively relating to shape (using terms such as cluster, mode(s), gap, symmetric, uniform, skewed-left, skewed-right and the presence of outliers) and quantitatively relating to spread/variability (using terms such as range and interquartile range).
7	KY.7.RP.1	Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units.
7	KY.7.RP.2b	Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams and verbal descriptions of proportional relationships.
7	KY.7.RP.2c	Represent proportional relationships by equations.
7	KY.7.RP.2d	Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0, 0) and (1, r) where r is the unit rate.
7	KY.7.RP.3b	Use proportional relationships to solve multistep ratio and percent problems.
7	KY.7.NS.1c	Understand subtraction of rational numbers as adding the additive inverse, p – q = p + (–q). Show that the distance between two rational numbers on the number line is the absolute value of their difference and apply this principle in real-world contexts.
7	KY.7.NS.1d	Apply properties of operations as strategies to add and subtract rational numbers.
7	KY.7.NS.2c	Apply properties of operations as strategies to multiply and divide rational numbers.
7	KY.7.NS.3	Solve real-world and mathematical problems involving the four operations with rational numbers.
7	KY.7.EE.4a	Solve word problems leading to equations of the form px + q = r and p(x + q) = r, where p, q and r are specific rational numbers. Solve equations of these forms. Graph the solution set of the equality and interpret it in context of the problem.
7	KY.7.G.1	Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.
7	KY.7.G.4a	Apply the formulas for the area and circumference of a circle to solve real-world and mathematical problems.
7	KY.7.G.4b	Explore and understand the relationship between the radius, diameter, circumference and area of a circle.
7	KY.7.G.6	Solve problems involving area of two-dimensional objects and surface area and volume of three-dimensional objects.
7	KY.7.G.6b	Solve real-world and mathematical problems involving volume and surface area, using nets as needed, of three-dimensional objects including cubes, pyramids and right prisms.

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GRADE	CODE	STANDARD
8	KY.8.NS.1	Understand informally that every number has a decimal expansion; the rational numbers are those with decimal expansions that terminate in 0s or eventually repeat. Know that other numbers are called irrational.
8	KY.8.NS.2	Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram and estimate the value of expressions.
8	KY.8.EE.5	Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways.
8	KY.8.EE.8a	Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously; understand that a system of two linear equations may have one solution, no solution, or infinitely many solutions.
8	KY.8.EE.8b	Solve systems of two linear equations in two variables algebraically by using substitution where at least one equation contains at least one variable whose coefficient is 1 and by inspection for simple cases
8	KY.8.EE.8c	Solve real-world and mathematical problems leading to two linear equations in two variables.
8	KY.8.F.3	Understand properties of linear functions.
8	KY.8.F.4	Construct a function to model a linear relationship between two quantities.
8	KY.8.G.7	Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.
8	KY.8.G.8	Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.
8	KY.8.G.9	Apply the formulas for the volumes and surface areas of cones, cylinders and spheres and use them to solve real-world and mathematical problems.

SCIENCE

8 STANDARDS

Based on the Kentucky state standards

GRADE	CODE	STANDARD
6	6-PS1-4	Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.
6	6-PS2-1	Apply Newton's third law to design a solution to a problem involving the motion of two colliding objects.
6	MS-ETS1-1	Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.
7	7-PS2-2	Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.
7	7-PS3-1	Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object.

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GRADE	CODE	STANDARD
7	7-PS4-1	Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave.
7	7-PS4-2	Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.
7	7-PS4-3	Integrate qualitative scientific and technical information to support the claim that designed technologies can transmit digital information as wave pulses.

COMPUTER SCIENCE

8 STANDARDS

Based on the Kentucky state standards

GRADE	CODE	STANDARD
6–8	M-NI-01	Model how different sets of rules (protocols) are used to transmit different types of data across networks and the Internet.
6–8	M-AP-02	Decompose problems and subproblems into parts to facilitate the design, implementation, and review of programs.
6–8	M-AP-05	Create clearly named variables that represent different data types and perform operations on their values.
6–8	M-AP-06	Create procedures with parameters to organize code and make it easier to reuse.
6–8	M-AP-07	Design and iteratively develop programs that combine control structures, including nested loops and compound conditionals.
6–8	M-AP-09	Systematically test and refine programs using a range of test cases.
6–8	M-IC-02	Compare the positive & negative effects of computing technologies on society.
6–8	M-CS-02	Design projects that combine hardware and software components to collect and exchange data.

SOURCES & NOTES

- The official mathematics, science and computer science standards for Kentucky, as published by the Kentucky Department of Education.
- Codes and standard wording are reproduced from the official standards documents. Clarification statements, examples and assessment boundaries are omitted.
- Grade shows the grade level at which True Robotics lessons address each standard. A range (for example K–2) marks a standard written for a grade band.
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- A lesson-level crosswalk is available on request at info@truerobotics.org.

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