TRUE ROBOTICS

INTRODUCTION TO ROBOTICS WITH AXLE

GRADES 6–8

This document lists the Georgia 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 Georgia Department of Education.

41	7	9	57
MATH	SCIENCE	CS	TOTAL STANDARDS

MATHEMATICS

41 STANDARDS

Based on the Georgia state standards

GRADE	CODE	STANDARD
6	6.NR.1.2	Multiply and divide any combination of whole numbers, fractions, and mixed numbers using a student-selected strategy. Interpret products and quotients of fractions and solve word problems.
6	6.NR.2.3	Interpret numerical data to answer a statistical investigative question created. Describe the distribution of a quantitative (numerical) variable collected, including its center, variability, and overall shape.
6	6.NR.2.4	Design simple experiments and collect data. Use data gathered from realistic scenarios and simulations to determine quantitative measures of center (median and/or mean) and variability (interquartile range and range). Use these quantities to draw conclusions about the data, compare different numerical data sets, and make predictions.
6	6.NR.4.4	Describe the concept of rates and unit rate in the context of a ratio relationship.
6	6.GSR.5.1	Explore area as a measurable attribute of triangles, quadrilaterals, and other polygons conceptually by composing or decomposing into rectangles, triangles, and other shapes. Find the area of these geometric figures to solve problems.
6	6.GSR.5.2	Given the net of three-dimensional figures with rectangular and triangular faces, determine the surface area of these figures.
6	6.GSR.5.3	Calculate the volume of right rectangular prisms with fractional edge lengths by applying the formula, V = (area of base) x (height).
6	6.PAR.6.3	Write and read expressions that represent operations with numbers and variables in realistic situations.
6	6.PAR.7.1	Solve one-step equations and inequalities involving variables when values for the variables are given. Determine whether an equation and inequality involving a variable is true or false for a given value of the variable.

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GRADE	CODE	STANDARD
6	6.PAR.7.2	Write one-step equations and inequalities to represent and solve problems; explain that a variable can represent an unknown number or any number in a specified set.
6	6.PAR.7.3	Solve problems by writing and solving equations of the form x + p = q, px = q and x/p = q for cases in which p, q and x are all nonnegative rational numbers.
6	6.PAR.8.3	Solve 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 x-coordinate or the same y-coordinate.
7	7.NR.1.4	Show and explain 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 contextual situations.
7	7.NR.1.5	Apply properties of operations, including part-whole reasoning, as strategies to add and subtract rational numbers.
7	7.NR.1.9	Apply properties of operations as strategies to solve multiplication and division problems involving rational numbers represented in an applicable scenario.
7	7.NR.1.11	Solve multi-step, contextual problems involving rational numbers, converting between forms as appropriate, and assessing the reasonableness of answers using mental computation and estimation strategies.
7	7.PAR.3.1	Construct algebraic equations to solve practical problems leading to equations of the form px + q = r and p(x + q) = r, where p, q, and r are specific rational numbers. Interpret the solution based on the situation.
7	7.PAR.4.1	Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units presented in realistic problems.
7	7.PAR.4.2	Determine the unit rate (constant of proportionality) in tables, graphs (1, r), equations, diagrams, and verbal descriptions of proportional relationships to solve realistic problems.
7	7.PAR.4.4	Identify, represent, and use proportional relationships.
7	7.PAR.4.5	Use context to 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	7.PAR.4.6	Solve everyday 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	7.PAR.4.8	Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways.
7	7.PAR.4.9	Use proportional relationships to solve multi-step ratio and percent problems presented in applicable situations.
7	7.GSR.5.4	Explore and describe the relationship between pi, radius, diameter, circumference, and area of a circle to derive the formulas for the circumference and area of a circle.
7	7.GSR.5.5	Given the formula for the area and circumference of a circle, solve problems that exist in everyday life.
7	7.GSR.5.6	Solve realistic problems involving surface area of right prisms and cylinders.

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GRADE	CODE	STANDARD
7	7.GSR.5.8	Explore volume as a measurable attribute of cylinders and right prisms. Find the volume of these geometric figures using concrete problems.
8	8.NR.1.1	Distinguish between rational and irrational numbers using decimal expansion. Convert a decimal expansion which repeats eventually into a rational number.
8	8.NR.1.2	Approximate irrational numbers to compare the size of irrational numbers, locate them approximately on a number line, and estimate the value of expressions.
8	8.FGR.5.2	Within realistic situations, identify and describe examples of functions that are linear or nonlinear. Sketch a graph that exhibits the qualitative features of a function that has been described verbally.
8	8.FGR.5.5	Write and explain the equations $y = mx + b$ (slope-intercept form), $Ax + By = C$ (standard form), and $(y - y_1) = m(x - x_1)$ (point-slope form) as defining a linear function whose graph is a straight line to reveal and explain different properties of the function.
8	8.FGR.5.7	Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph.
8	8.FGR.5.8	Explain the meaning of the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.
8	8.FGR.7.1	Interpret and solve relevant mathematical problems leading to two linear equations in two variables.
8	8.FGR.7.2	Show and explain that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because the points of intersection satisfy both equations simultaneously.
8	8.FGR.7.3	Approximate solutions of two linear equations in two variables by graphing the equations and solving simple cases by inspection
8	8.FGR.7.4	Analyze and solve systems of two linear equations in two variables algebraically to find exact solutions.
8	8.GSR.8.2	Apply the Pythagorean Theorem to determine unknown side lengths in right triangles within authentic, mathematical problems in two and three dimensions.
8	8.GSR.8.3	Apply the Pythagorean Theorem to find the distance between two points in a coordinate system in practical, mathematical problems.
8	8.GSR.8.4	Apply the formulas for the volume of cones, cylinders, and spheres and use them to solve in relevant problems.

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SCIENCE

7 STANDARDS

Based on the Georgia state standards

GRADE	CODE	STANDARD
8	S8P1.b	Develop and use models to describe the movement of particles in solids, liquids, gases, and plasma states when thermal energy is added or removed.
8	S8P1.c	Plan and carry out investigations to compare and contrast chemical (i.e., reactivity, combustibility) and physical (i.e., density, melting point, boiling point) properties of matter.
8	S8P2.a	Analyze and interpret data to create graphical displays that illustrate the relationships of kinetic energy to mass and speed, and potential energy to mass and height of an object.
8	S8P3.b	Construct an explanation using Newton's Laws of Motion to describe the effects of balanced and unbalanced forces on the motion of an object.
8	S8P3.c	Construct an argument from evidence to support the claim that the amount of force needed to accelerate an object is proportional to its mass (inertia).
8	S8P4.d	Develop and use a model to compare and contrast how light and sound waves are reflected, refracted, absorbed, diffracted or transmitted through various materials.
8	S8P4.f	Develop and use a model (e.g., simulations, graphs, illustrations) to predict and describe the relationships between wave properties (e.g., frequency, amplitude, and wavelength) and energy.

COMPUTER SCIENCE

9 STANDARDS

Based on the Georgia state standards

GRADE	CODE	STANDARD
6–8	CSS.DC.6-8.5	Understand the pervasiveness and tradeoffs of computers and computing in daily life.
6–8	CSS.DC.6-8.7.1	Develop a working vocabulary of embedded computing including digital, analog, events, microcontrollers, sensors, LED, switch, servo, cloud computing, and internet of things.
6–8	CSS.IDC.6-8.18	Recognize that there may be multiple approaches to solving a problem.
6–8	CSS.IDC.6-8.20.5	Implement a simple algorithm in a computer program.
6–8	CSS.IDC.6-8.20.10	Debug a program with an error.
6–8	CSS.CT.6-8.30	Identify sub-problems to consider while addressing a larger problem.
6–8	CSS.CT.6-8.37	Use and compare simple coding control structures (e.g., if-then, loops)
6–8	CSS.CT.6-8.38.3	Develop problem solutions using a programming language, including all of the following: looping behavior, conditional statements, expressions, variables, and functions.
6–8	CSS.DC.6-8.8	Investigate and identify the basic components of computers and networks.

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SOURCES & NOTES

- The official mathematics, science and computer science standards for Georgia, as published by the Georgia 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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