TRUE ROBOTICS

INTRODUCTION TO ROBOTICS WITH AXLE

GRADES 6–8

This document lists the Alabama 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 Alabama State Department of Education.

39	9	11	59
MATH	SCIENCE	CS	TOTAL STANDARDS

MATHEMATICS

39 STANDARDS

Based on the Alabama state standards

GRADE	CODE	STANDARD
6	6.4	Interpret and compute quotients of fractions using visual models and equations to represent problems.
6	6.11d	Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane, including finding distances between points with the same first or second coordinate.
6	6.15	Write, read, and evaluate expressions in which letters represent numbers in real-world contexts.
6	6.18	Determine whether a value is a solution to an equation or inequality by using substitution to conclude whether a given value makes the equation or inequality true.
6	6.19	Write and solve an equation in the form of x+p=q or px=q for cases in which p, q, and x are all non-negative rational numbers to solve real-world and mathematical problems.
6	6.21	Identify, represent, and analyze two quantities that change in relationship to one another in real-world or mathematical situations.
6	6.22	Write examples and non-examples of statistical questions, explaining that a statistical question anticipates variability in the data related to the question.
6	6.23	Calculate, interpret, and compare measures of center (mean, median, mode) and variability (range and interquartile range) in real-world data sets.
6	6.24a	Analyze the graphical representation of data by describing the center, spread, shape (including approximately symmetric or skewed), and unusual features (including gaps, peaks, clusters, and extreme values).
6	MA19.6.26	Calculate the area of triangles, special quadrilaterals, and other polygons by composing and decomposing them into known shapes.

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GRADE	CODE	STANDARD
6	MA19.6.27	Determine the surface area of three-dimensional figures by representing them with nets composed of rectangles and triangles to solve real-world and mathematical problems.
6	6.28	Apply previous understanding of volume of right rectangular prisms to those with fractional edge lengths to solve real-world and mathematical problems.
7	7.1	Calculate unit rates of length, area, and other quantities measured in like or different units that include ratios or fractions.
7	7.2b	Identify the constant of proportionality (unit rate) and express the proportional relationship using multiple representations including tables, graphs, equations, diagrams, and verbal descriptions.
7	7.2c	Explain in context the meaning of a point (x,y) on the graph of a proportional relationship, with special attention to the points (0,0) and (1, r) where r is the unit rate.
7	7.3	Solve multi-step percent problems in context using proportional reasoning, including simple interest, tax, gratuities, commissions, fees, markups and markdowns, percent increase, and percent decrease.
7	7.4c	Explain subtraction of rational numbers as addition of additive inverses.
7	7.4d	Use a number line to demonstrate 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	7.5	Solve real-world and mathematical problems involving the four operations of rational numbers, including complex fractions. Apply properties of operations as strategies where applicable.
7	7.9a	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 fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach.
7	7.17	Solve problems involving scale drawings of geometric figures, including computation of actual lengths and areas from a scale drawing and reproduction of a scale drawing at a different scale.
7	7.20	Explain the relationships among circumference, diameter, area, and radius of a circle to demonstrate understanding of formulas for the area and circumference of a circle.
7	7.20a	Informally derive the formula for area of a circle.
7	7.20b	Solve area and circumference problems in real-world and mathematical situations involving circles.
7	7.22	Solve real-world and mathematical problems involving area, volume, and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right rectangular prisms.
8	8.1	Define the real number system as composed of rational and irrational numbers.
8	8.2	Locate rational approximations of irrational numbers on a number line, compare their sizes, and estimate the values of the irrational numbers.
8	8.8	Graph proportional relationships.

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GRADE	CODE	STANDARD
8	MA19.8.9	Interpret y = mx + b as defining a linear equation whose graph is a line with m as the slope and b as the y-intercept.
8	8.10	Compare proportional and non-proportional linear relationships represented in different ways (algebraically, graphically, numerically in tables, or by verbal descriptions) to solve real-world problems.
8	8.12	Solve systems of two linear equations in two variables by graphing and substitution.
8	MA19.8.12a	Explain that the solution(s) of systems of two linear equations in two variables corresponds to points of intersection on their graphs because points of intersection satisfy both equations simultaneously.
8	8.12b	Interpret and justify the results of systems of two linear equations in two variables (one solution, no solution, or infinitely many solutions) when applied to real-world and mathematical problems.
8	8.15a	Distinguish between linear and non-linear functions.
8	8.16	Construct a function to model a linear relationship between two variables.
8	MA19.8.27	Apply the Pythagorean Theorem to find the distance between two points in a coordinate plane.
8	8.28	Apply the Pythagorean Theorem to determine unknown side lengths of right triangles, including real-world applications
8	8.30	Use formulas to calculate the volumes of three-dimensional figures (cylinders, cones, and spheres) to solve real-world problems.
8	8A.24a	Write explicit and recursive formulas for arithmetic and geometric sequences and connect them to linear and exponential functions.

SCIENCE

9 STANDARDS

Based on the Alabama state standards

GRADE	CODE	STANDARD
6	6.11a	Define problems and design solutions to monitor and mitigate human impact on the environment.
8	8.1	Plan and carry out investigations to support the claim that pure substances can be described and defined by their properties, including solubility, electrical conductivity, and density.
8	8.2	Develop and manipulate models to explain changes in particle motion, temperature, and state of a pure substance when thermal energy is added to or removed from a system.
8	SC23.8.11	Use models to demonstrate each of Newton's laws of motion and explain the effect of net force on objects.
8	8.11a	Use mathematical representations to explain how the sum of external forces on an object and the object's mass affect its acceleration.
8	8.13	Analyze graphical displays of data to describe the relationship of mass and velocity of an object to its kinetic energy (KE).

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GRADE	CODE	STANDARD
8	8.17	Use models of mechanical and electromagnetic waves to qualitatively describe the relationships among wave properties, including amplitude, wavelength, and frequency.
8	8.17a	Use models to compare and contrast light and sound wave behaviors, including reflection, refraction, diffraction, and speed, as waves propagate and interact with matter.
8	8.18	Construct an argument from evidence that digital and analog signals encode and transmit information differently.

DIGITAL LITERACY AND COMPUTER SCIENCE

11 STANDARDS

Based on the Alabama state standards

GRADE	CODE	STANDARD
6	DLCS25.6.3	Trace and debug pseudocode to identify outcomes and correct logic errors.
6	DLCS25.6.13	Explain the basic roles of routers, IP addresses, domain names, and servers in network communication.
6	DLCS25.6.24	Explain how computing technologies have changed and will continue to change the way people communicate, learn, and work in their daily lives and communities.
7	7.1	Design and test algorithms using pseudocode with sequencing, selection, and iteration applying relational and logical operators to control program flow and produce appropriate outcomes.
7	7.4	Analyze a multi-step problem by dividing it into its key components that can be completed collaboratively.
7	7.6	Design and implement a program that solves a problem, using sequencing, selection, and iteration, and user input to control the program's behavior.
7	7.25	Assess and predict the impact of emerging technologies.
8	8.1	Utilize a programming language to create algorithms that include sequencing, selection, and iteration.
8	8.5	Create reusable functions that include inputs to change how the function works and explain how using functions makes code easier to reuse and understand.
8	8.14	Create a diagram of a network to meet specific needs, including modems, routers, and servers.
8	8.20	Demonstrate how hardware components work together in the data processing cycle to perform computing tasks.

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SOURCES & NOTES

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