TRUE ROBOTICS

INTRODUCTION TO ROBOTICS WITH AXLE

GRADES 6–8

This document lists the Oklahoma 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 Oklahoma State Department of Education.

32	8	9	49
MATH	SCIENCE	CS	TOTAL STANDARDS

MATHEMATICS

32 STANDARDS

Based on the Oklahoma state standards

GRADE	CODE	STANDARD
6	6.N.3.2	Determine the unit rate for ratios.
6	6.N.4.3	Multiply and divide fractions and decimals using efficient and generalizable procedures.
6	6.N.4.4	Use mathematical modeling to solve and interpret problems including money, measurement, geometry, and data requiring arithmetic with decimals, fractions and mixed numbers.
6	6.A.1.1	Plot integer- and rational-valued (limited to halves and fourths) ordered-pairs as coordinates in all four quadrants and recognize the reflective relationships among coordinates that differ only by their signs.
6	6.A.1.2	Represent relationships between two varying positive quantities involving no more than two operations with rules, graphs, and tables; translate between any two of these representations.
6	6.A.1.3	Use and evaluate variables in expressions, equations, and inequalities that arise from various contexts, including determining when or if, for a given value of the variable, an equation or inequality involving a variable is true or false.
6	6.A.3.1	Model mathematical situations using expressions, equations and inequalities involving variables and rational numbers.
6	6.A.3.2	Use number sense and properties of operations and equality to model and solve mathematical problems involving equations in the form x + p = q and px = q, where p and q are nonnegative rational numbers. Graph the solution on a number line, interpret the solution in the original context, and assess the reasonableness of the solution.
6	6.GM.2.3	Find the area of right triangles, other triangles, special quadrilaterals, and polygons that can be decomposed into triangles and other shapes.
6	6.D.1.1	Interpret the mean, median, and mode for a set of data.

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GRADE	CODE	STANDARD
7	7.N.1.3	Explain the relationship between the absolute value of a rational number and the distance of that number from zero on a number line. Use the symbol for absolute value. Apply the concept of absolute value to model and solve problems.
7	7.N.2.5	Model and solve problems using rational numbers involving addition, subtraction, multiplication, division, and positive integer exponents.
7	7.A.1.2	Recognize that the graph of a proportional relationship is a line through the origin and the coordinate (1, r), where r is the slope and the unit rate (constant of proportionality, k).
7	7.A.2.1	Represent proportional relationships with tables, verbal descriptions, symbols, and graphs; translate from one representation to another. Determine and compare the unit rate (constant of proportionality, slope, or rate of change) given any of these representations.
7	7.A.2.2	Solve multi-step problems with proportional relationships (e.g., distance-time, percent increase or decrease, discounts, tips, unit pricing, mixtures and concentrations, similar figures, other mathematical situations).
7	7.A.3.1	Write and solve problems leading to linear equations with one variable in the form px + q = r and p(x + q) = r, where p, q, and r are rational numbers.
7	7.A.4.1	Use properties of operations (associative, commutative, and distributive) to generate equivalent numerical and algebraic expressions containing rational numbers, grouping symbols and whole number exponents.
7	7.GM.1.1	Recognize that the surface area of a rectangular prism can be found by finding the area of each component of the net of that figure. Know that rectangular prisms of different dimensions can have the same surface area.
7	7.GM.1.3	Using a variety of tools and strategies, develop the concept that the volume of rectangular prisms can be found by counting the total number of same-sized unit cubes that fill a shape without gaps or overlaps. Use appropriate measurements (e.g., cm3).
7	7.GM.2.2	Find the area and perimeter of composite figures.
7	7.GM.3.2	Demonstrate an understanding of the proportional relationship between the diameter and circumference of a circle and that the unit rate (constant of proportionality) is pi (π) and can be approximated by rational numbers such as 22/7 and 3.14.
7	7.GM.3.3	Calculate the circumference and area of circles to solve problems in various contexts, in terms of pi (π) and using approximations for pi (π).
7	7.GM.4.2	Apply proportions, ratios, and scale factors to solve problems involving scale drawings and to determine side lengths and areas of similar triangles and rectangles.
7	7.D.1.1	Design simple experiments, collect data, and calculate measures of center (mean, median, and mode) and spread (range and interquartile range). Use these quantities to draw conclusions about the data collected and make predictions.
8	PA.N.1.4	Compare and order real numbers; locate real numbers on a number line. Identify the square roots of perfect squares to 400 or, if it is not a perfect square root, locate it as an irrational number between two consecutive positive integers.
8	PA.A.1.2	Use linear functions to represent and model mathematical situations.
8	PA.A.1.3	Identify a function as linear if it can be expressed in the form y=mx + b or if its graph is a non-vertical straight line.

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GRADE	CODE	STANDARD
8	PA.A.2.3	Identify graphical properties of linear functions, including slope and intercepts. Know that the slope equals the rate of change, and that the y-intercept is zero when the function represents a proportional relationship.
8	PA.GM.1.1	Justify the Pythagorean theorem using measurements, diagrams, or dynamic software to solve problems in two dimensions involving right triangles.
8	PA.GM.1.2	Use the Pythagorean theorem to find the distance between any two points in a coordinate plane.
8	PA.GM.2.3	Justify why base area (B) and height (h) in the formula V=Bh are multiplied to find the volume of a rectangular prism. Use appropriate units (e.g., cm3).
8	PA.GM.2.4	Develop and use the formulas V = (πr)²h and V = Bh to determine the volume of right cylinders, in terms of π and using approximations for pi (π). Justify why base area (B) and height (h) are multiplied to find the volume of a right cylinder. Use appropriate units (e.g., cm3).

SCIENCE

8 STANDARDS

Based on the Oklahoma 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.PS4.2	Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.
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.PS3.1	Construct and interpret graphical displays of data to describe the proportional relationships of kinetic energy to the mass of an object and the speed of an object.
8	8.PS2.1	Apply Newton's Third Law to design a solution to a problem involving the motion of two objects in a system.
8	8.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.
8	8.PS4.1	Use mathematical representations to describe patterns in a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave.
8	8.PS4.3	Integrate qualitative scientific and technical information to support the claim that digitized signals (sent as wave pulses) are a more reliable way to encode and transmit information.

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COMPUTER SCIENCE

9 STANDARDS

Based on the Oklahoma state standards

GRADE	CODE	STANDARD
6	6.CS.HS.01	Model multiple methods of combining hardware and software to collect and exchange data.
6	6.AP.A.01	Use an existing algorithm in natural language or pseudocode to solve complex problems.
6	6.AP.C.01	Develop programs that utilize combinations of repetition, conditionals, and the manipulation of variables representing different data types.
6	6.AP.M.01	Decompose problems into parts to facilitate the design, implementation, and review of programs.
6	6.AP.PD.03	Test and refine programs using teacher provided inputs.
7	7.AP.A.01	Select and modify an existing algorithm in natural language or pseudocode to solve complex problems.
7	7.IC.CU.01	Describe the trade-offs associated with computing technologies (e.g., automation), explaining their effects on economies and society.
8	8.NI.NCO.01	Explain protocols and their importance to data transmission; model how packets are broken down into smaller pieces and how they are delivered.
8	8.AP.C.01	Develop programs that utilize combinations of nested loops, compound conditionals, procedures without parameters, and the manipulation of variables representing different data types.

SOURCES & NOTES

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