TRUE ROBOTICS

INTRODUCTION TO ROBOTICS WITH AXLE

GRADES 6–8

This document lists the Alaska 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 Alaska Department of Education & Early Development.

38	7	9	54
MATH	SCIENCE	CS	TOTAL STANDARDS

MATHEMATICS

38 STANDARDS

Based on the Alaska state standards

GRADE	CODE	STANDARD
6	6.NS.1	Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions (e.g., by using visual fraction models and equations to represent the problem).
6	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	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	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	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	6.EE.9	Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation.
6	6.G.1	Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing or decomposing into other polygons (e.g., rectangles and triangles). Apply these techniques in the context of solving real-world and mathematical problems.

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GRADE	CODE	STANDARD
6	6.G.2	Apply the standard formulas to find volumes of prisms. Use the attributes and properties (including shapes of bases) of prisms to identify, compare or describe three-dimensional figures including prisms and cylinders.
6	6.G.4	Represent three-dimensional figures (e.g., prisms) using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.
6	6.G.5	Identify, compare or describe attributes and properties of circles (radius, and diameter).
6	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	6.SP.2	Understand that a set of data has a distribution that can be described by its center (mean, median, or mode), spread (range), and overall shape and can be used to answer a statistical question.
6	6.SP.5c	Summarize numerical data sets in relation to their context, such as by: Giving quantitative measures of center (median and/or mean) and variability (interquartile range), as well as describing any overall pattern and any outliers with reference to the context in which the data were gathered.
7	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	7.RP.2b	Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships in real world situations.
7	7.RP.2c	Represent proportional relationships by equations and multiple representations such as tables, graphs, diagrams, sequences, and contextual situations.
7	7.RP.2d	Understand the concept of unit rate and show it on a coordinate plane. 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.RP.3	Use proportional relationships to solve multistep ratio and percent problems.
7	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	7.NS.1d	Apply properties of operations as strategies to add and subtract rational numbers.
7	7.NS.2c	Apply and name properties of operations used as strategies to multiply and divide rational numbers.
7	7.NS.2d	Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats.
7	7.NS.3	Solve real-world and mathematical problems involving the four operations with rational numbers.
7	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.
7	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.

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GRADE	CODE	STANDARD
7	7.G.4	Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.
7	7.G.6	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 prisms.
8	8.NS.1	Classify real numbers as either rational (the ratio of two integers, a terminating decimal number, or a repeating decimal number) or irrational.
8	8.NS.2	Order real numbers, using approximations of irrational numbers, locating them on a number line.
8	8.EE.5	Graph linear equations such as y = mx + b, interpreting m as the slope or rate of change of the graph and b as the y-intercept or starting value. Compare two different proportional relationships represented in different ways.
8	8.EE.8a	Show that the solution to a system of two linear equations in two variables is the intersection of the graphs of those equations because points of intersection satisfy both equations simultaneously.
8	8.EE.8b	Solve systems of two linear equations in two variables and estimate solutions by graphing the equations. Simple cases may be done by inspection.
8	8.EE.8c	Solve real-world and mathematical problems leading to two linear equations in two variables.
8	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	8.G.8	Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.
8	8.G.9	Identify and apply the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.
8	8.F.3	Interpret the equation y = mx + b as defining a linear function, whose graph is a straight line; give examples of functions that are not linear.
8	8.F.4	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. Interpret 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.

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SCIENCE

7 STANDARDS

Based on the Alaska state standards

GRADE	CODE	STANDARD
6	MS-PS4-1	Qualitatively and quantitatively describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave.
6	MS-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	MS-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.
8	MS-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.
8	MS-PS2-1	Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects.
8	MS-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.

COMPUTER SCIENCE

9 STANDARDS

Based on the Alaska state standards

GRADE	CODE	STANDARD
6	6.CS.HS.01	Identify ways that hardware and software (User Interface) design are combined 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.V.01	Develop programs that utilize combinations of repetition, conditionals, functions, and the manipulation of variables representing different data types.
6	6.AP.M.01	Decompose (break down) problems into abstraction layers to facilitate the design, implementation, and review of programs.
6	6.AP.PD.03	Test and refine programs using teacher provided inputs.
6	6.GCEI.C.01	Explain how computing impacts people's' everyday activities and explore carriers related to the field of computer science.
7	7.AP.A.01	Select and modify an existing algorithm in natural language or pseudocode to solve complex problems.
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.GCEI.C.01	Describe the trade-offs associated with computing technologies, explaining their effects on economies and global societies, and explore community and global careers related to the field of computer science (e.g., automation).

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SOURCES & NOTES

- The official mathematics, science and computer science standards for Alaska, as published by the Alaska Department of Education & Early Development.
- 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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