TRUE ROBOTICS

INTRODUCTION TO ROBOTICS WITH AXLE

GRADES 6–8

This document lists the Idaho 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 Idaho State Department of Education.

38	7	10	55
MATH	SCIENCE	CS	TOTAL STANDARDS

MATHEMATICS

38 STANDARDS

Based on the Idaho state standards

GRADE	CODE	STANDARD
6	6.NS.A.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.C.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.B.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.B.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.B.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.C.9	Use variables to represent two quantities in a real-world problem that change in relationship to one another; write equations to represent the relationship between the two quantities. Analyze the relationship using graphs and tables and relate these to the equations. Include an understanding of independent and dependent variables.
6	6.G.A.1	Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.

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GRADE	CODE	STANDARD
6	6.G.A.2	Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas V = lwh and V = Bh to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.
6	6.G.A.4	Represent three-dimensional figures 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.SP.A.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.A.2	Understand that a set of data collected to answer a statistical question has a distribution, which can be described by its center (median and/or mean), spread (range, interquartile range, and/or mean absolute deviation), and overall shape.
6	6.SP.B.5.c	Summarize numerical data sets in relation to their context, such as by: Giving quantitative measures of center (median, and/or mean) and variability (range, interquartile range, and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered.
7	7.RP.A.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.A.2.b	Identify the constant of proportionality in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships. Recognize the constant of proportionality as both the unit rate and as the multiplicative comparison between two quantities.
7	7.RP.A.2.c	Represent proportional relationships by equations.
7	7.RP.A.2.d	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.A.3	Use proportional relationships to solve multi-step ratio, rate, and percent problems.
7	7.NS.A.1.c	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.A.1.d	Apply properties of operations as strategies to add and subtract rational numbers.
7	7.NS.A.2.c	Apply properties of operations as strategies to multiply and divide rational numbers.
7	7.NS.A.3	Solve real-world and mathematical problems involving the four operations with integers and other rational numbers.
7	7.EE.B.4.a	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.G.A.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.B.4.a	Know that a circle is a two-dimensional shape created by connecting all of the points equidistant from a fixed point called the center of the circle.
7	7.G.B.4.b	Develop an understanding of circle attributes including radius, diameter, circumference, and area and investigate the relationships between each.
7	7.G.B.4.c	Informally derive and know the formulas for the area and circumference of a circle and use them to solve problems.
7	7.G.B.6	Generalize strategies for finding area, volume, and surface areas of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms. Solve real-world and mathematical problems in each of these areas.
8	8.NS.A.1	Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number.
8	8.NS.A.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	8.EE.B.5	Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways.
8	8.EE.C.8.a	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.
8	8.EE.C.8.b	Solve systems of two linear equations in two variables algebraically (including but not limited to using substitution and elimination strategies), and estimate solutions by graphing the equations; solve simple cases by inspection.
8	8.EE.C.8.c	Solve real-world and mathematical problems leading to two linear equations in two variables.
8	8.F.A.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.B.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.
8	8.G.B.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.B.8	Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.
8	8.G.C.9	Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.

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SCIENCE

7 STANDARDS

Based on the Idaho state standards

GRADE	CODE	STANDARD
6–7	MS-PS-4.3	Present qualitative scientific and technical information to support the claim that digitized signals (0s and 1s) can be used to encode and transmit information.
6	MS-PS-4.1	Use diagrams of a simple wave to explain that (1) a wave has a repeating pattern with a specific amplitude, frequency, and wavelength, and (2) the amplitude of a wave is related to the energy in the wave.
6	MS-PS-4.2	Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.
7	MS-PS-3.1	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-PS-1.4	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-PS-2.1	Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects.
8	MS-PS-2.2	Plan and conduct 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

10 STANDARDS

Based on the Idaho state standards

GRADE	CODE	STANDARD
6–8	6-8.CT.1.2	Compare and contrast the ways that humans and machines process instructions and sense the world.
6–8	6-8.CT.3.3	Demonstrate an understanding of how automation works and use algorithmic thinking to design and automate solutions.
6–8	6-8.CT.4.1	Demonstrate (e.g., physically or digitally) the flow of information as packets on the Internet and networks.
6–8	6-8.CT.5.1	Compare different algorithms that may be used to solve the same problem.
6–8	6-8.CT.5.4	Create, analyze, and modify control structures (if-else statements, switch-case statements, looping, etc.) to create programming solutions.
6–8	6-8.CT.5.5	Predict the outcome of an algorithm and then step through it to verify your predictions.
6–8	6-8.CT.5.6	Decompose a problem into sub-problems and demonstrate how the parts can be incorporated to create a solution.
6–8	6-8.DL.3.1	Identify different features of everyday objects that contain computing components.
6–8	6-8.DL.5.2	Summarize current events and changes resulting from computing and their effects on education, the workplace, and society.

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GRADE	CODE	STANDARD
6	6-8.CT.5.9	Select and use digital tools to support a design process; to identify constraints and trade-offs, and to weigh risks.

SOURCES & NOTES

- The official mathematics, science and computer science standards for Idaho, as published by the Idaho 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.
- Standards text remains the property of its publisher and is reproduced here for alignment reference only.
- A lesson-level crosswalk is available on request at info@truerobotics.org.

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