INTRODUCTION TO ROBOTICS WITH AXLE

GRADES 6–8

This document lists the Wisconsin 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 Wisconsin Department of Public Instruction.

36	10	9	55
MATH	SCIENCE	CS	TOTAL STANDARDS

MATHEMATICS

36 STANDARDS

Based on the Wisconsin state standards

GRADE	CODE	STANDARD
6	M.6.NS.A.1	Interpret, represent and compute division of fractions by fractions; and solve word problems by using visual fraction models (e.g., tape diagrams, area models, or number lines), equations, and the relationship between multiplication and division.
6	M.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	M.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	M.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	M.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	M.6.EE.C.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	M.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	M.6.G.A.2	Find volumes of right rectangular prisms with fractional edge lengths by using physical or virtual unit cubes. Develop (construct) and apply the formulas V = l w h and V = B h to find volumes of right rectangular prisms in the context of solving real-world and mathematical problems.
6	M.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	M.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	M.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, spread, and overall shape.
6	M.6.SP.B.5c	Summarize numerical data sets in relation to their context, such as by: Describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered and the quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation) were given.
7	M.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	M.7.RP.A.2b	Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.
7	M.7.RP.A.2c	Represent proportional relationships by equations.
7	M.7.RP.A.2d	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	M.7.RP.A.3	Use proportional relationships to solve multi-step ratio and percent problems.
7	M.7.NS.A.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	M.7.NS.A.1d	Apply properties of operations as strategies to add and subtract rational numbers.
7	M.7.NS.A.2c	Apply properties of operations as strategies to multiply and divide rational numbers.
7	M.7.NS.A.3	Solve real-world and mathematical problems involving the four operations with rational numbers.
7	M.7.EE.B.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. Flexibly and efficiently apply the properties of operations and equality to solve equations of these forms. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach.
7	M.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.
7	M.7.G.B.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.

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7	M.7.G.B.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	M.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 use patterns to rewrite a decimal expansion that repeats into a rational number.
8	M.8.NS.A.2	Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line, and estimate the value of expressions (e.g., π^2).
8	M.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	M.8.EE.C.8a	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	M.8.EE.C.8b	Solve systems of two linear equations in two variables by graphing and analyzing tables. Solve simple cases represented in algebraic symbols by inspection.
8	M.8.EE.C.8c	Solve real-world and mathematical problems leading to two linear equations in two variables.
8	M.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	M.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	M.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	M.8.G.B.8	Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.
8	M.8.G.C.9	Know the relationship among the formulas for the volumes of cones, cylinders, and spheres (given the same height and diameter) and use them to solve real-world and mathematical problems.

SCIENCE

10 STANDARDS

Based on the Wisconsin state standards

GRADE	CODE	STANDARD
6	SCI.PS4.A.m	A simple wave model has a repeating pattern with a specific wavelength, frequency, and amplitude, and mechanical waves need a medium through which they are transmitted. This model can explain many phenomena including sound and light. Waves can transmit energy.

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GRADE	CODE	STANDARD
6	SCI.PS4.B.m	The construct of a wave is used to model how light interacts with objects.
6	SCI.PS4.C.m	Waves can be used to transmit digital information. Digitized information is comprised of a pattern of 1s and 0s.
6	SCI.ETS1.A.m	The more precisely a design task's criteria and constraints can be defined, the more likely it is that the designed solution will be successful. Specification of constraints includes consideration of scientific principles and other relevant knowledge that are likely to limit possible solutions.
6	SCI.CC6.m	Students model complex and microscopic structures and systems and visualize how their function depends on the shapes, composition, and relationships among their parts. They analyze many complex natural and designed structures and systems to determine how they function. They design structures to serve particular functions by taking into account properties of different materials and how materials can be shaped and used.
7	SCI.CC4.m	Students understand systems may interact with other systems: They may have sub-systems and be a part of larger complex systems. They use models to represent systems and their interactions — such as inputs, processes, and outputs — and energy, matter, and information flows within systems. They also learn that models are limited in that they only represent certain aspects of the system under study.
7	SCI.PS3.A.m	Kinetic energy can be distinguished from the various forms of potential energy.
8	SCI.PS1.A.m	The fact that matter is composed of atoms and molecules can be used to explain the properties of substances, diversity of materials, states of matter, phase changes, and conservation of matter.
8	SCI.PS3.B.m	Energy changes to and from each type can be tracked through physical or chemical interactions. The relationship between the temperature and the total energy of a system depends on the types, states, and amounts of matter.
8	SCI.PS2.A.m	Motion and changes in motion can be qualitatively described using concepts of speed, velocity, and acceleration (including speeding up, slowing down, and/or changing direction). The role of the mass of an object must be qualitatively accounted for in any change of motion due to the application of a force (Newton's first and second law). For any pair of interacting objects, the force exerted by the first object on the second object is equal in strength to the force that the second object exerts on the first, but in the opposite direction (Newton's third law).

COMPUTER SCIENCE

9 STANDARDS

Based on the Wisconsin state standards

GRADE	CODE	STANDARD
6–8	ALG.1.c.m.1	Write algorithm steps using sequence, iteration, and selection to solve a task involving at least one data element.
6–8	ALG.3.a.m.2	Compare two or more algorithms to decide which is more accurate or efficient.
6–8	PRO.1.a.m.1	Analyze how a segment of code works, identifying the roles of variables, selection, and iteration.
6–8	PRO.1.a.m.2	Use procedures without parameters to structure code for clarity and readability.

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GRADE	CODE	STANDARD
6–8	PRO.2.b.m.1	Use appropriate data types and variables to store, update, and manage data in programs.
6–8	CSS.1.a.m.3	Explain how software and hardware interact to perform tasks, including how updates or settings affect device performance and user experience.
6–8	CSS.2.a.m.2	Describe how the parts of the Internet work (servers, routers, and cables) keep it working reliably and fix problems.
6–8	FUT.2.b.m.1	Provide examples of how computational innovations and devices impact health and wellbeing, both positively and negatively, locally and globally and create new solutions that depend on expertise from multiple fields (e.g. effects of globalization and automation).
6–8	FUT.3.a.m.2	Examine how changes in technology can create new jobs or change how people work.

SOURCES & NOTES

- The official mathematics, science and computer science standards for Wisconsin, as published by the Wisconsin Department of Public Instruction.
- 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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