INTRODUCTION TO ROBOTICS WITH AXLE

GRADES 6–8

This document lists the North Dakota 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 North Dakota Department of Public Instruction.

31	8	6	45
MATH	SCIENCE	CS	TOTAL STANDARDS

MATHEMATICS

31 STANDARDS

Based on the North Dakota state standards

GRADE	CODE	STANDARD
6	6.NO.O.3	Apply multiplication and division of fractions and decimals to solve and interpret problems using visual models, including authentic problems.
6	6.AR.EE.2	Read and evaluate algebraic expressions, including expressions with whole number exponents and grouping symbols. Write algebraic expressions to represent simple and authentic situations.
6	6.AR.EE.4	Describe the concept of a solution of an equation and an inequality. Determine whether a given number is a solution to an equation or an inequality.
6	6.AR.EE.5	Write and solve equations of the form x + p = q and px = q for cases in which p and q are non-negative whole numbers or decimals, including authentic problems.
6	6.GM.AV.1	Derive the relationship of the areas of triangles using the area of rectangles. Calculate the areas of triangles and quadrilaterals by composing and/or decomposing them into rectangles and triangles, including authentic problems.
6	6.GM.AV.2	Describe the concept of volume of a right rectangular prism. Apply given formulas to calculate the volume of right rectangular prisms, including fractional edge lengths, including authentic problems.
6	6.GM.GF.1	Identify and position ordered pairs of rational numbers in all four quadrants of a coordinate plane.
6	6.GM.GF.2	Draw polygons in the coordinate plane given coordinates for the vertices. Determine the length of a side joining points with the same first or second coordinate, including authentic problems.

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GRADE	CODE	STANDARD
6	6.GM.GF.3	Represent three-dimensional figures using nets made up of rectangles and triangles (right prisms and pyramids whose bases are triangles and rectangles). Calculate the surface area of prisms with rectangular and triangular bases using nets, including authentic problems.
6	6.DPS.D.1	Write a statistical question that can be answered using measures of center or variability of a data set.
6	6.DPS.D.2	Calculate measures of center (median and mean) and variability (range and mean absolute deviation) to answer a statistical question. Identify mode(s) if they exist.
6	6.DPS.D.4	Display numerical data in plots on a number line, including dot plots and histograms. Describe any overall patterns in data, such as gaps, clusters, and skews.
7	7.NO.NS.1	Describe the absolute value of a number as its distance from zero on a number line.
7	7.NO.O.1	Add, subtract, multiply, and divide integers using visual models and properties of operations in multi-step problems, including authentic problems.
7	7.AR.RP.1	Calculate unit rates associated with ratios of rational numbers, including ratios of lengths, areas, and other quantities measured in like or different units.
7	7.AR.RP.2	Analyze the relationship between the dependent and independent variables of a proportional relationship using graphs and tables. 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, k) where k is the unit rate.
7	7.AR.RP.3	Identify the constant of proportionality in tables, graphs, equations, diagrams, and descriptions of proportional relationships. Represent proportional relationships by an equation of the form y = kx, where k is the constant of proportionality, and describe the meaning of each variable (y, k, x) in the context of the situation.
7	7.AR.RP.4	Use proportional relationships to solve multi-step problems involving ratios, percents, and scale drawings of geometric figures, including authentic problems.
7	7.AR.EE.2	Write and solve equations of the form px + q = r and p(x + q) = r, including authentic problems.
7	7.GM.AV.1	Describe the relationship between the circumference and diameter of a circle (pi). Apply given formulas to calculate the area and circumference of a circle, including authentic problems.
7	7.GM.AV.2	Calculate areas of polygons by composing and/or decomposing them into rectangles and triangles, including authentic problems. Solve problems involving the surface area of prisms and right pyramids using nets, including authentic problems.
7	7.GM.AV.3	Solve problems involving the volume of prisms and composite solids, including authentic problems.
8	8.NO.NS.1	Compare and classify real numbers within the real number system.
8	8.NO.NS.2	Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them on a number line diagram, and estimate the value of irrational expressions involving one operation.
8	8.NO.O.2	Add, subtract, multiply, and divide rational numbers using strategies or procedures.
8	8.AR.EE.3	Explain the characteristics of a linear relationship, including identifying the slope and y-intercept in tables, graphs, equations, and descriptions.

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GRADE	CODE	STANDARD
8	8.AR.F.2	Compare and contrast properties of two linear functions, each represented in a different way (algebraically, graphically, numerically in tables, and/or by descriptions).
8	8.AR.F.3	Compare and contrast linear and non-linear functions represented in different ways (algebraically, graphically, numerically in tables, and/or by descriptions).
8	8.AR.F.4	Model a linear function between two quantities by creating a table, graph, and equation. Interpret the rate of change and initial value of a linear function in terms of the situation it models.
8	8.GM.AV.1	Apply given formulas to solve problems involving the volume of cones, cylinders, and spheres, including authentic problems.
8	8.GM.GF.6	Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in two and three dimensions on and off a coordinate plane, including authentic problems.

SCIENCE

8 STANDARDS

Based on the North Dakota state standards

GRADE	CODE	STANDARD
6–7	MS-PS4-3	Evaluate how different forms of technology utilize different signals.
6	MS-PS4-1	Use mathematical representations to 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-ET1-1	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/or 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 using Newton's First and Second Laws 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.

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COMPUTER SCIENCE AND CYBERSECURITY

6 STANDARDS

Based on the North Dakota state standards

GRADE	CODE	STANDARD
7	7.NI.1	Describe network connection types (e.g., Wi-Fi, mobile data, Ethernet).
7	7.DD.1	Describe the function of the components of an algorithm.
8	8.HS.1	Select and use software features and hardware to accomplish a task.
8	8.DD.2	Create an algorithm to solve a problem using multiple coding patterns (e.g., loops, conditionals, functions, or variables).
8	8.DD.3	Test algorithms or processes to determine if the predicted outcome matches the actual results.
8	8.S.1	Describe how current and emerging technology is changing the way people live, work, and interact.

SOURCES & NOTES

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