TRUE ROBOTICS

INTRODUCTION TO ROBOTICS WITH AXLE

GRADES 6–8

This document lists the Pennsylvania 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 Pennsylvania Department of Education and the Computer Science Teachers Association (CSTA), as adopted by Pennsylvania.

19	12	8	39
MATH	SCIENCE	CS	TOTAL STANDARDS

MATHEMATICS

19 STANDARDS

Based on the Pennsylvania state standards

GRADE	CODE	STANDARD
6	CC.2.1.6.E.1	Apply and extend previous understandings of multiplication and division to divide fractions by fractions.
6	CC.2.1.6.E.4	Apply and extend previous understandings of numbers to the system of rational numbers.
6	CC.2.2.6.B.2	Understand the process of solving a one-variable equation or inequality and apply it to real-world and mathematical problems.
6	CC.2.2.6.B.3	Represent and analyze quantitative relationships between dependent and independent variables.
6	CC.2.3.6.A.1	Apply appropriate tools to solve real-world and mathematical problems involving area, surface area, and volume.
6	CC.2.4.6.B.1	Demonstrate an understanding of statistical variability by displaying, analyzing, and summarizing distributions.
7	CC.2.1.7.D.1	Analyze proportional relationships and use them to model and solve real-world and mathematical problems.
7	CC.2.1.7.E.1	Apply and extend previous understandings of operations with fractions to operations with rational numbers.
7	CC.2.2.7.B.3	Model and solve real-world and mathematical problems by using and connecting numerical, algebraic, and/or graphical representations.
7	CC.2.3.7.A.1	Solve real-world and mathematical problems involving angle measure, area, surface area, circumference, and volume.
7	CC.2.3.7.A.2	Visualize and represent geometric figures and describe the relationships between them.

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GRADE	CODE	STANDARD
8	CC.2.1.8.E.1	Distinguish between rational and irrational numbers using their properties.
8	CC.2.1.8.E.4	Estimate irrational numbers by comparing them to rational numbers.
8	CC.2.2.8.B.2	Understand the connections between proportional relationships, lines, and linear equations.
8	CC.2.2.8.B.3	Analyze and solve linear equations and pairs of simultaneous linear equations.
8	CC.2.2.8.C.1	Define, evaluate, and compare functions.
8	CC.2.2.8.C.2	Use concepts of functions to model relationships between quantities.
8	CC.2.3.8.A.1	Apply the concepts of volume of cylinders, cones, and spheres to solve real-world and mathematical problems.
8	CC.2.3.8.A.3	Understand and apply the Pythagorean Theorem to solve problems.

SCIENCE, TECHNOLOGY & ENGINEERING (STEELS)

12 STANDARDS

Based on the Pennsylvania state standards

GRADE	CODE	STANDARD
6	3.2.6-8.Q	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	3.2.6-8.R	Develop and use a model to describe how waves are reflected, absorbed, or transmitted through various materials.
6	3.2.6-8.S	Integrate qualitative scientific and technical information to support the claim that digitized signals are a more reliable way to encode and transmit information than analog signals.
6	3.5.6-8.J	Use tools, materials, and machines to safely diagnose, adjust, and repair systems.
6	3.5.6-8.W	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	3.2.6-8.L	Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass and speed of an object.
7	3.5.6-8.EE	Differentiate between inputs, processes, outputs, and feedback in technological systems.
7	3.5.6-8.FF	Demonstrate how systems thinking involves considering relationships between every part, as well as how the systems interact with the environment in which it is used.
8	3.2.6-8.B	Develop a model that predicts and describes changes in the particle motion, temperature, and state of a pure substance when thermal energy is added or removed.
8	3.2.6-8.G	Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects.
8	3.2.6-8.H	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	3.5.6-8.LL	Compare how different technologies involve different sets of processes.

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COMPUTER SCIENCE

8 STANDARDS

Based on the Pennsylvania state standards

GRADE	CODE	STANDARD
6–8	2-CS-02	Design projects that combine hardware and software components to collect and exchange data.
6–8	2-NI-04	Model the role of protocols in transmitting data across networks and the Internet.
6–8	2-AP-11	Create clearly named variables that represent different data types and perform operations on their values.
6–8	2-AP-12	Design and iteratively develop programs that combine control structures, including nested loops and compound conditionals.
6–8	2-AP-13	Decompose problems and subproblems into parts to facilitate the design, implementation, and review of programs.
6–8	2-AP-14	Create procedures with parameters to organize code and make it easier to reuse.
6–8	2-AP-17	Systematically test and refine programs using a range of test cases.
6–8	2-IC-20	Compare tradeoffs associated with computing technologies that affect people's everyday activities and career options.

SOURCES & NOTES

- The official mathematics, science and computer science standards for Pennsylvania, as published by the Pennsylvania Department of Education and the Computer Science Teachers Association (CSTA), as adopted by Pennsylvania.
- 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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