TRUE ROBOTICS

TAKING OFF WITH PILOT

GRADES 3–5

This document lists the Virginia learning standards addressed by Taking Off with Pilot, True Robotics' grades 3–5 robotics curriculum. Standards are grouped by subject and grade level, with codes and wording as published by the Virginia Department of Education.

33	9	8	50
MATH	SCIENCE	CS	TOTAL STANDARDS

MATHEMATICS

33 STANDARDS

Based on the Virginia state standards

GRADE	CODE	STANDARD
3	3.NS.3a	Represent, name, and write a given fraction (proper or improper) or mixed number with denominators of 2, 3, 4, 5, 6, 8, and 10 using: i) region/area models (e.g., pie pieces, pattern blocks, geoboards); ii) length models (e.g., paper fraction strips, fraction bars, rods, number lines); and iii) set models (e.g., chips, counters, cubes).
3	3.NS.3f	Compare two fractions (proper or improper) and/or mixed numbers with like numerators of 2, 3, 4, 5, 6, 8, and 10 (e.g., 2/3 > 2/8) using words (greater than, less than, equal to) and/or symbols (>, <, =), using area/region models, length models, and without models.
3	3.NS.3g	Compare two fractions (proper or improper) and/or mixed numbers with like denominators of 2, 3, 4, 5, 6, 8, and 10 (e.g., 3/6 < 4/6) using words (greater than, less than, equal to) and/or symbols (>, <, =), using area/region models, length models, and without models.
3	3.CE.1c	Apply strategies (e.g., place value, properties of addition, other number relationships) and algorithms, including the standard algorithm, to determine the sum or difference of two whole numbers where addends and minuends do not exceed 1,000.
3	3.CE.2a	Represent multiplication and division of whole numbers through 10 × 10, including in a contextual situation, using a variety of approaches and models (e.g., repeated addition/subtraction, equal-sized groups/sharing, arrays, equal jumps on a number line, using multiples to skip count).
3	3.CE.2c	Apply strategies (e.g., place value, the properties of multiplication and/or addition) when multiplying and dividing whole numbers.
3	3.CE.2e	Represent, solve, and justify solutions to single-step contextual problems that involve multiplication and division of whole numbers through 10 × 10.

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GRADE	CODE	STANDARD
3	3.MG.1	The student will reason mathematically using standard units (U.S. Customary and metric) with appropriate tools to estimate and measure objects by length, weight/mass, and liquid volume to the nearest half or whole unit.
3	3.MG.2b	Solve problems, including those in context, involving perimeter: i) describe and give examples of perimeter as a measurement in contextual situations; ii) estimate and measure the distance around a polygon (with no more than six sides) to determine the perimeter and justify the measurement; and iii) given the lengths of all sides of a polygon (with no more than six sides), determine its perimeter and justify the measurement.
3	3.MG.3	The student will demonstrate an understanding of the concept of time to the nearest minute and solve single-step contextual problems involving elapsed time in one-hour increments within a 12-hour period.
3	3.MG.4e	Classify and compare polygons (triangles, quadrilaterals, pentagons, hexagons, octagons).
4	4.NS.3d	Compare two fractions (proper or improper) and/or mixed numbers using fractions with denominators of 12 or less, using the symbols >, <, and = (e.g., 2/3 > 1/7). Justify comparisons orally, in writing, or with a model.
4	4.NS.3g	Represent the division of two whole numbers as a fraction given a contextual situation and a model (e.g., 3/5 means the same as 3 divided by 5 or 3/5 represents the amount of muffin each of five children will receive when sharing three muffins equally).
4	4.CE.1c	Apply strategies (e.g., place value, properties of addition, other number relationships) and algorithms, including the standard algorithm, to determine the sum or difference of two whole numbers, where addends and minuends do not exceed 10,000.
4	4.CE.2e	Determine all factor pairs for a whole number 1 to 100, using concrete, pictorial, and numerical representations.
4	4.CE.2g	Apply strategies (e.g., rounding, place value, properties of multiplication and/or addition) and algorithms, including the standard algorithm, to estimate and determine the product of two whole numbers when given: i) a two-digit factor and a one-digit factor; ii) a three-digit factor and a one-digit factor; or iii) a two-digit factor and a two-digit factor.
4	4.CE.2h	Estimate, represent, solve, and justify solutions to single-step and multistep contextual problems that involve multiplication with whole numbers.
4	4.CE.2i	Apply strategies (e.g., rounding, compatible numbers, place value) and algorithms, including the standard algorithm, to estimate and determine the quotient of two whole numbers, given a one-digit divisor and a two- or three-digit dividend, with and without remainders.
4	4.MG.1	The student will reason mathematically to solve problems, including those in context, that involve length, weight/mass, and liquid volume using U.S. Customary and metric units.
4	4.MG.1d	Given the equivalent measure of one unit, solve problems, including those in context, by determining the equivalent measures within the U.S. Customary system for: i) length (inches and feet, feet and yards, inches and yards); ii) weight/mass (ounces and pounds); and iii) liquid volume (cups, pints, quarts, and gallons).
4	4.MG.2	The student will solve single-step and multistep contextual problems involving elapsed time (limited to hours and minutes within a 12-hour period).
4	4.MG.3	The student will use multiple representations to develop and use formulas to solve problems, including those in context, involving area and perimeter limited to rectangles and squares (in both U.S. Customary and metric units).

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GRADE	CODE	STANDARD
4	4.MG.3b	Determine the area and perimeter of a rectangle when given the measure of two adjacent sides (in whole number units), with and without models.
4	4.MG.3e	Identify and represent rectangles with the same perimeter and different areas or with the same area and different perimeters.
4	4.MG.5	The student will classify and describe quadrilaterals (parallelograms, rectangles, squares, rhombi, and/or trapezoids) using specific properties and attributes.
4	4.MG.5d	Compare, contrast, and classify quadrilaterals (parallelograms, rectangles, squares, rhombi, and/or trapezoids) based on the following properties and attributes: i) parallel sides; ii) perpendicular sides; iii) congruence of sides; and iv) number of right angles.
5	5.NS.2	The student will demonstrate an understanding of prime and composite numbers, and determine the prime factorization of a whole number up to 100.
5	5.CE.2b	Estimate and determine the sum or difference of two fractions (proper or improper) and/or mixed numbers, having like and unlike denominators limited to 2, 3, 4, 5, 6, 8, 10, and 12 (e.g., 5/8 + 1/4, 4/5 - 2/3, 3 3/4 + 2 5/12), and simplify the resulting fraction.
5	5.CE.2c	Estimate and solve single-step and multistep contextual problems involving addition and subtraction with fractions (proper or improper) and/or mixed numbers having like and unlike denominators, with and without models. Denominators should be limited to 2, 3, 4, 5, 6, 8, 10, and 12. Answers should be expressed in simplest form.
5	5.MG.1c	Given the equivalent metric measure of one unit, in a contextual problem, determine the equivalent measurement within the metric system: i) length (millimeters, centimeters, meters, and kilometers); ii) mass (grams and kilograms); and iii) liquid volume (milliliters and liters).
5	5.MG.2d	Investigate and develop a formula for determining the volume of rectangular prisms using concrete objects.
5	5.MG.2e	Solve problems, including those in context, to estimate and determine the volume of a rectangular prism using concrete objects, diagrams, and formulas when the length, width, and height are given in whole number units. Record the solution with the appropriate unit of measure (e.g., 12 cubic inches).
5	5.MG.3b	Classify triangles as right, acute, or obtuse and equilateral, scalene, or isosceles and justify reasoning.

SCIENCE

9 STANDARDS

Based on the Virginia state standards

GRADE	CODE	STANDARD
3	3.1a	define a design problem that can be solved through the development of an object, tool, process, or system
3	3.1d	The student will demonstrate an understanding of scientific and engineering practices by: constructing and critiquing conclusions and explanations
3	3.1f	read and comprehend reading-level appropriate texts and/or other reliable media; communicate scientific information, design ideas, and/or solutions with others

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GRADE	CODE	STANDARD
3	3.2	The student will investigate and understand that the direction and size of force affect the motion of an object.
4	4.2	The student will investigate and understand that plants and animals have structures that distinguish them from one another and play vital roles in their ability to survive.
5	5.3a	moving objects have kinetic energy
5	5.3d	when objects collide, the contact forces transfer energy and can change objects' motion
5	5.4a	electrical energy flows easily through conductors but not insulators
5	5.7	The student will investigate and understand that matter has properties and interactions.

COMPUTER SCIENCE

8 STANDARDS

Based on the Virginia state standards

GRADE	CODE	STANDARD
3	3.AP.3	The student will use the iterative design process to create, test, and debug programs containing events, loops, and conditional structures in a block-based programming tool.
3	3.CSY.1b	Explain the relationship between the inputs, processors, and outputs.
3	3.DA.1	The student will gather, store, and organize data to evaluate trends and identify patterns using a computing device.
3	3.IC.1a	Identify computing technologies that have changed the world.
4	4.AP.1b	Identify multiple algorithms for the same task.
4	4.AP.3a	Create and test programs that consist of sequencing, loops, variables, user inputs, and conditional control structures.
4	4.CSY.1a	Describe how computing systems perceive the world through sensors and other inputs.
5	5.AP.1d	Design an algorithm to solve a problem.

SOURCES & NOTES

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