TRUE ROBOTICS

TAKING OFF WITH PILOT

GRADES 3–5

This document lists the Iowa 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 Iowa Department of Education.

28	6	5	39
MATH	SCIENCE	CS	TOTAL STANDARDS

MATHEMATICS

28 STANDARDS

Based on the Iowa state standards

GRADE	CODE	STANDARD
3	3.OA.A.1	Interpret products of whole numbers.
3	3.OA.A.3	Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, with unknowns in all positions.
3	3.NBT.A.2	Fluently add and subtract within 1,000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.
3	3.NBT.A.3	Use place value and properties of operations to multiply one-digit whole numbers by multiples of 10 in the range 10–90.
3	3.NF.A.2	Understand a fraction as a number on the number line; represent fractions on a number line diagram.
3	3.NF.A.3d	Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusion.
3	3.MD.A.1	Tell and write time to the nearest minute and measure time intervals in minutes. Solve word problems involving addition and subtraction of time intervals in minutes.
3	3.MD.B.4	Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units—whole numbers, halves, or quarters.
3	3.MD.C.7b	Multiply side lengths to find areas of rectangles with whole-number side lengths in the context of solving real world and mathematical problems.

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GRADE	CODE	STANDARD
3	3.MD.D.8	Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters.
3	3.G.A.1	Understand that shapes in different categories (for example, rhombuses, rectangles, and others) may share attributes (for example, having four sides), and that the shared attributes can define a larger category (for example, quadrilaterals). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories.
4	4.OA.A.1	Interpret a multiplication equation as a comparison and represent verbal statements of multiplicative comparisons as multiplication equations.
4	4.OA.B.4	Be able to find all factor pairs for a whole number in the range 1–100. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the range 1–100 is a multiple of a given one-digit number. Determine whether a given whole number in the range 1–100 is prime or composite.
4	4.NBT.B.4	Fluently add and subtract multi-digit whole numbers up to 1,000,000 using an algorithm. Algorithms may include the standard algorithm, partial sums, partial differences, counting or adding up in increments.
4	4.NBT.B.5	Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Be able to illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.
4	4.NBT.B.6	Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.
4	4.NF.A.2	Compare two fractions with different numerators and different denominators, by creating common denominators or numerators, comparing to a benchmark fraction such as 1/2 and/or by using a visual fraction model. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols >, =, or <, and justify the conclusions.
4	4.MD.A.2	Use the four operations to solve word problems involving distances, intervals of time (including elapsed time), liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit.
4	4.MD.A.3	Apply the area and perimeter formulas for rectangles in real world and mathematical problems.
4	4.G.A.2	Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category and identify right triangles.
5	5.NF.A.1	Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators.

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GRADE	CODE	STANDARD
5	5.NF.A.2	Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers.
5	5.NF.B.3	Interpret that a fraction is the division of the numerator by the denominator (a/b = a ÷ b). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, by using visual fraction models or equations to represent the problem.
5	5.NF.B.4b	Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles and represent fraction products as rectangular areas.
5	5.MD.A.1	Convert among different-sized standard measurement units within a given measurement system and use these conversions in solving multi-step, real world problems.
5	5.MD.C.5a	Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes and show that the volume is the same as would be if found by multiplying the edge lengths or equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as volumes to represent the associative property of multiplication.
5	5.MD.C.5b	Apply the formulas V = l × w × h and V = B × h (where B stands for the area of the base) for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths in the context of solving real world and mathematical problems.
5	5.MD.C.5c	Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts (composite figures), applying this technique to solve real world problems.

SCIENCE

6 STANDARDS

Based on the Iowa state standards

GRADE	CODE	STANDARD
3	3-PS2-1	Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object.
3	3-ETS1-1	Define a simple design problem, reflecting a need or a want, that includes specified criteria for success and constraints on materials, time, or cost.
3	3-ETS1-2	Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.
4	4-PS3-1	Use evidence to construct an explanation relating the speed of an object to the energy of that object.
4	4-PS3-3	Ask questions and predict outcomes about the changes in energy that occur when objects collide.
5	5-PS1-3	Make observations and measurements to identify materials based on their properties.

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COMPUTER SCIENCE

5 STANDARDS

Based on the Iowa state standards

GRADE	CODE	STANDARD
3–5	1B-CS-01	Describe how internal and external parts of computing devices function to form a system.
3–5	1B-AP-08	Compare and refine multiple algorithms for the same task and determine which is the most appropriate.
3–5	1B-AP-09	Create programs that use variables to store and modify data.
3–5	1B-AP-10	Create programs that include sequences, events, loops, and conditionals.
3–5	1B-AP-15	Test and debug (identify and fix errors) a program or algorithm to ensure it runs as intended.

SOURCES & NOTES

- The official mathematics, science and computer science standards for Iowa, as published by the Iowa 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.
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- A lesson-level crosswalk is available on request at info@truerobotics.org.

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