TRUE ROBOTICS

TAKING OFF WITH PILOT

GRADES 3–5

This document lists the Kansas 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 Kansas State Department of Education and the NGSS Lead States, as adopted by Kansas.

28	6	8	42
MATH	SCIENCE	CS	TOTAL STANDARDS

MATHEMATICS

28 STANDARDS

Based on the Kansas state standards

GRADE	CODE	STANDARD
3	3.OA.1	Interpret products of whole numbers, (e.g., interpret 5·7 as the total number of objects in 5 groups of 7 objects each.)
3	3.OA.3	Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, (e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.)
3	3.NBT.2	Fluently (efficiently, accurately, and flexibly) add and subtract within 1000 using strategies (e.g., composing/decomposing by like base-10 units, using friendly or benchmark numbers, using related equations, compensation, number line, etc.) and algorithms (including, but not limited to: traditional, partial-sums, etc.) based on place value, properties of operations, and/or the relationship between addition and subtraction.
3	3.NBT.3	Multiply one-digit whole numbers by multiples of 10 in the range 10 to 90 (e.g., 9·80, 5·60) using strategies based on place value and properties of operations.
3	3.NF.2	Understand a fraction as a number on the number line; represent fractions on a number line diagram.
3	3.NF.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 relational symbols >, <, =, or ≠, and justify the conclusions, (e.g., by using a visual fraction model.)
3	3.MD.1	Tell and write time to the nearest minute using a.m. and p.m. and measure time intervals in minutes. Solve word problems involving addition and subtraction of time intervals in minutes, (e.g., by representing the problem on a number line diagram.)
3	3.MD.5	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.

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GRADE	CODE	STANDARD
3	3.MD.8b	Multiply side lengths to find areas of rectangles with whole-number side lengths in the context of solving real world and mathematical problems and represent whole-number products as rectangular areas in mathematical reasoning.
3	3.MD.9	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 are or with the same area and different perimeters.
3	3.G.1	Understand that shapes in different categories (e.g., rhombuses, rectangles, trapezoids, kites, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., 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.1	Interpret a multiplication equation as a comparison, (e.g., interpret 35=5·7 as a statement that 35 is 5 times as many as 7 and 7 times as many as 5.) Represent verbal statements of multiplicative comparisons as multiplication equations.
4	4.OA.4	Find all factor pairs for a whole number in the range 1 to 100. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the range 1 to 100 is a multiple of a given one-digit number. Determine whether a given whole number in the range 1 to 100 is prime or composite.
4	4.NBT.4	Fluently (efficiently, accurately, and flexibly) add and subtract multi-digit whole numbers using an efficient algorithm (including, but not limited to traditional, partial sums, etc.), based on place value understanding and the properties of operations.
4	4.NBT.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. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.
4	4.NBT.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.2	Compare two fractions with different numerators and different denominators, (e.g., by creating common numerators or denominators, or by comparing them to a benchmark fraction such as 1/2.) Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with relational symbols >, <, =, or ≠, and justify the conclusions, (e.g., by using visual fraction models.).
4	4.MD.2	Use the four operations to solve word problems involving distances, intervals of 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. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.
4	4.MD.3	Apply the area and perimeter formulas for rectangles in real world and mathematical problems explaining and justifying the appropriate unit of measure.
4	4.G.2	Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles (right, acute, obtuse, straight, reflex). Recognize and categorize triangles based on angles (right, acute, obtuse, and equiangular) and/or sides (scalene, isosceles, and equilateral).

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GRADE	CODE	STANDARD
5	5.NF.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.
5	5.NF.2	Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, (e.g., by using visual fraction models or equations to represent the problem.) Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers.
5	5.NF.3	Interpret a fraction as 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, e.g., by using visual fraction models or equations to represent the problem.
5	5.NF.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.1	Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real-world problems.
5	5.MD.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 found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent three-dimensional whole-number products as volumes, (e.g., to represent the associative property of multiplication.)
5	5.MD.5b	Apply the formulas V = l · w · h and V = B · h (B represents 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.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, applying this technique to solve real world problems.

SCIENCE

6 STANDARDS

Based on the Kansas state standards

GRADE	CODE	STANDARD
3–5	3-5-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-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	3-5-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.

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GRADE	CODE	STANDARD
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.

COMPUTER SCIENCE

8 STANDARDS

Based on the Kansas state standards

GRADE	CODE	STANDARD
3	3.CS.D.01	Identify how computing devices can be connected to other devices to extend their capabilities.
3	3.CS.HS.01	Model how information flows through hardware and software to accomplish tasks.
3	3.CS.IO.01	Demonstrate proper use of grade level appropriate input devices and produce digital artifacts with a controlled audience.
3	3.AP.A.01	Compare multiple algorithms for the same task.
3	3.AP.C.01	Create simple programs using a programming language that utilize sequencing, repetition, conditionals, and variables to solve a problem or express ideas independently.
3	3.AP.M.01	Decompose (break down) the steps needed to solve a problem into a precise sequence of instructions.
4	4.AP.C.01	Create programs using a programming language that utilize sequencing, repetition, conditionals and variables to solve a problem or express ideas both independently and collaboratively.
4	4.AP.PD.03	Analyze, debug (identify/fix errors), and create a program that includes sequencing, repetition and variables in a programming language.

SOURCES & NOTES

- The official mathematics, science and computer science standards for Kansas, as published by the Kansas State Department of Education and the NGSS Lead States, as adopted by Kansas.
- 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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