TAKING OFF WITH PILOT

GRADES 3–5

This document lists the Tennessee 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 Tennessee State Board of Education.

28	7	5	40
MATH	SCIENCE	CS	TOTAL STANDARDS

MATHEMATICS

28 STANDARDS

Based on the Tennessee state standards

GRADE	CODE	STANDARD
3	3.OA.A.1	Interpret the factors and products in whole number multiplication equations (e.g., 4 x 7 is 4 groups of 7 objects with a total of 28 objects or 4 strings measuring 7 inches each with a total length of 28 inches).
3	3.OA.A.3	Multiply and divide within 100 to solve contextual problems, with the unknown in any positions, in situations involving equal groups, arrays/area, and measurement quantities using strategies based on place value, the properties of operations, and the relationship between multiplication and division (e.g., contexts including computations such as 3 x ? = 24, 6 x 16 = ?, ? ÷ 8 = 3, or 96 ÷ 6 = ?).
3	3.NBT.A.2	Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.
3	3.NBT.A.3	Multiply one-digit whole numbers by multiples of 10 in the range 10–90 (e.g., 9 x 80, 5 x 60) using strategies based on place value and properties of operations.
3	3.NF.A.2	Understand a fraction as a number on the number line. Represent fractions on a number line.
3	3.NF.A.3.d	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. Use the symbols >, =, or < to show the relationship and justify the conclusions.
3	3.MD.A.1.a	Tell and write time to the nearest minute and measure time intervals in minutes. Solve contextual 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.

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GRADE	CODE	STANDARD
3	3.MD.C.7.b	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.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 exploring 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 may share attributes and that the shared attributes can define a larger category. Recognize rhombuses, rectangles, and squares as examples of quadrilaterals and recognize examples of quadrilaterals that do not belong to any of these subcategories.
4	4.OA.A.1	Interpret a multiplication equation as a comparison (e.g., interpret 35 = 5 x 7 as a statement that 35 is 5 times as many as 7 and 7 times as much as 5). Represent verbal/written statements of multiplicative comparisons as multiplication equations.
4	4.OA.B.4	Find factor pairs for whole numbers in the range 1–100 using models. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number is prime or composite and whether the given number is a multiple of a given one-digit number.
4	4.NBT.B.4	Fluently add and subtract within 1,000,000 using efficient strategies and algorithms.
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. 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 common numerators or by comparing to a benchmark such as 0 or 1/2 or 1. Recognize that comparisons are valid only when the two fractions refer to the same whole. Use the symbols >, =, or < to show the relationship and justify the conclusions.
4	4.MD.A.2	Solve one- or two-step real-world problems involving whole number measurements (including length, liquid volume, mass/weight, time, and money) with all four operations within a single system of measurement. (Contexts need not include conversions.)
4	4.MD.A.3	Know and apply the area and perimeter formulas for rectangles in real-world and mathematical contexts.
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. Classify triangles based on the measure of the angles as right, acute, or obtuse.
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.
5	5.NF.A.2	Solve contextual 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.

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GRADE	CODE	STANDARD
5	5.NF.B.3	Interpret a fraction as division of the numerator by the denominator (a/b = a ÷ b). Solve contextual 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.4.b	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 customary and metric measurement units within a single system by expressing measurements of a larger unit in terms of a smaller unit. Use these conversions to solve multi-step real-world problems involving distances, intervals of time, liquid volumes, masses of objects, and money (including problems involving simple fractions or decimals).
5	5.MD.C.5.a	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 whole-number products of three factors as volumes (e.g., to represent the associative property of multiplication).
5	5.MD.C.5.b	Know and apply the formulas V = l x w x h and V = B x h (where B represents the area of the base) for rectangular prisms with whole number edge lengths in the context of solving real-world and mathematical problems.
5	5.MD.C.5.c	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

7 STANDARDS

Based on the Tennessee state standards

GRADE	CODE	STANDARD
3	3.ETS1.1	Design a solution to a real-world problem that includes specified criteria and constraints.
3	3.ETS1.2	Apply evidence or research to support a design solution.
3	3.PS1.3	Construct an argument based on evidence that materials have both fixed and changing properties, some of which are useful for identification of a material.
4	4.PS3.1	Use evidence to explain the cause and effect relationship between the speed of an object and the energy of an object.
4	4.PS3.2	Carry out an investigation to show how faster speeds during a collision can cause a bigger change in the shape of the colliding objects.
4	4.ETS1.1	Categorize the effectiveness of design solutions by testing and comparing them to specified criteria and constraints.
5	5.PS2.1	Plan and carry out an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of the object.

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COMPUTER SCIENCE

5 STANDARDS

Based on the Tennessee state standards

GRADE	CODE	STANDARD
3	3.AT.2	Create an algorithm to solve a problem as a collaborative team.
4	4.FC.1	Demonstrate an appropriate level of proficiency in performing tasks using a range of digital devices.
4	4.PC.1	Test and debug a given program in a block-based visual programming environment using arithmetic operators, conditionals, and repetition in programs, in collaboration with others.
5	5.AT.3	Develop and recommend solutions to a given problem and explain the process to an audience.
5	5.PC.1	Create simple animated stories or solve pre-existing problems using a precise sequence of instructions and simple loops, collaboratively or individually.

SOURCES & NOTES

- The official mathematics, science and computer science standards for Tennessee, as published by the Tennessee State Board 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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