TAKING OFF WITH PILOT

GRADES 3–5

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

29	6	11	46
MATH	SCIENCE	CS	TOTAL STANDARDS

MATHEMATICS

29 STANDARDS

Based on the Maryland state standards

GRADE	CODE	STANDARD
3	3.NOS.B.2	Represent and interpret multiplication of two factors (0-10) as equal groups or as a composed unit that can be repeated/iterated. Explain the relationship between the factors and products.
3	3.AT.A.1	Use multiplication and division within 100 to solve one-step problems in context involving equal groups, arrays, and area by using concrete materials, drawings, and/or equations.
3	3.NOS.D.7	Fluently add and subtract within 1,000.
3	3.NOS.D.8	Multiply one-digit whole numbers by multiples of 10 in the range of 10-90 (e.g., 9 × 80; 60 × 5) using strategies based on place value and properties of operations.
3	3.NOS.F.12	Represent a fraction as a number on the number line.
3	3.NOS.F.13d	Compare two fractions with the same numerator or the same denominator by reasoning about their size. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions (e.g., by using concrete materials, drawings, number lines, and/or equations).
3	3.GR.A.2	Solve problems in context that involve addition and subtraction of time intervals in minutes (e.g., represent and solve using a number line).
3	3.GR.A.1	Measure the length of an object to the nearest half and quarter unit by using appropriate tools (e.g., rulers, yardsticks, meter sticks, and measuring tapes).
3	3.DS.A.1a	Create a scaled data visualization (e.g., picture graph, bar graph for categorial data; line plot with fraction units of halves and fourths for numerical data) to display collected or given data.
3	3.GR.C.7a	Determine the area of a rectangle with whole-number side lengths by tiling and connecting the visual representation to multiplication of the side lengths to solve problems in context.

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GRADE	CODE	STANDARD
3	3.GR.C.9	Solve problems in contexts involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and finding rectangles with the same perimeter and different areas or with the same area and different perimeters.
3	3.GR.B.5	Explain that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category of shapes (e.g., quadrilaterals).
4	4.AT.A.1	Interpret a multiplication situation 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.NOS.C.8	Explain and apply concepts of factors, multiples, and prime and composite numbers for whole numbers in the range of 1-100.
4	4.GR.A.2	Use the four operations to solve problems in context involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving common fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit.
4	4.GR.A.3	Apply the area and perimeter formulas for rectangles in context, including rectangles with missing dimensions.
4	4.GR.C.9	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.
4	4.NOS.B.3	Fluently add and subtract multi-digit whole numbers within 1,000,000.
4	4.NOS.B.5	Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers.
4	4.NOS.B.6	Divide whole numbers with up to four-digit dividends and one-digit divisors with and without remainders.
4	4.NOS.D.10	Compare two fractions with different numerators and different denominators, understanding that comparisons are valid only when the two fractions refer to the same whole.
5	5.GR.A.1	Apply the relationship between measurement units within a given measurement system to 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 problems.
5	5.NOS.C.8	Add and subtract fractions with unlike denominators.
5	5.NOS.C.9	Solve problems in context involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators using visual fraction models and/or equations to represent the problem.
5	5.NOS.D.10	Interpret a fraction as division of the numerator by the denominator (a/b = a ÷ b) in context using visual fraction models and equations to represent the problem (e.g., interpret 3/4 as the result of dividing 3 by 4 so when 3 wholes are shared equally among 4 people each person has a share of size 3/4).

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GRADE	CODE	STANDARD
5	5.NOS.D.12c	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.
5	5.GR.C.5a	Find the volume of a right rectangular prism with whole-number side lengths by filling it with unit cubes in layers and show that the volume is the same as would be found by multiplying the edge lengths, or by multiplying the height by the area of the base. Represent products of three whole numbers as volumes, (e.g., to represent the associative property of multiplication).
5	5.GR.C.5b	Apply the formulas V = (l)(w)(h) and V = (B)(h) for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths to solve problems in the context.
5	5.GR.C.5c	Determine the volumes of composite figures by decomposing them into non-overlapping right rectangular prisms and adding their volumes together to solve problems in context.

SCIENCE

6 STANDARDS

Based on the Maryland 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.
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

11 STANDARDS

Based on the Maryland state standards

GRADE	CODE	STANDARD
3–5	1.d	Students: understand the fundamental concepts of technology operations, demonstrate the ability to choose, use and troubleshoot current technologies and are able to transfer their knowledge to explore emerging technologies.
3–5	4.b	Students: select and use digital tools to plan and manage a design process that considers possible constraints and risks
3	3.CS.D.01	Identify internal and external parts of computing devices that function together to form a system.

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GRADE	CODE	STANDARD
3	3.AP.A.01	Develop and compare multiple algorithms for the same task.
3	3.AP.M.01	Decompose a simple problem into a precise set of sequences instructions.
3	3.a	Students: plan and employ effective research strategies to locate information and other resources
3	4.a	Students: know and use a design process for generating ideas, testing theories, creating innovative artifacts or solving authentic problems
3	6.c	Students: communicate complex ideas clearly and effectively by creating or using a variety of digital content such as visualizations, models or simulations
4	4.CS.D.01	Describe how internal and external parts of computing devices function to form a system.
5	5.AP.PD.03	Create, test, and debug a program that includes sequencing, repetition, and variables in a programming language to ensure its runs as intended.
5	5.AP.C.01	Create programs using a programming language that includes sequences, loops, conditionals, event handlers, and variables that utilize mathematics operations to manipulate values in order to solve a problem or express an idea.

SOURCES & NOTES

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