TRUE ROBOTICS

TAKING OFF WITH PILOT

GRADES 3–5

This document lists the Arizona 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 Arizona Department of Education.

29	6	8	43
MATH	SCIENCE	CS	TOTAL STANDARDS

MATHEMATICS

29 STANDARDS

Based on the Arizona state standards

GRADE	CODE	STANDARD
3	3.OA.A.1	Interpret products of whole numbers as the total number of objects in equal groups (e.g., interpret 5 x 7 as the total number of objects in 5 groups of 7 objects each).
3	3.OA.A.3	Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities.
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 to 90 using strategies based on place value and the properties of operations (e.g., 9 x 80, 5 x 60).
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. Understand that comparisons are valid only when the two fractions refer to the same whole. Record results of comparisons with the symbols >, =, or <, and justify conclusions.
3	3.MD.A.1	Tell and write time to the nearest minute and measure 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 to the nearest quarter-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, and represent whole-number products as rectangular areas in mathematical reasoning.

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GRADE	CODE	STANDARD
3	3.MD.C.8	Solve real-world and mathematical problems involving perimeters of plane figures and areas of rectangles, including finding the perimeter given the side lengths, finding an unknown side length. Represent 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 (e.g., rhombuses, rectangles, 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.A.1	Represent verbal statements of multiplicative comparisons as multiplication equations. Interpret a multiplication equation as a comparison (e.g., 35 is the number of objects in 5 groups, each containing 7 objects, and is also the number of objects in 7 groups, each containing 5 objects).
4	4.OA.B.4	Find all factor pairs for a whole number in the range 1 to 100 and understand that a whole number is a multiple of each of its factors.
4	4.NBT.B.4	Fluently add and subtract multi-digit whole numbers using a standard algorithm.
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	Demonstrate understanding of division by finding whole-number quotients and remainders with up to four-digit dividends and one-digit divisors.
4	4.NF.A.2	Compare two fractions with different numerators and different denominators (e.g., by creating common denominators or numerators and by comparing to a benchmark fraction).
4	4.MD.A.2	Use the four operations to solve word problems and problems in real-world context involving distances, intervals of time (hr, min, sec), liquid volumes, masses of objects, and money, including decimals and problems involving fractions with like denominators, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using a variety of representations, including number lines that feature a measurement scale.
4	4.MD.A.3	Apply the area and perimeter formulas for rectangles in mathematical problems and problems in real-world contexts including problems with unknown side lengths.
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 (e.g., understand right triangles as a category, and identify right triangles).
5	5.OA.B.4	Understand primes have only two factors and decompose numbers into prime factors.
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 (e.g., 2/3 + 5/4 = 8/12 + 15/12 = 23/12).

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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 by using a variety of representations, equations, and visual models to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers (e.g. recognize an incorrect result 2/5 + 1/2 = 3/7, by observing that 3/7 < 1/2).
5	5.NF.B.3	Interpret a fraction as the number that results from dividing the whole number numerator by the whole number denominator (a/b = a ÷ b). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers.
5	5.NF.B.4c	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 found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as volumes (e.g., to represent the associative property of multiplication).
5	5.MD.C.5b	Understand and use the formulas V = l x w x h and V = B x h, where in this case B is the area of the base (B = l x w), for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths to solve mathematical problems and problems in real-world contexts.
5	5.MD.C.5c	Understand volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms, applying this technique to solve mathematical problems and problems in real-world contexts.

SCIENCE

6 STANDARDS

Based on the Arizona state standards

GRADE	CODE	STANDARD
3	3-5.3.a	Students, in collaboration with an educator, employ appropriate research techniques to locate digital resources that will help them in their learning process.
3	3-5.6.c	Students, in collaboration with an educator, create digital artifacts using digital tools to communicate ideas visually, graphically, and/or auditorily.
5	5.P1U1.2	Plan and carry out investigations to demonstrate that some substances combine to form new substances with different properties and others can be mixed without taking on new properties.
5	5.P3U1.4	Obtain, analyze, and communicate evidence of the effects that balanced and unbalanced forces have on the motion of objects.
5	5.P3U2.5	Define problems and design solutions pertaining to force and motion.
5	5.P4U1.6	Analyze and interpret data to determine how and where energy is transferred when objects move.

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COMPUTER SCIENCE

8 STANDARDS

Based on the Arizona state standards

GRADE	CODE	STANDARD
3–5	3-5.1.d	Students explore age-appropriate technologies and begin to transfer their learning to different tools or learning environments.
3	3.CS.D.1	Identify how internal and external parts of computing devices function to form a system within a single device and hardware that connects to the device to extend capability.
3	3.DA.CVT.1	Select tools from a specified list to collect, organize, and present data visually to highlight relationships and support a claim.
3	3.IC.C.1	Identify computing technologies that have changed the world.
4	4.AP.A.1	Compare and refine multiple algorithms for the same task and determine which is the most effective.
4	4.AP.V.1	Create programs that use variables to store and modify data
4	4.AP.C.1	Create programs that include sequences, events, loops, and/or conditionals.
4	4.AP.PD.3	Test and debug (identify and fix errors) a program/app or algorithm to ensure it runs as intended.

SOURCES & NOTES

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