StateNotes

Mathematics and Science

Education Commission of the States • 700 Broadway, Suite 1200 • Denver, CO 80203-3460 • 303.299.3600 • Fax: 303.296.8332 • www.ecs.org

50-State View of High School Graduation Requirements in Mathematics and Science

Updated July 2006

With the exception of New Jersey, required coursework is expressed below in Carnegie units, with one unit reflecting one year of coursework. Units defined in Idaho and Indiana policy have been translated from half-year to full-year units to maintain consistency. Subject area fields with "--" indicate that requirements for that subject are determined at the state level.

	Math Requirements	Science Requirements
Alabama	4, including 1 unit each of Algebra I and geometry	4, including 1 unit each of biology and a physical science
Alaska	2	2
Arizona	2	2
Arkansas	3, including 1 unit each of algebra and geometry **Effective with the class of 2009:** 4, including 1 algebra, 1 geometry **Effective with the class of 2010:** 4 ***Smart Core*:** All students must take a math course in 11th or 12th grade. Four courses must include Algebra I, geometry, Algebra II and a choice of a math class more advanced than Algebra II.	3, including 1 unit each of biology and a physical science **Effective with the class of 2010:** 3 units of lab sciences chosen from physical science, biology or applied biology/chemistry, chemistry, or physics or Principles of Technology I and II or PIC Physics. Students who receive waivers from these requirements must complete 3 units, including 1 unit biology or its equivalent and 1 unit of a physical science.
California	2, including Algebra I At least one course or a combination of the two courses must "meet or exceed the rigor of the content standards for Algebra I." A student who took Algebra I or its equivalent before 9th grade must not take it again in high school but must still complete 2 units of math while in 9th through 12th grade.	2, including biological and physical sciences.
Colorado	--	--
Connecticut	3	2
Delaware	3	3
District of Columbia	3, including Elementary Algebra **Effective with the class of 2008:** One unit Algebra I and/or a higher-level course "and must enroll in the course no later than grade 9."	3, including 1 lab science unit.
Florida	3, including 1 unit of Algebra I or higher **Effective with the class of 2011:** 4, including 1 unit of Algebra I or higher	3, including 2 lab science units
Georgia	***Tech/Career Prep:*** 3, including Algebra I or an equivalent. ***College Prep:*** 4, incl. Algebra I + II and geometry. Geometry course must be Euclidian Geometry or Informal Geometry. Fourth course must be Statistics or listed in the College Preparatory Mathematics or Advanced Mathematics categories of the state high school	3 ***College Prep:*** Must include "a physical science, a life science, and one additional science course. Students earning the ***Technology-Career-preparatory (TC)*** or ***Technology/Career-preparatory with Distinction (TC+)*** seal must meet the requirements for the ***College Preparatory (CP)*** or ***College Preparatory***

	Math Requirements	Science Requirements
	math course catalog in GA. COMP. R. § 160-4-2-.03.	***with Distinction (CP+)*** seal or must pass any three units of science including one physical science, one life science or two units of applied biology/chemistry." *All must be lab-based.*
Hawaii	3	3
Idaho	2 May be fulfilled by "Applied Mathematics, Business Mathematics, Algebra, Geometry, Trigonometry, Fundamentals of Calculus, Probability and Statistics, Discrete Mathematics, and courses in mathematical problem solving and reasoning."	2, including 1 lab science unit
Illinois	2, 1 of 2 units "may be related to computer technology." **Effective with the class of 2009:** 3 **Effective with the class of 2010:** 3, including Algebra I and geometry content	1 **Effective with the class of 2011:** 2
Indiana	2 ***Core 40*****:** 3-4 **Effective with the class of 2008:** Must include 1 unit Algebra I or Integrated Mathematics I unless student completed one of these courses before entering high school. **Effective with the class of 2010:** 2 units must be completed after the student enters high school. ***Core 40:*** 3 Students must complete one of two course sequences: (1) Algebra I, geometry and Algebra II or (2) Integrated Mathematics I, II, III. Students are strongly encouraged to complete a unit of math during their final year of high school. **Effective with the class of 2011:** All students must meet ***Core 40*** requirements. One unit each Algebra I, Algebra II and geometry, or Integrated Math I, II and III for 3 units. Additional units may be completed in pre-calculus/trigonometry, AP Calculus, discrete mathematics, probability and statistics or AP Statistics.	2 ***Core 40*****:** 3 **Effective with the class of 2010:** 2, including Biology I ***Core 40:*** 3 Must include 1 unit biology, 1 unit chemistry, physics or integrated chemistry-physics and 1unit additional credits in Core 40 science courses. **Effective with the class of 2011:** All students must meet ***Core 40*** requirements.
Iowa	-- **Effective with the class of 2011:** 3	-- **Effective with the class of 2011:** 3
Kansas	2 **Effective with the class of 2009:** 3, including "algebraic and geometric concepts."	2, including 1 lab science unit **Effective with the class of 2009:** 3, including 1 unit lab science
Kentucky	3, including Algebra I and geometry Third unit must be a math elective from the program of studies in 704 KY. ADMIN REGS. 3:303 **Effective with the class of 2012:** 3, with Algebra I, Algebra II and geometry required. An integrated, applied, interdisciplinary or technical/occupational course that prepares a student for a career path based on the student's Individual Learning Plan may be substituted for required courses on an individual basis if the course meets content standards of the program of studies.	3, must include life science, physical science, and earth and space science as provided in the program of studies, 704 KY. ADMIN REGS. 3:303 **Effective with the class of 2012:** 3, all must incorporate lab-based scientific investigation experienced and include the content strands of biological science, physical science, earth and space science and unifying concepts.
Louisiana	3 **Effective with the class of 2009:** 3 units,	3, incl. 1 unit biology

	Math Requirements	Science Requirements
	including 1 unit Algebra I or its equivalent	
Maine	2 **Effective with the class of 2007:** Graduation "determined by student achievement of the standards of the system of learning results in" math and 4 other subject areas. **Effective with the class of 2010:** Students must achieve "standards of the system of learning results" in all 8 content areas.	2, including 1 lab science unit **Effective with the class of 2007:** Graduation "determined by student achievement of the standards of the system of learning results in ... science and technology" and 4 other subject areas. **Effective with the class of 2010:** Students must achieve "standards of the system of learning results" in all 8 content areas.
Maryland	3, incl. algebra and geometry	3, incl. 1 unit biology 1 unit "biology aligned with the Maryland High School Assessment for biology and two from the earth, life, or physical sciences, or all of the above, in which laboratory experiences are an integral component"
Massachusetts	--	--
Michigan	-- **Effective with the class of 2011:** 4, including completion of at least algebra I, geometry and algebra II, or an integrated sequence of this course content that consists of 3 credits, and an additional mathematics credit, such as trigonometry, statistics, precalculus, calculus, applied math, accounting, business math or a retake of algebra II. Students must successfully complete at least one mathematics course during their final year of high school enrollment.	-- **Effective with the class of 2011:** 3, including completion of at least biology and either chemistry or physics.
Minnesota	-- **Effective with the class of 2008:** 3 units, must include "at least algebra, geometry, statistics and probability sufficient to satisfy the academic standard."	-- **Effective with the class of 2008:** 3, incl. 1 unit biology
Mississippi	3, including Algebra I and 1 higher course **Effective with the class of 2009:** 4, including Algebra I and 1 higher course. **Effective with the class of 2012:** 4, including Algebra I, and 2 higher courses.	3, including Biology I **Effective with the class of 2012:** 4, including Biology I and 1 lab physical science. Lab physical science must be chosen from Physical Science, Chemistry I or II, AP Chemistry, Physics I or II, AP Physics B, AP Physics C-Electricity and Magnetism or AP Physics C-Mechanics
Missouri	2 **Effective with the class of 2010:** 3	2 **Effective with the class of 2010:** 3
Montana	2	2
Nebraska	--	--
Nevada	3	2
New Hampshire	2	2, 1 unit each of physical sciences and biological sciences.
New Jersey	15 credits (3 Carnegie units)	15 credits (3 Carnegie units)
New Mexico	3, including at least 1 unit equivalent to Algebra I or higher	2, including 1 lab science unit **Effective with the class of 2009:** 3 units required, including 1 lab unit.
New York	3	3, including a minimum of 1 lab unit 3 units of "commencement level science," including 1 unit life sciences, 1 unit physical sciences and 1 unit either life sciences or physical sciences.

	Math Requirements	Science Requirements
North Carolina	***College prep:*** 4, including higher math algebra I, algebra II, geometry, and a higher level course for which algebra II is a prerequisite; or integrated mathematics I, II, III, and one course beyond integrated mathematics III. ***Career prep:*** 3, including Algebra I Career prep: 3 units, 1 of which must be Algebra I. ***College technical prep:*** 3 units, which must be either algebra I, geometry, and algebra II; or algebra I, technical mathematics I, and technical mathematics II; or integrated mathematics I, II, and III.	3, including Biology All diploma options must include biology, a physical science and earth/environmental science.
North Dakota	--	--
Ohio	3	3, including 1 unit each biological sciences and physical sciences
Oklahoma	3, including Algebra I **Effective with the class of 2010:** 3 units, all Algebra I level and higher. "[L]imited to Algebra I, Algebra II, Geometry, Trigonometry, Math Analysis, Calculus, Advanced Placement Statistics, or any mathematics course with content and/or rigor above Algebra I and approved for college admission requirements."	3, including Biology 1 **Effective with the class of 2010:** 3 units lab science "[L]imited to Biology, Chemistry, Physics, or any laboratory science course with content and/or rigor equal to or above Biology and approved for college admission requirements."
Oregon	2 **Effective with the class of 2010:** 3	2
Pennsylvania	--	--
Rhode Island	3 **Effective with the class of 2008:** 4	2 **Effective with the class of 2008:** 3
South Carolina	4	3
South Dakota	2-3 (5 units math and laboratory science, of which at least two units must be math.) **Effective with the class of 2008:** 3, incl. 1 unit Algebra I or higher. **Effective with the class of 2010:** Advanced program: 3, incl. Algebra I, Algebra II and geometry. Standard: 3, incl. Algebra I. All students must complete ***Advanced*** high school program unless excused by parent/guardian and school counselor or school administrator, in which case the ***Standard*** high school program requirements must be fulfilled.	2-3, incl. 2 units lab science (5 units math and laboratory science, of which at least two units must be laboratory science.) **Effective with the class of 2008:** 2 units lab science **Effective with the class of 2010:** Advanced program: 3 units lab science, incl. biology and chemistry or physics. Standard: 2 units lab science
Tennessee	3 Must include at least 1 unit Algebra 1, Math for Technology II or Integrated Mathematics I (but not more than one of these). ***University Prep:*** Two credits in Algebra II, Geometry, or other advanced mathematics course or ... 2 credits in Integrated Mathematics II and Integrated Mathematics III. According to the Tennessee Department of Education Web site, **effective with the class of 2009** "must also complete one of the following: Algebra II, Geometry, Integrated Math II, or Technical Geometry."	3 Must include 1 unit Biology I, Biology for Technology or the equivalent in an integrated curriculum. 1 unit must be "drawn from the physical sciences" and all science courses must "include laboratory experiences."
Texas	***Recommended program:*** 3, including Algebra I, Algebra II and geometry ***Minimum program:*** 3, including Algebra I and geometry	***Recommended program:*** 3, incl. biology and chemistry or physics. Biology credit must be taken in biology, Advanced Placement Biology or International Baccalaureate Biology. The other two units must be chosen from (a) Integrated Physics and Chemistry (IPC); (b) Chemistry, AP Chemistry or IB Chemistry; and (c) Physics, Principles of Technology I, AP Physics or IB

	Math Requirements	Science Requirements
		Physics. ***Minimum program:*** 2, incl. biology and Integrated Physics and Chemistry (IPC) **Effective with the class of 2011 for the *Recommended program*:** 4
Utah	2, incl. Algebra I and geometry High school math credit may not be earned in courses below Elementary Algebra and Applied Mathematics I.	2, must be chosen from two of the four science areas: earth systems science, biological science, chemistry and physics. Up to one unit may be earned in any of the four disciplines.
Vermont	3	3
Virginia	3 (Algebra I and higher) "Courses completed to satisfy this requirement shall be at or above the level of algebra and shall include at least two course selections from among: Algebra I, Geometry, Algebra II, or other mathematics courses above the level of algebra and geometry. The board may approve additional courses to satisfy this requirement."	3 units laboratory science "Courses completed to satisfy this requirement shall include course selections from at least two different science disciplines: earth sciences, biology, chemistry, or physics."
Washington	2	2, including 1 lab science
West Virginia	3, incl. Algebra I and above "Successful completion of Applied Math I and II is equivalent to an Algebra I credit. Applied Geometry may be substituted for a formal course of geometry." **Effective with the class of 2008:** 3-4 Students in professional and skilled pathways must complete 1 of 4 career major units in math "including Algebra I and two other courses above Algebra I. Successful completion of Applied Math I and II is equivalent to an Algebra I credit and a credit for a course prior to Algebra I. All students must take Algebra I or its equivalent prior to the end of the 10th grade." **Effective with the class of 2009:** 3-4 4 units for students in professional and skilled pathway, 3 units for students in entry pathway. For students in professional and skilled pathway, at least 3 of 4 units must be Algebra I and above. For students in entry pathway, at least 2 of 3 units must be Algebra I and above. "It is the intent that all students will take mathematics annually, but must take at least three mathematics classes in grades 9-12. If students begin the math sequence prior to grade 9, they should take other mathematics courses, which may include college courses, AP courses, virtual school courses, or other advanced offerings. This principle applies to all required course sequences. The mathematics courses selected for credit must be relevant to the student's career pathway. Successful completion of Applied Math I and II is equivalent to an Algebra I credit and a credit for a course prior to Algebra I." **Effective with the class of 2010:** 4 All students, regardless of pathway, must complete 4 units of math. For students in entry pathway, at least 2 of 4 units must be Algebra I and above.	3 Coordinated and Thematic Science (CATS) 9 and 10 and a course above the CATS 10 level. **Effective with the class of 2008:** Students in professional pathway must complete 1 of the 4 career major units in science (unit must be above CATS 10). **Effective with the class of 2009:** 3 units must be completed in CATS 9 and 2 courses above the CATS 9 level. For professional pathway, 4th unit of science must be above CATS 9.
Wisconsin	2	2

	Math Requirements	Science Requirements
	Must include "instruction in the properties, processes, and symbols of arithmetic and elements of algebra, geometry, and statistics."	Must include "instruction in the biological sciences and physical sciences."
Wyoming	3 **Effective with the class of 2006:** 3 Additionally, diplomas must indicate a level of endorsement. ***Comprehensive endorsement:*** Standard requirements and proficient performance on common core of knowledge and skills in math. ***General endorsement:*** Proficient performance in a majority of 9 subject areas, including math.	3 **Effective with the class of 2006:** 3 Additionally, diplomas must indicate a level of endorsement. ***Comprehensive endorsement:*** Standard requirements and proficient performance on common core of knowledge and skills in science. ***General endorsement:*** Proficient performance in a majority of 9 subject areas, including science.

Kyle Zinth, researcher in the ECS Information Clearinghouse, and Jennifer Dounay, project manager for the ECS High School Policy Center, compiled this report. Email: kzinth@ecs.org and jdounay@ecs.org

Helping State Leaders Shape Education Policy