

Technology in TEKS

§126.2. Technology Applications, Kindergarten-Grade 2.

(b) Knowledge and skills.

(1) Foundations. The student demonstrates knowledge and appropriate use of hardware components, software programs, and their connections. The student is expected to:

(A) use technology terminology appropriate to the task;

(3) Foundations. The student complies with the laws and examines the issues regarding the use of technology in society. The student is expected to:

(A) follow acceptable use policies when using computers; and

(B) model respect of intellectual property by not illegally copying software or another individual's electronic work.

(6) Information acquisition. The student evaluates the acquired electronic information. The student is expected to:

(A) determine the success of strategies used to acquire electronic information; and

(B) determine the usefulness and appropriateness of digital information.

(7) Solving problems. The student uses appropriate computer-based productivity tools to create and modify solutions to problems. The student is expected to:

(A) use software programs with audio, video, and graphics to enhance learning experiences; and

(B) use appropriate software, including the use of word processing and multimedia, to express ideas and solve problems.

Source: The provisions of this §126.2 adopted to be effective September 1, 1998, 22 TexReg 5203.

§126.3. Technology Applications, Grades 3-5.

(b) Knowledge and skills.

(1) Foundations. The student demonstrates knowledge and appropriate use of hardware components, software programs, and their connections. The student is expected to:

- (A) use technology terminology appropriate to the task;
 - (C) identify and describe the characteristics of digital input, processing, and output;
- (6) Information acquisition. The student evaluates the acquired electronic information. The student is expected to:
- (A) apply critical analysis to resolve information conflicts and validate information;
 - (B) determine the success of strategies used to acquire electronic information; and
 - (C) determine the usefulness and appropriateness of digital information.
- (7) Solving problems. The student uses appropriate computer-based productivity tools to create and modify solutions to problems. The student is expected to:
- (A) use software programs with audio, video, and graphics to enhance learning experiences;
 - (B) use appropriate software to express ideas and solve problems including the use of word processing, graphics, databases, spreadsheets, simulations, and multimedia; and
 - (C) use a variety of data types including text, graphics, digital audio, and video.
- (8) Solving problems. The student uses research skills and electronic communication, with appropriate supervision, to create new knowledge. The student is expected to:
- (B) use interactive technology environments, such as simulations, electronic science or mathematics laboratories, virtual museum field trips, or on-line interactive lessons, to manipulate information; and
 - (C) participate with electronic communities as a learner, initiator, contributor, or mentor.

Source: The provisions of this §126.3 adopted to be effective September 1, 1998, 22 TexReg 5203.

§126.12. Technology Applications (Computer Literacy), Grades 6-8.

(c) Knowledge and skills.

- (1) Foundations. The student demonstrates knowledge and appropriate use of hardware components, software programs, and their connections. The student is expected to:
- (A) demonstrate knowledge and appropriate use of operating systems, software applications, and communication and networking components;

- (C) demonstrate the ability to select and use software for a defined task according to quality, appropriateness, effectiveness, and efficiency;
 - (E) use technology terminology appropriate to the task;
- (3) Foundations. The student complies with the laws and examines the issues regarding the use of technology in society. The student is expected to:
- (A) discuss copyright laws/issues and model ethical acquisition and use of digital information, citing sources using established methods;
 - (B) demonstrate proper etiquette and knowledge of acceptable use while in an individual classroom, lab, or on the Internet and intranet;
 - (C) describe the consequences regarding copyright violations including, but not limited to, computer hacking, computer piracy, intentional virus setting, and invasion of privacy;
 - (D) identify the impact of technology applications on society through research, interviews, and personal observation; and
 - (E) demonstrate knowledge of the relevancy of technology to future careers, life-long learning, and daily living for individuals of all ages.
- (6) Information acquisition. The student evaluates the acquired electronic information. The student is expected to:
- (A) determine and employ methods to evaluate the electronic information for accuracy and validity;
 - (B) resolve information conflicts and validate information through accessing, researching, and comparing data; and
 - (C) demonstrate the ability to identify the source, location, media type, relevancy, and content validity of available information.
- (7) Solving problems. The student uses appropriate computer-based productivity tools to create and modify solutions to problems. The student is expected to:
- (J) use foundation and enrichment curricula in the creation of products.
- (8) Solving problems. The student uses research skills and electronic communication, with appropriate supervision, to create new knowledge. The student is expected to:
- (A) participate with electronic communities as a learner, initiator, contributor, and teacher/mentor;

- (B) complete tasks using technological collaboration such as sharing information through on-line communications;
 - (C) use groupware, collaborative software, and productivity tools to create products;
 - (D) use technology in self-directed activities by sharing products for defined audiences; and
 - (E) integrate acquired technology applications skills, strategies, and use of the word processor, database, spreadsheet, telecommunications, draw, paint, and utility programs into the foundation and enrichment curricula.
- (9) Solving problems. The student uses technology applications to facilitate evaluation of work, both process and product. The student is expected to:
- (A) design and implement procedures to track trends, set timelines, and review/evaluate progress for continual improvement in process and product; and
 - (B) resolve information conflicts and validate information through research and comparison of data.
- (12) Communication. The student uses technology applications to facilitate evaluation of communication, both process and product. The student is expected to:
- (B) determine and employ technology specifications to evaluate projects for design, content delivery, purpose, and audience, demonstrating that process and product can be evaluated using established criteria or rubrics;

Source: The provisions of this §126.12 adopted to be effective September 1, 1998, 22 TexReg 5203.

§126.21. Implementation of Texas Essential Knowledge and Skills for Technology Applications, High School.

The provisions of this subchapter shall supersede §75.123 of this title (relating to Computer Science) beginning September 1, 1998.

Source: The provisions of this §126.21 adopted to be effective September 1, 1998, 22 TexReg 5203.

§126.22. Computer Science I (One Credit).

(c) Knowledge and skills.

- (1) Foundations. The student demonstrates knowledge and appropriate use of hardware components, software programs, and their connections. The student is expected to:

- (E) differentiate current programming languages, discuss the use of the languages in other fields of study, and demonstrate knowledge of specific programming terminology and concepts;
 - (F) differentiate among the levels of programming languages including machine, assembly, high-level compiled and interpreted languages; and
 - (G) demonstrate coding proficiency in a contemporary programming language.
- (2) Foundations. The student uses data input skills appropriate to the task. The student is expected to:
- (A) demonstrate proficiency in the use of a variety of input devices such as keyboard, scanner, voice/sound recorder, mouse, touch screen, or digital video by appropriately incorporating such components into the product; and
- (3) Foundations. The student complies with the laws and examines the issues regarding the use of technology in society. The student is expected to:
- (A) discuss copyright laws/issues and model ethical acquisition and use of digital information, citing sources using established methods;
- (5) Information acquisition. The student acquires electronic information in a variety of formats, with appropriate supervision. The student is expected to:
- (B) use a variety of resources, including foundation and enrichment curricula, together with various productivity tools to gather authentic data as a basis for individual and group programming projects; and
 - (C) design and document sequential search algorithms for digital information storage and retrieval.
- (6) Information acquisition. The student evaluates the acquired electronic information. The student is expected to:
- (A) determine and employ methods to evaluate the design and functionality of the process using effective coding, design, and test data; and
 - (B) implement methods for the evaluation of the information using defined rubrics.
- (7) Solving problems. The student uses appropriate computer-based productivity tools to create and modify solutions to problems. The student is expected to:
- (A) apply problem-solving strategies such as design specifications, modular top-down design, step-wise refinement, or algorithm development;

- (B) use visual organizers to design solutions such as flowcharts or schematic drawings;
 - (C) develop sequential and iterative algorithms and codes programs in prevailing computer languages to solve practical problems modeled from school and community;
 - (D) code using various data types;
 - (E) demonstrate effective use of predefined input and output procedures for lists of computer instructions including procedures to protect from invalid input;
 - (F) develop coding with correct and efficient use of expressions and assignment statements including the use of standard/user-defined functions, data structures, operators/proper operator precedence, and sequential/conditional/repetitive control structures;
 - (G) create and use libraries of generic modular code to be used for efficient programming;
 - (H) identify actual and formal parameters and use value and reference parameters;
 - (I) use control structures such as conditional statements and iterated, pretest, and posttest loops;
 - (J) use sequential, conditional, selection, and repetition execution control structures such as menu-driven programs that branch and allow user input; and
 - (K) identify and use structured data types of one-dimensional arrays, records, and text files.
- (8) Solving problems. The student uses research skills and electronic communication, with appropriate supervision, to create new knowledge. The student is expected to:
- (A) participate with electronic communities as a learner, initiator, contributor, and teacher/mentor;
 - (C) extend the learning environment beyond the school walls with digital products created to increase teaching and learning in the foundation and enrichment curricula; and
 - (D) participate in relevant, meaningful activities in the larger community and society to create electronic projects.
- (9) Solving problems. The student uses technology applications to facilitate evaluation of work, both process and product. The student is expected to:
- (A) design and implement procedures to track trends, set timelines, and review/evaluate progress for continual improvement in process and product;

- (B) use correct programming style to enhance the readability and functionality of the code such as spacing, descriptive identifiers, comments, or documentation;
 - (C) seek and respond to advice from peers and professionals in delineating technological tasks;
 - (D) resolve information conflicts and validate information through accessing, researching, and comparing data; and
 - (E) create technology specifications for tasks/evaluation rubrics and demonstrate that products/product quality can be evaluated against established criteria.
- (10) Communication. The student formats digital information for appropriate and effective communication. The student is expected to:
- (A) annotate coding properly with comments, indentation, and formatting; and
 - (B) create interactive documents using modeling, simulation, and hypertext.
- (12) Communication. The student uses technology applications to facilitate evaluation of communication, both process and product. The student is expected to:
- (A) write technology specifications for planning/evaluation rubrics documenting variables, prompts, and programming code internally and externally;

Source: The provisions of this §126.22 adopted to be effective September 1, 1998, 22 TexReg 5203.

§126.23. Computer Science II (One Credit).

(c) Knowledge and skills.

- (1) Foundations. The student demonstrates knowledge and appropriate use of hardware components, software programs, and their connections. The student is expected to:
- (A) identify object-oriented data types and delineate the advantages/disadvantages of object data;
 - (B) demonstrate coding proficiency in contemporary programming languages including an object-oriented language; and
 - (C) survey the issues accompanying the development of large software systems such as design/implementation teams, software validation/testing, and risk assessment.

(3) Foundations. The student complies with the laws and examines the issues regarding the use of technology in society. The student is expected to:

(A) discuss copyright laws/issues and model ethical acquisition and use of digital information, citing sources using established methods;

(B) demonstrate proper etiquette and knowledge of acceptable use policies when using networks, especially resources on the Internet and intranet;

(D) code modules for the World Wide Web (WWW) community.

(4) Information acquisition. The student uses a variety of strategies to acquire information from electronic resources, with appropriate supervision. The student is expected to:

(A) construct search algorithms including linear and binary searches; and

(B) compare and contrast search and sort algorithms including linear and binary searches for different purposes and search time.

(5) Information acquisition. The student acquires electronic information in a variety of formats, with appropriate supervision. The student is expected to:

(A) acquire information in and knowledge about electronic formats including text, audio, video, and graphics; and

(B) use a variety of resources, including foundation and enrichment curricula, together with various productivity tools to gather authentic data as a basis for individual and group programming projects.

(6) Information acquisition. The student evaluates the acquired electronic information. The student is expected to:

(A) determine and employ methods to evaluate the design and functionality of the process using effective coding, design, and test data; and

(B) implement methods for the evaluation of the information using defined rubrics.

(7) Solving problems. The student uses appropriate computer-based productivity tools to create and modify solutions to problems. The student is expected to:

(A) use appropriately and trace recursion in program design comparing invariant, iterative, and recursive algorithms;

(B) manipulate data structures using string processing;

(C) use notation for language definition such as syntax diagrams or Backus-Naur forms;

- (D) identify, describe, and use sequential/non-sequential files; multidimensional arrays and arrays of records; and quadratic sort algorithms such as selection, bubble, or insertion, and more efficient algorithms including merge, shell, and quick sorts;
 - (E) create robust programs with increased emphasis on design, style, clarity of expression and documentation for ease of maintenance, program expansion, reliability, and validity;
 - (F) apply methods for computing iterative approximations and statistical algorithms;
 - (G) define and develop code using the concepts of abstract data types including stacks, queues, linked lists, trees, graphs, and information hiding;
 - (H) identify and describe the correctness and complexity of algorithms such as divide and conquer, backtracking, or greedy algorithms;
 - (I) develop software to solve a school or community problem such as customer relations, design, modular programming, documentation, validation, marketing, or support; and
 - (J) research advanced computer science concepts such as applied artificial intelligence, expert systems, robotics, depth-first/breadth-first and heuristic search strategies, multitasking operating systems, or computer architecture, such as reduced instruction set computer (RISC) and complex instruction set computer (CISC).
- (8) Solving problems. The student uses research skills and electronic communication, with appropriate supervision, to create new knowledge. The student is expected to:
- (A) participate with electronic communities as a learner, initiator, contributor, and teacher/mentor;
 - (C) extend the learning environment beyond the school walls with digital products created to increase teaching and learning in the foundation and enrichment curricula; and
 - (D) participate in relevant, meaningful activities in the larger community and society to create electronic projects.
- (9) Solving problems. The student uses technology applications to facilitate evaluation of work, both process and product. The student is expected to:
- (A) demonstrate the ability to read and modify large programs including the design description and process development;
 - (B) analyze algorithms using "big-O" notation, best, average, and worst case space techniques;
 - (C) compare and contrast design methodologies including top-down and bottom-up;

- (D) analyze models used in development of software including software life cycle models, design objectives, documentation, and support; and
 - (E) seek and respond to advice from peers and professionals in delineating technological tasks.
- (10) Communication. The student formats digital information for appropriate and effective communication. The student is expected to:
- (A) annotate coding properly with comments, indentation, and formatting; and
 - (B) create interactive documents using modeling, simulation, and hypertext.
- (11) Communication. The student delivers the product electronically in a variety of media, with appropriate supervision. The student is expected to:
- (A) publish information in a variety of ways including, but not limited to, printed copy and monitor displays; and
 - (B) publish information in a variety of ways including, but not limited to, software, Internet documents, and video.
- (12) Communication. The student uses technology applications to facilitate evaluation of communication, both process and product. The student is expected to:
- (A) write technology specifications for planning and evaluation rubrics documenting variables, prompts, and program internally and externally;
 - (B) seek and respond to advice from peers and professionals in evaluating the product; and
 - (C) debug and solve problems using reference materials and effective strategies.

Source: The provisions of this §126.23 adopted to be effective September 1, 1998, 22 TexReg 5203.

§112.71. Principles of Technology (One Physics Credit).

(c) Knowledge and skills.

(1) The student, for at least 40% of instructional time, conducts laboratory and field investigations using safe, environmentally appropriate, and ethical practices. These investigations must involve actively obtaining and analyzing data with physical equipment, but may also involve experimentation in a simulated environment as well as field observations that extend beyond the classroom. The student is expected to:

- (A) demonstrate safe practices during laboratory and field investigations; and

(B) demonstrate an understanding of the use and conservation of resources and the proper disposal or recycling of materials.

(2) The student uses a systematic approach to answer scientific laboratory and field investigative questions. The student is expected to:

(A) know the definition of science and understand that it has limitations, as specified in subsection (b)(2) of this section;

(B) know that scientific hypotheses are tentative and testable statements that must be capable of being supported or not supported by observational evidence. Hypotheses of durable explanatory power that have been tested over a wide variety of conditions are incorporated into theories;

(C) know that scientific theories are based on natural and physical phenomena and are capable of being tested by multiple independent researchers. Unlike hypotheses, scientific theories are well-established and highly-reliable explanations, but may be subject to change as new areas of science and new technologies are developed;

(D) distinguish between scientific hypotheses and scientific theories;

(E) design and implement investigative procedures, including making observations, asking well-defined questions, formulating testable hypotheses, identifying variables, selecting appropriate equipment and technology, and evaluating numerical answers for reasonableness;

(F) demonstrate the use of course apparatus, equipment, techniques, and procedures, including multimeters (current, voltage, resistance), triple beam balances, batteries, clamps, dynamics demonstration equipment, collision apparatus, data acquisition probes, discharge tubes with power supply (H, He, Ne, Ar), hand-held visual spectrometers, hot plates, slotted and hooked lab masses, bar magnets, horseshoe magnets, plane mirrors, convex lenses, pendulum support, power supply, ring clamps, ring stands, stopwatches, trajectory apparatus, tuning forks, carbon paper, graph paper, magnetic compasses, polarized film, prisms, protractors, resistors, friction blocks, mini lamps (bulbs) and sockets, electrostatics kits, 90-degree rod clamps, metric rulers, spring scales, knife blade switches, Celsius thermometers, meter sticks, scientific calculators, graphing technology, computers, cathode ray tubes with horseshoe magnets, ballistic carts or equivalent, resonance tubes, spools of nylon thread or string, containers of iron filings, rolls of white craft paper, copper wire, Periodic Table, electromagnetic spectrum charts, slinky springs, wave motion ropes, and laser pointers;

(G) use a wide variety of additional course apparatus, equipment, techniques, materials, and procedures as appropriate such as ripple tank with wave generator, wave motion rope, micrometer, caliper, radiation monitor, computer, ballistic pendulum, electroscope, inclined plane, optics bench, optics kit, pulley with table clamp, resonance tube, ring stand screen, four-inch ring, stroboscope, graduated cylinders, and ticker timer;

- (H) make measurements with accuracy and precision and record data using scientific notation and International System (SI) units;
 - (I) identify and quantify causes and effects of uncertainties in measured data;
 - (J) organize and evaluate data and make inferences from data, including the use of tables, charts, and graphs;
 - (K) communicate valid conclusions supported by the data through various methods such as lab reports, labeled drawings, graphic organizers, journals, summaries, oral reports, and technology-based reports; and
 - (L) express and manipulate relationships among physical variables quantitatively, including the use of graphs, charts, and equations.
- (3) The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions within and outside the classroom. The student is expected to:
- (A) in all fields of science, analyze, evaluate, and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, including examining all sides of scientific evidence of those scientific explanations, so as to encourage critical thinking by the student;
 - (B) communicate and apply scientific information extracted from various sources such as current events, news reports, published journal articles, and marketing materials;
 - (C) draw inferences based on data related to promotional materials for products and services;
 - (D) explain the impacts of the scientific contributions of a variety of historical and contemporary scientists on scientific thought and society;
 - (E) research and describe the connections between physics and future careers; and
 - (F) express and interpret relationships symbolically in accordance with accepted theories to make predictions and solve problems mathematically, including problems requiring proportional reasoning and graphical vector addition.
- (4) The student uses the scientific process to investigate physical concepts. The student is expected to:
- (A) understand that scientific hypotheses are tentative and testable statements that must be capable of being supported by observational evidence;
 - (B) understand that scientific theories are based on natural and physical phenomena and are capable of being tested by multiple independent researchers;

- (C) design and implement investigative procedures;
 - (D) demonstrate the appropriate use and care of laboratory equipment;
 - (E) demonstrate accurate measurement techniques using precision instruments;
 - (F) record data using scientific notation and International System (SI) of units;
 - (G) identify and quantify causes and effects of uncertainties in measured data;
 - (H) organize and evaluate data, including the use of tables, charts, and graphs;
 - (I) communicate conclusions supported through various methods such as laboratory reports, labeled drawings, graphic organizers, journals, summaries, oral reports, or technology-based reports; and
- (5) The student demonstrates appropriate safety techniques in the field and laboratory environments. The student is expected to:
- (A) master relevant safety procedures;
 - (B) follow safety guidelines as described in various manuals, instructions, and regulations;
 - (C) identify and classify hazardous materials and wastes; and
 - (D) make prudent choices in the conservation and use of resources and the disposal of hazardous materials and wastes appropriately.
- (6) The student uses critical-thinking, scientific-reasoning, and problem-solving skills. The student is expected to:
- (A) analyze and evaluate scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing;
 - (B) communicate and apply scientific information;
 - (C) explain the societal impacts of scientific contributions; and
 - (D) research and describe the connections between technologies and future career opportunities.
- (7) The student describes and applies the laws governing motion in a variety of situations. The student is expected to:

- (A) generate and interpret relevant equations using graphs and charts for one- and two-dimensional motion, including:
 - (i) using and describing one-dimensional equations for displacement, distance, speed, velocity, average velocity, acceleration, and average acceleration;
 - (ii) using and describing two-dimensional equations for projectile and circular motion; and
 - (iii) using and describing vector forces and resolution;
 - (B) describe and calculate the effects of forces on objects, including law of inertia and impulse and conservation of momentum;
 - (C) develop and interpret free-body force diagrams; and
 - (D) identify and describe motion relative to different frames of reference.
- (8) The student describes the nature of forces in the physical world. The student is expected to:
- (A) research and describe the historical development of the concepts of gravitational, electromagnetic, weak nuclear, and strong nuclear forces;
 - (B) describe and calculate the magnitude of gravitational forces between two objects;
 - (C) describe and calculate the magnitude of electrical forces;
 - (D) describe the nature and identify everyday examples of magnetic forces and fields;
 - (E) describe the nature and identify everyday examples of electromagnetic forces and fields;
 - (F) characterize materials as conductors or insulators based on their electrical properties;
 - (G) design and construct both series and parallel circuits and calculate current, potential difference, resistance, and power of various circuits;
 - (H) investigate and describe the relationship between electric and magnetic fields in applications such as generators, motors, and transformers; and
 - (I) describe technological applications of the strong and weak nuclear forces in nature.
- (9) The student describes and applies the laws of the conservation of energy and momentum. The student is expected to:

- (A) describe the transformational process between work, potential energy, and kinetic energy (work-energy theorem);
- (B) use examples to analyze and calculate the relationships among work, kinetic energy, and potential energy;
- (C) describe and calculate the mechanical energy of, the power generated within, the impulse applied to, and the momentum of a physical system; and
- (D) describe and apply the laws of conservation of energy and conservation of momentum.

Source: The provisions of this §112.71 adopted to be effective July 12, 2010, 35 TexReg 6070.

§112.72. Other Courses for Which Students May Receive Science Credit.

(e) Science, Technology, Engineering, and Mathematics courses.

- (1) Advanced Biotechnology. Students shall be awarded one credit in science for successful completion of this course as described in §130.364 of this title (relating to Advanced Biotechnology (One Credit)). Recommended prerequisites: Biology and Chemistry. Students must meet the 40% laboratory and fieldwork requirement in §74.3(b)(2)(C) of this title (relating to Description of a Required Secondary Curriculum). This course is recommended for students in Grade 11 or 12.
- (2) Scientific Research and Design. Students shall be awarded one credit in science for successful completion of this course as described in §130.372 of this title (relating to Scientific Research and Design (One Science Credit)). Prerequisite: one unit of high school science. Students must meet the 40% laboratory and fieldwork requirement in §74.3(b)(2)(C) of this title (relating to Description of a Required Secondary Curriculum). This course is recommended for students in Grade 11 or 12. Students may repeat this course with different course content for up to three credits.
- (3) Engineering Design and Problem Solving. Students shall be awarded one credit in science for successful completion of this course as described in §130.373 of this title (relating to Engineering Design and Problem Solving (One Science Credit)). Prerequisites: Geometry, Algebra II, Chemistry, and Physics. Students must meet the 40% laboratory and fieldwork requirement in §74.3(b)(2)(C) of this title (relating to Description of a Required Secondary Curriculum). This course is recommended for students in Grade 11 or 12.

Source: The provisions of this §112.72 adopted to be effective July 12, 2010, 35 TexReg 6070.