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EDUCATION
Part LXXXI. Bulletin 110—Technology Education Content Standards Curriculum Framework
Subpart 1. Standards and Benchmarks

Chapter 1. General Provisions

§101. Purpose

A. Mission Statement. The mission of Technology Education in Louisiana is to cultivate the technological capabilities of students, to prepare them to comprehend and contribute to a technologically sophisticated society, and to foster and encourage professionalism of those engaged in this pursuit.

B. Intended Audience

1. The Louisiana Technology Education curriculum framework is to be used by a broad audience:

a. technology education teachers;

b. K-12 teachers;

c. parents;

d. school and district administrators;

e. school board members;

f. policy makers;

g. Louisiana Department of Education staff;

h. college/university faculty/administrators;

i. business/industry leaders; and

j. government agency staff.

2. The framework serves as a guide for curriculum and instruction and as a general reference to the concepts and skills taught within Louisiana Technology Education courses. The intended users of the framework include:

1. technology education teachers—to use in planning curriculum, instruction, and assessment;

2. K-12 teachers—to use in identifying ways to incorporate technology education/TSA concepts and skills into curricula;

3. parents—to use as a means of assessing the effectiveness of their children's technology education;

4. school and district administrators and school board members—to use as a vision for technology education and a basis for planning:

a. resource allocations;

b. materials purchases;

c. local curriculum development;

d. teachers' professional development; and

e. facility planning;

5. policy makers and State Education staff—to use as a basis for developing:

a. laws;

b. policies;

c. professional development activities/materials;

d. assessment strategies; and

e. funding priorities to support local program development;

7. university faculty and administrators—to use as a basis for the content and design of pre-service and in-service teacher education programs and articulation agreements;

8. technical college faculty and administrators—to use as a basis for articulation agreements and program development; and

9. business/industry leaders and government agency staff to use as a basis for developing effective partnerships for supporting technology education programs and professional development.

C. How Teachers should Use this Part XCIII. This Subpart XCIII presents the standards and benchmarks appropriate for Louisiana's Technology Education programs. Local needs will determine the curriculum that should be taught within the local technology education programs. Although teachers will be able to use this framework to guide them in the restructuring of their curricula, this Subpart does not contain specific performance criteria that are essential in technology education. These specific assessment criteria must be developed at the local level.

D. Technology Defined

Technology—the application of knowledge, resources, tools, and skills to solve particular problems and extend human capabilities for useful purposes.

Technology Education—an integrated, experience-based program designed to:

a. prepare a population that is knowledgeable about technology-it's evolution, systems, utilization of techniques, tools, materials and processes, and social and cultural significance.

b. foster creative thinking, decision making, problem solving, visualizing, knowing how to learn, and reasoning skills.

c. boost human capabilities and explore career opportunities and job seeking skills.

d. to apply basic skills of reading, writing, mathematics, listening, and speaking.

E. Technology Education Rationale

1. Technology Education is that segment of the total educational program that provides sequential learner-centered experiences designed to foster:

a. an understanding of self;

b. an understanding of the economic system and consumer awareness;

c. an understanding of the role of technology in our modern society;

d. an awareness of educational and occupational options;

e. an awareness of the managerial, social, historical, and cultural aspects of industry;

f. the development of career interests; and

g. the development of fundamental technical skills in the proper use of common industrial tools, materials, and processes.

2. Technology Education has the obligation to provide programs that:

a. assist in the discovery and development of:

i. personal aptitudes;

ii. interests;

iii. creative technical problem-solving abilities;

iv. self-reliance;

v. sound judgment and resourcefulness; and

b. assist in the development of industrial and technological skills necessary for living in a technical society.

3. As a component in the total education program, Technology Education has the responsibility for providing programs that:

a. assist individuals in making informed and meaningful occupational choices in industry and technology;

b. provide occupational information and exploratory experiences pertaining to a broad range of occupations including training requisites, working conditions, salaries or wages, and other relevant information;

c. prepare students for enrollment in advanced career and technical education programs and lifelong learning.

E. Students in Louisiana's schools can benefit from Technology Education programs at both the elementary and secondary levels. Regardless of their gender, ability levels, or handicaps, all students can benefit from Technology Education activities which will assist them in preparing for adult roles in a complex technological society.

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§103. Definitions

Academic Cross-Reference—a reference to related academic content standards.

Applied Academics—a method of teaching in which the instructor presents subject matter in a way that relates a particular academic discipline to personal workforce application.

Approved Program—a career and technical program that offers at least four of the recommended courses for a career major-two of which must be at the competency level.

Articulation—the process of linking two or more educational systems to produce a smooth flow of students from one institution to another without experiencing delays, duplication of courses, or loss of credit.

Assessment—a process through which evidence is gathered in a range of content areas to determine both a student's understanding and ability to apply that understanding.

Benchmark—a broad statement of expected skills and knowledge that is used as a reference to develop curriculum and assess student progress.

Career Clusters—broad categories of occupations that form the basis for initial career exploration and discovery.

Career Major—a specific course of study within a broader career cluster. (Example: Accounting within the Business cluster).

Career Path—a plan of study that will enable a student upon graduation, to be employed or enter a postsecondary school with a continuation of skills or course work already started at the high school level.

Career Plan—a student's written plan for career and educational goals while in secondary school and beyond.

Competency Course—a required course in a career major.

Content Standard—a description of what a student should *know* and *be able to do* through subject matter, knowledge, proficiencies, etc., gained as a result of their education.

Cooperative Learning—an instructional strategy used in many applied academic courses that involves learning in the context of sharing, responding, and communicating with other learners.

Curriculum Framework—an outline of broad goals and standards of a system of education.

Focus Statement—a statement describing the importance of a career major.

Foundation Skills—processes that are common to all areas and levels of education and are intended to suggest methods and objectives of instructional strategies.

High Schools That Work—a process model developed by the Southern Regional Education Board (SREB) that focuses on applied learning, integration of academic and vocational content, and school-to-work transitions.

Integrated—refers to combining elements across the strands within a particular content area or framework.

Interdisciplinary—combining elements across content areas in the curriculum.

Lifelong Learning—the concept of continued education and training, formal and informal, throughout one's career.

Portfolios—personalized, sequential career planning journal designed to guide students through career development interests and aptitudes as they progress through school and beyond; including examples of student skill mastery.

Related Elective Course—an additional course offered to complement and enhance opportunities within a career major.

School-Based Learning—program of instruction based on career majors, designed to meet high academic and occupational skill standards, which involves counseling and career exploration, and periodic evaluation of academic strengths and weaknesses.

School-to-Work Transition—a system that enables students to identify and navigate paths to productive and progressively more rewarding roles in the workplace that encompasses three components:

1. school-based learning;
2. connecting activities; and
3. work-based learning.

Skill Standard—the identification of the knowledge, skill, and level of ability needed to satisfactorily perform a given job.

Strands—concepts common to all content areas; *strands* are interrelated and should be integrated rather than taught in isolation.

Tech Prep—a sequence of study beginning in high school and continuing through at least two years of postsecondary occupational education to prepare students for high skilled jobs that require more than a high school diploma.

Technology—the application of knowledge, resources, tools, and skills to solve particular problems and extend human capabilities for useful purposes.

Technology Education—an integrated, experience-based instructional program designed to:

1. prepare a population that is knowledgeable about technology, its:
    a. evolution;
    b. systems;
    c. utilization of techniques;
    d. tools;
    e. materials and processes; and
    f. social and cultural significance;
2. foster:
    a. creative thinking;
    b. decision making;
    c. problem solving;
    d. visualizing;
    e. knowing how to learn; and
    f. reasoning skills;
3. boost human capabilities and explore career opportunities and job seeking skills;
4. to apply basic skills of:
    a. reading;
    b. writing;
    c. mathematics;
    d. listening; and
    e. speaking.

Vocational Completer—a student who successfully completes four courses in a career major:

1. two must be competency courses; and
2. two must be selected from the competency courses and/or identified related electives.

Work-Based Learning—integration of theoretical instruction with a planned program of job training or experiences, paid work experience, workplace mentoring, instruction in general work-place competencies, and updating elements that will engage student interest, develop positive work attitudes, and prepare youth for high-skill, high-wage careers.

Workplace Mentor—an employee at the workplace who possesses the skills to be mastered by a student, and who:

1. instructs the student;
2. critiques the student's performance;
3. challenges the student to perform well; and
4. works in consultation with classroom teachers and the employer.

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Chapter 3. Goals

§301. All Grade Levels

A. In providing a sound program of Technology Education for Louisiana schools, clear goals are essential to serve as program guides. While the overriding goal of Technology Education is to assist students in developing toward successful adulthood through the development of their socio-economic awareness, their interests, their abilities, and their understanding of industry and technology and their potential as citizens, other supporting goals are:

1. to develop in each student an insight and understanding of industry and the free enterprise system and its relationship to society through a coordinated program of study focusing on the principles and practices of industry;

2. to assist students in developing their talents, aptitudes, interests, and potentials. A part of the school's responsibility is to assist each student in developing to their fullest potential;

3. to develop in each student an understanding of industrial processes, the practical application of scientific principles, and modern technology;

4. to develop problem-solving abilities related to the materials, processes, and products of industry. The problem-solving approach as applied in Technology Education involves creative thinking and gives the student an opportunity to apply principles and processes of the scientific method, along with supporting activities, to the solution of problems;

5. to develop in each student skills in the proper and safe use of the tools, materials, and machines common to industrial processes. These skills are acquired through planning, construction, and production activities centered around industrial-technical processes and products;

6. to develop in each student attitudes toward career opportunities that will enhance their chances of success as they progress through the career preparation process, to the end that they are able to make informed career decisions resulting in satisfactory and rewarding job selection.

B. Depending on their content and focus, the goals in Paragraphs 1-6 above are applicable to all grade levels (K-12), to adult programs, and to all segments of the student population including, but not limited to, the gifted, the slow learner, and the handicapped. Technology Education programs should be an articulated set of offerings in both vertical and horizontal directions. This will ensure reasonable content progression and program focus.

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§303. Elementary Grade Level

A. Technology Education at the elementary grades shall consist of basic industrial and technological problem-solving activities which are appropriate to learning experiences of all elementary school children. Each child can benefit from gaining a clearer understanding of our industrial-technological society. Activities involving the use of tools, materials, and processes should be integrated within the basic curriculum of the elementary school.

B. Specific goals are to develop in the students:

1. an occupational awareness and a positive self-image of themselves as workers;

2. problem-solving abilities;

3. technical awareness;

4. creative abilities and basic skills associated with tools, materials, and processes.

a. Such activities can contribute to the development of logical reasoning powers, psychomotor skills, and cooperative work traits.

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§305. Middle and Junior High Grade Level

A. Technology Education at the middle/junior high grades should provide a variety of laboratory and classroom experiences with an emphasis on orientation and exploration. The curriculum develops students' aptitudes, abilities, and interests, while at the same time develops their appreciation for technical knowledge. Through "hands-on" experiences, students learn about industry and are thereby provided with the skills useful in making informed and meaningful occupational choices.

B. Three primary goals are:

1. to develop in each student technical competencies, concepts, and basic skills common to industrial-technical materials and processes;

2. to develop in each student an awareness of industry and technology and its effect on a changing, evolving society; and

3. to provide each student with an opportunity to explore:

a. construction;

b. manufacturing;

c. communication;

d. transportation; and

e. other related clusters of industrial activity.

C. Technology Education programs at the middle/junior grades provide students with the opportunity to explore in a "hands-on" way many of the occupational areas associated with industry. This type of activity can be invaluable as students seek to determine those areas that are consistent with their interests and abilities.

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§307. Senior High Level

A. Technology Education at the senior high school level provides concentrated and somewhat specialized technical courses designed to meet the industrially-related consumer needs of secondary students as well as preparing students for enrollment in advanced vocational-technical programs. High school programs may use combinations of general and unit organization as a part of their delivery system. At this level elective options are important because they help students to expand career awareness, technological literacy, consumer skills, and skills and knowledge related to the world of work. Such options play a significant role in assisting students in making job-related decisions as they progress through the formal education system. Students in the upper grades evidence a wide range of interests, abilities, and life goals. With this in mind, designers of Technology Education programs must provide courses that attempt to address the widest possible range of students' needs and interests. In the Technology Education program, not all students will study the same depth or type of content. For example, courses and content may be tailored to a student who may be involved in advanced career-technical training as a portion of the regular high school program.

B. Technology Education at the high school level will address the following types of student needs:

1. to provide basic instruction to meet the needs of three basic groups of students:

a. the elective student who seeks to explore more deeply the career, cultural, and consumer aspects of American industry;

b. those students who will pursue advanced education in areas of career, technical, industrial education, and the applied sciences; and

c. the reluctant learner, the prospective dropout, the culturally unique, and those students who may be entering the labor force either prior to normal graduation or immediately thereafter;

2. to provide the students with practical and realistic learning situations that simulate the industrial and technical world of work;

3. to develop in all students those attitudes and attributes that will assist them in becoming productive members of our technical society.

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Chapter 5. Career Clusters

Subchapter A. Course Offerings

§501. Introduction

A. The course title listing in this Chapter 5 utilizes course title terminology that is descriptive of the courses and has achieved general acceptance on both regional and national levels. The minimum and maximum time specifications provided for in the clusters recognize that in grades 6-8 Technology Education experiences should be of a broad exploratory nature. It further recognizes that time use configurations at those grade levels often makes 36-week elective courses impractical. Where a full 36-week block of time is available, two or more clusters of up to 18 weeks each should be scheduled. The six-week time minimum recognizes that it is very difficult to develop a meaningful program that utilizes a smaller time frame. Where possible, all of the cluster areas listed should be available so that students will have an opportunity to explore the widest possible range of material. The "General Technology Education" course listed for grades 9-12 is specified as a prerequisite to all unit programs except the drafting sequence. It is felt that if students reach this point and have either a limited number of elective hours available or are beginning the first of many Technology Education courses, a good foundation course is essential. By providing basic skills and knowledge in a course that cuts across other unit courses, repetition can be minimized and more time devoted to technical content.

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Subchapter B. Technology Education Implementation and Operation

§503. Purpose and Requirements

A. Technology Education (TE) is:

1. an instructional program that provides students (grades 6-12) with hands-on exploratory experiences and insights into technology and career opportunities so that they can make meaningful occupational and educational choices;

2. a program that can help the student to:

a. become technologically literate;

b. develop an understanding of economic development; and

c. adjust to the changing environment;

3. an articulated, integral part of the total academic and vocational education program with emphasis in safety and the use of tools, equipment and materials. Technology Education programs in Louisiana follow the standards for Technology Education programs as developed by the United States Department of Education.

B. The instructional content of Technology Education is drawn from the areas of communication; manufacturing; construction; and power, energy, and transportation. The program assists students in developing understanding and application of:

1. academic and technological concepts, processes, and systems;

2. applying tools, materials, machines, processes, and technical concepts safely and efficiently;

3. developing technological skills in technology; and

4. simulated laboratory instruction.

C. A Technology Education program shall be from the job cluster areas of:

1. communication;

2. manufacturing;

3. construction; and

4. power, energy, and transportation.

D. It is the responsibility of the local school system to select the appropriate cluster(s) to be implemented. A minimum of four units is required for each cluster as follows.

1. The first course in each cluster shall be General Technology Education or Basic Technical Drafting. It is recommended that the first course be General Technology Education.

2. The second and third courses shall be a Basic Technology Education course, followed by an Advanced Technology Education course listed in the course options of the cluster.

3. The fourth course shall be an elective from any of the Technology Education offerings.

E. Technology Education shall be integrated at the most appropriate grade level to best serve the needs of the school. A Technology Education teacher has a certification in Industrial Arts. Schools with two or less full-time Technology Education teachers may offer required courses on an alternating basis in order to meet the requirements for program approval.

F. An approved Technology Education program may consist of a combination of two Technology Education courses and one or two Trade and Industrial Education courses. Technology Education courses would articulate with Trade and Industrial Education courses to create a career path program that would lend itself to Trade and Technical career clusters such as:

1. air conditioning and refrigeration;

2. automotive technology;

3. construction;

4. communications;

5. computer technology;

6. drafting and design technology; and

7. etc.

G. Program options for the Trade and Technical career clusters in Technology Education cannot be listed because of the vast range of possibilities within a local system. However, any local education governing agency desiring to offer a combined Technology Education/Trade and Industrial program shall first have the program approved by the Division of Family, Career and Technical Education, State Department of Education (SDE).

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HISTORICAL NOTE: Promulgated by the Department of Education, Board of Elementary and Secondary Education, Career and Technical Education, LR 30:2702 (December 2004).

§505. Communication Technology

A. Communication Technology is designed to provide students with the opportunity to explore the fundamentals of message design, production, and transmission using audio, visual, and audio-visual methods. Included in the activities are career exploration in:

1. manual and computer-aided drafting;

2. drafting;

3. graphic arts;

4. photography;

5. electronic communications; and

6. computer utilization.

B. Course Options

Course Options I	Units
Basic Technical Drafting	1
Advanced Technical Drafting	1
Architectural Drafting	1
Technology Education Elective	1
Course Options II	**Units**
General Technology Education or Basic Technical Drafting	1
Communication Technology	1
Physics of Technology I & II	1
Technology Education Elective	1
Course Options III	**Units**
General Technology Education or Basic Technical Drafting	1
Basic Electricity/Electronics	1
Advanced Electricity/Electronics	1
Technology Education Elective	1

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§507. Manufacturing Technology

A. Manufacturing Technology is designed to provide students with information and skills concerning manufacturing processes, organizations, and occupations. It utilizes a variety of materials, computers, robots, tools, and processes needed to simulate the manufacturing industry. It further provides learning and leadership experiences that give the students a current look at the important industrial and technical concepts of today and tomorrow.

Course Options I	Units
General Technology Education or Basic Technical Drafting	1
Basic Metal Technology	1
Advanced Metal Technology or Materials and Processes	1
Technology Education Elective	1
Course Options II	**Units**
General Technology Education or Basic Technical Drafting	1
Basic Metal Technology	1
Welding Technology	1
Technology Education Elective	1
Course Options III	**Units**
General Technology Education or Basic Technical Drafting	1
Basic Metal Technology	1
Manufacturing Technology	1
Technology Education Elective	1

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HISTORICAL NOTE: Promulgated by the Department of Education, Board of Elementary and Secondary Education, Career and Technical Education, LR 30:2703 (December 2004).

§509. Construction Technology

A. Construction Technology is designed to provide the student with the opportunity to gain a more in-depth understanding of the construction industry and explores construction occupations. It provides construction concepts and activities that simulate management and production practices as they currently relate to the construction industry and other technology areas.

Course Options I	Units
General Technology Education or Basic Technical Drafting	1
Basic Wood Technology	1
Advanced Wood Technology or Materials and Processes	1
Technology Education Elective	1
Course Options II	**Units**
General Technology Education or Basic Technical Drafting	1
Architectural Drafting	1
Construction Technology	1
Technology Education Elective	1
Course Options III	**Units**
General Technology Education or Basic Technical Drafting	1
Basic Wood Technology	1
Construction Technology	1
Technology Education Elective	1

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§511. Energy, Power, and Transportation Technology

A. Energy, Power, and Transportation Technology is an overview of the exciting field of the transportation industry. It emphasizes the utilization of power and energy and how these systems are related to transportation technology. The student will have experience with power trainers and small engines and will research the future trends and environmental impact of laser, nuclear, and solar energy.

Course Options I	Units
General Technology Education or Basic Technical Drafting	1
Power Mechanics	1
Physics of Technology I	1
Technology Education Elective	1
Course Options II	**Units**
General Technology Education or Basic Technical Drafting	1
Power Mechanics	1
Energy, Power, and Transportation	1
Technology Education Elective	1
Course Options III	**Units**
General Technology Education or Basic Technical Drafting	1
Energy, Power, and Transportation	1
Physics of Technology I & II	1
Technology Education Elective	1

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Subchapter C. Exploratory Technology Education and Curriculum Overview

§523. Grades 6-8

A. Purpose and Scope

1. The technology systems of communication, manufacturing, construction, transportation, and modular technology make up the curriculum direction for the Exploratory Technology Education Program. Each school will integrate the technology education program at the most appropriate grade level to best serve the needs of the local school body, school, and community.

2. All Exploratory Education courses are taught in a one-period block of time, with each of the technology systems being designed to articulate with courses offered in comprehensive high schools (e.g., math, science, agriculture, and family and consumer sciences). Interdisciplinary education is vital to the success of Technology Education Programs.

B. Exploratory Technology Education I. The first exploratory technology education course in which a student participates is identified as the Exploratory Technology Education I course. This course may be offered as a nine-week, 18-week, or 36-week course and is recommended for grade 6.

1. System Options
    a. Communication
    b. Manufacturing
    c. Construction
    d. Transportation
    e. Modular Technology

C. Exploratory Technology Education II. Two of the four technology systems are to be implemented for a period of 18 weeks each. It is the responsibility of the local school/program to select which two systems to implement for grade 7.

1. System Options
    a. Communication
    b. Manufacturing
    c. Construction
    d. Transportation
    e. Modular Technology

D. Exploratory Technology Education III. Each school program will implement the remaining two technology systems not implemented in the previous technology education course. This level is optional, as some schools may not have appropriate time periods for implementation for grade 8.

1. System Options
    a. Communications
    b. Manufacturing
    c. Construction
    d. Transportation
    e. Modular Technology

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HISTORICAL NOTE: Promulgated by the Department of Education, Board of Elementary and Secondary Education, Career and Technical Education, LR 30:2704 (December 2004).

Chapter 7. Course Offerings

NOTE: Technology Education courses shall be taught in sequence as outlined in Bulletin 741. Safety must be taught in all courses. Refer to Bulletin 1674 for safety information.

Subchapter A. Middle School

§701. Middle School Exploring Technology Education

A. Middle School Exploring Technology Education course offerings shall be as follows.

Course Title	Received Grade Level	Unit(s)
Manufacturing Technology	6-8	1
Construction Technology	6-8	1
Communication Technology	6-8	1
Transportation Technology	6-8	1
Modular Technology	6-8	1

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Subchapter B. Senior High School Technology Education

§711. Senior High School

A. Senior High School Technology Education course offerings shall be as follows.

Course Title	Received Grade Level	Unit(s)
General Technology Education	9-12	1
Basic Wood Technology	9-12	1
Advanced Wood Technology	10-12	1
Communication Technology	9-12	1
Construction Technology	10-12	1
Cooperative Technology Education	12	3
Basic Electricity/Electronics	9-12	1
Advanced Electricity/Electronics	10-12	1
Basic Metal Technology	9-12	1
Advanced Metal Technology	10-12	1
Welding Technology	10-12	1
Energy, Power, and Transportation Technology	9-12	1
Power Mechanics	9-12	1
Manufacturing Technology	9-12	1
Basic Technical Drafting	9-12	1/2
Advanced Technical Drafting	10-12	1
Architectural Drafting	10-12	1
Physics of Technology I & II	11-12	1
Materials and Processes	10-12	1
Technology Education Computer Applications	9-12	1
Technology Elective I & II	9-12	1/2, 1 and 2
Technology Internship I	11-12	2
Technology Internship II	12	2

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HISTORICAL NOTE: Promulgated by the Department of Education, Board of Elementary and Secondary Education, Career and Technical Education, LR 30:2705 (December 2004).

Subchapter C. Philosophy and Curriculum

§721. Philosophy and Curriculum Structure

A. Technology Education is a practical, activity-oriented, laboratory-based program for all high school students. It is an integrated curriculum encompassing knowledge and skills across technology systems, with emphasis on new and emerging technology.

B. Technology programs are designed to provide high school students with a broad base of knowledge and flexibility needed to function efficiently in a technological society.

C. As future leaders, students need an understanding of technology to enable them to make informed decisions that will improve society and protect the environment.

D. The knowledge needed for making future judgments of technology requires lifelong learning skills, which are acquired through a continuous process of applying new knowledge to unique problems.

E. Technology teaches critical-thinking skills through the use of problem-solving techniques.

F. Technology programs enable all high school students to learn about the technology that affects their lives.

G. Technology Education programs provide high school students with the basis for making wise career choices and developing career plans/paths.

H. Technology Education is designed as a fundamental component of the curriculum for all high school students.

I. Career-technical performance standards and model curriculum integrated performance activities for Technology Education are presented in this Part XCIII.

J. Technology Education provides students with the opportunity to explore, research, and shadow careers related to their interests. This will encourage them to become more productive workers, responsible citizens, and create marketable employees to meet the needs of industry.

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Chapter 9. School-to-Work

§901. School-to-Work Transition

A. The School-to-Work Opportunities Act establishes a national framework to broaden the educational, career, and economic opportunities for all youth through partnerships between businesses, schools, community-based organizations, and state and local governments.

1. Workplaces become active learning environments.

2. Employers become joint partners with educators to train students.

3. Schools challenge students to higher academic and skill standards.

B. School-to-work opportunities grow from strong partnerships at the state and local community level that design and implement systems tailored to meet specific needs. School-to-work systems contain three core elements:

1. school-based learning;

2. work-based learning; and

3. connecting activities.

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HISTORICAL NOTE: Promulgated by the Department of Education, Board of Elementary and Secondary Education, Career and Technical Education, LR 30:2705 (December 2004).

§903. Workplace Skills Education and Training

A. Strategies for better educating students for the workplace include:

1. career research and information beginning in early grades;

2. applied academic courses that present subject matter in a way that connects abstract knowledge to workplace applications using cooperative learning strategies;

3. integration of vocational and academic subjects;

4. counseling and career pathways to focus students in their choice of courses to study;

5. articulation between secondary and postsecondary education;

6. collaborative partnerships between education, business, labor, and communities in the total education experience of students; and

7. integration of school-based and work-based learning through:

a. vocational cooperative programs—provides school-supervised work experiences;

b. apprenticeships—on-the-job training and related instruction;

c. career academies (school within a school)—integrates academic and vocational courses and provides workplace learning in a particular career focus area;

d. job shadowing—provides information about a job or position through the student following or "shadowing" a worker for a short period of time;

e. job mentoring—provides more specific job information and actual work experience as a student is assigned to an adult worker (mentor) who models workplace behavior, skills, and training in a one-to-one relationship;

f. school-based enterprises—work simulation within the school in the form of stores, print shops, child care centers, etc., operated by the students;

g. work simulation—provides work experience either in the classroom or in the community through simulated work experiences;

h. volunteer service programs—provides the opportunity to gain employability and work skills outside the classroom through experiences in developing and improving the community; and

i. vocational student organizations—provides work-based experiences for students through formalized

events, demonstrations, volunteer work, and leadership training.

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Chapter 11. Information Literacy Model

§1101. Information Literacy Model for Lifelong Learning

A. Students must become competent and independent users of information to be productive citizens of the twenty-first century. They must be prepared to live in an information-rich and changing global society. Due to the rapid growth of technology, the amount of information available is accelerating so quickly that teachers are no longer able to impact a complete knowledge base in a subject area. In addition, students entering the workforce must know how to access information, solve problems, make decisions, and work as part of a team. Therefore, information literacy, the ability to recognize an information need, and then locate, evaluate, and use the needed information, is a basic skill essential to the twenty-first century workplace and home. Information-literate students are self-directed learners who, individually or collaboratively, use information responsibly to create quality products and to be productive citizens. Information literacy skills must not be taught in isolation; they must be integrated across all content areas, utilizing fully the resources of the classroom, the school library media center, and the community. The information literacy model for lifelong learning is a framework that teachers at all levels can apply to help students become independent, lifelong learners.

1. Defining/Focusing. The first task is to recognize that an information need exists. Students make preliminary decisions about the type of information needed based on prior knowledge.

2. Selecting Tools and Resources. After students decide what information is needed, they then develop search strategies for locating and accessing appropriate, relevant sources in:

a. the school library media center;

b. community libraries and agencies;

c. resource people; and

d. others as appropriate.

3. Extracting and Recording. Students examine the resources for readability, currency, usefulness, and bias. This task involves:

a. skimming or listening for key words;

b. "chunking";

c. reading;

d. finding main ideas; and

e. taking notes.

4. Processing Information. After recording information, students must examine and evaluate the data in order to utilize the information retrieved. Students must interact with the information by categorizing, analyzing, evaluating, and comparing for bias, inadequacies, omissions, errors, and value judgments. Based on their findings, they either move on to the next step or do additional research.

5. Organizing Information. Students effectively sort, manipulate, and organize the information that was retrieved. They make decisions on how to use and communicate their findings.

6. Presenting Findings. Students apply and communicate what they have learned, e.g.:

a. research report;

b. project;

c. illustration;

d. dramatization;

e. portfolio;

f. book report;

g. map;

h. oral/audiovisual presentation;

i. game;

j bibliography;

k. hyper stack.

7. Evaluating Efforts. Throughout the information problem-solving process, students evaluate their efforts. This assists students in determining the effectiveness of the research process. The final product may be evaluated by the teacher and also other qualified or interested resource persons.

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Chapter 13. Foundation Skills

§1301. Louisiana Content Standards Foundation Skills

NOTE: Within this Part XCIII, the foundation skills are listed numerically in parentheses after each benchmark.

A. The Louisiana Content Standards Task Force has developed the following foundation skills which should apply to all students in all disciplines.

1. Communication—a process by which information is exchanged and a concept of *meaning* is created and shared between individuals through a common system of symbols, signs, or behavior. Students should be able to communicate clearly, fluently, strategically, technologically, critically, and

creatively in society and in a variety of workplaces. This process can best be accomplished through use of the following skills:

a. reading;

b. writing;

c. speaking;

d. listening;

e. viewing; and

f. visually representing.

2. Problem Solving—the identification of an obstacle or challenge and the subsequent application of knowledge and thinking processes, which include reasoning, decision making, and inquiry in order to reach a solution using multiple pathways, even when no routine path is apparent.

3. Resource Access and Utilization—the process of identifying, locating, selecting, and using resource tools to help in analyzing, synthesizing, and communicating information. The identification and employment of appropriate tools, techniques, and technologies are essential to all learning processes. These resource tools include:

a. pen, pencil, paper;

b. audio/video materials;

c. word processors;

d. computers;

e. interactive devices;

f. telecommunications; and

g. other emerging technologies.

4. Linking and Generating Knowledge—the effective use of cognitive processes to generate and link knowledge across the disciplines and in a variety of contexts. In order to engage in the principles of continual improvement, students must be able to transfer and elaborate on these processes. *Transfer* refers to the ability to apply a strategy or content knowledge effectively in a setting or context other than that in which it was originally learned. *Elaboration* refers to monitoring, adjusting, and expanding strategies into other contexts.

5. Citizenship—the application of the understanding of the ideals, rights, and responsibilities of active participation in a democratic republic that includes:

a. working respectfully and productively together for the benefit of the individual and the community;

b. being accountable for one's civil, constitutional, and statutory rights; and

c. mentoring others to become productive citizens and lifelong learners.

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Chapter 15. International Technology Education Association Standards

§1501. Standards for Technological Literacy/Content for the Study of Technology

A. Introduction

1. Standards for Technological Literacy: Content for the Study of Technology (Technology Content Standards) was published by the International Technology Education Association (ITEA) and its Technology for All Americans Project (TfAAP) in April 2000. It defines what students should know and be able to do in order to be technologically literate and provides standards that prescribe what the outcomes of the study of technology in grades K-12 should be.

2. The International Technology Education Association (ITEA) Content Standards have been found to be strands that are intertwined throughout the Louisiana Technology Education Content Standards. Both sets of standards parallel each other and establish the requirements for technological literacy.

3. Technology Content Standards will help ensure that all students receive an effective education about technology by setting forth a consistent content for the study of technology.

4. Within this Part XCIII, the appropriate ITEA standards are cross-referenced to the Louisiana Technology Education Standards.

B. Why Technology Content Standards are Important

1. Technology literacy enables people to develop knowledge and abilities about human innovation in action.

2. Technology Content Standards establishes the requirements for technological literacy for all students-kindergarten through grade 12.

3. Technology Content Standards provides qualitative expectations of excellence for all students.

4. Effective democracy depends on all citizens participating in the decision-making process. Because so many decisions involve technological issues, all citizens need to be technologically literate.

5. A technologically literate population can help our nation maintain and sustain economic progress.

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§1503. International Technology Education Association Content Standards

A. The Nature of Technology

1. Standard 01. Students will develop an understanding of the characteristics and scope of technology.

2. Standard 02. Students will develop an understanding of the core concepts of technology.

3. Standard 03. Students will develop an understanding of the relationships among technologies and the connections between technology and other fields of study.

B. Technology and Society

1. Standard 04. Students will develop an understanding of the cultural, social, economic, and political effects of technology.

2. Standard 05. Students will develop an understanding of the effects of technology on the environment.

3. Standard 06. Students will develop an understanding of the role of society in the development and use of technology.

4. Standard 07. Students will develop an understanding of the influence of technology on history.

C. Design

1. Standard 08. Students will develop an understanding of the attributes of design.

2. Standard 09. Students will develop an understanding of engineering design.

3. Standard 10. Students will develop an understanding of the role of:

a. troubleshooting;

b. research and development;

c. invention and innovation; and

d. experimentation in problem solving.

D. Abilities of a Technological World

1. Standard 11. Students will develop abilities to apply the design process.

2. Standard 12. Students will develop abilities to use and maintain technological products and systems.

3. Standard 13. Students will develop abilities to assess the impact of products and systems.

E. The Designed World

1. Standard 14. Students will develop an understanding of and be able to select and use medical technologies.

2. Standard 15. Students will develop an understanding of and be able to select and use agricultural and related biotechnologies.

3. Standard 16. Students will develop an understanding of and be able to select and use energy and power technologies.

4. Standard 17. Students will develop an understanding of and be able to select and use information and communication technologies.

5. Standard 18. Students will develop an understanding of and be able to select and use transportation technologies.

6. Standard 19. Students will develop an understanding of and be able to select and use manufacturing technologies.

7. Standard 20. Students will develop an understanding of and be able to select and use construction technologies.

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Chapter 17. Content Standards

§1701. Middle School Standards

A. Technology education content standards for middle schools are as follows.

1. M1. Explore areas of the manufacturing process from research and development to marketing the product.

2. M2. Explore areas of the construction industry from planning to completion of light, heavy, industrial, and civil construction.

3. M3. Communicate ideas and information through experiences in the:

a. drafting;

b. design;

c. printing;

d. photography;

e. telecommunications; and

f. computers.

4. M4. Explore transportation technology, past, present, and future, and be able to discuss the selection and uses of transportation technologies.

5. M5. Develop an understanding of various technology systems through modular computer assisted instruction.

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HISTORICAL NOTE: Promulgated by the Department of Education, Board of Elementary and Secondary Education, Career and Technical Education, LR 30:2708 (December 2004).

§1703. High School Standards

A. Technology education content standards for high school shall accomplish the following:

1. provide students with the opportunity to explore various technical careers through contemporary and/or modular Technology Education activities;

2. understand and apply the basic concepts that are common to the broad field of technical drawing;

3. prepare detailed drawings including:

a. developments;

b. intersections;

c. charts;

d. diagrams;

e. threads;

f. fasteners;

g. descriptive geometry;

h. auxiliary;

i. revolutions;

j. CAD; and

k. specialized areas;

4. demonstrate the ability to complete a set of working drawings for home construction;

5. communicate ideas and information through experiences dealing with:

a. drafting;

b. design;

c. printing;

d. photography;

e. telecommunication; and

f. computers.

6. understand and apply the principles of electricity and electronics through laboratory learning experiences.

7. develop a career interest in electronics through course content centered around:

a. semiconductor devices;

b. application of digital electronics;

c. computers; and

d. communication circuits;

8. explore all areas of the manufacturing process from research and development to marketing the final product;

9. develop an understanding of industrial materials and how they are processed to increase their value. Emphasis will be placed on proper materials selection for particular products and appropriate manufacturing processes;

10. develop an understanding of the seven major fields of basic metals:

a. bench metal;

b. sheet metal;

c. art metal;

d. ornamental metal;

e. forging;

f. casting; and

g. welding;

11. be able to use the tool instruments and machines in the metalwork advanced lab of the following areas:

a. sheet metal;

b. metallurgy;

c. casting;

d. welding;

e. machining;

f. material testing;

g. finishing; and

h. safety;

12. develop an understanding of traditional concepts in welding and demonstrate proficiency in:

a. fusion process;

b. components;

c. weld testing and inspection; and

d. automated welding systems;

13. develop an understanding of the construction industry from the initial planning stage to completion of light, heavy, industrial, and civil construction;

14. explore the fundamentals of woodworking, beginning with hand tool experiences and processing into the study and use of modern power tools and machines;

15. develop an understanding of the advance practices utilized in the manufacture of wood products;

16. develop an understanding of the various power, energy and transportation systems and the technological, environmental, and societal impacts associated with them; and

17. provide students with the opportunity for in-depth exploration of the field of power mechanics, of the various power conversion and generator systems, and the productive utilization of those systems.

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Chapter 19. Strands

§1901. Technology Education Strands

A. *Strands*—the categories within particular content areas, which may vary from discipline to discipline. *Strands* are interrelated, and should be integrated rather than taught in isolation.

B. The following are strands that are found throughout the course offerings in Technology Education.

1. Technology Student Association (TSA). The mission of the Technology Student Association is to prepare our membership for the challenges of a dynamic world by promoting technological literacy, leadership, and problem solving, resulting in personal growth opportunities.

2. Safety. All Technology Education courses demand the safe use of tools and equipment. Personal safety is emphasized through this content area. Course safety rules are referenced to OSHA safety regulations and standards.

3. Communication Skills. Reading, writing, speaking, and listening activities are incorporated throughout the technology education curriculum.

4. Science Skills. Physical science, physics and chemistry, biology, all of these sciences have a place in Technology Education. The practical application of science is a common objective in all technical education courses.

5. Mathematics Skills. Technology Education courses emphasize the practical application of mathematics skills. Measuring, calculating, and problem solving are common activities in technology courses.

6. Career Paths. Technology Education offers a definite path for a student to follow including job seeking skills. Occupational clusters are offered in many skill areas.

7. SCANS Skills. The know-how identified by SCANS (Secretary's Commission on Achieving Necessary Skills) is made up of five workplace competencies and a three-part foundation of skills and personal qualities that are needed for solid job performance.

8. Workplace Competencies. Effective workers can productively use:

a. resources. They know how to allocate:

i. time;

ii. money;

iii. materials;

iv. space; and

v. staff;

b. interpersonal skills. They can:

i. work on teams;

ii. teach others;

iii. serve customers;

iv. lead;

v. negotiate; and

vi. work well with people from culturally diverse backgrounds;

c. information. They can:

i. acquire and evaluate data;

ii. organize and maintain files;

iii. interpret and communicate; and

iv. use computers to process information;

d. systems. They:

i. understand social, organization, and technological systems;

ii. can monitor and correct performance; and

iii. can design or improve systems;

e. technology. They can:

i. select equipment and tools;

ii. apply technology to specific tasks; and

iii. maintain and troubleshoot equipment;

9. Foundation Skills. Competent workers in the high-performance workplace need:

a. basic skills:

i. reading;

ii. writing;

iii. mathematics;

iv. speaking; and

v. listening;

b. thinking skills. The ability to:

i. learn;

ii. reason;

iii. think creatively;

iv. make decisions; and

v. solve problems;

c. personal qualities:

i. individual responsibility;

ii. self-esteem and self-management;

iii. sociability; and

iv. integrity.

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Chapter 21. Academic Standards and Benchmarks

§2101. Purpose

A. Standards and benchmarks provide a framework for local curriculum development. A school district's physical facilities, available equipment, resources, and community and business support are only a few of the factors that make the system unique and determine the curriculum offered.

B. In using this framework to develop curriculum, a *standard* is the major outcome of a course, and *benchmarks* are the goals for obtaining that outcome. Local systems will select the career majors to be offered, the courses offered in these majors, and create the objectives and activities that teachers will use to direct their instruction to reach the benchmarks for the selected courses. This procedure will allow local systems to structure curriculum to meet the needs of their students, schools, and communities while remaining consistent with the overall framework for the entire state.

C. Local systems will use the career majors as a guide to select the courses that will be offered for each major. Not all career majors or all courses listed with the major in this framework must be offered locally. Employment opportunities and postsecondary education availability in the local area should be considered as curriculum is developed.

D. To be identified as a vocational completer, a student must successfully complete four courses in the career major-two of which must be competency courses. The other two courses must be selected from the competency courses and/or related elective courses identified in the career major.

E. Following each career major are the content standards that relate to the major. The standards identify what students should know and be able to do. In the column beside each standard are benchmarks that identify specific skills and knowledge and serve as points of reference to gauge student progress toward achievement of standards. Benchmarks set the direction of instruction.

F. Academic Content Standards Cross-References

1. Cross-references to academic content standards reinforce the integration of academic and technology skills. English language arts, mathematics, social studies, and science academic standards are cross-referenced in the third column beside each Technology Education standard. The referenced academic standards are listed in full in Subpart 3, Appendices.

a. See Subpart 3, Chapter 27 for detailed referenced Academic Content Standards.

2. Codes used in the table to identify the academic standards are given as follows.

English Language Arts—ELA

Standard number is given, then benchmark number

Example: ELA1-M1 (Standard one, Benchmark Middle School Number One)

Mathematics

Strand letter is given, then benchmark number

N—Number and Number Relations Strand

A—Algebra Strand

M—Measurement Strand

G—Geometry Strand

D—Data, Discrete Math, and Probability Strand

P—Patterns, Relations, and Functions Strand

Social Studies

Strand letter is given, then benchmark letter and number

G—Geography Strand

C—Civics Strand

E—Economics Strand

H – History Strand

Science

Strand letter is given, then benchmark letter and number

SI—Science as Inquiry Strand

PS—Physical Science Strand

LS—Life Science Strand

SE—Science and the Environment Strand

Arts

Strand letter is given, then benchmark letter and number

CE—Creative Expression

AP—Aesthetic Perception

HP—Historical and Cultural Perception

CA—Critical Analysis

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Chapter 23. Middle School Standards and Benchmarks

§2301. Introduction

A. Competency Courses (generally taught in nine-week blocks):

1. manufacturing;
2. construction;
3. communication;

4. transportation;

5. modular technology.

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§2303. Focus Statement

A. Technology Education for sixth, seventh, and eighth grades is designed to incorporate many areas of Technology Education. Students are provided the opportunity to explore these areas and gain insight into the multitude of career choices available in technology. Students will explore the technology systems of:

1. manufacturing;

2. construction;

3. communication;

4. transportation; and

5. modular technology education.

B. Manufacturing. A study of manufacturing will assist students reach the following goals:

1. to develop an understanding of the multitude of career choices in manufacturing;

2. gain experience in working with techniques used in the manufacturing industry;

3. be able to work with other students using tools, materials, and techniques to produce a manufactured product.

C. Construction. A study of construction will assist students reach the following goals:

1. to develop in the student an understanding and insight into construction technology;

2. to assist each student in discovering and developing to the fullest potential talents, attitudes, and interests related to construction technology.

D. Communication. A study of communication will assist students reach the following goals:

1. to assist the student in becoming aware of the evolution of language and communication media;

2. to value, comprehend, and perform communication functions of:

a. decoding;

b. encoding;

c. transmitting;

d. receiving;

e. storing; and

f. retrieving.

E. Transportation. A study of transportation will assist students in reaching the following goals:

1. to develop an understanding of the career options in the field of transportation;

2. to gain experience in the knowledge and techniques of the transportation industry.

F. Modular Technology. A study of modular technology will assist students in reaching the following goals:

1. to be successful and to have a good quality of life, the technology education student will learn job skills and expectations by rotating through various career workstations;

2. understand the importance of becoming a lifelong learner, developing personal skills and the connection to technology applications.

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§2305. Manufacturing Benchmarks

A. Standard. M1. Explore areas of the manufacturing process from research and development to marketing the product.

Benchmarks	Louisiana Foundation Skills	ITEA Standards for Technology Education	Academic Cross-Reference (Standard-Benchmark)
A. Discuss management, personnel and production techniques involvement in manufacturing industries	1,3	1,2,3,4,5,7,12,17,18	English Language Arts ELA 1—M1,M3,M4,M5 ELA 2—M1,M2,M3,M4,M5,M6 ELA 3—M1,M2,M3,M4,M5 ELA 4—M1,M2,M3,M4,M5,M6 ELA 5—M1,M2,M3,M4,M5,M6 ELA 7—M1,M2,M3,M4 Mathematics N—1M,2M,3M,4M,5M,6M,7M A—2M,3M,3M,4M,5M M—1M,2M,3M,4M G—1M,2M,3M,4M,5M,6M,7M Social Studies G - 1A-M1, 1A-M2, 1D-M1, ID-M2, 1D-M4 E – 1A-M1, 1A-M2, 1A-M5, 1A-M6, 1B-M1, 1B-M4, 1B-M5, 1B-M6 H – 1A-M1, 1A-M2, 1A-M3, 1A-M4 Science S1-M - A1,A2,A3,A4,A5, A6,A7,A8,B1,B3,B4,B5 PS-M - A9,B2,C1,C2,C3,C8 ESS-M - A1,A2,A3,A5,A6,B1, B2,C8 SE-M – A1,A2
B. Develop cognitive and psychomotor skills and attitudes by performing manufacturing practices and experiments and participating role playing.	2,3,4	1,2,3,4,5,6,7,8,9,10,12,18	
C. Discuss the integration of men, machines, and materials into efficient production systems.	1,2,3,4,5	1,2,3,7,8	
D. Discuss the many vocations in manufacturing industries.	3,4,5	1,2,3,8,10,18	
E. Develop the ability to work individually and in teams to apply knowledge and solve problems in manufacturing.	1,2,3,5	1,2,3,8,10,18	

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§2307. Construction Benchmarks

A. Standard. M2. Explore areas of the construction industry from planning to completion of light, heavy, industrial, and civil construction.

Benchmarks	Louisiana Foundation Skills	ITEA Standards for Technology Education	Academic Cross-Reference (Standard-Benchmark)
A. Understand and use the tools, materials, and processes common to the construction industry.	2,3,4	1,2,3,4,7,8,9,16,17,18,19,20	English Language Arts ELA 1 — M1,M3,M4,M5 ELA 2 – M1,M2,M3,M4,M5,M6 ELA 3 – M1,M2,M3,M4,M5 ELA 4 – M1,M2,M3,M4,M5,M6 ELA 5 – M1,M2,M3,M4,M5,M6 ELA 7 – M1,M2,M4 Mathematics N – 1M,2M,3M,4M,5M,6M,7M A – 5M M – 1M,2M,3M,4M,5M,6M G – 1M,4M,5M,6M,7M Social Studies G – 1A-M1, 1A-M2, 1D-M1, 1D-M2 E – 1A-M1, 1A-M3, 1A-M11, 1B-M1, 1B-M2, 1B-M5 Science S1-M – A1,A2,A3,A4,A5,A6, A7,A8 PS-M – C1 ESS-M – A1 SE-M – A1
B. Develop an awareness of the many careers in construction industry.	3,4,5	1,2,3,4,6,7,20	
C. Understand the interrelationship of construction technology and community development.	3,4,5	1,2,3,4,5,6,7,20	
D. Discover and develop to the fullest potential individual talents, attitudes, and interests related to construction technology.	1,2,3,4,5	1,2,3,4,6,7,8,9,10,20	

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§2309. Communication Benchmarks

A. Standard. M3. Communicate ideas and information through experiences in the drafting, design, printing, photography, telecommunications, and computers.

Benchmarks	Louisiana Foundation Skills	ITEA Standards for Technology Education	Academic Cross-Reference (Standard-Benchmark)
A. Appreciate, under-stand, and perform selected management, personnel, and production processes as they apply to communication systems. B. Discuss careers and occupational choices with the communication industries C. Develop responsible and safe work attitudes, habits, and the ability to function effectively as a member of a team. D. Demonstrate the ability to send and receive information more effectively and efficiently through writing, gesturing, reading, speaking, and listening	2,3,4 1,2,3,4 1,2,3,4,5 1,2,3,4,5	1,2,3,4,7,8,9,11,12,17 1,2,3,4,7,12,13,17 1,2,3,4,7,11,12,17 1,2,3,6,9,10,11,12,13,17	English Language Arts ELA 1 – M1,M3,M4,M5 ELA 2 – M1,M2,M3,M4,M5,M6 ELA 3 – M1,M2,M3,M4,M5 ELA 4 – M1,M2,M3,M4,M5,M6 ELA 5 – M1,M2,M3,M4,M5,M6 ELA 7 – M1,M2,M3,M4 Mathematics N – 1M,2M,3M,4M,5M,6M,7M A – 1M,2M,5M M – 1M,2M,3M,4M G – 1M,2M,3M,4M,5M,6M,7M Social Studies G – 1A-M1, 1A-M2, 1D-M1 E – 1A-M2, 1B-M3, 1B-M4 H – 1A-M3, 1A-M6 Science S1-M— A1,A2,A3,A4,A5,A6, A7,A8 ESS-M— A1 SE-M— A1,A2

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§2311. Transportation Benchmarks

A. Standard. M4. Explore transportation technology past, present, and future, and be able to discuss the selection and uses of transportation technologies.

Benchmarks	Louisiana Foundation Skills	ITEA Standards For Technology Education	Academic Cross-Reference (Standard-Benchmark)
A. Discuss the requirements of jobs in the transportation industry. B. Gain experience in the knowledge and techniques of the transportation industry. C. Discuss management, personnel, and production techniques of transportation. D. Explore the many vocations in the transportation industry. E. Develop a sense of self-realization and generate self-activating behaviors. F. Discuss the positive and negative impacts of transportation systems on our society and our environment.	1,3 1,2,3 1,2,3 1,3,4,5 1,3,4,5 1,2,3,4	1,2,3,4,5,7,12,17,18 1,2,3,4,5,6,7,8,9,10,12,18 1,2,3,7,18 1,2,3,8,10,18, 1,2,3,4,7,8,12,14,15,16,17, 18,19,20, 18	English Language Arts ELA 1 – M1,M3,M4,M5 ELA 2 – M1,M2,M3,M4,M5,M6 ELA 3 – M1,M2,M3,M4,M5 ELA 4 – M1,M2,M3,M4,M5,M6 ELA 5 – M1,M2,M3,M4,M5,M6 ELA 7 – M1,M2,M4 Mathematics N – 1M,2M,3M,4M,5M,6M,7M A – 1M,2M,3M,4M,5M M – 1M,2M,3M,4M,5M,6M G – 1M,2M,3M,4M,5M,6M Social Studies G – 1A-M1, 1A-M2, 1D-M1, 1D-M2, 1D-M4, 1D-M5 E – 1A-M1, 1A-M2, 1A-M5, 1A-M9, 1B-M1, 1B-M3, IB-M4, 1B-M5, 1B-M6 H – 1A-M1, 1A-M2, 1A-M5, 1A-M6 Science S1—M – A1,A2,A3,A4,A5,A6,A7, B3,B4,B5 PS—M – B1,B2,B3,C1,C2,C6,C7 ESS—M – A1,A2,A3,A5,A6,B1,B2 SE—M – A1,A2

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§2313. Modular Technology Benchmarks

A. Standard. M5. Develop an understanding of the various technology systems through modular computer assisted instruction.

Benchmarks	Louisiana Foundation Skills	ITEA Standards For Technology Education	Academic Cross-Reference (Standard-Benchmark)
A. Read curriculum module binder to obtain the operating directions, research technical books and define technical terms. B. View instructional videos for daily workstation activities required to initiate the computer applications and hands-on activities. C. Use related computer software programs to perform various module activities. D. Team with a partner to complete hands-on activities through computer assisted instruction.	1,3,4 2,3,4 1,2,3,4 1,2,3,5	1,2,3,4,7,8,9, 16,17,18,19,20 1,2,3,4,6,8,10, 12,17,18,19,20 1,2,3,4,6,8,12, 17,18,19,20 1,2,3,4,8,9,11, 12,13,17,18,19,20	English Language Arts ELA 1 – M1,M3,M4,M5 ELA 2 – M1,M2,M3,M4,M5,M6 ELA 3 – M1,M2,M3 ELA 4 – M1,M2,M3,M4,M5,M6 ELA 5 – M1,M2,M3,M4,M5,M6 ELA 7 – M1,M2,M3,M4 Mathematics N – 1M,2M,3M,4M,5M,6M,7M A – 1M,2M,3M,4M M – 1M,2M,3M,4M G – 1M,2M,3M,4M,5M,6M Social Studies G – 1A-M1, 1A-M2, 1D-M1, 1D-M2, 1D-M4 E – 1A-M1, 1A-M2, 1A-M5, 1B-M1, 1B-M4, 1B-M5, 1B-M6 H – 1A-M1, 1A-M2, 1A-M5, 1A-M6 Science S1—M – A1,A2,A3,A4,A5,A6,A7,B3 B4,B5 PS—M – B1,B2,B3,C1,C2,C6,C7 ESS—M – A1,A2,A3,A5,A6,B1,B2, SE—M – A1,A2

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Chapter 25. High School Standards and Benchmarks

Subchapter A. General Technology Education

§2501. Introduction

A. Competency Courses

1. General Technology

B. Related Electives

1. Basic Technical Drafting;
2. Advanced Technical Drafting;
3. Architectural Drafting;
4. Communication Technology;
5. Basic Electricity/Electronics;
6. Advanced Electricity/Electronics;
7. Manufacturing Technology;
8. Materials and Processes;
9. Basic Metals;
10. Advanced Metal Technology;
11. Welding Technology;
12. Construction Technology;
13. Basic Wood Technology;
14. Advanced Wood Technology;
15. Energy, Power, and Transportation Technology;
16. Power Mechanics;
17. Physics of Technology I; and
18. Principles of Technology II.

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§2503. Focus Statement

A. The following are the goals and expectations being implemented in raising expectations and setting high standards in the *General Technology Education* cluster.

1. The technology lab is equipped with up-to-date technology.

2. The curriculum is activity-centered, with an emphasis on students' self-directed exploration of careers.

3. The relationships between English/Language Arts, Mathematics, Science, and Technology are emphasized.

4. The Technology Education student will explore the job skills and expectations needed in the job market by rotating through various career workstations.

B. General Technology Education. This course is designed to provide students with the opportunity to explore a variety of technical careers through contemporary technology education activities. Students will study and complete laboratory activities related to the fields of communication, construction, manufacturing, and transportation. Students will apply mathematics, science, and communication skills to study, design, perform experiments,

and construct projects to enhance their learning. Work-based learning strategies appropriate for this course include field trips, service learning, and job shadowing. This course and Technology Student Association technical and leadership activities enhance skills essential for students interested in technical and engineering career fields.

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§2505. General Technology Education Benchmarks

A. Standard 1. Provide students with the opportunity to explore various technical careers through contemporary and/or modular Technology Education activities.

Benchmarks	Louisiana Foundation Skills	ITEA Standards For Technology Education	Academic Cross-Reference (Standard-Benchmark)
A. Discuss business ethics in the workplace	1,3,5	1,2,3,4,6,7	English Language Arts ELA 1 – H1,H3,H4,H5 ELA 2 – H1,H2,H3,H4,H5,H6 ELA 3 – H2,H2,H3 ELA 4 – H1,H2,H3,H4,H5,H6 ELA 5 – H1,H2,H3,H4,H5,H6 ELA 7 – H1,H2 Mathematics N – 1H,2H,3H.4H,5H,6H,7H A – 1H,2H,3H,4H M – 1H,2H,3H,4H G – 1H,2H,3H,4H,5H,6H Social Studies G – 1A-H1, 1A-H2, 1D-H1, 1D-H2, 1D-H3, 1D-H4, 1D-H5 E – 1A-H1, 1A-H2, 1A-H3, 1A-H5, 1B-H1, 1B-H2, 1B-H4, 1B-H5 1B-H6 H – 1A-H1, 1A-H2, 1A-H5, 1A-H6 Science S1—H – A1,A2,A3,A4,A5,A6,A7,B2, B3,B4,B5 PS—H – B1,B2,B3,C1,C2,C6,C7,D1, D6,D7,E1,E2,E3,E4,F1,F2, G1,G2,G3,G4 ESS—H – A1,A2,A3,A5,A6,B1,B2 SE—H – A1,A2,A9,A10,A11,B1,B2, B3,B4,B5,B6,C1,C2,C3,C4, C5,D1,D2,D3,D4,D5,D6
B. Design, draw, build, and assemble a balsa wood project using the teamwork concept.	1,2,3,4,5	1,2,3,4,7,8,9,10,17,18,19,20	
C. Perform basic operations of an MAC/PC microcomputer: word processing, graphics, database, and spreadsheet applications.	1,3	1,2,3,4,7,8,9,11,12,17	
D. Compose and print various projects using graphic design computer software.	1,2,3	1,2,3,4,7,8,11,12,13,17	
E. Identify basic drawing instruments, acceptable lettering practices, and the alphabet of lines used in drafting and apply them to both basic and Computer Aided Drafting Design (CADD).	1,2,3,4	1,2,3,4,7,8,11,12,13,17	
F. Develop an under-standing of the need for a drug free life/workplace.	1,3,5	1,2,3,4,5,7,12,14	
G. Demonstrate basic skills in electrical circuitry related to magnetism AC/DC circuits, motors, voltage, current, resistance, power, measurements.	1,3,4	1,2,3,6,7,8,11,12,16	
H. Discuss the common electronics components and circuits used today.	1,3,4	1,2,3,5,6,7,8,10,11,12,13,16	
I. Explain the principles of flight and use video tape instruction and computer programs to design an airplane.	1,2,3,4	1,2,3,4,7,8,9,10,11,12,13,16	
J. Explain the value of a dollar, learn how to open and maintain a checking account utilizing a computer program.	1,3,5	1,2,3,4,7,12,13	
K. Explore the space program and the development of rocketry; build and launch a model rocket.	1,2,3,4,5	1,2,3,4,5,7,8,11,19	
L. Discuss transportation systems and identify means of solving transportation problems.	1,2,3,5	1,2,3,4,6,7,8,16,18	
M. Identify careers related to the field of Computer Numerical Control.	1,3,5	1,2,3,4,7,14,15,16,17,18, 19,20	
N. Gain knowledge and develop fundamental skills in assembling, operating, and testing basic hydraulic circuits.	1,2,3,4,5	1,2,3,7,10,19,20	
O. Explore the communication areas of fiber optics, laser, and microwave transmissions.	1,3,4,5	1,2,3,4,5,7,8,11,12,16,17	
P. Monitor, record, and interpret weather observations.	1,3,4,5	1,2,3,4,5,6,7,13,17	
Q. Identify, construct, and operate pneumatic circuits.	1,2,3,4	1,2,3,4,5,6,7,9,11,16	

Benchmarks	Louisiana Foundation Skills	ITEA Standards For Technology Education	Academic Cross-Reference (Standard-Benchmark)
R. Explore alternate energy sources of hydro-electric power, solar sterling, solar thermal, and wind power.	1,2,3,4,5	1,2,3,4,5,6,7,9,10,16	
S. Explore manufacturing industries, materials, and how they are processed, and the production of goods to satisfy the demands of society.	1,2,3,4,5	1,2,3,4,5,6,7,8,9,10,11,12, 13,14,15,19	
T. Explore construction industries, the generation of prints and specifications, and construction of structure to satisfy the demands of society.	1,2,3,4,5	1,2,3,4,5,6,7,8,9,10,11,12, 13,20	
U. Prepare a student career portfolio.	1,3,5	4,8,12,16,17,18,19,20	

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Subchapter B. Communication Technology

§2509. Introduction

A. Competency Courses

1. Basic Technical Drafting;
2. Advanced Technical Drafting;
3. Architectural Drafting;
4. Communication Technology;
5. Basic Electricity/Electronics;
6. Advanced Electricity/Electronics.

B. Related Electives

1. General Technology Education;
2. Manufacturing Technology;
3. Materials and Processes;
4. Basic Metal Technology;
5. Advanced Metal Technology;
6. Welding Technology;
7. Construction Technology;
8. Basic Wood Technology;
9. Advanced Wood Technology;
10. Energy, Power, and Transportation Technology;
11. Power Mechanics;
12. Physics of Technology I;
13. Physics of Technology II.

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§2511. Focus Statement

A. Communication Technology emphasizes a strong foundation in drafting and electronics. Basic Technical Drafting is the primary course being taught in this area. Technical Drafting is used by engineers, architects, and construction fields to describe size, shape, and details. The ability to read and understand drawings is becoming increasingly important in the world of work. For this reason, drafting should be one of the first courses taken by a communication technology major.

B. Advanced Technical Drafting:

1. is designed as a follow-up to Basic Technical Drafting;

2. involves the preparation of detailed drawings, including:

   a. developments;
   b. intersections;
   c. charts;
   d. diagrams;
   e. threads;
   f. descriptive geometry;
   g. auxiliary views;
   h. revolutions; and
   i. specialized drafting areas.

C. Architectural Drafting is designed to give the student an overview of the basic concepts that are common in the area of residential planning and design.

D. Communication Technology is a course that broadens student knowledge and improves ability to effectively communicate ideas and information through experiences in:

1. drafting;
2. design;
3. printing;

4. photography;
5. telecommunications; and
6. computers.

E. Basic Electricity/Electronics is a one-year introductory course and requires no previous knowledge of electricity or electronics. The student will gain a working knowledge of relevant theories and physical laws and their applications.

F. Advanced Electronics is intended for those students who successfully complete Basic Electronics and desire to continue their training in this field. The course content centers around semiconductor devices and their applications to:

1. digital electronics;
2. computer; and
3. communication circuits.

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§2513. Communication Technology Benchmarks

A. Standard 2. Understand and apply the basic concepts that are common to the broad field.

Benchmarks	Louisiana Foundation Skills	ITEA Standards for Technology Education	Academic Cross-Reference (Standard-Benchmark)
A. Develop basic skills in the proper use of drafting instruments and materials.	1,2,3,4,5	1,2,3,7,8,17	English Language Arts ELA 1 – H1,H3,H4,H5 ELA 2 – H1,H2,H3,H4,H5,H6
B. Develop an understanding of the technical aspects of drafting.	1,2,3,4	1,2,3,6,7,10,11,13,17,20	ELA 3 – H1,H2,H3 ELA 4 – H1,H2,H3,H4,H5,H6 ELA 5 – H1,H2,H3,H4,H5,H6
C. Develop an appreciation for the value of effective designs.	1,2,3,4,5	1,2,3,4,5,6,7,8,9,10,11,12,13,17,20	ELA 7 – H1,H2 Mathematics N – 1H,2H,3H,4H,5H,6H,7H
D. Foster an understanding of the importance of drafting in industry.	1,3,4,5	1,3,4,6,7,12,13,17	M – 1H,2H,3H,4H G – 1H,2H,3H,4H,5H,6H
E. Explore the many technical careers that incorporate drafting.	1,3,5	1,3,4,5,6,7,8,9,10,11,12,13,17	D – 3H,7H,8H,9H P – 1H,2H,3H,4H,5H Social Studies G— 1B-H1, 1D-H1 E— 1A-H3, 1B-H1, 1B-H2, 1C-H2 H— 1A-H6 Science S1-H – A3 ESS-H – A1 SE-H – A3,A4,All,B1,B2,C2,C4, D2,D3,D5,D6

B. Standard 3. Prepare detailed drawings including:

1. developments;
2. intersections;
3. charts;
4. diagrams;
5. threads;
6. fasteners;
7. descriptive geometry;
8. auxiliary;
9. revolutions;
10. CAD; and
11. specialized areas.

Benchmarks	Louisiana Foundation Skills	ITEA Standards for Technology Education	Academic Cross-Reference (Standard-Benchmark)
A. Review Basic Drafting I and II: safety, orthographic projection, dimensioning, pictorials, sectional, and working drawings, basic CADD.	1,2,3,4,5	1,2,3,4,6,7,8,9,10,11,12,13,17	English Language Arts ELA 1 – H1,H3,H4,H5 ELA 2 – H1,H2,H3,H4,H5,H6 ELA 3 – H1,H2,H3 ELA 4 – H1,H2,H3,H4,H5,H6 ELA 5 - H1,H2,H3,H4,H5,H6 ELA 7 – H1,H2 Mathematics N – 1H,2H,3H,4H,5H,6H,7H M – 1H,2H,3H,4H G – 1H,2H,4H,5H,6H D – 3H,7H,8H,9H P – 1H,2H,3H,4H,5H Social Studies G— 1B-H1, 1D-H1 E— 1A,H3, 1B-H1, 1B-H2, 1C-H2 H— 1A-H6 Science S1–H – A3 ESS–H – A1 SE–H – A3,A4,A11,B1,B2,C2, C4,D2,D3,D5,D6
B. Recognize how functional drafting techniques can be used to prepare effective technical drawings.	1,3,4	1,2,3,4,5,6,7,11,12,13,17	
C. Visualize the surface development of three-dimensional objects: parallel line development, radial-line development, and triangulation.	1,2,3,4	1,2,3,7,8,9,10,17	
D. Describe and complete auxiliary drawings.	1,2,3	1,2,3,8,9,10,17	
E. Read, interpret, and construct graphic charts and diagrams.	1,2,3	1,2,3,10,11,12,13,17	
F. Prepare drawings of threads using detailed representation.	1,2,3	1,2,3,7,10,11,12,13,17	
G. Graphically define the fundamentals of solving descriptive geometry problems.	1,2,3,4	1,2,3,7,8,9,10,11,12,13,17	
H. Describe the uses of technical illustrations and prepare one form of technical illustration.	1,2,3,4	1,2,3,4,7,8,9,10,11,12,13,17	
I. Complete drawings in optional areas: map, electri-cal, architectural, pipe, aero-space, structural, welding.	1,2,3,4,5	1,2,3,4,5,6,7,8,9,10,11,12,13,17	
J. Use CADD to prepare drawings in all previously covered areas.	1,2,3,4,5	1,2,3,4,5,6,7,8,9,10,11,12,13,17	

C. Standard 4. Demonstrate the ability to complete a set of working drawings for home construction.

Benchmarks	Louisiana Foundation Skills	ITEA Standards for Technology Education	Academic Cross-Reference (Standard-Benchmark)
A. Research and apply FHA and city building codes and standards to residential plans.	1,2,3,4,5	1,2,3,5,6,7,8,9,10,11,12,13, 16,17,19,20	English Language Arts ELA 1 – H1,H3,H4,H5 ELA 2 – H1,H2,H3,H4,H5,H6 ELA 3 – H1,H2,H3 ELA 4 – H1,H2,H3,H4,H5,H6 ELA 5 – H1,H2,H3,H4,H5,H6 ELA 7 – H1,H2,H3,H4 Mathematics N – 1H,2H,3H,4H,5H,6H,7H M – 1H,2H,3H,4H G – 1H,2H,3H,4H,5H,6H D – 3H,7H,8H,9H P – 1H,2H,3H,4H,5H Social Studies G— 1B-H1, 1D-H1 E— 1A-H3, 1B-H1, 1B-H2, 1C-H2 H— 1A-H1, 1A-H2, 1A-H6 Science S1–H – A3 ESS-H – A1 SE-H - A3,A4,A11,B1,B2,C2, C4, D2,D3,D5,D6 Arts CE-1VA-H2,H3,H4,H5 AP-2VA-H1,H2,H3,H4 HP-3VA-H1,H2,H4,H5 CA-4VA-H1,H2,H3,H4
B. Show examples of unique lettering style and techniques.	1,3	17	
C. Demonstrate the basic elements of architectural dimensioning.	1,3	11,17	
D. Communicate verbally in the field of architecture.	1,3,5	2,3,4,5,8,9,10,11,17,20	
E. Discuss architectural history and how it impacts modern day practices.	1,3,4	3,7,8,9,13,20	
F. Identify architectural styles.	1,3,5	3,6,7,8,13,20	
G. Evaluate a proposed construction project with reference to the costing of materials.	1,2,3,4,5	3,6,8,9,10,11,12,13,19,20	
H. Develop a complete set of residential drawings.	1,2,3,4,5	6,8,9,10,11,16,17,19,20	
I. Demonstrate the use of CADD through architectural computer programs.	1,2,3,4,5	8,9,10,11,12,17	

D. Standard 5. Communicate ideas and information through experiences dealing with drafting, design, printing, photography, telecommunication, and computers.

Benchmarks	Louisiana Foundation Skills	ITEA Standards for Technology Education	Academic Cross-Reference (Standard-Benchmark)
A. Develop technical abilities within the field of Communication Technology.	1,3,5	1,2,3,4,5,6,7,10,11,12,13,17	English Language Arts ELA 1 – H1,H3,H4,H5 ELA 2 – H1,H2,H3,H4,H5,H6 ELA 3 – H1,H2,H3 ELA 4 – H1,H2,H3,H4,H5,H6 ELA 5 – H1,H2,H3,H4,H5,H6 ELA 7 – H1,H2,H4
B. Apply English/Language Arts, Science, and Mathematics competencies to solve meaningful communication problems.	1,2,3,4,5	1,2,3,4,5,6,10,11,12,13,17	
C. Develop safe work habits which are necessary for active participation in the communications laboratory.	1,2,3,5	1,2,3,5,6,7,12,17	Mathematics N – 1H,2H,3H,4H,5H,6H,7H A – 1H,2H,3H,4H M – 1H,2H,3H,4H
D. Develop an awareness and understanding of communication and its related technology systems.	1,3,4,5	1,2,3,10,12,13,17	G – 1H,2H,3H,4H,5H,6H D – 3H,7H,8H,9H P – 1H,2H,3H,4H,5H
E. Discuss and be able to interrelate the fundamental elements of the communication process.	1,3,4,5	1,2,3,4,5,6,7,12,13,17	Social Studies G— 1B-H1, 1D-H1, 1D-H4 E— 1A-H1, 1B-H1, 1B-H2, 1C-H2
F. Discuss an appreciation for the impacts that communication technology has on our society.	1,3,4,5	1,22,3,4,5,6,7,13,17	H— 1A-H6, 1B-H6, 1B-H16
G. Develop an understanding of the function, structure, and control of mass media.	1,3,4,5	1,2,3,4,5,6,7,12,13,17	Science S1–H – A3,A5,A6 SE-H – A1,B1,B2,D1,D2,D3,D5, D6 PS—H – D4,D7,E3,E4
H. Explore the design, production, and marketing of mass communication products.	1,2,3,4,5	1,2,3,4,5,6,7,8,9,10,11,12,13,17	ESS—H – A1
I. Examine the trends in mass communication.	1,3,4 5	1,2,3,4,5,6,7,12,13,17	Art CE—1VA – H1,H2,H3,H4,H5, H6,H7 HP—3VA – H4 CA—4VA – H1,H2,H3,H4

E. Standard 6. Understand and apply the principles of electricity and electronics through laboratory learning experiences.

Benchmarks	Louisiana Foundation Skills	ITEA Standards for Technology Education	Academic Cross-Reference (Standard-Benchmark)
A. Develop a working knowledge of electricity and electronics.	1,3	1,2,3,7,8,10,12,13,16	English Language Arts ELA 1 – H1,H3,H4,H5 ELA 2 – H1,H2,H3,H4,H5,H6
B. Explore careers within the field of electronics communications.	1,2,3,4	1,2,3,6,7,10,11,12,13,16	ELA 3 – H1,H2,H3 ELA 4 – H1,H2,H3,H4,H5,H6 ELA 5 – H1,H2,H3,H4,H5,H6
C. Apply English/Language Arts, Science and Math skills to practical situations.	1,2,3,4	1,2,3,10,11,12,16	ELA 7 – H1,H2,H4 Mathematics N – 1H,2H,3H,4H,5H,6H,7H
D. Develop basic skills in the proper use of the tools and equipment used in electricity and electronics.	1,3	1,2,3,5,6,7,12,13,16	A – 1H,2H,3H,4H M – 1H,2H,3H,4H G – 1H,2H,3H,4H,5H,6H
E. Demonstrate problem solving and critical thinking abilities.	1,2,3,4,5	1,3,5,6,7,16	P – 1H,2H,3H,4H,5H Social Studies G— 1C-H1,1D-H1,1D-H2,1D-H4, 1D-H5
F. Develop a positive safety attitude and safe work habits.	1,3,5	1,3,4,5,6,7,8,9,10,11,12,13,16	E— 1A-H1,1A-H2,1A-H3,1A-H6, 1B-H1,1B-H2
G. Explore educational opportunities.	1,3,5	1,2,3,4,5,6,7,16	H— 1A-H6,1B-H6,1B-H16,1B-H17, 1C-H15
H. Develop an awareness of the diverse nature of electricity and electronics and their impact on our society.	1,3,4,5	1,2,3,4,5,6,7,8,9,12,13,16	Science S1—H – A1,A3,A4,A5,A6,A7,B1, B2,B3,B4,B5 PS—H – A1,A2,B1,B2,B3,C3,C6, C7,D5,D6,D7,E1,E2,F1, F2,G1,G2,G3,G4 ESS—H – A1,A2,A3,B2 SE—H – A11,B1,B2,B3,B4,B5,B6, C2,C3,C4,C5,D1,D2,D3, D4,D5,D6

F. Standard 7. Develop a career interest in electronics through course content centered around:

1. semiconductor devices;
2. application of digital electronics;
3. computers; and
4. communication circuits.

Benchmarks	Louisiana Foundation Skills	ITEA Standards for Technology Education	Academic Cross-Reference (Standard-Benchmark)
NOTE: *The benchmarks that are listed in basic electronics should be taken to a higher level in the advanced electronics benchmark.	1,3	1,2,3,7,8,10,12,13,16	English Language Arts ELA 1 – H1,H3,H4,H5 ELA 2 – H1,H2,H3,H4,H5,H6 ELA 3 – H1,H2,H3
*A. Develop a working knowledge of electronics.			ELA 4 – H1,H2,H3,H4,H5,H6 ELA 5 – H1,H2,H3,H4,H5,H6
*B. Explore careers within the field of electronic communications.	1,2,3,4	1,2,3,6,7,10,11,12,13,16	ELA 7 – H1,H2,H4 Mathematics N – 1H,2H,3H,4H,5H,6H,7H
*C. Apply English/Language Arts, Science and Math skills to electronics.	1,2,3,4	1,2,3,10,11,12,16	A – 1H,2H,3H,4H M – 1H,2H,3H,4H G – 1H,2H,3H,4H,5H,6H
*D. Develop skills in the proper use of tools and equipment.	1,3	1,2,3,5,6,7,12,13,16	P – 1H,2H,3H,4H,5H Social Studies
*E. Demonstrate problem-solving and critical-thinking abilities.	1,2,3,4,5	1,3,4,6,7,12,13,17	G— 1C-H1,1D,H1,1D-H2,1D-H4, 1D-H5 E— 1A-H1,1A-H2,1A-H3,1A-H6, 1B-H1,1B-H2
*F. Develop positive safety attitudes and work habits.	1,3,5	1,2,3,5,6,7,16	H— 1A-H6,1B-H6,1B,H16, 1B-H17,1C-H15

Benchmarks	Louisiana Foundation Skills	ITEA Standards for Technology Education	Academic Cross-Reference (Standard-Benchmark)
*G. Explore educational opportunities.	1,3,5	1,2,3,4,5,6,7,16	Science S1—H – A1,A3,A4,A5,A6,A7,B1, B2,B3,B4,B5 PS—H – A1,A2,B1,B2,B3,C3,C6, C7,D5,D6,D7,E1,E2,F1, F2,G1,G2,G3,G4 ESS—H – A1,A2,A3,B2 SE—H – A11,B1,B2,B3,B4,B5, B6,C2,C3,C4,C5,D1, D2,D3,D4,D5,D6
*H. Develop an awareness of the diverse nature of electricity and electronics and their impact on our society.	1,3,4,5	1,2,3,4,5,6,7,8,9,12,13,16	
I. Use test instruments to properly measure voltage, amperage, resistance, etc.	1,3	1,2,3,10,12,13,16	
J. Identify electronic components and explain their use.	1,3	1,2,3,12,13,16	
K. Develop a technical vocabulary.	1,3	1,2,3,7,16	
L. Demonstrate working knowledge of semiconductor components.	1,3,4	1,2,3,12,13,16	

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Subchapter C. Manufacturing Technology

§2517. Introduction

A. Competency Courses

1. Manufacturing Technology;
2. Materials and Processes;
3. Basic Metal Technology;
4. Advanced Metal Technology; and
5. Welding Technology.

B. Related Electives

1. General Technology Education;
2. Basic Technical Drafting;
3. Advanced Technical Drafting;
4. Architectural Drafting;
5. Basic Electricity/Electronics;
6. Advanced Electricity/Electronics;
7. Energy, Power, and Transportation Technology;
8. Power Mechanics;
9. Physics of Technology I; and
10. Physics of Technology II.

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§2519. Focus Statement

A. Manufacturing Technology investigates all areas of the manufacturing process from research and development to marketing the product. Manufacturing Technology also develops an awareness for:

1. technology;
2. industry;
3. future trends in manufacturing; and
4. the social impacts of technology and industry on society and the environment.

B. Materials and Processes is a course that presents both the materials and the processes commonly used in modern manufacturing industries. Studying processes relating to many different industrial materials gives the student a broader understanding of manufacturing.

C. Basic Metal Technology is designed as an introductory course for students who are interested in the field of metals. The course is divided into seven major fields:

1. bench metal;
2. sheet metal;
3. art metal;
4. ornamental metalwork;
5. forging;
6. casting; and
7. welding.

D. Advanced Metal Technology is designed as a second advanced course for students interested in further study in the field of metals. The course is divided into six major fields:

1. advanced metalworking tools;
2. sheet metal working and layout;
3. metallurgy and heat treating;

4. casting;

5. welding; and

6. machining.

E. Welding Technology is designed to provide students with the opportunity for in-depth exploration in the field of welding. Of primary concern are the various fusion systems and the productive utilization of those systems. Experiences related to the design, theory, and utilization of the welding systems are provided for the students.

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§2521. Manufacturing Technology Benchmarks

A. Standard 8. Explore all areas of the manufacturing process from research and development to marketing the final product.

Benchmarks	Louisiana Foundation Skills	ITEA Standards for Technology Education	Academic Cross-Reference (Standard-Benchmark)
A. Develop fundamental skills in manufacturing process.	1,2,3,4,5	1,2,3,7,8,9,11,12,13,19	English Language Arts ELA 1 – H1,H3,H4,H5 ELA 2 – H1,H2,H3,H4,H5,H6
B. Develop an awareness of the various careers associated with the manufacturing industries.	1,3,5	1,2,3,4,5,6,7,19	ELA 3 - H1,H2,H3 ELA 4 – H1,H2,H3,H4,H5,H6 ELA 5 – H1,H2,H3,H4,H5,H6 ELA 7 – H1,H2
C. Develop an understanding of how the seven types of technological resources (people, information, materials, tools and machines, capital, energy and time) play a vital role in each stage of the manufacturing.	1,3,5	1,2,3,4,5,6,7,10,11,12,13,19	Mathematics N – 1H,2H,3H,4H,5H,6H,7H D – 7H,9H A – 1H,2H,3H,4H M – 1H,2H,3H,4H
D. Discuss and apply the design process used in creating new products.	1,2,3,4,5	3,8,9,10,11,12,13,19	G – 1H,2H,3H,4H,5H,6H Social Studies G— 1A-H1,1A-H2,1D-H1,1D-H2, 1D-H4,1D-H5
E. Develop an understanding of design, product development, production policies, finance, and product marketing.	1,2,3,4	3,8,9,10,11,12,13,19	E— 1A-H1,1A-H2,1A-H3,1A-H5, 1B-H1,1B-H2,1B-H4,1B-H5, 1B-H6
F. Compute mathematical problems associated with manufacturing.	2,3,4	3,9,10,11,12,13,19	H— 1A-H1,1A-H2,1A-H5,1A-H6 Science S1—H – A1,A2,A3,A4,A5,A6,A7, B3,B4,B5
G. Develop insights into future manufacturing trends.	1,3,4,5	3,4,5,6,7,8,9,10,11,13,19	PS—H – C1,C2,D1,D6,D7,E1,E2, E3,E4,F1,F2,G1,G2,G3, G4 ESS—H –A1,A2,A3,A5,A6,A7,B1, B2,D7 SE—H –A1,A2,A11,B1,B2,B3,B4, B5,B6,C1,C2,C3,C4,C5, D1,D2,D3,D4,D5,D6

B. Standard 9. Develop an understanding of industrial materials and how they are processed to increase their value. Emphasis will be placed on materials selection for particular products and appropriate manufacturing processes.

Benchmarks	Louisiana Foundation Skills	ITEA Standards for Technology Education	Academic Cross-Reference (Standard-Benchmark)
A. Develop fundamental skills in the selection and safe use of manufacturing tools and equipment.	1,3,5	1,2,3,5,7,9,10, 12,13,19	English Language Arts ELA 1 – H1,H3,H4,H5 ELA 2 – H1,H2,H3,H4,H5,H6 ELA 3 – H1,H2,H3 ELA 4 – H1,H2,H3,H4,H5,H6 ELA 5 – H1,H2,H3,H4,H5,H6 ELA 7 – H1,H2
B. Apply Science, Mathematics, and English/ Language Arts skills to the solution of problems relating to materials and the processes.	2,3,4	1,2,3,4,5,6,7,8, 10,11,12,13,19	
C. Develop an understanding of how manufacturing products are planned from research and development to marketing.	1,2,3	3,4,5,6,7,11,12, 13,19	Mathematics N – 1H,2H,3H,4H,5H,6H,7H D – 7H,9H A – 1H,2H,3H,4H M – 1H,2H,3H,4H G – 1H,2H,3H,4H,5H,6H
D. Explore the trends in materials and processes design.	1,3	3,4,5,6,7,8,9,10, 11,12,13,19	
E. Develop an under-standing of how the five elements of the industrial production systems: research and development, marketing, finance, production, and management play a vital role in the selection and utilization of materials and processes.	1,2,3,4,5	1,3,4,5,6,7,10, 11,12,13,19	Social Studies G – 1A-H1,1A-H2,1D-H1,1D-H2, 1D-H4,1D-H5 E – 1A-H1,1A-H2,1A-H3,1A-H5, 1B-H1,1B-H2,1B-H4,1B-H5, 1B-H6 H – 1A-H1,1A-H2,1A-H5,1A-H6
F. Understand the difference between metallic and non-metallic industrial materials.	1,3,4	3,7,12,13,19	Science S1-H— A1,A2,A3,A4,A5,A6,A7, B3,B4,B5
G. Develop an awareness of the various careers associated with materials and processes in the manufacturing field.	1,3,4,5	1,2,3,4,5,6,7,19	PS-H— C1,C2,D1,D6,D7,E1,E2, E3,E4,F1,F2,G1,G2,G3, G4 ESS-H— A1,A2,A3,A5,A6,A7,B1, B2,D7, SE-H— A1,A2,A11,B1,B2,B3,B4, B5,B6,C1,C2,C3,C4,C5, D1,D2,D3,D4,D5,D6

C. Standard 10. Develop an understanding of the seven major fields of basic metals:

1. bench metal;
2. sheet metal;
3. art metal;
4. ornamental metal;
5. forging;
6. casting; and
7. welding.

Benchmarks	Louisiana Foundation Skills	ITEA Standards for Technology Education	Academic Cross-Reference (Standard-Benchmark)
A. Explore the various metalwork areas so as to develop an understanding of the technology involved in the metals industry. B. Develop fundamental skills in the design, fabrication, heat treatment, machining, and welding of metals products. C. Develop safe work habits in working with metals, labs, and metalworking machinery. D. Develop an understanding of the career opportunities in the field of metalworking. E. Develop problem-solving abilities and apply mathematics and science principles through problem-solving activities.	1,2,3 2,3,4 1,3,5 1,3,4,5 2,3,4	1,2,3,6,7,13 1,2,3,5,6,8,9,10 1,2,3,5,6,7,19,20 1,2,3,4,5,6,7,8,9,10,11, 12,13,19 1,2,3,8,9,10,11,12,13,19	English Language Arts ELA 1 – H1,H3,H4,H5 ELA 2 – H1,H2,H3,H4,H5,H6 ELA 3 – H1,H2,H3 ELA 4 – H1,H2,H3,H4,H5,H6 ELA 5 – H1,H2,H3,H4,H5,H6 ELA 7 – H1,H2 Mathematics N – 1H,2H,3H,4H,5H,6H,7H D – 7H,9H A – 1H,2H,3H,4H M – 1H,2H,3H,4H G – 1H,2H,3H,4H,5H,6H Social Studies G – 1A=H1,1A-H2,1D-H1,1D-H2, 1D-H4,1D-H5 E – 1A-H1,1A-H2,1A-H3,1A-H5, 1B-H1,1B-H2,1B-H4,1B-H5, 1B-H6 H – 1A-H1,1A-H2,1A-H5,1A-H6 Science S1-H— A1,A2,A3,A4,A5,A6,A7, B3,B4,B5 PS-H— B1,B2,C1,C2,D1,D6,D7, E1,E2,E3,E4,F1,F2,G1, G2,G3,G4 ESS-H— B1,B2 SE-H— A1,A2,A11,B1,B2,B3,B4, B5,B6,C1,C2,C3,C4,C5, D1,D2,D3,D4,D5,D6

D. Standard 11. Be able to use the tool instruments and machines in the metalwork advanced lab of the following areas:

1. sheet metal;
2. metallurgy;
3. casting;
4. welding;
5. machining;
6. material testing;
7. finishing; and
8. safety.

Benchmarks	Louisiana Foundation Skills	ITEA Standards for Technology Education	Academic Cross-Reference (Standard-Benchmark)
A. Develop an awareness of the positive and negative impact of metalworking on society. B. Perform lab assignments in the various metalworking areas so as to develop an understanding of the technology used in the metalworking industries. C. Provide related information and develop the essential skills needed in the design, fabrication, heat treating, welding, machining, and finishing of industrial products.	1,3,5 1,2,3 2,3,4	1,2,3,4,5,6,7,8,9,13,19 1,2,3,4,5,6,7,8,9,10,11, 12,13,19 1,2,3,7,8,10,11,12,13,19	English Language Arts ELA 1 – H1,H3,H4,H5 ELA 2 – H1,H2,H3,H4,H5,H6 ELA 3 – H1,H2,H3 ELA 4 – H1,H2,H3,H4,H5,H6 ELA 5 – H1,H2,H3,H4,H5,6H ELA 7 – H1,H2 Mathematics N – 1H,2H,3H,4H,5H,6H,7H D – 7H,9H A – 1H,2H,3H,4H M – 1H,2H,3H,4H G – 1H,2H,3H,4H,5H,6H Social Studies G – 1A-H1,1A-H2,1D-H1,1D-H2, 1D-H4,1D-H5 E – 1A-H1,1A-H2,1A-H3,1A-H5, 1B-H1,1B-H2,1B-H4,1B-H5, 1B-H6 H – 1A-H1,1A-H2,1A-H5,1A-H6 Science S1-H— A1,A2,A3,A4,A5,A6,A7, B3,B4,B5 PS-H— B1,B2,C1,C2,D1,D6,D7, E1,E2,E3,E4,F1,F2,G1,G2, G3,G4 ESS-H— B1,B2 SE-H— A1,A2,A11,B1,B2,B3,B4, B5,B6,C1,C2,C3,C4,C5, D1,D2,D3,D4,D5,D6

E. Standard 12. Develop an understanding of traditional concepts in welding and demonstrate proficiency in:

1. fusion process;
2. components;
3. weld testing and inspection; and
4. automated welding systems.

Benchmarks	Louisiana Foundation Skills	ITEA Standards for Technology Education	Academic Cross-Reference (Standard-Benchmark)
A. Analyze basic safety skills associated with the welding environment.	1,3,5	1,2,3,5,6,7,19,20	English Language Arts ELA 1 – H1,H3,H4,H5 ELA 2 – H1,H2,H3,H4,H5,H6 ELA 3 – H1,H2,H3 ELA 4 – H1,H2,H3,H4,H5,H6 ELA 5 – H1,H2,H3,H4,H5,H6 ELA 7 – H1,H2
B. Develop fundamental skills in the selection and operations of OFC (oxygen, fuel-gas, cutting) processes, systems and equipment.	2,3,4	1,2,3,7,10,11, 12,13,19,20	
C. Develop an understanding of the various OFC processes, purpose and functions, and operation of OFC equipment.	2,3,4	5,6,7,12,13,20	Mathematics N – 1H,2H,3H,4H,5H,6H,7H D – 7H,9H A – 1H,2H,3H,4H M – 1H,2H,3H,4H G – 1H,2H,3H,4H,5H,6H
D. Describe the components of a SMAW (shielded metal arc welding) system and explain the components in terms of their function.	2,3,4	5,6,7,12,13,20	
E. Identify equipment, conditions, consumables, and the appropriate settings to be used in the GTAW (gas tungsten arc welding) process.	2,3,4	1,2,3,5,6,7,12,13,20	Social Studies G – 1A-H1,1A-H2,1D-H1,1D-H2, 1D-H4,1D-H5 E – 1A-H1,1A-H2,1A-H3,1A-H5, 1B-H1,1B-H2,1B-H4,1B-H5, 1B-H6 H – 1A-H1,1A-H2,1A-H5,1A-H6
F. Be able to discuss the components utilized with GMAW (gas metal arc welding) process.	2,3,4	5,6,7,12,13,20	
G. Be able to discuss metal inert gas welding activities such as arc spot welding, pulsed spray welding, and electrogas welding.	2,3,4	1,2,3,4,5,6,712,13,20	Science S1-H— A1,A2,A3,A4,A5,A6,A7, B3,B4,B5 PS-H— B1,B2,C1,C2,D1,D6,D7, E1,E2,E3,E4,F1,F2,G1, G2,G3,G4 ESS-H – B1,B2 SE-H— A1,A2,A11,B1,B2,B3,B4, B5,B6,C1,C2,C3,C4,C5, D1,D2,D3,D4,D5,D6

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Subchapter D. Construction Technology

§2525. Introduction

A. Competency Courses

1. Construction Technology;
2. Basic Wood Technology; and
3. Advanced Wood Technology.

B. Related Electives

1. General Technology Education;
2. Manufacturing Technology;
3. Material-Processes;
4. Basic Metal Technology;
5. Advanced Metal Technology;
6. Welding Technology;
7. Basic Technical Drafting;
8. Advanced Technical Drafting;
9. Architectural Drafting;
10. Basic Electricity/Electronics;
11. Energy, Power, and Transportation Technology;
12. Power Mechanics;
13. Physics of Technology I; and
14. Physics of Technology II.

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§2527. Focus Statement

A. The ability to select and use tools, materials, and processes is increasingly important in a technological work environment. Construction Technology emphasizes a strong foundation in:

1. Basic Wood Technology;
2. Construction Technology; and
3. Advanced Wood Technology, including:
   a. safety;
   b. tools;
   c. machines;
   d. processes; and
   e. materials used in manufacturing of wood products.

B. Construction Technology investigates all areas of the construction industry from planning to completion of light, heavy, industrial, and civil construction and the various careers associated with each area.

C. Basic Wood Technology is designed to teach the fundamentals of woodworking, beginning with hand tool experiences and progressing into the study and use of modern power tools and machines. Safety should be actively incorporated into all aspects of instruction. The knowledge should be applied through the development and construction of various projects.

D. Advanced Wood Technology is designed for students interested in improving their knowledge and experiences dealing with the materials, tools, and processes used in the manufacture of wood products. The course content centers around design, planning, and building of projects which will serve as a vehicle for learning and skill development.

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§2529. Construction Technology Benchmarks

A. Standard 13. Develop an understanding of the construction industry from the initial planning stage to the completion of light, heavy, industrial, and civil construction.

Benchmarks	Louisiana Foundation Skills	ITEA Standards for Technology Education	Academic Cross-Reference (Standard-Benchmark)
A. Develop an understanding of the technical requirements of construction.	1,3,4	1,2,3,7,8,9,20	English Language Arts ELA 1 – H1,H3,H4,H5 ELA 2 – H1,H2,H3,H4,H5,H6
B. Develop safe work habits in the laboratory.	1,3,4,5	1,2,3,5,6,7,20	ELA 3 – H1,H2,H3 ELA 4 – H1,H2,H3,H4,H5,H6
C. Develop an understanding of the four major types of construction.	1,3,4	1,2,3,4,5,6,7,20	ELA 5 – H1,H2,H3,H4,H5,H6 ELA 6 – H1 ELA 7 – H1,H2
D. Develop an understanding of the occupational requirements and opportunities in the construction industry.	1,3,5	1,2,3,4,5,6,7,8,9,10,11,12,13,20	Mathematics N – 1H,2H,3H,4H,5H,6H,7H M – 1H,2H,3H,4H G – 1H,2H,3H
E. Develop basic competencies in the use of various tools and equipment used in construction industries.	1,2,3	1,2,3,5,6,7,12,13,20	Social Studies G— 1A-H1,1B-H1,1D-H1,1D-H2, 1C-H2,1D-H3 E— 1A-H1,1A-H2,1A-H3,1B-H1, 1B-H2
F. Compute mathematical problems associated with the construction industry.	1,2,3,4	1,2,3,4,5,6,10,11,12,13,20	H— 1A-H6 C— 1A-H1
G. Discuss federal, state, and local laws pertaining to construction.	1,3,5	1,2,3,5,6,20	Science S1H – A1,A2,A3,A7 PS-H – C1,C3,D7,G4
H. Explore career opportunities associated with the construction industry.	1,2,3,4,5	1,2,3,5,7,8,10,20	LS-H – D4,E1 ESS-H – A1 SE-H – A1,A3,A4,A11,B1,B2,B3, B4,B5,B6,C1,C2,C3,C4, D1,D2,D3,D4,D5,D6

B. Standard 14. Explore the fundamentals of woodworking, beginning with hand tool experiences and progressing into the study and use of modern power tools and machines.

Benchmarks	Louisiana Foundation Skills	ITEA Standards for Technology Education	Academic Cross-Reference (Standard-Benchmark)
A. Develop an understanding of the woodworking technology laboratory physical plant, its layout, management, and safety procedures.	1,2,3,4	1,2,3,5,6,8,9, 10,12,13,19,20	English Language Arts ELA 1 – H1,H3,H4,H5 ELA 2 – H1,H2,H3,H4,H5,H6 ELA 3 – H1,H2,H3 ELA 4 – H1,H2,H3,H4,H5,H6 ELA 5 – H1,H2,H3,H4,H5,H6 ELA 6 – H1 ELA 7 – H1,H2 Mathematics N – 1H,2H,3H,4H,5H,6H,7H M – 1H,2H,3H,4H G – 1H,2H,3H D – 7H Social Studies G— 1A-H1,1B-H1,1D-H1,1D-H2, 1C-H2,1D-H3 E— 1A-H1,1A-H2,1A-H3,1B-H1, 1B-H2 H— 1A-H6 C— 1A-H1 Science S1-H – A1,A2,A3,A7 PS-H – C1,C3,D7,G4 LS-H – D4,E1 ESS-H – A1 SE-H – A1,A3,A4,A11,B1,B2, B3,B4,B5,B6,C1,C2, C3,C4,D1,D2,D3,D4, D5,D6
B. Display safety consciousness while working in the lab.	1,3,4,5	1,2,3,5,6,7,12, 13,19,20	
C. Be able to identify, select, and use the basic hand tools.	1,2,3,4,5	1,2,3,5,6,7,19,20	
D. Learn the selection process, principles of design, and basic drawing techniques involved in product planning.	1,2,3	1,2,3,4,5,6,7, 8,9,10,19,20	
E. Process stock using hand tools and machines in a reasonable manner by squaring, gluing, bending, veneering, and edging.	2,3,4	1,2,3,5,6,7,12,13,19,20	
F. Identify, select and install appropriate hardware according to project requirements.	2,3,4	1,2,3,7,8,19,20	
G. Demonstrate the skills necessary for safe operation of portable power tools and machine tools.	1,2,3,5	1,2,3,5,6,7,12,13,19,20	
H. Apply science and mathematics skills to problem solving.	2,3,4	1,2,3,10,11,12,19,20	

C. Standard 15. Develop an understanding of the advanced practices utilized in the manufacture of wood products.

Benchmarks	Louisiana Foundation Skills	ITEA Standards for Technology Education	Academic Cross-Reference (Standard-Benchmark)
A. Provide advanced experiences in the types, manufacture, and use of wood and wood-based products.	1,3,4,5	1,2,3,7,8,19,20	English Language Arts ELA 1 – H1,H3,H4,H5 ELA 2 – H1,H2,H3,H4,H5,H6 ELA 3 – H1,H2,H3 ELA 4 – H1,H2,H3,H4,H5,H6 ELA 5 – H1,H2,H3,H4,H5,H6 ELA 6 – H1 ELA 7 – H1,H2 Mathematics N – 1H,2H,3H,4H,5H,6H,7H M – 1H,2H,3H,4H G – 1H,2H,3H D – 7H Social Studies G— 1A-H1,1B-H1,1D-H1,1D-H2, 1C-H2,1D-H3 E— 1A-H1,1A-H2,1A-H3,1B-H1, 1B-H2 H— 1A-H6 C— 1A-H1 Science S1-H – A1,A2,A3,A7 PS-H – C1,C3,D7,G4 LS-H – D4,E1 ESS-H – A1 SE-H – A1,A3,A4,A11,B1,B2, B3,B4,B5,B6,C1,C2,C3, C4,D1,D2,D3,D4,D5,D6
B. Encourage students to appreciate and develop working drawings based on the elements of good design and efficient construction techniques.	1,2,3,4	1,2,3,8,9,10,19,20	
C. Develop an understanding of advanced material processes and construction techniques utilized in the manufacture of wood products.	1,3,4	1,2,3,4,5,6,7,11,12,13, 19,20	
D. Practice safe and efficient work habits.	1,3,5	1,2,3,5,6,7,19,20	
E. Demonstrate advanced skills in the use of hand, portable, and stationary power machines.	1,2,3,4,5	1,2,3,5,6,7,12, 13,19,20	
F. Discuss career opportunities within the woodworking industry.	1,3,5	1,2,3,4,5,6,7,8,9,10, 11,12,13,19,20	
G. Discuss developing technologies in wood products manufacturing.	1,3,4,5	1,2,3,4,5,6,7, 12,13,19,20	

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Subchapter E. Energy, Power, and Transportation Technology

§2533. Introduction

A. Competency Courses

1. Energy, Power and Transportation Technology;
2. Power Mechanics;
3. Physics of Technology I; and
4. Physics of Technology II.

B. Related Electives

1. General Technology Education;
2. Manufacturing Technology;
3. Materials and Processes;
4. Basic Metal Technology;
5. Advanced Metal Technology;
6. Welding Technology;
7. Basic Technical Drafting;
8. Advanced Technical Drafting;
9. Architectural Drafting;
10. Basic Electricity/Electronics; and
11. Advanced Electricity/Electronics.

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§2535. Focus Statement

A. This curriculum has been designed to facilitate teaching the course in two distinct parts. The first semester focuses on energy and power while the second semester focuses on transportation. The study of various power, energy and transportation systems and the technological, environmental, and societal impacts associated with them will be the focus.

B. Energy, Power, and Transportation. This technology investigates the sources of energy, as well as the methods of controlling, converting, and transmitting energy. The course is designed for students to understand the common and alternative sources of energy. Students will use terminology and units of measurement related to energy systems, as well as compare and evaluate past, present, and emerging energy systems.

C. Power Mechanics. This technology investigates in-depth exploration in the field of Power Mechanics. Of primary concern are the various power conversion and generation systems and the productive utilization of those systems. Students will study and develop basic competencies in working with mechanical systems, fluid power systems, electrical systems, and internal and external combustion systems.

D. Physics of Technology I and II. This course is designed to provide students with an understanding of the use of process skills as an integral part of science activities. Students will be provided the opportunity to develop those intellectual processes of inquiry and thought by which scientific phenomena are explained, measured, predicted, organized, and communicated. These experiences will serve to reinforce scientific concepts. Work-based learning strategies appropriate for this course include field trips, service learning, and job shadowing. This course and technology Student Association technical and leadership activities enhance skills essential for students interested in technical and engineering career fields.

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§2537. Energy, Power, and Transportation Technology Benchmarks

A. Standard 16. Develop an understanding of the various power, energy, and transportation systems and the technological, environmental, and societal impacts associated with them.

Benchmarks	Louisiana Foundation Skills	ITEA Standards for Technology Education	Academic Cross-Reference (Standard-Benchmark)
A. Investigate the sources of energy, as well as the methods of controlling, converting, and transmitting energy. B. Explore and understand the various systems, system components, and how they interact. C. Research related information and develop solutions to specific problems. D. Foster an understanding of common and alternative sources of energy, use of terminology, and units of measurement related to energy systems. E. Compare and evaluate past, present, and emerging energy systems, understand the fundamentals of the laws of thermodynamics and ways of changing energy. F. Explore and investigate the various technical means used to transport people and goods on land, water, air, and space. G. Develop a basic understanding of transportation systems and related occupations. H. Investigate the advantages and limitations of various transportation systems with implications toward future means of transportation.	1,2,3,4,5 2,3,4 1,2,3 3,4 1,2,3,4 1,2,3,4,5 1,3,5 1,2,3,4,5	1,2,3,5,11,12,13,16 1,2,3,4,5,6,7,11,12, 13,16 1,2,3,6,7,10,16 1,2,3,4,7,8,12,16 1,2,3,4,5,6,7,16 1,2,3,4,5,6,7,16,18 1,2,3,4,5,6,7,8,9,10, 11,12,13,18 1,2,3,4,5,6,7, 13,16,18	English Language Arts ELA 1 – H1,H3,H4,H5 ELA 2 – H1,H2,H3,H4,H5,H6 ELA 3 – H1,H2,H3 ELA 4 – H1,H2,H3,H4,H5,H6 ELA 5 – H1,H2,H3,H4,H5,H6 ELA 6 – H1 ELA 7 – H1,H2 Mathematics N – 1H,2H,3H,4H,5H,6H,7H A – 1H,2H,3H,4H M – 1H,2H,3H,4H G – 1H,2H,3H,4H,5H,6H Social Studies G— 1A-H1,1A-H2,1D-H1,1D-H2, 1D-H3,1D-H4,1D-H5 E— 1A-H1,1A-H2,1A-H3,1A-H5, 1A-H6,1A-H7,1B-H1,1B-H2, 1B-H4,1B-H5,1B-H6,1D-H3 H— 1A-H1,1A-H2,1A-H5,1A-H6 Science S1-H – A1,A2,A3,A4,A5,A6,A7, B3,B4,B5, PS-H – B1,B2,B3,C1,C2,C6,C7, D1,D6,D7,E1,E2,E3,E4, F1,F2,G1,G2,G3,G4 ESS-H – A1,A2,A3,A5,A6,B1,B2 SE-H – A1,A2,A11,B1,B2, B3,B4,B5,B6,C1,C2, C3,C4,C5,D1,D2,D3, D4,D5,D6

B. Standard 17. Provide students with the opportunity for in-depth exploration of the field of power mechanics, of the various power conversion and generator systems, and the productive utilization of those systems.

Benchmarks	Louisiana Foundation Skills	ITEA Standards for Technology Education	Academic Cross-Reference (Standard-Benchmark)
A. Develop an awareness of the impact of power mechanics systems on our modern technological society. B. Develop and provide safety information essential for working with power mechanic systems. C. Develop an understanding of the various power systems and their relationship to the various forms of energy and transportation systems. D. Foster an understanding of the fundamental principles of mathematics and physics applicable to power mechanics systems. E. Conduct research and development projects and write technical papers describing their projects. PRINCIPLES OF TECHNOLOGY I, II Refer to Science Standards and Benchmarks guide for these two subjects.	1,3,5 1,3,5 1,3,4 3,4 1,3	1,2,3,4,5,6,7,16 1,2,3,5,6,7,12,13,16 1,2,3,4,5,6,7,8,9,10, 11,12,13,16 1,2,3,10,11,12,16 1,2,3,7,8,9,10,11, 12,13,16	English Language Arts ELA 1 – H1,H3,H4,H5 ELA 2 – H1,H2,H3,H4,H5,H6 ELA 3 – H1,H2,H3 ELA 4 – H1,H2,H3,H4,H5,H6 ELA 5 – H1,H2,H3,H4,H5,H6 ELA 7 – H1,H2 Mathematics N – 1H,2H,3H,4H,5H,6H,7H A – 1H,2H,3H,4H M – 1H,2H,3H,4H G – 1H,2H,3H,4H,5H,6H Social Studies G – 1D-H1,1D-H2,1D-H4,1D-H5 E – 1A-H1,1A-H2,1A,H3 H – 1A-H2,1A-H5,1A-H6 Science S1-H— A1,A2,A3,A4,A5,A6,A7, B3,B4,B5 PS-H— B1,B2,B3,D1,D6,D7,E1, E2,E3,E4,F1,F2,G1,G2, G3,G4 ESS-H— A1,A2,A3,A5,A6,B1,B2 SE-H— A1,A2,A11,B1,B2,B3,B4, B5,B6,C1,C2,C3,C4,C5, D1,D2,D3,D4,D5,D6

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EDUCATION
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Subpart 3. Appendices

Chapter 27. Appendix A. Academic Cross References

§2701. Introduction

A. This Chapter 27 includes a list of the content standards and benchmarks that have been referenced in this Part. All referenced content area standards and benchmarks are for students in grades 6-8, indicated as "M" for middle school, and grades 9-12, indicated as "H" for high school.

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§2703. English Language Arts (ELA)

A. Standard One. Students read, comprehend, and respond to a range of materials, using a variety of strategies for different purposes.

ELA-1-M1	Using knowledge of word meaning and developing basic and technical vocabulary using a variety of strategies (e.g., context clues affixes, etymology, dictionary.
ELA-1-M3	Reading, comprehending, and responding to written, spoken, and visual texts in extended passages.
ELA-1-M4	Interpreting texts with supportive explanations to generate connections to real-life situations and other texts (e.g., business, technical, scientific).
ELA-1-M5	Using purposes for reading (e.g., enjoying, learning, researching, problem solving) to achieve a variety of objectives.
ELA-1-H1	Using knowledge of word meaning and extending basic and technical vocabulary employing a variety of strategies (e.g., context clues, affixes, etymology, dictionary, thesaurus).
ELA-1-H2	Analyzing the effects of complex literary devices (e.g., figurative language, flash-back, foreshadowing, dialogue, irony) and complex elements (e.g., setting, plot, character, theme, mood, style) on a selection.
ELA-1-H3	Reading, comprehending, and responding to extended, complex written, spoken, and visual texts.
ELA-1-H4	Interpreting complex texts with supportive explanations to generate connections to real-life situations and other texts (e.g., business, technical, scientific).
ELA-1-H5	Using the various purposes for reading (e.g., enjoying, learning, researching, problem-solving) to complete complex projects.

B. Standard Two. Students write competently for a variety of purposes and audiences.

ELA-2-M1	Writing a composition that clearly implies a central idea with supporting details in a logical, sequential order.
ELA-2-M2	Using language, concepts, and ideas that show an awareness of the intended audience and/or purpose (e.g., classroom, real-life, workplace) in developing complex compositions.
ELA-2-M3	Applying the steps of the writing process.
ELA-2-M4	Using narration, description, exposition, and persuasion to develop various modes of writing (e.g., notes, stories, poems, letters, essays, logs).
ELA-2-M5	Recognizing and applying literary devices (e.g., figurative language, symbolism, dialogue).
ELA-2-M6	Writing as a response to texts and life experiences (e.g., letters, journals, lists).
ELA-2-H1	Writing a composition of complexity that clearly implies a central idea with supporting details in a logical, sequential order.
ELA-2-H2	Using language, concepts, and ideas that show an awareness of the intended audience and/or purpose (e.g., classroom, real-life, workplace) in developing complex compositions.
ELA-2-H3	Applying the steps of the writing process, emphasizing revising and editing in final drafts.
ELA-2-H4	Using narration, description, exposition, and persuasion to develop various modes of writing (e.g., notes, stores, poems, letters, essays, editorials, critical analyses, logs).
ELA-2-H5	Recognizing and applying literary devices (e.g., figurative language, symbolism, dialogue) and various stylistic elements (e.g., diction, sentence structure, voice tone).
ELA-2-H6	Writing as a response to texts and life experiences (e.g., technical writing, resumés).

C. Standard Three. Students communicate using standard English grammar usage, sentence structure, punctuation, capitalization, spelling, and handwriting.

ELA-3-M1	Writing legibly.
ELA-3-M2	Demonstrating use of punctuation (e.g., comma, apostrophe, colon, semicolon, quotation marks, dashes, parentheses), capitalization, and abbreviations.
ELA-3-M3	Demonstrating standard English structure and usage.
ELA-3-M4	Demonstrating understanding of the parts of speech to make choices for writing.
ELA-1-M5	Spelling accurately using strategies and resources (e.g., glossary, dictionary, thesaurus, spell check) when necessary.
ELA-3-H1	Writing legibly.
ELA-3-H2	Using the grammatical and mechanical conventions of standard English
ELA-3-H3	Spelling accurately using strategies and resources (e.g., glossary, dictionary, thesaurus, spell check) when necessary.

D. Standard Four. Students demonstrate competence in speaking and listening as tools for learning and communicating.

ELA-4-M1	Speaking intelligibly, using standard English pronunciation and diction.
ELA-4-M2	Giving and following directions/procedures.
ELA-4-M3	Using the features of speaking (e.g., audience analysis, message construction, delivery, interpretation of feedback) when giving rehearsed and unrehearsed presentations.
ELA-4-M4	Speaking and listening for a variety of audiences (e.g., classroom, real-life, workplace) and purposes (e.g., awareness, concentration, enjoyment, information, problem solving).
ELA-4-M5	Listening and responding to a wide variety of media (e.g., music, TV, film, speech).
ELA-4-M6	Participating in a variety of roles in group discussions (e.g., active listener, contributor, discussion leader, facilitator, recorder).
ELA-4-H1	Speaking intelligibly, using standard English pronunciation and diction.
ELA-4-H2	Giving and following directions/procedures.
ELA-4-H3	Using the features of speaking (e.g., audience analysis, message construction, delivery, interpretation of feedback) when giving prepared and impromptu presentations.
ELA-4-H4	Speaking and listening for a variety of audiences (e.g., classroom, real-life, workplace) and purposes (e.g., awareness, concentration, enjoyment, information, problem solving).
ELA-4-H5	Listening and responding to a wide variety of media (e.g., music, TV, film, speech, CD-ROM).
ELA-4-H6	Participating in a variety of roles in group discussions (e.g., active listener, contributor, discussion leader, facilitator, recorder, mediator).

E. Standard Five. Students locate, select, and synthesize information from a variety of texts, media, references, and technological sources to acquire and communicate knowledge.

ELA-5-M1	Recognizing and using organizational features of printed text, other media, and electronic information (e.g., parts of texts, alphabetizing, captions, legends, microprint, laser discs, hypertext, CD-ROM, pull-down menus, keyword searches, icons, passwords, entry menu features).
ELA-5-M2	Locating and evaluating information sources (e.g., print materials, databases, CD-ROM references, Internet information, electronic reference works, community and government data, television and radio resources, audio and visual materials).
ELA-5-M3	Locating, gathering, and selecting information using graphic organizers, outlining, note taking, summarizing, interviewing, and surveying to produce documented texts and graphics.
ELA-5-M4	Using available technology to produce, revise, and publish a variety of works.
ELA-5-M5	Citing references using various formats (e.g., endnotes, bibliography).
ELA-5-M6	Interpreting graphic organizers (e.g., charts/graphs, tables/schedules, diagrams/maps, flowcharts).
ELA-5-H1	Recognizing and using organizational features of printed text, other media, and electronic information (e.g., parts of texts, citations, endnotes, bibliographic references, microprint, laser discs, hypertext, CD-ROM, keyword searches, bulletin boards, e-mail).
ELA-5-H2	Locating and evaluating information sources (e.g., print materials, databases, CD-ROM references, Internet information, electronic reference works, community and government data, television and radio resources, audio and visual materials).
ELA-5-H3	Accessing information and conducting research using graphic organizers, outlining, note taking, summarizing, interviewing, and surveying to produce documented texts and graphics.
ELA-5-H4	Using available technology to produce, revise, and publish a variety of works.
ELA-5-H5	Citing references using various formats (e.g., parenthetical citations, endnotes, bibliography).
ELA-5-H6	Interpreting graphic organizers (e.g., charts/graphs, tables/schedules, diagrams/maps, organizational charts/flowcharts.)

F. Standard Six. Students read, analyze, and respond to literature as a record of life experiences.

ELA-6-H1	Identifying, analyzing, and responding to United States and world literature that represents the experiences and traditions of diverse ethnic groups.

G. Standard Seven. Students apply reasoning and problem solving skills to their reading, writing, speaking, listening, viewing, and visually representing.

ELA-7-M1	Using comprehension strategies (e.g., sequencing, predicting, drawing conclusions, comparing and contrasting, making inferences, determining main ideas, summarizing, recognizing literary devices, paraphrasing) in contexts.
ELA-7-M2	Problem solving by using reasoning skills, life experiences, accumulated knowledge, and relevant available information.
ELA-7-M3	Analyzing the effects of an author's purpose and point of view.
ELA-7-M4	Distinguishing fact from opinion and probability, skimming and scanning for facts, determining cause and effect, inductive and deductive reasoning, generating inquiry, and making connections with real-life situations across texts.
ELA-7-H1	Using comprehension strategies (e.g., predicting, drawing conclusions, comparing, and contrasting, making inferences, determining main ideas, summarizing, recognizing literary devices, paraphrasing) in contexts.
ELA-7-H2	Problem solving by analyzing, prioritizing, categorizing, and evaluating; incorporating life experiences; and using available information.
ELA-7-H3	Analyzing the effects of an author's life, culture, and philosophical assumptions and an author's purpose and point of view.
ELA-7-H4	Distinguishing fact from opinion, skimming and scanning for facts, determining cause and effect, generating inquiry, and making connections with real-life situations across texts.

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§2705. Mathematics

A. Number and Number Relations Strand (N). In problem-solving investigations, students demonstrate an

understanding of the real number system and communicate the relationships within that system using a variety of techniques and tools.

N-1-M	Demonstrating that a rational number can be expressed in many forms, and selecting an appropriate form for a given situation (e.g., fractions, decimals, and percents).
N-2-M	Demonstrating number sense and estimation skills to describe, order, and compare rational numbers (e.g., magnitude, integers, fractions, decimals, and percents).
N-3-M	Reading, writing, representing, and using rational numbers in a variety of forms (e.g., integers, mixed numbers, and improper fractions).
N-4-M	Demonstrating a conceptual understanding of the meaning of the basic arithmetic operations (add, subtract, multiply, and divide) and their relationships to each other.
N-5-M	Applying an understanding of rational numbers and arithmetic operations to real-life situations.
N-6-M	Constructing, using, and explaining procedures to compute and estimate with rational number employing mental math strategies.
N-7-M	Selecting and using appropriate computational methods and tools for given situations involving rational numbers (e.g., estimation, or exact computation using mental arithmetic, calculator, computer, or paper and pencil).
N-1-H	Demonstrating an understanding of the real number system.
N-2-H	Demonstrating that a number can be expressed in many forms, and selecting an appropriate form for a given situation (e.g., fractions, decimals, percents, and scientific notation).
N-3-H	Using number sense to estimate and determine if solutions are reasonable.
N-4-H	Determining whether an exact or approximate answer is necessary.
N-5-H	Selecting and using appropriate computational methods and tools for given situations (e.g., estimation, or exact computation using mental arithmetic, calculator, symbolic manipulator, or paper and pencil).
N-6-H	Applying ratios and proportional thinking in a variety of situations (e.g., finding a missing term of a proportion).
N-7-H	Justifying reasonableness of solutions and verifying results.

B. Algebra Strand (A). In problem-solving investigations, students demonstrate an understanding of concepts and processes that allow them to analyze, represent, and describe relationships among variable quantities and to apply algebraic methods to real-world situations.

A-1-M	Demonstrating a conceptual understanding of variables, expressions, equations, and inequalities (e.g., symbolically represent real-world problems as linear terms, equations, or inequalities).
A-2-M	Modeling and developing methods for solving equations and inequalities (e.g., using charts, graphs, manipulatives, and/or standard algebraic procedures).
A-3-M	Representing situations and number patterns with tables, graphs, and verbal and written statements, while exploring the relationships among these representations (e.g., multiple representations for the same situation).
A-4-M	Analyzing tables and graphs to identify relationships exhibited by the data and making generalizations based upon these relationships.
A-5-M	Demonstrating the connection or algebra to the other strands and to real-life situations.
A-1-H	Demonstrating the ability to translate real-world situations (e.g., distance versus time relationships, population growth functions for diseases, growth of minimum wage, auto insurance tables) into algebraic expressions, equations, and inequalities and vice versa.
A-2-H	Recognizing the relationship between operations involving real numbers and operations involving algebraic expressions.
A-3-H	Using tables and graphs as tools to interpret algebraic expressions, equations, and inequalities.
A-4-H	Solving algebraic equations and inequalities using a variety of techniques with the appropriate tools (e.g., hand-held manipulatives, graphing calculator, symbolic manipulator, or pencil and paper).

C. Measurement Strand (M). In problem-solving investigations, students demonstrate an understanding of the concepts, processes, and real-life applications of measurements.

M-1-M	Applying the concepts of length, area, surface area, volume capacity, weight, mass, money, time, temperature, and rate to real-world experiences.
M-2-M	Demonstrating an intuitive sense of measurement (e.g., estimating and determining reasonableness of measures).
M-3-M	Selecting appropriate units and tools for tasks by considering the purpose for the measurement and the precision required for the task (e.g., length of a room in feet rather than inches).
M-4-M	Using intuition and estimation skills to describe, order, and compare formal and informal measures (e.g., ordering cup, pint, quart, gallon; comparing a meter to a yard).
M-5-M	Converting from one unit of measurement to another within the same system. (Comparisons between systems, customary and metric, should be based on intuitive reference points, not formal computation.)
M-6-M	Demonstrating the connection of measurement to the other strands and to real-life situations.
M-1-H	Selecting and using appropriate units, techniques, and tools to measure quantities in order to achieve specified degrees of precision, accuracy, and error (or tolerance) of measurements.
M-2-H	Demonstrating an intuitive sense of measurement (e.g., estimating and determining reasonableness of results as related to area, volume, mass, rate, and distance).
M-3-H	Estimating, computing, and applying physical measurement using suitable units (e.g., calculate perimeter and area of plane figures, surface area and volume of solids presented in real-world situations).
M-4-H	Demonstrating the concept of measurement as it applies to real-world experiences.

D. Geometry Strand (G). In problem-solving investigations, students demonstrate an understanding of geometric concepts and applications involving the one-, two-, and three-dimensional geometry, and justify their findings.

G-1-M	Using estimation skills to describe, order, and compare geometric measures.
G-2-M	Identifying describing, comparing, constructing, and classifying geometric figures and concepts.
G-3-M	Making predictions regarding transformations of geometric figures (e.g., make predictions regarding translations, reflections, and rotations of common figures).
G-4-M	Constructing two- and three-dimensional models.
G-5-M	Making and testing conjectures about geometric shapes and their properties.
G-6-M	Demonstrating an understanding of the coordinate system (e.g., locate points, identify coordinates, and graph points in a coordinate plane to represent real-world situations).
G-7-M	Demonstrating the connection of geometry to the other strands and to real-life situations (e.g., applications of the Pythagorean Theorem).
G-1-H	Identifying, describing, comparing, constructing, and classifying geometric figures in two and three dimensions using technology where appropriate to explore and make conjectures about geometric concepts and figures.
G-2-H	Representing and solving problems using geometric models and the properties of those models (e.g., Pythagorean Theorem of formulas involving radius, diameter, and circumference).
G-3-H	Solving problems using coordinate methods, as well as synthetic and transformational methods (e.g., transform on a coordinate plane a design found in real-life situations).
G-4-H	Using inductive reasoning to predict, discover, and apply geometric properties and relationships (e.g., patty paper constructions, cum of the angles in a polygon).
G-5-H	Classifying figures in terms of congruence and similarity and applying these relationships.
G-6-H	Demonstrating deductive reasoning and mathematical justification (e.g., oral explanation, informal proof, and paragraph proof).

E. Data, Discrete Math, and Probability Strand (D). In problem-solving investigations, students discover trends, formulate conjectures regarding cause-and-effect relationships, and demonstrate critical thinking skills in order to make informed decisions.

D-3-H	Using simulations to estimate probabilities (e.g., lists and tree diagrams).
D-7-H	Making inferences from data that are organized in charts, tables, and graphs (e.g., pictograph; bar, line, or circle graph; stem-and-leaf plot or scatter plot).
D-8-H	Using logical thinking procedures, such as flow charts, Venn diagrams, and truth tables.
D-9-H	Using discrete math to model real-life situations (e.g., fair games or elections, map coloring).

F. Patterns, Relations, and Functions (P). In problem-solving investigations, students demonstrate understanding of patterns, relations, and functions that represent and explain real-world situations.

P-1-H	Modeling the concepts of variables, functions, and relations as they occur in the real world and using the appropriate notation and terminology.
P-2-H	Translating between tabular, symbolic, or graphic representations of functions.
P-3-H	Recognizing behavior of families of elementary functions, such as polynomial, trigonometric, and exponential functions, and, where appropriate, using graphing technologies to represent them.
P-4-H	Analyzing the effects of changes in parameters (e.g., coefficients and constants) on the graphs of functions, using technology whenever possible.
P-5-H	Analyzing real-world relationships that can be modeled by elementary functions.

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§2707. Social Studies

A. Geography Strand: Physical and Cultural Systems (G). Students develop a spatial understanding of Earth's surface and the processes that shape it, the connections between people and places, and the relationship between man and his environment.

Benchmark A. The World in Spatial Terms	
G-1A-M1	Identifying and describing the characteristics, functions, and applications of various types of maps and other geographic representations, tools, and technologies.
G-1A-M2	Interpreting and developing maps, globes, graphs, charts, models, and databases to analyze spatial distributions and patterns.
G-1A-H1	Using geographic representations, tools, and technologies to explain, analyze, and solve geographic problems.
G-1A-H2	Organizing geographic information and answering complex questions by formulating mental maps of places and regions.

Benchmark B. Places and Regions	
G-1B-H1	Determining how location and social, cultural, and economic processes affect the features and significance of places.

Benchmark C. Physical and Human Systems	
G-1C-H1	Analyzing the ways in which Earth's dynamic and interactive physical processes affect different regions of the world.
G-1C-H2	Determining the economic, political, and social factors that contribute to human migration and settlement patterns and evaluating their impact on physical and human systems.

Benchmark D. Environment and Society	
G-1D-M1	Analyzing and evaluating the effects of human actions upon the physical environment.
G-1D-M2	Explaining and giving examples of how characteristics of different physical environments affect human activities.
G-1D-M4	Identifying problems that relate to contemporary geographic issues and researching possible solutions.

G-1D-H1	Describing and evaluating the ways in which technology has expanded the human capability to modify the physical environment.
G-1D-H2	Examining the challenges placed on human systems by the physical environment and formulating strategies to deal with these challenges.
G-1D-H3	Analyzing the relationship between natural resources and the exploration, colonization, settlement, and uses of land in different regions of the world.
G-1D-H4	Evaluating policies and programs related to the use of natural resources.
G-1D-H5	Developing plans to solve local and regional geographic problems related to contemporary issues.

B. Civics Strand: Citizenship and Government (C). Students develop an understanding of the structure and purposes of government, the foundations of the American democratic system, and the role of the United States in the world, while learning about the rights and responsibilities of citizenship.

Benchmark A. Structure and Purposes of Government	
C-1A-H1	Analyzing the necessity and purposes of politics and government and identifying examples of programs that fit within those purposes.

C. Economics Strand: Interdependence and Decision Making (E). Students develop an understanding of fundamental economic concepts as they apply to the interdependence and decision making of individuals, households, businesses, and governments in the United States and the world.

Benchmark A. Fundamental Economic Concepts	
E-1A-M1	Describing how the scarcity of resources necessitates decision making at both personal and societal levels.
E-1A-M5	Giving examples of how skills and knowledge increase productivity and career opportunities.
E-1A-M6	Describing the essential differences in the production and allocation of goods and services in traditional, command, and market systems.
E-1A-H1	Analyzing the impact of the scarcity of productive resources and examining the choices and opportunity cost that result.
E-1A-H2	Analyzing the roles that production, distribution, and consumption play in economic decisions.
E-1A-H3	Applying the skills and knowledge necessary in making decisions about career options.
E-1A-H4	Comparing and evaluating economic systems.
E-1A-H5	Explaining the basic features of market structures and exchanges.
E-1A-H6	Analyzing the roles of economic institutions, such as corporations and labor unions, that compose economic systems.

Benchmark B. Individuals, Households, Businesses, and Governments	
E-1B-M1	Explaining the role of supply and demand in a competitive market system.
E-1B-M4	Identifying the costs and benefits of government policies on competitive markets.

Benchmark B. Individuals, Households, Businesses, and Governments	
E-1B-M5	Identifying different types of taxes and user fees and predicting their consequences.
E-1B-M6	Determining the reasons for trade between nations, identifying costs and benefits, and recognizing the worldwide interdependence that results.
E-1B-H1	Identifying factors that cause changes in supply and demand.
E-1B-H2	Analyzing how changes in supply and demand, price, incentives, and profit influence production and distribution in a competitive market system.
E-1B-H3	Analyzing the impact of government taxation, spending, and regulation on different groups in a market economy.
E-1B-H4	Analyzing the causes and consequences of worldwide economic interdependence.
E-1B-H5	Evaluating the effects of domestic policies on international trade.
E-1B-H6	Analyzing Louisiana's role in the national and world economies.

Benchmark C. The Economy as a Whole	
E-1C-H2	Explaining how interest rates, investments, and inflation/deflation impact the economy.

D. History Strand: Time, Continuity, and Change (H). Students develop a sense of historical time and historical perspective as they study the history of their community, state, nation, and world.

Benchmark A. Historical Thinking Skills	
H-1A-M1	Describing chronological relationships and patterns.
H-1A-M2	Demonstrating historical perspective through the political, social, and economic context in which an event or idea occurred.
H-1A-M3	Analyzing the impact that specific individuals, ideas, events, and decisions had on the course of history.
H-1A-M4	Analyzing historical data using primary and secondary sources.
H-1A-H1	Applying key concepts, such as chronology and conflict, to explain and analyze patterns of historical change and continuity.
H-1A-H2	Explaining and analyzing events, ideas, and issues within a historical context.
H-1A-H3	Interpreting and evaluating the historical evidence presented in primary and secondary sources.
H-1A-H4	Utilizing knowledge of facts and concepts drawn from history and methods of historical inquiry to analyze historical and contemporary issues.
H-1A-H5	Conducting research in efforts to analyze historical questions and issues.
H-1A-H6	Analyzing cause-effect relationships.

Benchmark B. United States History **Era6: The Development of the Industrial United States (1870-1900)**	
H-1B-H6	Analyzing the development of industrialization and examining its impact on American society.
H-1B-H16	Explaining the major changes that have resulted as the United States has moved from an industrial to an information society.

Benchmark B. United States History Era6: The Development of the Industrial United States (1870-1900)	
H-1B-H17	Analyzing developments and issues in contemporary American society.

Benchmark C. World History Era9: The 20th Century Since 1945 (1945 to the Present)	
H-1C-H15	Explaining the worldwide significance of major political, economic, social, cultural, and technological, developments and trends.

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§2709. Science

A. Science as Inquiry Strand: (SI). Students will *do* science by engaging in partial and full inquiries that are within their developmental capabilities.

Benchmark A. The Abilities Necessary to do Scientific Inquiry	
SI-M-A1	Identifying questions that can be used to design a scientific investigation.
SI-M-A2	Designing and conducting a scientific investigation.
SI-M-A3	Using mathematics and appropriate tools and techniques to gather, analyze, and interpret data.
SI-M-A4	Developing descriptions, explanations, and graphs using data.
SI-M-A5	Developing models and predictions using the relationships between data and explanations.
SI-M-A6	Comparing alternative explanations and predictions.
SI-M-A7	Communicating scientific procedures, information, and explanations.
SI-M-A8	Utilizing safety procedures during scientific investigations.
SI-H-A1	Identifying questions and concepts that guide scientific investigations.
SI-H-A2	Designing and conducting scientific investigations.
SI-H-A3	Using technology and mathematics to improve investigations and communications.
SI-H-A4	Formulating and revising scientific explanations and models using logic and evidence.
SI-H-A5	Recognizing and analyzing alternative explanations and models.
SI-H-A6	Communicating and defending a scientific argument.
SI-H-A7	Utilizing science safety procedures during scientific investigations.

Benchmark B. Understanding Scientific Inquiry	
SI-M-B1	Recognizing that different kinds of questions guide different kinds of scientific investigations.
SI-M-B2	Communicating that current scientific knowledge guides scientific investigations.
SI-M-B3	Understanding that mathematics, technology and scientific techniques used in an experiment can limit or enhance the accuracy of scientific knowledge.

Benchmark B. Understanding Scientific Inquiry	
SI-M-B4	Using data and logical arguments to propose, modify, or elaborate on principles and models.
SI-M-B5	Understanding that scientific knowledge is enhanced through peer review, alternative explanations, and constructive criticism.
SI-H-B2	Communicating that scientists conduct investigations for a variety of reasons, such as exploration of new areas, discovery of new aspects of the natural world, confirmation of prior investigations, evaluation of current theories, and comparison of models and theories.
SI-H-B3	Communicating that scientists rely on technology to enhance the gathering and manipulation of data.
SI-H-B4	Analyzing a proposed explanation of scientific evidence according to the following criteria: follow a logical structure; follow rules of evidence; allow for questions and modifications; and is based on historical and current scientific knowledge.
SI-H-B5	Communicating that the results of scientific inquiry, new knowledge, and methods emerge from different types of investigations and public communication among scientists.

B. Physical Science Strand (PS). Students will develop an understanding of the characteristics and interrelationships of matter and energy in the physical world.

1. Grades 6 - 8

Benchmark A. Properties and Changes of Properties in Matter	
PS-M-A9	Identifying elements and compounds found in common foods, clothing, household materials, and automobiles.

Benchmark B. Motions and Forces	
PS-M-B1	Describing and graphing the motions of objects.
PS-M-B2	Recognizing different forces and describing their effects (gravity, electrical, magnetic).
PS-M-B3	Understanding that, when an object is not being subjected to a force, it will continue to move at a constant speed and in a straight line.

Benchmark C. Transformations of Energy	
PS-M-C1	Identifying and comparing the characteristics of different types of energy.
PS-M-C2	Understanding the different kinds of energy transformations and the fact that energy can be neither destroyed nor created.
PS-M-C3	Understanding that the sun is a major source of energy and that energy arrives at the Earth's surface as light with a range of wavelengths.
PS-M-C6	Describing the types of energy that can be involved, converted, or released in electrical circuits.
PS-M-C7	Understanding that energy is involved in chemical reactions.
PS-M-C8	Comparing the uses of different energy resources and their effects upon the environment.

2. Grades 9 - 12

Benchmark B. Atomic Structure	
PS-H-B1	Describing the structure of the atom and identifying and characterizing the particles that compose it (including the structure and properties of isotopes).
PS-H-B2	Describing the nature and importance of radioactive isotopes and nuclear reactions (fission, fusion, radioactive decay).
PS-H-B3	Understanding that an atom's electron configuration, particularly that of the outermost electrons, determines the chemical properties of that atom.

Benchmark C. The Structure and Properties of Matter	
PS-H-C1	Distinguishing among elements, compounds, and/or mixtures.
PS-H-C2	Discovering the patterns of physical and chemical properties found on the periodic table of the elements.
PS-H-C6	Recognizing that carbon atoms can bond to one another in chains, rings, and branching networks to form a variety of structures.
PS-H-C7	Using the kinetic theory to describe the behavior of atoms and molecules during the phase changes and to describe the behavior of matter in its different phases.

Benchmark D. Chemical Reactions	
PS-H-D1	Observing and describing changes in matter and citing evidence of chemical change.
PS-H-D6	Comparing and contrasting the energy changes that accompany changes in matter.
PS-H-D7	Identifying important chemical reactions that occur in living systems, the home, industry, and the environment.

Benchmark E. Forces and Motion	
PS-H-E1	Recognizing the characteristics and relative strengths of the forces of nature (gravitational, electrical, magnetic, nuclear).
PS-H-E2	Understanding the relationship of displacement, time, rate of motion, and rate of change of motion; representing rate and changes of motion mathematically and graphically.
PS-H-E3	Understanding effects of forces on changes in motion as explained by Newtonian mechanics.
PS-H-E4	Illustrating how frame of reference affects our ability to judge motion.

Benchmark F. Energy	
PS-H-F1	Describing and representing relationships among energy, work, power, and efficiency.
PS-H-F2	Applying the universal law of conservation of matter, energy, and momentum, and recognizing their implications.

Benchmark G. Interactions of Energy and Matter	
PS-H-G1	Giving examples of the transport of energy through wave action.

Benchmark G. Interactions of Energy and Matter	
PS-H-G2	Analyzing the relationship and interaction of magnetic and electrical fields and the forces they produce.
PS-H-G3	Characterizing and differentiating electromagnetic and mechanical waves and their effects on objects as well as humans.
PS-H-G4	Explaining the possible hazards of exposure to various forms and amounts of energy.

C. Earth Science Strand (ESS). Students will develop an understanding of the properties of Earth's materials, the structure of the Earth's system, the Earth's history, and the Earth's place in the universe. (WARNING: Benchmarks for grades 9-12 need to be addressed if Earth Science is not offered at the high school level.)

1. Grades 6-8

Benchmark A. Structure of the Earth	
ESS-M-A1	Understanding that the Earth is layered by density with an inner and outer core, a mantle, and a thin outer crust.
ESS-M-A2	Understanding that the Earth's crust and solid upper mantle are diving plates that move in response to convection currents (energy transfers) in the mantle.
ESS-M-A3	Investigating the characteristics of earthquakes and volcanos and identifying zones where they may occur.
ESS-M-A4	Investigating how soils are formed from weathered rock and decomposed organic material.
ESS-M-A5	Identifying the characteristics and uses of minerals and rocks and recognizing that rocks are mixtures of minerals.
ESS-M-A6	Explaining the processes involved in the rock cycle.

Benchmark B. Earth History	
ESS-M-B1	Investigating how fossils show the development of life over time.
ESS-M-B2	Devising a model that demonstrates supporting evidence that the Earth has existed for a vast period of time.

Benchmark C. Earth in the Solar System	
ESS-M-C8	Understanding that space exploration is an active area of scientific and technological research and development.

2. Grades 9-12

Benchmark A. Energy in the Earth System	
ESS-H-A1	Investigating the methods of energy transfer and identifying the sun as the major source of energy for most of the Earth's systems.
ESS-H-A2	Modeling the seasonal changes in the relative position and appearance of the sun and inferring the consequences with respect to the Earth's temperature.
ESS-H-A3	Explaining fission and fusion in relation to the Earth's internal and external heat sources.

ESS-H-A5	Demonstrating how the sun's radiant energy causes convection currents within the atmosphere and the oceans.

Benchmark B. Geochemical Cycles	
ESS-H-B1	Illustrating how stable chemical atoms or elements are recycled through the solid earth, oceans, atmosphere, and organisms.
ESS-H-B2	Demonstrating Earth's internal and external energy sources as forces in moving chemical atoms or elements.

D. Science and the Environment Strand (SE). In learning environmental science, students will develop an appreciation of the natural environment, learn the importance of environmental quality, and acquire a sense of stewardship. As consumers and citizens, they will be able to recognize how our personal, professional, and political actions affect the natural world.

Benchmark A. Ecological Systems and Interactions	
SE-M-A1	Demonstrating knowledge that an ecosystem includes living, and nonliving factors and that humans are an integral part of ecosystems.
SE-M-A2	Demonstrating an understanding of how carrying capacity and limiting factors affect plant and animal populations.
SE-H-A1	Demonstrating an understanding of the functions of Earth's major ecological systems.
SE-H-A2	Investigating the flow of energy in ecological systems.
SE-H-A9	Demonstrating an understanding of influencing factors of biodiversity.
SE-H-A10	Explaining that all species represent a vital link in a complex web of interaction.
SE-H-A11	Understanding how pollutants can affect living systems.

Benchmark B. Resources and Resource Management	
SE-H-B1	Explaining the relationships between renewable and nonrenewable resources.
SE-H-B2	Comparing and contrasting conserving and preserving resources.
SE-H-B3	Recognizing that population size and geographic and economic factors result in the inequitable distribution of the Earth's resources.
SE-H-B4	Comparing and contrasting long- and short-term consequences of resource management.
SE-H-B5	Analyzing resource management.
SE-H-B6	Recognizing that sustainable development is a process of change in which resource use, investment direction, technological development, and institutional change meet society's present as well as future needs.

Benchmark C. Environmental Awareness and Protection	
SE-H-C1	Evaluating the dynamic interaction of land, water, and air and its relationship to living things in maintaining a healthy environment.
SE-H-C2	Evaluating the relationships between quality of life and environmental quality.

Benchmark C. Environmental Awareness and Protection	
SE-H-C3	Investigating and communicating how environmental policy is formed by the interaction of social, economic, technological, and political considerations.
SE-H-C4	Demonstrating that environmental decisions include analyses that incorporate ecological, health, social, and economic factors.
SE-H-C5	Analyzing how public support affects the creation and enforcement of environmental laws and regulations.

Benchmark D. Personal Choices and Responsible Actions	
SE-H-D1	Demonstrating the effects of personal choices and actions on the natural environment.
SE-H-D2	Analyzing how individuals are capable of reducing and reversing their impact on the environment through thinking, planning, education, collaboration, and action.
SE-H-D3	Demonstrating that the most important factor in prevention and control of pollution is education.
SE-H-D4	Demonstrating a knowledge that environmental issues should be a local and global concern.
SE-H-D5	Recognizing that the development of accountability toward the environment is essential for sustainability.
SE-H-D6	Developing an awareness of personal responsibility as stewards of the local and global environment.

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§2711. Arts

A. Creative Expression (CE). Students develop creative expression through the application of knowledge, ideas, skills, and organizational abilities.

1. Grades 9-12

CE-1VA-H1	Producing works of art that successfully convey a central thought based on ideas, feelings, and memories.
CE-1VA-H2	Applying a variety of media techniques, technologies, and processes for visual expression and communication.
CE-1VA-H3	Recognizing and utilizing individual expression through the use of the elements of design while exploring compositional problems.
CE-1VA-H4	Producing a visual representation of ideas derived through the study of various cultures, disciplines, and art careers.
CE-1VA-H5	Producing imaginative works of art generated from individual and group ideas.

B. Aesthetic Perception (AP). Students develop aesthetic perception through the knowledge of art forms and respect for commonalities and differences.

1. Grades 9-12

AP-2VA-H1	Using an expanded art/design vocabulary when responding to the aesthetic qualities of a work of art.
AP-2VA-H2	Analyzing unique characteristics of art as it reflects the quality of everyday life in various cultures.
AP-2VA-H3	Using descriptors, analogies, and other metaphors to describe interrelationships observed in works of art, nature, and the total environment.
AP-2VA-H4	Assimilating the multiple possibilities and options available for artistic expression.

C. Historical and Cultural Perception (HP). Students develop historical and cultural perception by recognizing and understanding that the arts throughout history are a record of human experience with a past, present, and future.

1. Grades 9-12

HP-EVA-H1	Categorizing specific styles and periods of art as they relate to various cultural, political, and economic conditions.
HP-EVA-H2	Analyzing how works of art cross geographical, political, and historical boundaries.
HP-EVA-H4	Analyzing materials, technologies, media, and processes of the visual arts throughout history.
HP-EVA-H5	Identifying the roles of artists who have achieved recognition and ways their works have influenced the community.

D. Critical Analysis (CA). Students will make informed judgments about the arts by developing critical analysis skills through study of and exposure to the arts.

1. Grades 9-12

CA-4VA-H1	Translating knowledge of the design elements and principles to communicate individual ideas.
CA-4VA-H2	Working individually/collectively to compare and contrast symbols and images in the visual arts with historical periods and in other core curricula.
CA-4VA-H3	Comparing and contrasting the processes, subjects, and media of the visual arts.
CA-4VA-H4	Analyzing how specific works are created and how they relate to cultures and to historical periods.

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Chapter 29. Appendix B. Sample Lesson Plans

§2901. Construction—Eighth Grade-Middle School

A. Standard—M2. Explore areas of the construction industry from planning to completion of light, heavy, industrial, and civil construction.

B. Benchmark A. Understand and use the common tools, materials, and processes common to the construction industry.

C. Foundation Skills (1), (2), (3), (4), (5). The benchmark in Subsection B above applies to skills 1,2,3,4,5 which addresses:

1. communication;
2. problem-solving;
3. resource access and utilization;
4. linking and generating knowledge; and
5. citizenship.

D. ITEA Standard—1,2,3,4,5,20

E. Academic References

1. English Language Arts

a. *STD-1. Students read, comprehend, and respond to a range of materials, using a variety of strategies for different purposes.

b. *Benchmark ELA-1-M1. Using knowledge of word meaning and extending basic and technical vocabulary, employing a variety of strategies (e.g., context, clues, affixes, etymology, dictionary, thesaurus).

2. Mathematics

a. *STD-Measurement. In problem-solving investigations, students demonstrate an understanding of the:

i. concepts;
ii. process; and
iii. real-life applications of measurement.

b. *Benchmarks M-1-M. Applying the concepts of:

i. length;
ii. area;
iii. surface area;
iv. volume;
v. capacity;
vi. weight;
vii. mass;
viii. money;
ix. time;
x. temperature; and
xi. rate to real-world experiences.

3. Science

a. *STD-Science as Inquiry. The students will do science by engaging in practical and full inquires that are within their developmental capabilities.

b. *Benchmarks SI-M-A3. Using mathematics and appropriate tools and techniques to gather, analyze, and interpret data.

F. Lesson and Assessment. Teacher-generated lesson on the use of drafting elevation for construction. Include specific content related to the standards and benchmarks referenced in this lesson.

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§2903. Basic Technical Drawing I

A. Standard—2. Understand and apply the basic concepts that are common to the broad field of technical drawing.

B. Benchmark A. Develop basic skills in the proper use of drafting instruments and materials.

C. Foundation Skills (1), (2), (3), (4), (5). The Benchmark in Subsection B above apples to skills 1, 2, 3, 4, 5, which addresses:

1. communication;
2. problem solving;
3. resource access and utilization;
4. linking and generating knowledge, and
5. citizenship.

D. ITEA Standards 1, 2, 3, 7, 8, 17

E. Academic References

1. English Language Arts (Select all that apply to the specific lesson)

a. *STD 1. Students read, comprehend, and respond to a range of materials using a variety of strategies for different purposes.

b. *Benchmark ELA-I-HI. Using knowledge of word meaning and extending basic and technical vocabulary, employing a variety of strategies (e.g., context, clues, affixes, etymology, dictionary, thesaurus).

2. Mathematics

a. *STD Measurement. In problem-solving investigations, students demonstrate an understanding of the concepts, processes, and real-life applications of measurement.

b. *Benchmarks M-I-H. Selecting and using appropriate units, techniques, and tools to measure quantities in order to achieve specified degrees of precision, accuracy, and error (or tolerance) of measurements.

3. Science

a. *STD—Science as Inquiry. The students will do science by engaging in practical and full inquiries that are within their developmental capabilities.

b. *Benchmarks SI-H-A3. Using technology and mathematics to improve investigations and communications.

4. Lesson and Assessment. Teacher-generated lesson on the use of drafting instruments. Include specific content related to the standards and benchmarks referenced in this lesson.

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§2905. Basic Woodworking Technology

A. Standard—14. Explore the fundamentals of:

1. woodworking;
2. beginning with hand tool experiences; and
3. progressing into the study and use of modern power tools and machines.

B. Benchmark. Develop an understanding of the woodworking technology laboratory physical plant, its layout, management, and safety procedures (1), (2), (3), (4).

C. Foundation Skills (1), (2), (3), (4), (5). The Benchmark in Subsection B above applies to skills 1, 2, 3, 4, and 5, which addresses:

1. communication;
2. problem-solving;
3. resources access and utilization;
4. linking and generating;
5. knowledge and citizenship.

D. ITEA Standards 1, 2, 3, 5, 6, 7, 12, 13, 19, 20

E. Academic References

1. English Language Arts

a. *STD-1. Students read, comprehend, and respond to a range of materials, using a variety of strategies for different purposes.

b. *Benchmark ELA-1-H1. Using knowledge of word meaning and extending basic and technical vocabulary, employing a variety of strategies (e.g., context clues, affixes etymology, dictionary, thesaurus).

2. Mathematics

a. *STD-Number and Number Relations. In problem-solving investigations, students demonstrate an understanding of the real number system and communicate the relationship within that system using a variety of techniques and tools.

b. *Benchmark N-3-H. Using number sense to estimate and determine if solutions are reasonable (2,4).

3. Science

a. *STD—Science and the Environment. In learning environmental science, students will develop an appreciation of the natural environment, learn the importance of environmental quality, and acquire a sense of stewardship. As consumers and citizens, they will be able to recognize how our personal, professional and political actions affect the natural world.

b. *Benchmark SE-H-D2. Analyzing how individuals are capable of reducing and reversing their impact on the environment through:

i. thinking;

ii. planning;

iii. education; and

iv. action.

4. Social Studies

a. *STD-Economics. Students develop an understanding of fundamentals economic concepts as they apply to:

i. interdependence and decision making of individuals;

ii. households;

iii. businesses; and

iv. governments in the United States and the world.

b. *Benchmarks E-1A-H3. Applying the skills and knowledge necessary in making decisions about career options.

F. Lesson and Assessment. Teacher-generated lesson on laboratory organization and management. Include specific content related to the standards and benchmarks referenced in this lesson.

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Chapter 31. Appendix C—Mission Statement

§3101. Introduction

A. Purpose. To develop rigorous and challenging standards that will enable all Louisiana students to become lifelong learners and productive citizens for the twenty-first century.

B. This mission statement was developed by the Louisiana Statewide Content Standards Task Force in October, 1995 and has served as the focus for the standards initiatives that have been developed by the Louisiana Department of Education. Along with this mission statement, the Task Force also identified five foundation skills that committee members felt should be embedded in all content areas to promote lifelong learning and to prepare Louisiana students to be successful in the next millennium.

C. The following five foundation skills serve as the backbone for the content standards initiative:

1. communication;

2. problem-solving;

3. resource access and utilization;

4. linking and generating knowledge;

5. citizenship.

AUTHORITY NOTE: Promulgated in accordance with R.S. 6:(A)(10) and R.S. 17:10.

HISTORICAL NOTE: Promulgated by the Department of Education, Board of Elementary and Secondary Education, Career and Technical Education, LR 30:2737 (December 2004).

§3103. Foundation Skills

A. Foundation Skill 1—Communication:

1. exchanging of information;

2. creating and sharing meaning;

3. applying the skills of:

a. reading;

b. writing;

c. speaking;

d. listening;

e. viewing; and

f. visually representing in society and a variety of workplaces.

B. Foundation Skill 2—Problem Solving:

1. recognizing and defining problems;

2. identifying an obstacle or challenge;

3. applying knowledge and thinking processes to reach a solution using multiple pathways;

4. showing a willingness to take risks in order to learn;

5. persevering in the face of challenges and obstacles;

6. utilizing the five senses as a resource for problem solving;

7. analyzing past problems and applying basic knowledge to develop logical, creative, and practical strategies to predict, prevent, and solve problems;

8. identifying and considering a variety of viewpoints in solving problems;

9. developing, selecting, and applying strategies to solve existing and potential problems;

10. selecting and applying appropriate technology and other resources to solve problems;

11. verifying the appropriateness of the solution;

12. analyzing and evaluating the results or consequences.

C. Foundation Skill 3—Resource Access and Utilization:

1. identifying, locating, selecting, and using resource tools in analyzing, synthesizing, and communicating information;

2. identifying and employing appropriate tools, techniques, and technologies essential to the learning process, e.g.:

a. pen, pencil, and paper;

b. audio/video material;

c. word processors;

d. computer;

e. interactive devices;

f. telecommunications; and

g. other emerging technologies.

D. Foundation Skill 4—Linking and Generating Knowledge:

1. using cognitive processes to generate and link knowledge across the disciplines and in a variety of contexts;

2. applying a strategy or content knowledge effectively in a setting or context other than that in which it was originally learned;

3. monitoring, adjusting, and expanding strategies in other contexts.

E. Foundation Skill 5—Citizenship:

1. understanding the ideals, rights, and responsibilities of active participation in a democratic republic;

2. working respectfully and productively together for the benefit of the individual and the community;

3. being accountable for one's choices and actions and understanding their impact on others;

4. knowing one's civil, constitutional, and statutory rights;

5. mentoring others to be productive citizens and lifelong learners.

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Chapter 33. Appendix D. Technology Student Association

Subchapter A. Mission Statements

§3301. Technology Student Association, Inc., and Technology Student Association Mission Statements

A. Technology Student Association, Inc., Mission Statement. The mission of the Technology Student Association, Inc., is the provide leadership and support to Technology Student Association (TSA) through educational programs and services.

B. Technology Student Association Mission Statement

1. The mission of the TSA is to prepare our membership for the challenges of a dynamic world by promoting technological literacy, leadership, and problem solving, resulting in personal growth opportunities. In order to help our members achieve that goal, TSA offers recognition in both technology and leadership areas. We believe that by just participating in a carefully designed competition, a student becomes a *winner.* He or she learns how to compete by striving to be the best. Many teachers find that TSA curricular events provide yet another motivational tool.

2. These diverse events, which are offered at different grade levels, are designed and revised every two years by a standing Curricular Resources Committee. It is comprised of technology educators who have had hands-on classroom experience. The Curricular Resources Guide, the final product, is the result of the work of the committee, its competition coordinators (also teachers), and proposals of hundreds of TSA state and chapter advisors. Those suggestions make TSA competitions as current and dynamic as they are. National competitions and awards ceremonies are held at the annual National TSA Conference in June.

3. The Curricular Resources Guide presents competition categories, evaluation standards, requirements, eligibility, and procedures that apply to National TSA competition. Many states choose to adopt the same guidelines for state competitions for consistency. Many school districts use TSA guidelines for curricular activities in the classroom. The latest revised edition includes "TSA's Awards and Recognition Programs." Both are important editions that have further improved the TSA program.

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Subchapter B. Technology Course Guides

§3303. Introduction to Technology

A. Students will first study the basic elements of all technology, including:

1. processes;
2. energy;
3. information, and;
4. people.

B. Students will experience up to four systems of technology, including:

1. constructing;
2. transporting;
3. communicating; and
4. producing/manufacturing.

C. Finally, the impact of technology on society, environment, and culture will be related to the future consequences and decisions.

D. Technology Course Content

1. What is Technology?
   a. Why Study Technology?
   b. How Technology Affects Our Lives
   c. The Development of Technology
   d. Technological Change and Careers
   e. Personnel Systems and Management
2. Resources for Technology
   a. People
   b. Information
   c. Materials
   d. Tools and Machines
   e. Energy
   f. Capital
   g. Time
3. Choosing and Processing Resources
4. Systems and Problem Solving
   a. The Input
   b. The Process
   c. The Output
   d. Feedback
   e. Subsystems
   f. The Problem Solving System
5. Electronics and Computers
6. Systems of Technology
7. Controlling the System
8. Impacts and Outlooks

E. TSA Instructional Activities

1. Leadership/Management Systems

a. Personnel system uses class leaders to manage class/lab activities.

b. Officers conduct class meetings to select topics to study in technology.

c. Secretary assists class with seminar to report on progress.

d. Students speak to class and other groups about technology and impacts.

e. Students assume roles in personnel system to manage and maintain laboratory.

f. Students build display or booth to use in campaign for election or public display.

2. Technological and Career Resources

a. Resource Committee arranges for speakers to explain technological careers.

b. Officers arrange tour of local museum or technological display.

c. Committee organizes career information and invites guidance personnel to class.

d. Students display models of technological devices in public place.

e. Students write or call for information related to their study.

f. Class invites community persons to speak on development of technology.

3. Solving School/Community Problems

a. Small group or committees suggest model or services needed by school or community.

b. Service Committee proposes solution to a school or community problem.

c. Class makes model to depict solution to a problem.

d. Officers contact civic club or agency needing model of invention or device.

e. Students inspect laboratory for safety and make posters to depict problems.

f. Classes donate models to elementary school or library for other students to study.

g. Students assist others with research, display, or reports needed.

4. Enterprise Projects

a. Enterprise Committee suggests services the class could perform for profit.

b. Class votes to select a student project or model to reproduce and sell.

c. Officers contract with outside group to make a model or products they will purchase.

d. Students build projects/products needed by school or group with fee used by student association.

e. Students build sales model that depicts how new device/product works.

f. Class prepares display of the economic value of technology and inventions.

5. Contest/Achievement Recognition

a. Recognition Committee lists contests and Achievement Program for class.

b. Officers cooperate in planning Technology Education display at mall during Science and Technology Week.

c. Classes display models and projects during school Open House or PTA meetings.

d. Students make safety posters for local industry judging and use.

e. Committee organizes a class awards system to display projects and recognize students.

f. Teachers register outstanding students for contests and conferences.

For further reference see: *Technology in Your World* by Michael Hacker and Robert Barden Delmar Publishers Inc., 1987 and *Living with Technology* by Michael Hacker and Robert Barden Delmar Publishers Inc., 1988

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§3305. Technological Systems

A. Technological Systems is a *hands-on* study of the systems and subsystems which are related/interrelated to technology's impact on people and their work/potential. Students solve problems and create new systems or products. Emphasis is given to critical thinking about the problem and the impact of the new system or product on people and society. Through individual and group activities, students strengthen their creative abilities and potential for success in technological occupations and educational progress.

B. Technology Course Content

1. Introduction to Technology

a. Objectives and content of course

b. Safety with tools, materials, and machines.

c. Personnel system for management and maintenance.

d. Career opportunities and information

2. Communication

a. Technical sketching and design

b. Graphic communications

c. Using electricity to communicate

3. Construction

a. Basic tools and machines

b. Materials and processes of construction

c. Building frames and structures

4. Manufacturing

a. Engineering and product research

b. Production planning

c. Processes for production

d. Management and distribution

5. Transportation

a. Power and energy systems

b. Impact on people

c. Experiences with mechanical systems

d. Future implications

C. TSA Instructional Activities

1. Leadership/Management Systems

a. Personnel system uses class leaders to manage class/lab activities.

b. Officers conduct class meetings to select products, activities, or processes to study.

c. Committees are set up to organize, plan, and build modules for studies of systems.

d. Student leaders select and train personnel for projects.

e. Historian assembles written reports by committee for final report.

f. Officers assume management role in production activities.

2. Technological and Career Resources

a. Resources Committee arranges for speaker from Chamber of Commerce.

b. Officers organize tour of industry related to study of technological systems.

c. Students interview managers in industries.

d. Committee collects and organizes career information.

e. Students invite workers to demonstrate systems and discuss careers.

f. Students write or call for information about systems related to study.

3. Solving School/Community Problems

a. Service Committee suggests group projects needed to solve problem in school community, or agency.

b. Students construct group projects which can be used to explain system, process or products.

c. Students demonstrate information to students or adults.

d. Students teach safety with basic tools to elementary children.

e. Students produce products, such as toys, to donate to needy children.

4. Enterprise Projects

a. Enterprise Committee suggests products for class to line produce and sell.

b. Students contract with local industry for funds to construct system display.

c. Students invite corporate manager to help set up company in class to simulate a system.

d. Class constructs items that involve course content and produce a profit.

e. Officers from company to role play contractor, subcontractor activities.

f. Students design advertisement to market products.

g. Students make school spirit items for other school groups to sell.

5. Contests/Achievement Recognition

a. Recognition Committee lists contests and Achievement Program for class.

b. Officers give awards for best constructed product or model in class.

c. Teacher preregisters models and products for state and national contests.

d. Committee helps organize Open House or Technology Fair to display projects and systems models.

e. Students demonstrate process or system in shopping mall or other public place.

f. Chapter recognizes students for effort and accomplishment.

For further reference see: Technology Today and Tomorrow by Fales, et al. Glenco Publishing Co.

AUTHORITY NOTE: Promulgated in accordance with R.S. 6:(A)(10) and R.S. 17:10.

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§3307. Communication Systems

A. Communication Systems involves students in using technology to communicate information which is visual or audio. Communication systems are an integral part of the other technological activities involving input, processing, output, and feedback. Students employ tools, materials, and other elements to solve problems, create media, and process information. Students develop personal interests and analyze the impact of communication systems on people and society.

B. Technology Course Content

1. Introduction to Communication Technology

a. Objectives and content of course

b. Safety with tools, materials, and machines

c. Personnel system for management and maintenance

d. Career opportunities and information

e. Communications systems

f. Model of communications

2. Telecommunication

a. Relationship to communications

b. Processes

c. One-way communications systems

d. Two-way communications systems

e. Telecommunications

3. Drafting Communications

a. Relationship to communications model

b. Equipment familiarizations

c. Techniques

d. Types of mechanical drawing

e. Size description

f. Reproduction

g. Drafting careers

4. Graphic Communications

a. Relationships to communications model

b. Layout and design

c. Image generation

d. Photo-conversion: principles of process photography

e. Image transfer

f. Binding, finishing, and packaging

g. Graphic communications careers

5. Continuous Tone Photography

a. Relationship to communications model

b. Black and white still photography

c. Cinematography

d. Photography careers

6. Communications Enterprise and the Technology Students Association

C. TSA Instructional Activities

1. Leadership/Management Systems

a. Personnel system uses class officers to manage class/lab routines.

b. Officers lead class discussions to decide group activities.

c. Small groups or committee plan class work for year and coordinate with school association activities.

d. Students present design for products for speaking experience.

e. Students role play managers in communications work and business related to course.

f. Students produce campaign materials for elections in school students associations.

2. Technological and Career Resources

a. Resource Committee arranges for speakers from electronics or graphics industries in the community.

b. Students organize tour of TV station, newspaper, or other communications facility.

c. Committee assembles career information for use by the students.

d. Students contact local printers for unused paper and materials.

e. Students design safety posters for local industry.

f. Teacher organizes career shadowing experience for students.

3. Solving School/Community Problems

a. Service Committee suggests electronic or graphic projects needed to solve problem in school, community, or agency.

b. Students design and reproduce bulletin board for class.

4. Enterprise Projects

a. Enterprise Committee suggests product for class to print to raise money for association activities.

b. Officers may contract to make projects for civic group.

c. Officers role play corporate officers in communications activity.

d. Class develops advertising campaign for selling of products by class or chapter.

e. Students use computer to word process type for products needed by others.

f. Officers manage service to take orders for engraved name tags and signs.

5. Contest/Achievement Recognition

a. Recognition Committee lists contests and Achievement Program as learning activities for class.

b. Class gives awards for quality, design, or creativity in projects.

c. Students display graphic and electronic projects for others to see.

d. Teacher preregisters students for contests at conferences.

e. Students prepare brochure or flyer about achievements.

f. Class produces note pads or bumper stickers about technology education or Science and Technology Week.

For further reference see: *Exploring Communications* by Seymour, Ritz and Cloghessy The Goodheart-Willcox Publishing Company, Inc., 1987.

AUTHORITY NOTE: Promulgated in accordance with R.S. 6:(A)(10) and R.S. 17:10.

HISTORICAL NOTE: Promulgated by the Department of Education, Board of Elementary and Secondary Education, Career and Technical Education, LR 30:2740 (December 2004).

§3309. Construction Systems

A. Construction Systems emphasize the building or servicing involved in construction activities. Students gain experience in preparing a site, setting foundations, building structures, and installing mechanical systems. Activities reflect the production of one-of-a-kind items such as bridges, highways, and residential or commercial structures.

B. Technology Course Content

1. Introduction to Construction Technology

a. Objective and content of course

b. Safety with tools, materials, and machines

c. Personnel system for management and maintenance

d. Career opportunities and information

2. Construction Planning

a. Beginning the project

b. Designing and engineering construction projects

c. Selecting a builder

3. Applying Technology to People

a. Working as a contractor

b. Collective bargaining

c. Hiring construction personnel

d. Training and educating for construction

e. Working conditions

f. Advancing in construction

g. Handling grievances

h. Mediating and arbitrating

i. Striking

4. Construction Production Technology

a. Site preparation

b. Setting foundations

c. Building superstructures

d. Installing utilities

e. Enclosing framed superstructures

f. Finishing the project

g. Completing the site

h. Servicing the property

5. Impacts of construction projects on people and society.

C. TSA Instructional Activities

1. Leadership/Management Systems

a. Personnel system uses class officers to manage class/lab activities.

b. Officers conduct class meeting to plan activities related to course.

c. Small groups called committees organize and build modules.

d. Student leaders select and train personnel for construction projects.

e. Students inspect and certify work prior to teacher grading.

f. Reporter greets visitors and explains class or laboratory activities.

g. Officers assume management role in collective bargaining sessions.

h. Officers announce chapter activities and speak about technology education.

2. Technological and Career Resources

a. Technological and Career Resources Committee arranges for speaker from construction company in community.

b. Officers organize tour of architectural office, engineering firm, or construction site.

c. Students interview construction workers, union officials and contractors.

d. Committee arranges visit to local modular construction manufacturing plant.

e. Contractors encouraged to donate unused or new materials to school.

f. Construction workers are invited to demonstrate their specialty and discuss inspection/codes.

g. Class constructs career displays, collage, or bulletin board for displaying with ads.

3. Solving School/Community Problems

a. Small group or committee suggests construction projects needed by school/community.

b. Students may help the needy with home repair or winterizing.

c. Class or association constructs projects such as park bench for school/community.

d. Students demonstrate energy, conservation, and insulation techniques.

e. Officers conduct meeting to hear report on problems related to construction.

f. Class builds item(s) needed to solve problem(s).

g. Students teach safety with basic tools to elementary children.

4. Enterprise Projects

a. Enterprise Committee suggests project for class to construct and sell.

b. Students build storage shed or playhouse for resale in community.

c. Students contract with civic organization for funds to construct playground equipment.

d. Officers contract to build ticket booth or drop boxes for civic agencies.

e. Classes clean up a work site for local contractor who donates unused materials.

f. Class constructs items ordered by school personnel when related to course content.

g. Officers form company to role play contractor, subcontractor activities.

h. Students use construction lumber or masonry to make play equipment or toys to sell.

i. Students operate scrap lumber recycling center.

5. Contest Achievement Recognition

a. Recognition Committee lists contests and Achievement Program for class.

b. Officers give awards for best constructed module or dream house.

c. Teacher preregisters well-built modules and dream houses for state and national conferences.

d. Teachers obtain and present *Certificates of Completion* from Associated General Contractors.

e. Committee helps organize Open House or Fair to display projects.

f. Students demonstrate technical skills, such as solar heating, at mall or public place.

g. Chapter recognizes students who earn points in the Achievement Program.

h. Students prepare speeches which describe the impacts of technology.

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§3311. Manufacturing Systems

A. Manufacturing Systems gives students experiences in selection of materials and using numerous manufacturing processes. Students will understand the importance of these activities to the total manufacturing system. Activities include work on a manufacturing line and solving problems related to production or quality, distributing, and servicing. The impact of manufacturing is also studied.

B. Technology Course Content

1. Introduction to Manufacturing

a. Objectives and content of course

b. Safety with tools, materials, and machines.

c. Personnel system for management and maintenance

d. Career opportunities and information

2. Manufacturing Management Technology

a. Identify consumer demands

b. Research and development

c. Designing manufactured goods

d. Three-dimensional models

e. Engineering the product

f. Planning production

g. Measuring work

h. Production control

3. Manufacturing Personnel Technology

4. The Enterprise

5. Industrial Inputs

6. Industrial Processes

a. Forming

b. Separating

c. Combining

7. Distribution and Servicing

8. Impact of Manufacturing and Manufactured Products on People and Society

C. TSA Instructional Activities

1. Leadership/Management Systems

a. Personnel system uses class officers to manage class/lab activities.

b. Officers, as managers, conduct class meeting to plan manufacturing activities.

c. Class votes on products to mass produce.

d. Class manufactures a profitable product to support chapter leadership activities.

e. Officers role play to resolve personnel conflicts.

f. Students make speeches or reports on class activities and impact of manufacturing.

2. Technological and Career Resources

a. Resource Committee arranges for speakers from industries related to course.

b. Students organize tour of research lab or manufacturing company.

c. Local companies are encouraged to donate unused, or surplus materials to school.

d. Workers in local industries are interviewed using questionnaire developed by committee.

e. Committee collects and manages career information and literature.

3. Solving School/Community Problems

a. Service Committee suggests products needed by school or community.

b. Committee sets up service days to repair manufactured goods.

c. Students collect toys to repair and present to needy children.

d. Students make safety posters for local industry.

e. Officers contract to solve problems for civic club or agency.

f. Class demonstrates how industry works to younger children.

4. Enterprise Projects

a. Enterprise Committee suggests products for class to manufacture and sell.

b. Officers manage enterprise for profit and support of chapter.

c. Committee contracts with civic group to produce products they will donate or sell.

d. Officers role play corporate officers in manufacturing enterprise.

e. Students build products to be sold at craft fair or local sale.

f. Class subcontracts to make parts needed for a larger production by school association.

5. Contest/Achievement Recognition

a. Recognition Committee lists contests and Achievement Program as learning activities for class members.

b. Committee organizes Open House with project exhibit and manufacturing demonstration.

c. Students practice and register for competitive events related to course.

d. Officers invite school and community personnel to visit school and observe classes.

e. Committee prepares news release about class activities and achievements.

f. Class recognizes students for progress and achievements.

For further reference see: Exploring Manufacturing by R. Thomas Wright The Goodheart-Willcox Publishing Company, Inc., 1985

AUTHORITY NOTE: Promulgated in accordance with R.S. 6:(A)(10) and R.S. 17:10.

HISTORICAL NOTE: Promulgated by the Department of Education, Board of Elementary and Secondary Education, Career and Technical Education, LR 30:2742 (December 2004).

§3313. Transportation Systems

A. Students survey the many broad sources of energy and power utilized in power and transportation systems. Instruction includes:

1. how energy is converted to power;

2. how power is transmitted and controlled; and

3. how power is utilized through mechanical fluid and electrical devices.

B. Career opportunities are explored in power and transportation fields. Students build projects, conduct experiments, and repair mechanical devices such as small engines, electric motors, and outboard motors.

C. Technology Course Content

1. Introduction to Transportation Systems

a. Objectives and content of course

b. Safety with tools, materials, and machines

c. Personnel system for management and maintenance

d. Career opportunities and information

2. Applications of power in Transportation Systems

a. What is transported

b. Where and how it is transported

c. Why transport

d. Career opportunities in transportation technology

3. Heat Engines

a. Internal combustion

b. External combustion

c. The use of heat engines in transportation systems

d. Career opportunities

4. Natural Sources of Power

a. Wind

b. Water

c. Solar

d. Muscle

e. Other

f. The use of natural sources of power in transportation systems

g. Career opportunities

5. Transmission and Control of Power

a. Mechanical

b. Fluid power

c. Electrical power

d. Use of transmission and control of power in transportation systems

6. Research and Development in Power and Transportation Technology

D. TSA Instructional Activities

1. Leadership/Management Systems

a. Personnel system uses class officers to manage class/lab routines.

b. Officers lead class discussions to decide group activities.

c. Committees plan activities which help students learn the methods by which people and goods are moved.

d. Students demonstrate transportation systems and models to others.

e. Students set up management systems to model transportation industries.

f. Class manages chapter activities such as transportation to conference.

2. Technological and Career Resources

a. Resource Committee lists persons and transportation industries in community.

b. Committee organizes tour of airport, trucking company, or other business related to course.

c. Students invite local transportation managers to explain scheduling, bills of lading, and maintenance.

d. Committee assembles career information for use by students.

e. Students identify and select files on transportation.

f. Students invite community workers to assist with model construction details.

3. Solving School/Community Problems

a. Small group or committee suggests models and transportation items needed by school, community, or agency.

b. Students develop bulletin board to promote safety or energy conservation.

c. Class conducts a safety check of school or toys and other community items.

d. Students organize a bicycle safety program for younger children.

e. Class studies local road conditions and offers suggestions to solve problems.

f. Students demonstrate use of transportation system with models at local mall.

4. Enterprise Projects

a. Enterprise Committee suggests product for class to raise funds for selected purpose.

b. Students may contract to make project for civic group.

c. Students make model of value to someone who will purchase model.

d. Class experiments with coal slurry pipeline to determine economic advantages.

e. Officers organize transportation to off-campus school activities.

f. Committee sets up a service to solve problem for community and school personnel.

5. Contests/Achievement Recognition

a. Recognition Committee suggests contests and Achievement program as learning activities for class.

b. Class gives awards for craftsmanship, design, or creativity in projects.

c. Students create a contest to involve students in airplane design.

d. Class gives awards for best transportation model.

e. Class displays models and student projects at Open House.

f. Class gives awards for energy conservation by students or others in school.

For further reference see: Energy,, Power, and Transportation by Fales and Kuetemeyer Glencoe Publishing Co., 1986

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HISTORICAL NOTE: Promulgated by the Department of Education, Board of Elementary and Secondary Education, Career and Technical Education, LR 30:2743 (December 2004).