# TEST SUMMARY AND FRAMEWORK

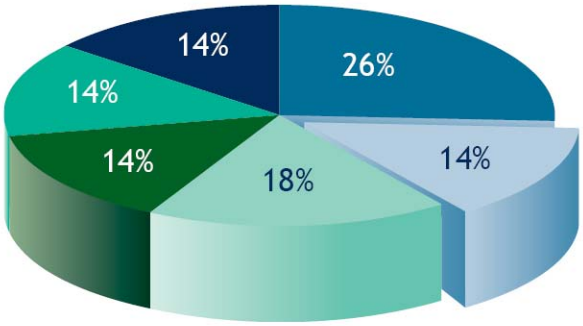
## TEST SUMMARY

## TECHNOLOGY EDUCATION

The Washington Educator Skills Tests—Endorsements™ (WEST-E™) are designed to measure a candidate's knowledge of the subject-area content contained in the test framework for each field. All WEST-E tests are fully aligned with the state's teacher endorsement competencies and, as applicable, the Essential Academic Learning Requirements.

This test summary describes general testing information as well as the approximate percentage of the total test score derived from each content domain. The test framework, organized by content domain, contains the objectives that define the content for the test.

| | |
|---|---|
| **Test Format** | Multiple-choice questions |
| **Number of Questions** | Approximately 110 |
| **Test Session** | 2 hours, 15 minutes (does not include 15-minute tutorial) |
| **Passing Score** | 240 (scores are calculated in a range from 100 to 300) |
| **Test Code** | 040 |




| Key | Approximate Percentage of Test | Content Domain | Range of Objectives |
|---|---|---|---|
| | 26% | Foundations and Design | 0001-0006 |
| | 14% | Energy and Power Technology | 0007-0009 |
| | 18% | Information and Communication Technology | 0010-0013 |
| | 14% | Transportation Technology | 0014-0016 |
| | 14% | Manufacturing Technology | 0017-0019 |
| | 14% | Construction Technology | 0020-0022 |

# TEST FRAMEWORK

# TECHNOLOGY EDUCATION

## FOUNDATIONS AND DESIGN

**0001 Understand the Career and Technical Education program.**

For example:

- identifying characteristics and requirements of the Career and Technical Education course approval and reapproval process
- recognizing the role of Tech Prep articulation in facilitating the transition from middle school to high school or from high school to college
- identifying business, industry, and OSPI-approved safety and health standards
- identifying the purposes of professional organizations in Career and Technical Education fields and the benefits of participation in these organizations
- recognizing the role of Career and Technical Education advisory committees

**0002 Understand the scope and core concepts of technology education.**

For example:

- applying business management techniques (e.g., developing work schedules, tracking work flow, optimizing use of resources) to technological situations
- recognizing that technological innovations stimulate competitiveness and that innovations are translated into marketable goods and services
- assessing the influence of scientific and technological innovations on productivity and living standards
- identifying major advances, discoveries, and inventions in science and technology and their historical contexts

**0003 Understand the relationships among technology, society, and the environment, and connections between technology and other fields.**

For example:

- recognizing the relationships between technology and culture, society, economy, and politics and the role of government in regulating and encouraging technology
- analyzing the interrelationships between technology and the environment (e.g., conservation, sustainability, materials disposal, monitoring and controlling emissions)
- applying mathematical principles and concepts (e.g., dimensional analysis, graphing, quadratic equations, trigonometric functions) to technological situations (including those related to biotechnology, medical technology, and agricultural technology)
- applying principles and concepts from physics, chemistry, and biology (e.g., force, laws of thermodynamics, molecular biology) to technological situations

**0004 Understand engineering design and its role in technology.**

For example:

- identifying steps in the design process
- applying core concepts in technology to technological situations (e.g., systems thinking, tradeoffs, feedback, quality control)
- applying quality-control procedures and concepts in given technology-related situations
- applying procedures for setting, interpreting, and meeting design criteria and constraints (e.g., ergonomic considerations, ADA compliance, manufacturability, production costs, consumer feedback)

**0005 Understand the role of research and development, experimentation and invention, and troubleshooting in technology.**

For example:

- demonstrating knowledge of the role of research and development and of experimentation and invention in technology
- analyzing the roles of models and modeling in the design process
- applying procedures for troubleshooting technology systems
- applying procedures for communicating information in the design process (e.g., developing and interpreting flowcharts, drawings, spreadsheets, graphs, and time charts)

**0006 Understand safety.**

For example:

- applying procedures for ensuring safety while working with materials related to technology
- applying procedures for ensuring safety while working with tools and equipment related to technology
- identifying equipment and procedures for ensuring and maintaining a safe work environment (including MSDS sheets, proper storage and disposal of materials, implementing OSHA regulations)
- applying procedures for responding to workplace emergencies (e.g., using safety equipment, administering first aid, reporting emergencies)
- demonstrating knowledge of safety assessments (e.g., safety demonstrations and training, safety tests, record keeping)

## ENERGY AND POWER TECHNOLOGY

**0007 Understand principles and characteristics of energy and power technology and of energy resources.**

For example:

- identifying careers, employment opportunities, and job specialties in energy and power technology, and their responsibilities and requirements
- demonstrating knowledge of renewable and nonrenewable energy resources and their characteristics and applications
- demonstrating knowledge of types of energy (e.g., electrical, thermal, kinetic, potential), processes and devices used in converting between types of energy, and units used to measure energy and work
- demonstrating knowledge of processes used to generate power from different energy sources (e.g., wind, hydro, nuclear, solar, fossil fuel, fuel cells)
- analyzing the concepts of energy content, energy loss, efficiency, and energy conservation

**0008 Understand principles and processes related to electrical energy.**

For example:

- analyzing the nature of electrical charge and electrical current
- demonstrating knowledge of electronic components (e.g., resistors, diodes, capacitors, transistors) and devices (e.g., transformers, switches, relays) and their functions
- applying formulas and solving problems involving current, voltage, resistance, and power in parallel and series electrical circuits
- applying procedures for making measurements in electrical circuits

**0009 Understand components and operating principles of motors, engines, and mechanical systems.**

For example:

- identifying the components and operating principles of internal combustion and electrical motors
- identifying types, characteristics, and applications of mechanical components (e.g., cams, gears, pulleys, transmissions, linkages) used in power and energy systems
- analyzing the transmission and/or transformation of power and energy in mechanical systems (e.g., pneumatics, hydraulics, gears, pulleys, transmissions)
- applying procedures for maintaining, troubleshooting, and repairing motors and engines

## INFORMATION AND COMMUNICATION TECHNOLOGY

**0010 Understand principles and characteristics of information and communication technology.**

For example:

- identifying careers, employment opportunities, and job specialties in information and communication technology, and their responsibilities and requirements
- identifying types of information technology and communication technology industries and their characteristics
- identifying major material and service providers in information and communication technology industries
- recognizing terminology related to computers and computer networks (e.g., port, server, RAM)
- identifying components of computer systems (e.g., peripherals, processing units, BIOS, buses, memory expansion cards) and their functions
- demonstrating knowledge of procedures for selecting, operating, troubleshooting, and maintaining computer hardware and software
- recognizing the role of computers in technology and technological systems

**0011 Understand drafting processes.**

For example:

- identifying types and characteristics of sketches and drawings used in the design process
- identifying and interpreting symbols and lines used in drafting and computer-aided design (CAD)
- interpreting technical drawings and their notations (e.g., architectural drawings, isometric drawings, dimensioning, measurements and specifications, tolerances, multiview drawings, section drawings)
- applying procedures for producing technical drawings with and without the aid of computer technology

**0012 Understand principles and characteristics of graphic communication.**

For example:

- identifying elements of graphic design (e.g., color, line, proportion, symmetry, typography, layout) and their role in communication
- identifying types and characteristics of common digital image formats
- identifying processes and procedures related to electronic image preparation and production (e.g., image capture, image editing, image transfer, image assembly)
- applying procedures for using computer hardware and software in electronic publishing (e.g., scanners, printers, photo-imaging software, drawing software, computer-aided publishing software, Web page publishing software)

**0013 Understand the processes and procedures of electronic communication.**

For example:

- identifying characteristics and bands of the electromagnetic spectrum (e.g., radio/TV waves, microwaves) and its use in electronic communication
- applying procedures for producing multimedia productions (e.g., video production, computer animation, 3-D modeling, titling, digital graphics, audio mixing, Web development)
- applying procedures for locating and retrieving information (e.g., Internet search techniques and strategies, database queries and searches, downloading and storing data)

## TRANSPORTATION TECHNOLOGY

**0014 Understand principles and characteristics of transportation technology.**

For example:

- identifying careers, employment opportunities, and job specialties in transportation technology, and their responsibilities and requirements
- identifying types of transportation systems (e.g., land, air, marine, space, intermodal)
- identifying types of transportation industries and describing their characteristics
- identifying and analyzing technological problems that exist in transportation systems
- recognizing and describing power sources and systems used in transportation

**0015 Understand the processes and procedures used in transportation technology.**

For example:

- identifying technical processes and procedures (e.g., energy storage, propulsion, guidance, control) used in various types of transportation systems (e.g., land, air, marine, space) and their characteristics
- identifying appropriate technical processes and procedures, and applying the appropriate scientific principles (e.g., buoyancy, thrust, lift, inertia, momentum, gravitational acceleration) in a variety of transportation situations
- applying procedures for managing transportation system vehicles, fleets, and systems (e.g., dispatching, scheduling, routing)
- analyzing the use of devices for transmitting and/or transforming power in transportation systems (e.g., pneumatics, hydraulics, gears, pulleys, transmissions)

**0016 Understand the appropriate selection and use of resources in transportation technology industries.**

For example:

- identifying the types and characteristics of materials used in transportation technology
- identifying the types and characteristics of tools and equipment used in transportation technology
- evaluating a given transportation situation to determine appropriate uses of materials
- evaluating a given transportation situation to determine appropriate uses of tools and equipment

## MANUFACTURING TECHNOLOGY

**0017 Understand principles and characteristics of manufacturing technology.**

For example:

- identifying careers, employment opportunities, and job specialties in manufacturing technology, and their responsibilities and requirements
- identifying types of manufacturing industries and describing their characteristics
- identifying types of manufacturing systems (e.g., just-in-time, continuous, intermittent, custom, automated) and analyzing their characteristics
- analyzing legal and ethical issues related to manufacturing (e.g., environmental regulations, labeling requirements, warranties, OSHA and EPA regulations, product recalls, trade secrets)
- identifying appropriate plans of action to take in a given management situation in manufacturing (e.g., resource management, supply chain management, production management)

**0018 Understand the processes and procedures of manufacturing technology.**

For example:

- identifying technical processes used in manufacturing (e.g., casting, forming, combining, conditioning, separating, fastening, finishing, packaging) and their characteristics and uses
- applying procedures for selecting appropriate processes and techniques in a given manufacturing situation
- evaluating the role of automation in manufacturing (e.g. robotics, computer-aided manufacturing)
- analyzing the use of manufacturing processes in a given situation

**0019 Understand the appropriate selection and use of resources in manufacturing technology.**

For example:

- identifying the properties of materials (e.g., wood, glass, masonry materials, metal alloys, polymers) used in manufacturing technology
- selecting appropriate materials for a given application based on their properties and/or characteristics (e.g., strength, weight, availability, cost, environmental impact)
- selecting appropriate tools, equipment, and materials for a given application
- analyzing trends in manufacturing technology and their effects on the selection and use of resources

## CONSTRUCTION TECHNOLOGY

**0020 Understand principles and characteristics of construction technology.**

For example:

- identifying careers, employment opportunities, and job specialties in construction technology, and their responsibilities and requirements
- identifying types of construction industries, their characteristics, and their major material and service providers
- identifying legal issues related to construction (e.g., building codes, environmental regulations, permitting regulations)
- analyzing building designs and requirements (e.g., location, cost, use, size, zoning)

**0021 Understand the processes and procedures of construction technology.**

For example:

- identifying the characteristics and structural properties of various construction designs (e.g., truss, cantilever, suspension, arch)
- identifying principles of project planning and preconstruction (e.g., design, cost estimation, financing, site selection)
- identifying processes and procedures used to construct various types of structures (e.g., buildings, bridges, playground equipment)
- applying procedures for managing construction projects and construction sites

**0022 Understand the appropriate selection and use of resources in construction technology.**

For example:

- identifying types and characteristics of tools, equipment, and materials in construction technology
- selecting appropriate materials for a given application (e.g., carpentry, masonry, plumbing, electrical) based on their properties and/or characteristics (e.g., strength, weight, availability, cost, environmental impact)
- selecting appropriate tools and equipment in construction processes
- analyzing trends in construction technology and their effects on the selection and use of resources