PLACE®

STUDY GUIDE

37 Technology Education

Program for Licensing Assessments for Colorado Educators®

CO-SG-FLD037-02

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TABLE OF CONTENTS

TEST FIELD 37: TECHNOLOGY EDUCATION

PART 1: GENERAL INFORMATION ABOUT THE PLACE® AND TEST PREPARATION

Part 1 of this study guide is contained in a separate PDF file. Click the link below to view or print this section:

General Information About the PLACE and Test Preparation

PART 2: FIELD-SPECIFIC INFORMATION

TEST FIELD 37: TECHNOLOGY EDUCATION

INTRODUCTION

This section includes a list of the test objectives, immediately followed by a set of practice multiple-choice questions. For test areas that include a performance assessment (Basic Skills, all languages other than English, Special Education Specialist: Visually Impaired), one or more practice performance assignments (as applicable) will also be included.

TEST OBJECTIVES. As noted earlier, the test objectives are broad, conceptual statements that reflect the knowledge, skills, and understanding an entry-level educator needs to teach effectively in a Colorado classroom. The list of test objectives represents the **only** source of information about what a specific test will cover.

PRACTICE MULTIPLE-CHOICE QUESTIONS. The practice multiple-choice questions included in this section are designed to give you an introduction to the nature of the questions included on the PLACE test. The practice questions represent the various types of multiple-choice questions you may expect to see on an actual test; however, they are **not** designed to provide diagnostic information to help you identify specific areas of individual strengths and weaknesses or to predict your performance on the test as a whole.

When you answer the practice multiple-choice questions, you may wish to use the answer key to check your answers. To help you identify how the test objectives are measured, the objective statement to which each multiple-choice question corresponds is listed in the answer key. When you are finished with the practice questions, you may wish to go back and review the entire list of test objectives and descriptive statements for your test area.

TEST FIELD 37: TECHNOLOGY EDUCATION

Fundamentals of Technology
Communication and Information Systems
Energy, Power, and Transportation Systems
Production and Construction Systems
Technology Education Programs

FUNDAMENTALS OF TECHNOLOGY

Understand the history of technology and historical trends in technology and technology education.

Includes important figures and developments in the history of technology, their effects on society, and historical trends in the fields of technology and technology education.

Understand core concepts and terms related to technology and technological systems.

Includes defining basic technology terms and concepts and applying terms and concepts to the selection and analysis of technological systems.

Understand applications of mathematics and natural and physical sciences in technological systems and processes.

Includes basic calculations and unit conversions; units of measure; fundamental concepts of algebra and geometry; basic principles of chemistry, physics, biology, and environmental sciences; and applications of mathematics and science in technology.

Understand the applications and effects of technology in other disciplines.

Includes advances and innovations in biological, medical, and agricultural sciences (e.g., diagnostic tools, food preservation methods, food production methods).

Understand principles of high quality and productivity management in business and industry.

Includes basic principles of effective business management, principles of resource allocation, fundamentals of quality control and quality assurance systems, and principles and techniques of managing for both high quality and high productivity.

Analyze the impact of technological systems on economic, political, and legal aspects of society and on the environment.

Includes the effects of a particular technology on society, the interrelationships between technology and specific areas of society, and the relationships between technology and the environment.

Understand the principles, methodologies, and roles of problem solving, research, and development in technological systems.

Includes basic principles of technological research; the role of research and development; the functions and methodologies of problem solving, research, and development; and applications of problem solving, research, and development in existing and emerging technologies.

COMMUNICATION AND INFORMATION SYSTEMS

Understand principles, processes, and tools used in technical and graphic communications.
Includes principles of speaking, reading, and writing in a technical environment; basic elements of graphic design; tools and processes used in measuring and marking; fundamentals of sketching and technical drawing; principles of computer-aided design and drawing; and basic principles of desktop publishing.

Understand principles, processes, and tools used in imaging, photography, and printing.
Includes fundamentals of still and motion imagery; film development and printing; principles and procedures used in photography and video; and materials, equipment, and processes used in printing, imaging, and editing.

Understand principles, processes, and components used in electronic communication.
Includes types and principles of electronic communication, processes used in electronic communication (e.g., encoding, transmitting, receiving, decoding, storing), and components and functions of electronic communication systems.

Understand the basic functions, components, and operations of computers.
Includes knowledge of basic computer components (e.g., input and output devices, storage media), computer functions (e.g., information management, communication, product creation), types and applications of software, principles of computer operations and operating systems, and computer upkeep and trouble-shooting.

Understand components, functions, and operating principles of computer systems and networks.
Includes the various components and functions of computer systems and networks (e.g., servers, LANs, Internet) and operating principles and processes of computer networks, including security issues.

ENERGY, POWER, AND TRANSPORTATION SYSTEMS

Understand types, characteristics, and applications of energy resources.
Includes types of energy and units used to measure energy and work; sources of energy; characteristics of different types of energy; applications of energy resources; principles for generating, storing, controlling, and transmitting energy; and the environmental effects of energy generation and use.

Understand basic principles and processes related to electrical energy.
Includes basic principles of electronics, and components and properties of AC and DC circuits.

Understand basic principles and processes related to renewable and nonrenewable energy sources.
Includes types and properties of renewable and nonrenewable energy sources (e.g., fossil fuels, nuclear power, wind power), and principles and processes of power generation and storage.

Understand basic components and operating principles of motors, engines, and mechanical systems.
Includes components of motors and engines, operating principles of electric motors and internal combustion engines, principles for controlling motors and engines, basic trouble-shooting and maintenance procedures, and principles of mechanical systems (e.g., hydraulic, pneumatic).

Understand components, processes, and systems used in land transportation.
Includes types of transportation vehicles; power sources; and technological and scientific principles related to control, guidance, propulsion, and energy storage.

Understand components, processes, and systems used in water transportation.
Includes types of transportation vehicles; power sources; and technological and scientific principles related to control, guidance, propulsion, and energy storage.

Understand components, processes, and systems used in aerospace transportation.
Includes types of transportation vehicles; power sources; and technological and scientific principles related to control, guidance, propulsion, and energy storage.

PRODUCTION AND CONSTRUCTION SYSTEMS

Understand types, characteristics, and uses of materials used in production technologies.
Includes identifying types and characteristics of raw materials used in manufacturing and construction (e.g., wood, concrete, plastics, ceramics, composites), selecting appropriate materials for a given application, and comparing characteristics and advantages of various materials.

Understand tools and equipment used in production technologies.
Includes safe and appropriate use of hand tools and power tools, tools for specific purposes, maintenance procedures, and tools and equipment used in various types of manufacturing (e.g., presses, lathes, kilns, computer numerical controlled machining centers).

Understand principles and processes used in manufacturing.
Includes principles and processes for casting and molding, forming, separating, conditioning, assembling, and finishing materials and products; project management; the role of automation in manufacturing (e.g., robotics, CAD/CAM); and quality control procedures.

Understand principles and processes used in residential and commercial construction.
Includes site selection, project management, and usage planning; blueprints; building codes; procedures for constructing foundations, floors, walls, roofs, and other systems; scheduling; structural analysis; and procedures for rough and finish assembly.

Understand principles and processes related to design and prototyping.
Includes problem-solving procedures related to the design process, prototype testing, and patent searching.

TECHNOLOGY EDUCATION PROGRAMS

Understand work force preparation documents, employability skills and standards, and careers and sources of career information related to technology.
Includes procedures and standards for creating resumes, portfolios, and letters of application; knowledge of skills and attributes desired by employers; appropriate workplace behaviors; characteristics of various technology careers; and sources of career information.

Understand how to manage student work areas safely and the safe use of tools, systems, and processes in school-based and work-based learning sites.

Includes basic principles of safety and risk management, safety procedures for specific tools and equipment, the use of safety equipment, safety laws and regulations, and work- and job-site safety procedures.

Understand how to acquire, evaluate, organize, interpret, and communicate information related to technology and technology education.

Includes research procedures and sources; personal record keeping; evaluation and problem-solving strategies; and procedures for organizing, interpreting, and communicating technology information.

Understand how to organize and manage student organizations and cooperative learning experiences.

Includes principles for organizing a technology students' organization; recruitment; roles and responsibilities of the advisor; procedures for running meetings, managing finances, and scheduling activities; goals and management of cooperative learning experiences; and ways to promote positive relationships with community businesses and industrial partners.

PRACTICE QUESTIONS: TECHNOLOGY EDUCATION

1. Which of the following is an example of a static equilibrium?

   A. The operator of a lock raises and lowers water levels to allow ships to pass through a canal.

   B. A person applies just enough pressure to a car's accelerator to prevent the car from rolling backwards down a hill.

   C. The water level in a water tank is kept constant by an automated system that pumps water in as water flows out.

   D. An electric power plant changes its electrical output to match energy demand.

2. An industrial design company working on a prototype for a small hoist is using a $\frac{3}{4}$ horsepower electric engine to lift small loads. After a number of trials, the design team decides they would like the hoist to lift twice as much weight in half the time. Which of the following is the least powerful engine that will accomplish this task?

   A. $1\frac{1}{2}$ horsepower

   B. $2\frac{1}{4}$ horsepower

   C. 3 horsepower

   D. $3\frac{1}{2}$ horsepower

3. A manufacturing company is producing rear bumpers for trucks. The bumpers are intended to minimize damage to trucks backing into loading platforms at speeds less than 7 miles per hour. Which of the following is the most appropriate method of testing the bumpers?

   A. Subject the bumper's prototype to an impact at 7 miles per hour.

   B. Produce a computer simulation that can predict the outcome of low-speed collisions.

   C. Randomly select some bumpers and perform collision tests at speeds of 7 miles per hour.

   D. Test each bumper by subjecting it to an impact at slightly less than 7 miles per hour.

4. A videographer is using a digital video camera to videotape an outdoor scene. She has spent some time adjusting the depth of field, but the viewfinder display now indicates that the image is over-saturated. Which of the following solutions would be most appropriate in this situation?

   A. Use a smaller aperture.

   B. Use a filter that adds red.

   C. Use a higher grade of videotape.

   D. Use a neutral density filter.

5. A construction company wants to use its computer system to track expenses and revenues for each of its projects. Which of the following types of computer software would be most appropriate in this situation?

   A. spreadsheet software

   B. financial planning software

   C. cost accounting software

   D. database software

6. A company would like to protect its computer network against unauthorized access from computers outside the company. Which of the following is most likely to offer this protection?

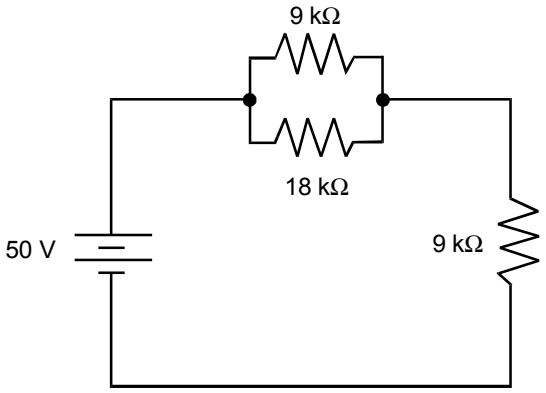
   A. virus scan software

   B. firewall software

   C. disk defragmenting software

   D. system error-logging software

7. Use the circuit diagram below to answer the question that follows.



What is the total resistance in this circuit?

A. 9 kΩ

B. 13.5 kΩ

C. 15 kΩ

D. 27 kΩ

8. Which of the following is the main challenge to collecting solar energy for large-scale use?

A. high cost of photovoltaic cells

B. daily movement of the sun

C. efficiency of photovoltaic cells

D. interference by electromagnetic waves

9. In a solid-fuel rocket engine, the rate and pattern of the engine burn is determined by the:

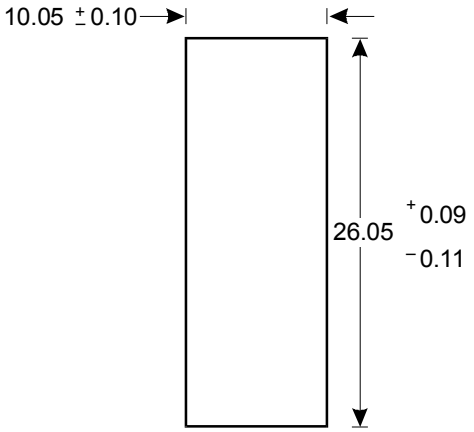
   A. control of valves in the fuel-delivery system.

   B. size and shape of the engine's central channel.

   C. flow rate of oxidizer into the engine chamber.

   D. amount and type of fuel in the rocket engine.

10. Use the diagram below to answer the question that follows.



According to the dimensions and tolerances indicated in the diagram, which of the following actual dimensions is acceptable for this piece?

   A. 9.93 × 26.14

   B. 9.95 × 25.94

   C. 10.11 × 25.90

   D. 10.15 × 26.59

11. A person has designed a new computer mouse that is more comfortable to hold and easier to use than present models. In conducting a patent search for the new design, it is most important to ascertain that:

   A. the new design is, in fact, easier to use and more comfortable to hold than the old design.

   B. there is a significant market for the newly designed mouse.

   C. the original patent for a computer mouse has expired.

   D. no patent for a similar design has already been filed.

12. An individual is seeking a position as a customer service consultant for an information technology company. For this position, it would be most useful for the individual to have experience with:

   A. evaluating and maintaining data communications equipment.

   B. analyzing the information technology needs of users.

   C. implementing system security policies and procedures.

   D. communicating technical information verbally and in writing.

ANSWER KEY: TECHNOLOGY EDUCATION

Question Number	Correct Response	Objective
1.	**B**	Understand core concepts and terms related to technology and technological systems.
2.	**C**	Understand applications of mathematics and natural and physical sciences in technological systems and processes.
3.	**C**	Understand principles of high quality and productivity management in business and industry.
4.	**D**	Understand principles, processes, and tools used in imaging, photography, and printing.
5.	**C**	Understand the basic functions, components, and operations of computers.
6.	**B**	Understand components, functions, and operating principles of computer systems and networks.
7.	**C**	Understand basic principles and processes related to electrical energy.
8.	**C**	Understand basic principles and processes related to renewable and nonrenewable energy sources.
9.	**B**	Understand components, processes, and systems used in aerospace transportation.
10.	**B**	Understand principles and processes used in manufacturing.
11.	**D**	Understand principles and processes related to design and prototyping.
12.	**D**	Understand work force preparation documents, employability skills and standards, and careers and sources of career information related to technology.