California Subject Examinations for Teachers®

TEST GUIDE

INDUSTRIAL AND TECHNOLOGY EDUCATION SUBTEST I

Sample Questions and Responses and Scoring Information

CS-TG-QR184X-01

Sample Test Questions for CSET: Industrial and Technology Education Subtest I

Below is a set of multiple-choice questions and constructed-response questions that are similar to the questions you will see on Subtest I of CSET: Industrial and Technology Education. You are encouraged to respond to the questions without looking at the responses provided in the next section. Record your responses on a sheet of paper and compare them with the provided responses.

1. A design team has just finished evaluating several possible designs for a product. Which of the following steps should the team take next?

   A. List design specifications.

   B. Produce working drawings.

   C. Select an optimal design.

   D. Design the manufacturing process.

2. A design team at a toy company is planning a new toy fire truck that sprays water and has operating sirens and emergency lights. To determine the feasibility of the proposed operating mechanisms for the spray, siren, and lights, the team's first step should be to create a:

   A. simulation.

   B. prototype.

   C. thumbnail.

   D. mock-up.

3. Which of the following employment opportunities is most likely to require a background in computer network technology?

   A. Webmaster

   B. database specialist

   C. system administrator

   D. word-processing technician

4. A worker with which of the following titles is most likely to be responsible for tracking the movement of vehicles in a large corporate fleet?

   A. quality engineer

   B. operations analyst

   C. management engineer

   D. systems analyst

5. A safety coordinator at a power plant has expressed concern that some of the plant's safety procedures are outdated and should be revisited. Which of the following responses would be most appropriate for the safety coordinator's supervisor to make?

   A. Agree to review the company's safety procedures with upper management at a future meeting.

   B. Explain to the coordinator that changes to safety procedures cannot be based on opinions of one worker.

   C. Evaluate the company's safety record and compare it with that of other power plants.

   D. Ask the coordinator for specific details concerning the procedures, and determine the merit of the coordinator's concerns.

6. An electrical worker is replacing wiring in a residential apartment and shuts off the appropriate circuit breakers so that there is no current in the circuits being repaired. Which of the following additional precautions would be most important for the worker to take in this situation?

   A. turning off the electrical switches in the apartment

   B. tagging the circuit, closing and locking the electrical service box

   C. notifying the electric company of the work being done

   D. disconnecting the main service wires to the electrical service box

7. A manufacturing design department uses a stereolithography system that includes a Class IIIb laser. The system's cabinet permits access to the laser beam. Injury to the workers would be most likely to occur if an operator were to place which of the following types of material in the beam?

   A. damp wood

   B. dyed fabric

   C. molten plastic

   D. polished metal

8. At the end of the nineteenth century, a device that emitted and controlled the path of a beam of electrons was invented. The invention of this device led most directly to:

   A. radio.

   B. radar.

   C. lasers.

   D. television.

9. Which of the following behaviors is permitted under the single-user license that accompanies most computer software?

   A. copying the software for archival and backup purposes

   B. installing the software on a network server

   C. copying the software for educational use by students

   D. installing the software on multiple machines in the same company

10. Which of the following is a requirement for obtaining a utility patent for an invention?

    A. The invention must be described in words and in drawings.

    B. The invention must have a working prototype.

    C. The invention must contribute to scientific understanding.

    D. The invention must be based on current technology.

11. In an automobile, which of the following parts provides an interface between the engine and the starting system?

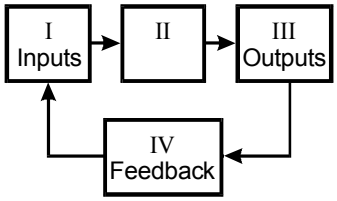
    A. timing belt

    B. drivetrain

    C. camshaft

    D. solenoid

12. **Use the diagram below to answer the question that follows.**



Which of the following is the correct label for Block II in the diagram?

A. Process

B. Resources

C. Control

D. Specification

13. Which of the following components of project management is most likely to involve communication skills and the ability to create and deliver a presentation?

    A. developing the project plan

    B. acquiring approval for the project plan

    C. implementing the project plan

    D. updating the project plan

14. A security system uses a password that consists of a letter followed by two digits. How many possible passwords are there using this system?

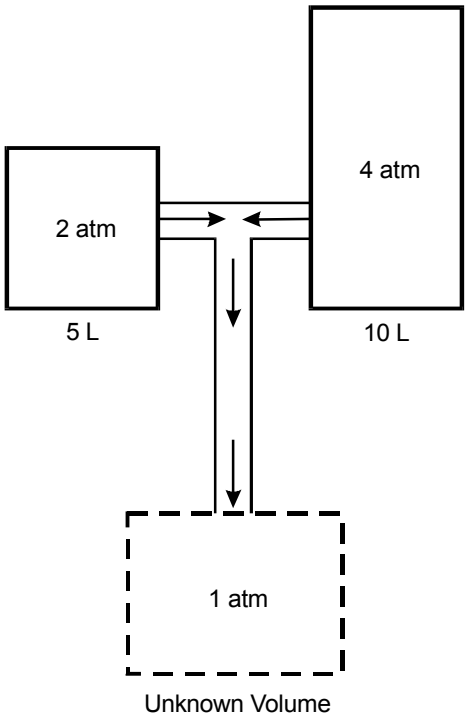
    A. 126

    B. 1,000

    C. 2,600

    D. 2,699

15. **Use the diagram below to answer the question that follows.**



The contents of a 5-liter container of gas at a pressure of 2 atmospheres and a 10-liter container of an identical gas at a pressure of 4 atmospheres are pumped into a third container that was previously empty but now contains the two gases at a pressure of 1 atmosphere. What is the size of the third container?

A. 400 liters

B. 100 liters

C. 50 liters

D. 5 liters

16. **Use the information below to complete the exercise that follows.**

A biotechnology company that specializes in agricultural genetics has been invited to participate in a community job fair. You have been asked to prepare the company's representative for possible questions and situations that might arise at the fair.

Using your knowledge of technology careers and employability skills, write a response in which you:

- identify the skills, knowledge, attitudes, aptitudes, and responsibilities needed for one career path within the company; and

- describe the workplace skills relevant to the company's work and environment.

17. **Use the information below to complete the exercise that follows.**

You have been asked to help with the design of a small auto body repairing and painting shop.

Using your knowledge of safety and environmental issues in technology, write a response in which you:

- draw a facility plan and indicate the location of two pieces of equipment related to safety or environmental protection; and
- explain how the two indicated pieces of equipment are used and why they are needed.

18. **Use the information below to complete the exercise that follows.**

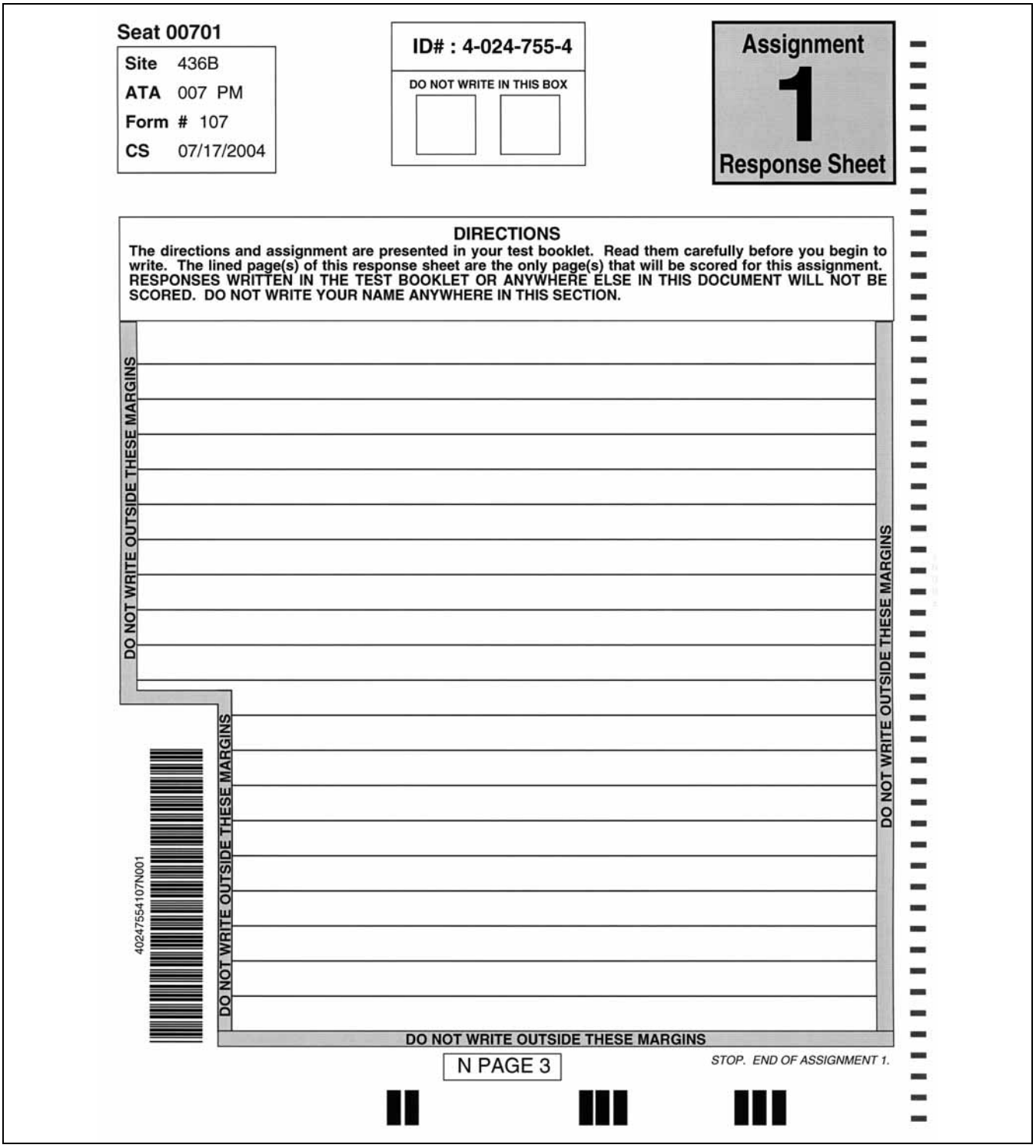
A developer is proposing a project that involves the construction of a new waste-to-energy incinerator to help with the disposal of municipal waste.

Using your knowledge of project and product development, write a response in which you:

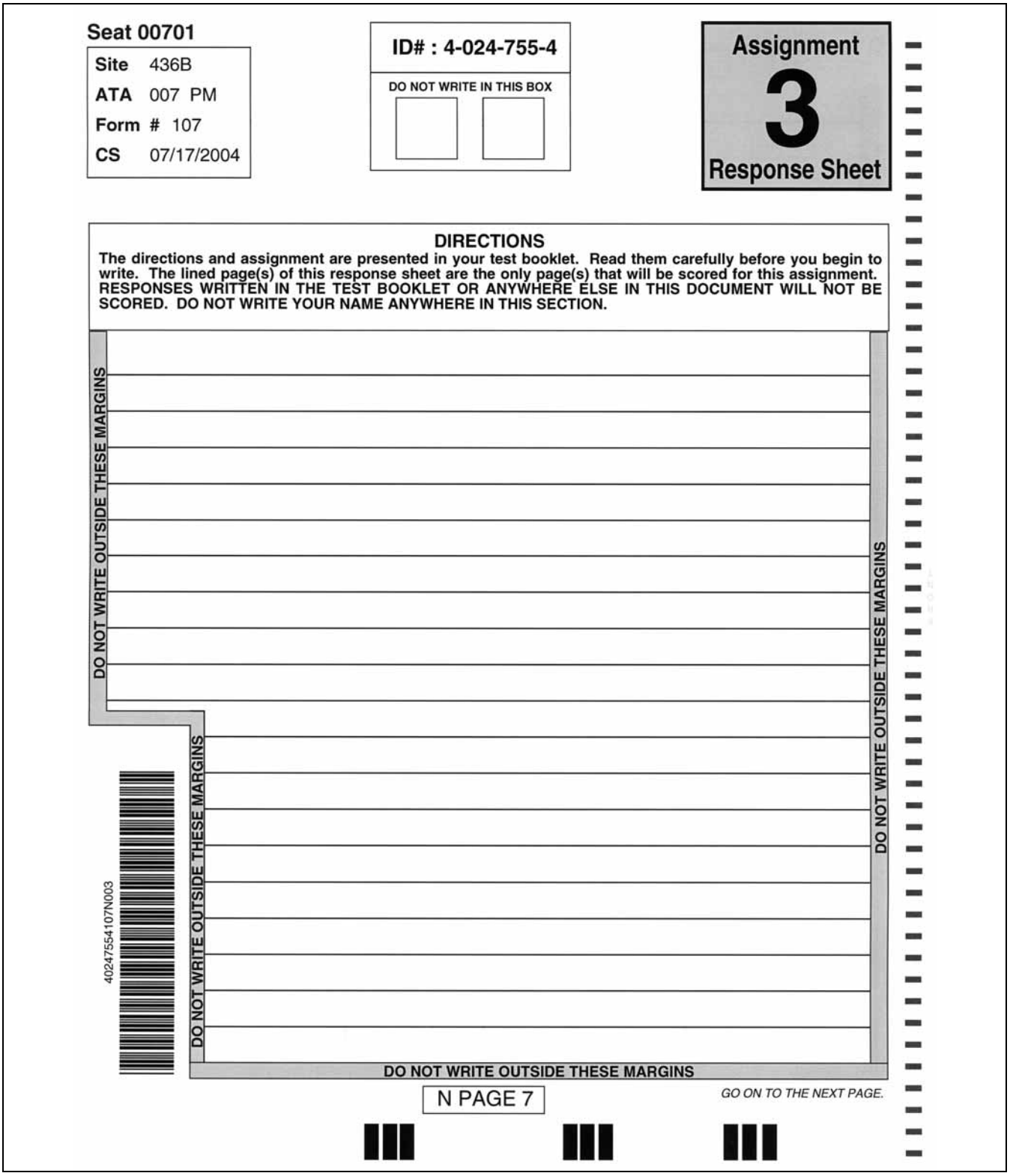
- describe two environmental concerns related to this type of project;
- describe one procedure for addressing each of the two environmental concerns;
- describe two safety issues related to this type of project; and
- describe one precaution for addressing each of the two safety issues.

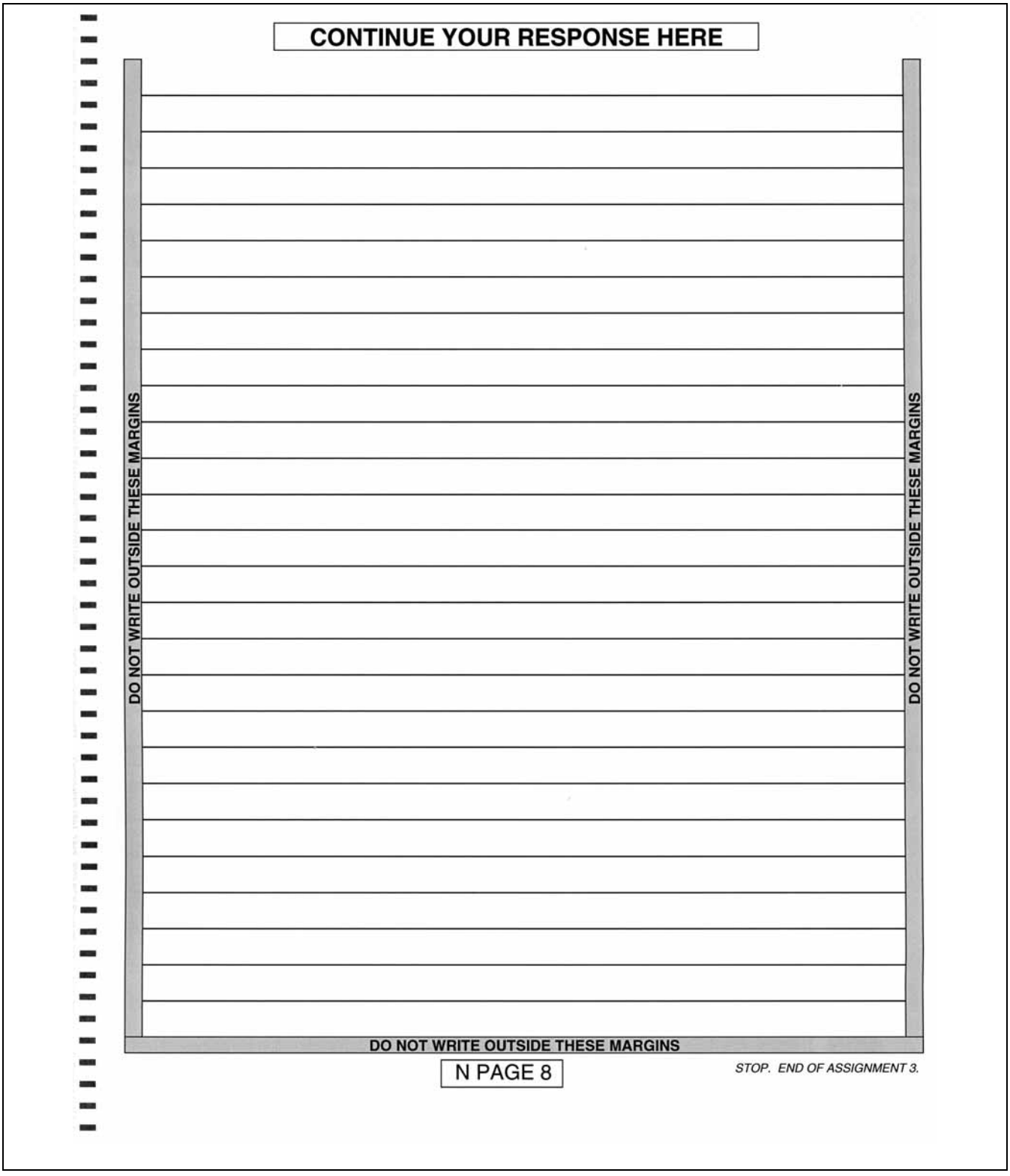
Sample Written Response Sheets for CSET: Industrial and Technology Education Subtest I

For questions 16–17, examinees would record their written response to each question on a one-page response sheet located in their answer document. The length of their response to each question is limited to the lined space available on the response sheet. A sample of the response sheet is provided below.



For question 18, examinees would record their written response on a two-page response sheet located in their answer document. The length of their response to this question is limited to the lined space available on the response sheet. A sample of the response sheet is provided below and on the next page.




CONTINUE YOUR RESPONSE HERE
DO NOT WRITE OUTSIDE THESE MARGINS
DO NOT WRITE OUTSIDE THESE MARGINS
DO NOT WRITE OUTSIDE THESE MARGINS
N PAGE 8
STOP. END OF ASSIGNMENT 3.

Annotated Responses to Sample Multiple-Choice Questions for CSET: Industrial and Technology Education Subtest I

Nature of Technology

1. **Correct Response: C.** (SMR Code: 1.1) After evaluating all designs under consideration, a design team will usually select an optimal design from the group. The purpose of the design evaluation is to provide data for the selection of the optimal design.

2. **Correct Response: B.** (SMR Code: 1.1) The design team would like to evaluate the feasibility of one of the subsystems of a product. To assess whether a subsystem will actually work, the team should construct a working model or prototype of the proposed toy truck.

3. **Correct Response: C.** (SMR Code: 1.2) The job of a computer system administrator is to keep a computer network operating efficiently. Responsibilities include installing, configuring, and maintaining the software and hardware related to the computer network.

4. **Correct Response: B.** (SMR Code: 1.2) The scheduling and tracking of vehicles in a transportation system is the responsibility of a company's operations division. An analyst in this area would collect and analyze data and then use the analysis to improve efficiency in the system.

5. **Correct Response: D.** (SMR Code: 1.2) Workers' concerns regarding safety should always be taken seriously. In this case, a supervisor should listen to the worker's concerns, ask for any additional details that might help in an analysis of the situation, and then determine the merits of the worker's concerns. If the concerns are determined to have merit, appropriate action should be taken to ensure safety at the plant.

6. **Correct Response: B.** (SMR Code: 1.3) The electrical worker must ensure that the circuits being worked on are not carrying current. Shutting off the circuit breakers will prevent current from flowing in those circuits, but the worker must also close and lock the service box so that nobody turns the current on again without the electrical worker's knowledge.

7. **Correct Response: D.** (SMR Code: 1.3) Direct viewing of the beam of a Class IIIb laser can be harmful to a person's eyes. Placing a piece of polished metal in the path of a laser would cause the beam to be reflected. The reflected beam would not be significantly reduced in intensity and could cause damage to a person's eyes.

8. **Correct Response: D.** (SMR Code: 1.4) A cathode ray tube includes a filament that emits a stream of electrons, as well as a pair of deflection plates or coils that allow the electron stream to be deflected to strike any point on a viewing screen. The viewing screen is coated with a phosphor that glows briefly when it is struck by electrons. The picture tubes of televisions are cathode ray tubes.

9. **Correct Response: A.** (SMR Code: 1.4) The single-user license that accompanies most computer software restricts use of the software to one computer. However, creation of a backup copy is an appropriate precaution and is allowed under the terms of most single-user licenses.

10. **Correct Response: A.** (SMR Code: 1.4) A utility or non-provisional patent is one of the three types of patents available in the United States and is the type usually thought of when people speak of patents. Two of the important components of an application for a utility patent are drawings and a clear, concise description of the invention for which a patent is being sought.

11. **Correct Response: D.** (SMR Code: 1.5) The purpose of an automobile's solenoid is to engage and disengage the starter motor from the engine's flywheel. When an automobile is started, current is applied to the solenoid. This induces a magnetic field in the solenoid, which moves a plunger that engages the gears of the automobile's starter motor. The spinning starter motor turns the automobile's engine. After the engine starts, a spring returns the solenoid's plunger to its resting position.

12. **Correct Response: A.** (SMR Code: 1.5) In the Universal System Model, a process acts on inputs to produce outputs. This process of converting inputs to outputs is monitored by the feedback component of the system.

13. **Correct Response: B.** (SMR Code: 1.5) Acquiring approval for a project requires communication of project details in a clear and concise manner and format. This often involves the preparation of materials in a variety of formats, including text-based, electronic, and verbal, and the presentation of this material to individuals and groups.

14. **Correct Response: C.** (SMR Code: 1.6) The allowed values for this password range from A00 to Z99. The numerical component of the password allows for 100 unique combinations. Since there are 26 possible letters that can be assigned to each of these 100 combinations, the total number of possible passwords is (26)(100) or 2,600.

15. **Correct Response: C.** (SMR Code: 1.6) In this system, the product of pressure and volume will remain the same after the contents of the top containers are pumped into the bottom container. For the top left container, the product is 2 atm × 5 L = 10 atm L. For the top right container, the product is 4 atm × 10 L = 40 atm L. The sum of the two tanks is 10 atm L + 40 atm L = 50 atm L. The product of pressure and volume for the bottom tank must therefore equal 50 atm L. Since its volume is 1 atm, its pressure must be 50 L.

Examples of Responses to Sample Constructed-Response Questions for CSET: Industrial and Technology Education Subtest I

Nature of Technology (Short [Focused]-Response Questions)

Question #16 (Strong Response)

A biotechnology company specializing in agricultural genetics would have need of skilled researchers to work on product research and development. Qualifications for researcher positions would include knowledge of scientific method and processes, advanced command of biology and genetics, and understanding and skill in appropriate laboratory techniques, practices, and processes. The company would also need laboratory assistants who could follow well-defined laboratory procedures. This type of job often offers entry-level positions with opportunities for advancement and opportunities for further education. In addition to these technical positions, the company would also need the types of workers that most other companies need, such as quality control staff, administrative staff, and support staff.

To work effectively in the environment of a biotechnology company, employees should be good problem solvers who can identify problems and develop action plans. They should be skilled communicators and constructive team members. They should be creative and generative thinkers, have a strong orientation to client satisfaction, and be conscious of and committed to high standards of safety.

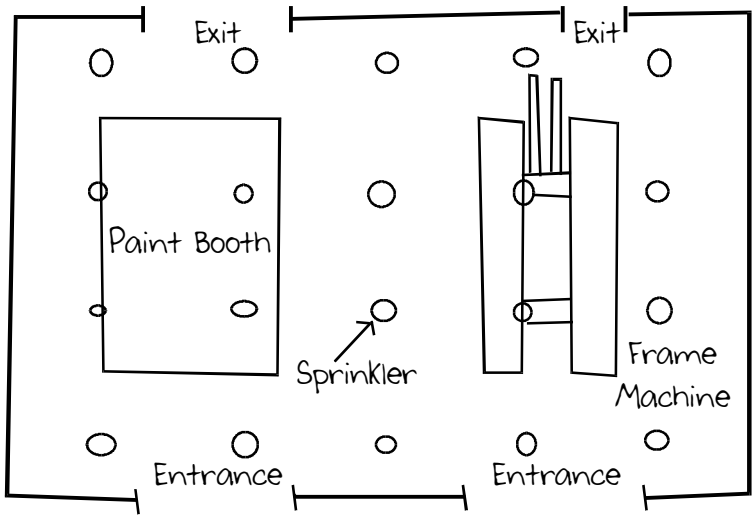
Question #16 (Weak Response)

Biotechnology is a complicated and demanding field, with a constantly increasing body of information. Anyone who wants to work for a biotechnology firm must be up to date on the latest biological research. The company must be competitive and if employees have out-of-date knowledge, other companies may gain the competitive edge.

This means strong academic preparation at the college level as well as a willingness to continue to learn after being hired. An advanced degree would be preferable.

To move into a management position, an employee must be even more qualified, not only with the academic background, but also with skills in coordinating and motivating others.

Question #17 (Strong Response)

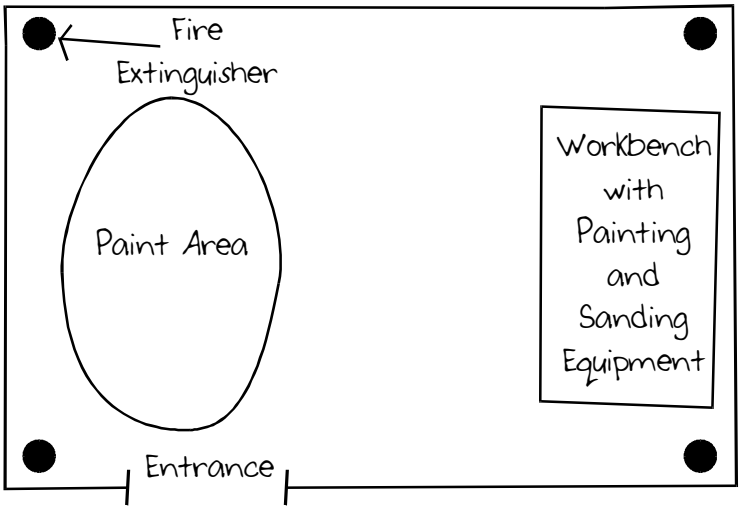


The shop should contain a paint booth and adequate ventilation and fire safety equipment, including automatic sprinklers.

An enclosed paint booth is needed to contain any fumes generated during painting. It should have a ventilation system specifically designed to remove any hazardous air contaminants and should have adequate airflow per minute. Routine maintenance should include keeping the fan blades free of paint residues. The booth should be large enough to allow workers access to vehicles from all angles while wearing protective equipment.

Proper fire detection and suppression equipment should be installed in the shop. Smoke detectors should be installed and should be wired directly to the building's electrical supply. The shop should have an adequate number of appropriate fire extinguishers. The fire extinguishers should be type B fire extinguishers, which will put out grease and paint fires. Multipurpose A, B, C extinguishers would be even better since the shop may also experience fires involving regular combustibles (type A) and electrical fires (type C).

Question #17 (Weak Response)



An auto body shop should include a paint station with various sprayers and other paint application tools, a large selection of sanders and buffing equipment, and an adequate supply of fire extinguishers. A paint station is needed to apply the primers and paints that are essential to make the vehicle look like new. All of the tools must be repaired following a detailed maintenance schedule as most accidents in workshops result from tools malfunctioning or being misused.

Fire extinguishers are important because there is always a potential risk of a spark, which could cause a fire with all those chemicals and solvents around.

Nature of Technology (Extended-Response Question)

Question #18 (Strong Response)

Waste-to-energy incineration is the burning of waste materials to produce energy in the form of steam, electricity, or both. Two environmental concerns related to waste-to-energy incineration involve the potential for air pollution and the toxic nature of the ash that results from the incineration process. Airborne emissions may include fly ash and toxic chemicals including heavy metals. The ash that remains after incineration of waste may include high levels of heavy metals (including cadmium, mercury, and lead), dioxin, and other toxic chemicals.

Waste-to-energy incinerators incorporate a number of technologies to reduce the impact of the facility on the environment. First, they burn at a very high temperature to completely burn many of the products of more conventional combustion and to prevent the formation of others. Also, many incinerators have scrubbers that spray powdered lime into the hot exhaust to remove many of the harmful chemicals. The scrubber may be controlled by a computer system that continually monitors the facility's emissions. Most of the fly ash is physically removed from the exhaust stream. The ash is sometimes passed under a large magnet that removes some of the metals from the ash. Finally, the ash is stored in a lined landfill, away from groundwater that might otherwise become contaminated.

Safety concerns at a waste-to-energy incinerator include the inhalation of airborne particulates by employees and burns caused by contact with any of the hot surfaces in the plant. Inhalation of particulate matter can be minimized or

continued on next page

Question #18 (Strong Response) ***continued***

prevented by having workers in particulate-laden areas wear face masks, filter respirators with HEPA cartridges, or other appropriate protective equipment. Workers can be protected from burns by incorporating OSHA-approved safety markings to warn workers of hot surfaces and by insisting that all workers comply with company safety policies and procedures.

Question #18 (Weak Response)

A waste-to-energy incinerator is a dirty, dangerous operation. Collecting waste to fuel the plant is difficult and cumbersome. Then it must be transported to the site where it is to be burned. Each step of the process can cause environmental problems of the water and air. Also if the plant is noisy and unattractive it could be an eyesore that could cause property values to decline. Nobody would want to live near such a facility.

It is important to protect our environment from contaminants such as those produced by a waste-to-energy incinerator. Most of us take fresh air and water for granted, but if we allow noxious substances to be discharged unchecked, the quality of our air and water will deteriorate rapidly.

Safety is also a concern. Workers have a right to a safe and healthy work environment. They should not have to worry about getting sick or injured at work. It is the responsibility of the employer to keep the workplace safe. Of course it is also the responsibility of the worker to exercise care and follow safety procedures.

Scoring Information for CSET: Industrial and Technology Education Subtest I

Responses to the multiple-choice questions are scored electronically. Scores are based on the number of questions answered correctly. There is no penalty for guessing.

Responses to constructed-response questions are scored by qualified California educators using focused holistic scoring.

Because the constructed-response questions on CSET: Industrial and Technology Education Subtest I are of two types—one type requiring a short (focused) response taking approximately 10–15 minutes to complete, and another type requiring an extended response taking approximately 30–45 minutes to complete—two sets of performance characteristics and two scoring scales will be used to score responses to the constructed-response questions. Scorers will judge the overall effectiveness of your responses while focusing on the appropriate performance characteristics that have been identified as important for this subtest (see below and page 20). Each response will be assigned a score based on an approved scoring scale (see pages 20–21).

Your performance on the subtest will be evaluated against a standard determined by the California Commission on Teacher Credentialing based on professional judgments and recommendations of California educators.

Performance Characteristics and Scoring Scales for CSET: Industrial and Technology Education Subtest I

A. SHORT (FOCUSED)-RESPONSE QUESTIONS

Performance Characteristics. The following performance characteristics will guide the scoring of responses to the short (focused)-response constructed-response questions on CSET: Industrial and Technology Education Subtest I.

PURPOSE	The extent to which the response addresses the constructed-response assignment's charge in relation to relevant CSET subject matter requirements.
SUBJECT MATTER KNOWLEDGE	The application of accurate subject matter knowledge as described in the relevant CSET subject matter requirements.
SUPPORT	The appropriateness and quality of the supporting evidence in relation to relevant CSET subject matter requirements.

Scoring Scale. Scores will be assigned to each response to the short (focused)-response constructed-response questions on CSET: Industrial and Technology Education Subtest I according to the following scoring scale.

SCORE POINT	SCORE POINT DESCRIPTION
3	**The "3" response reflects a command of the relevant knowledge and skills as defined in the subject matter requirements for CSET: Industrial and Technology Education.** • The purpose of the assignment is fully achieved. • There is an accurate application of relevant subject matter knowledge. • There is appropriate and specific relevant supporting evidence.
2	**The "2" response reflects a general command of the relevant knowledge and skills as defined in the subject matter requirements for CSET: Industrial and Technology Education.** • The purpose of the assignment is largely achieved. • There is a largely accurate application of relevant subject matter knowledge. • There is acceptable relevant supporting evidence.
1	**The "1" response reflects a limited or no command of the relevant knowledge and skills as defined in the subject matter requirements for CSET: Industrial and Technology Education.** • The purpose of the assignment is only partially or not achieved. • There is limited or no application of relevant subject matter knowledge. • There is little or no relevant supporting evidence.
U	**The "U" (Unscorable) is assigned to a response that is unrelated to the assignment, illegible, primarily in a language other than English, or does not contain a sufficient amount of original work to score.**
B	**The "B" (Blank) is assigned to a response that is blank.**

B. EXTENDED-RESPONSE QUESTION

Performance Characteristics. The following performance characteristics will guide the scoring of responses to the extended-response constructed-response question on CSET: Industrial and Technology Education Subtest I.

PURPOSE	The extent to which the response addresses the constructed-response assignment's charge in relation to relevant CSET subject matter requirements.
SUBJECT MATTER KNOWLEDGE	The application of accurate subject matter knowledge as described in the relevant CSET subject matter requirements.
SUPPORT	The appropriateness and quality of the supporting evidence in relation to relevant CSET subject matter requirements.
DEPTH AND BREADTH OF UNDERSTANDING	The degree to which the response demonstrates understanding of the relevant CSET subject matter requirements.

Scoring Scale. Scores will be assigned to each response to the extended-response constructed-response question on CSET: Industrial and Technology Education Subtest I according to the following scoring scale.

SCORE POINT	SCORE POINT DESCRIPTION
4	**The "4" response reflects a thorough command of the relevant knowledge and skills as defined in the subject matter requirements for CSET: Industrial and Technology Education.** • The purpose of the assignment is fully achieved. • There is a substantial and accurate application of relevant subject matter knowledge. • The supporting evidence is sound; there are high-quality, relevant examples. • The response reflects a comprehensive understanding of the assignment.
3	**The "3" response reflects a general command of the relevant knowledge and skills as defined in the subject matter requirements for CSET: Industrial and Technology Education.** • The purpose of the assignment is largely achieved. • There is a largely accurate application of relevant subject matter knowledge. • The supporting evidence is adequate; there are some acceptable, relevant examples. • The response reflects an adequate understanding of the assignment.
2	**The "2" response reflects a limited command of the relevant knowledge and skills as defined in the subject matter requirements for CSET: Industrial and Technology Education.** • The purpose of the assignment is partially achieved. • There is limited accurate application of relevant subject matter knowledge. • The supporting evidence is limited; there are few relevant examples. • The response reflects a limited understanding of the assignment.
1	**The "1" response reflects little or no command of the relevant knowledge and skills as defined in the subject matter requirements for CSET: Industrial and Technology Education.** • The purpose of the assignment is not achieved. • There is little or no accurate application of relevant subject matter knowledge. • The supporting evidence is weak; there are no or few relevant examples. • The response reflects little or no understanding of the assignment.
U	**The "U" (Unscorable) is assigned to a response that is unrelated to the assignment, illegible, primarily in a language other than English, or does not contain a sufficient amount of original work to score.**
B	**The "B" (Blank) is assigned to a response that is blank.**