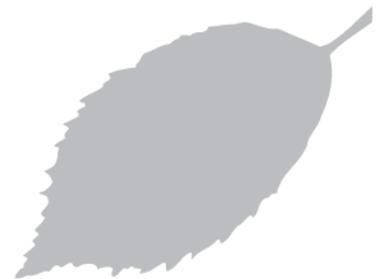


**Massachusetts  
Tests for Educator Licensure® (MTEL®)**



**Digital Literacy and  
Computer Science  
(71)**

**PRACTICE TEST**



[www.mtel.nesinc.com](http://www.mtel.nesinc.com)

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Version [1.2]

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## INTRODUCTION

This practice test is a sample test consisting of 100 multiple-choice questions and 2 open-response item assignments.

To assist you in recording and evaluating your responses on the practice test, a Multiple-Choice Answer Sheet, an Answer Key Worksheet, and an Evaluation Chart by test objective are included for the multiple-choice questions. Evaluation Information, Sample Responses and Analyses, and a Scoring Rubric are included for the open-response items. Lastly, there is a Practice Test Score Calculation worksheet.

## PURPOSE OF THE PRACTICE TEST

The practice test is designed to provide an additional resource to help you effectively prepare for the MTEL Digital Literacy and Computer Science (71) test. The primary purpose of the practice test is to help you become familiar with the structure and content of the test. It is also intended to help you identify areas in which to focus your studies. Education faculty and administrators of teacher preparation programs may also find this practice test useful as they help students prepare for the official test.

## TAKING THE PRACTICE TEST

In order to maximize the benefits of the practice test, it is recommended that you take this test under conditions similar to the conditions under which the official MTEL tests are administered. Try to take the practice test in a quiet atmosphere with few interruptions and limit yourself to the four-hour time period\* allotted for the official test administration. You will find your results to be more useful if you refer to the answer key only after you have completed the practice test.

## INCORPORATING THE PRACTICE TEST IN YOUR STUDY PLAN

Although the primary means of preparing for the MTEL is your college education, adequate preparation prior to taking or retaking the MTEL test is strongly recommended. How much preparation and study you need depends on how comfortable and knowledgeable you are with the content of the test.

The first step in preparing to take the MTEL is to identify what information the test will address by reviewing the objectives for your field. A complete, up-to-date list of the Test Objectives is included in the Test Information Guide for each test field. The test objectives are the core of the testing program and a helpful study tool. Before taking or retaking the official test, focus your study time on those objectives for which you wish to strengthen your knowledge.

This practice test may be used as one indicator of potential strengths and weaknesses in your knowledge of the content on the official test. However, because of potential differences in format and difficulty between the practice test and an official MTEL Digital Literacy and Computer Science (71) test, it is not possible to predict precisely how you might score on an official MTEL Digital Literacy and Computer Science (71) test. Keep in mind that the subareas for which the test weighting is greatest will receive emphasis on this test. Refer to the Test Information Guide for additional information about how to prepare for the test.

\* For tests that have subtests, candidates may take one or both subtests during the four-hour session.

**DIGITAL LITERACY AND COMPUTER SCIENCE (71)  
PRACTICE TEST**

Candidates taking the Digital Literacy and Computer Science (71) test will be provided with the reference sheet on the following pages.

The following conventions are followed in the code samples found on this test. Alternative styles are acceptable in candidate-created pseudocode in the open-response assignments. Candidate-created pseudocode will not be evaluated for syntax, but instead for how well it demonstrates programming concepts and solves the presented problem.

Category	Notation	Example
Assignment	=	<pre>x = 5 y = TRUE my_string = "Some text." my_list = [2, 3.14, "apple"]</pre>
Spacing	indents indicate control flow	<pre>while (x != 0)     x = x - 1     print(x)</pre>
Mathematics	+ addition (or string concatenation) - subtraction * multiplication / division % modulo ^ exponentiation	<pre>x + b "Some " + "text." x - b x * b x / b x % b x ^ b</pre>
Relationships	< less than > greater than <= less than or equal to >= greater than or equal to == equal to != not equal to is string equality	<pre>x &lt; b x &gt; b x &lt;= b x &gt;= b x == b x != b word = "bird" word is "bird" == TRUE</pre>
Logic	TRUE condition true FALSE condition false AND both conditions true OR at least one condition true NOT condition not true	<pre>(5 &lt; 7) == TRUE (5 &gt; 7) == FALSE (5 &lt; 7) AND (5 == 5) == TRUE (5 &gt; 7) OR (5 == 5) == TRUE NOT (5 &gt; 7) == TRUE</pre>

Category	Notation	Example
Indexes	[0] the first item in a list or string	<code>my_sentence[0]</code>
	[n] the (n + 1)th item in a list or string	<code>my_list[1]</code> #accesses 2nd element in my_list
	[x,y] the (x + 1)th row and (y + 1)th column in a 2d array	<code>my_array[2,5]</code>
Conditionals	if (condition) block	<code>if (x &gt;= 100) print("A large number.")</code>
	if (condition) block else block	<code>if (x &lt;= 100) print("A small number.") else print("A large number.")</code>
Iterables	while (condition) block	<code>while (x &lt; 10) print(x) x = x + 1</code>
	for (i = a; i < b; i = i + c) block	<code>for (i = 1; i &lt; 10; i = i + 1) print(i ^ 2)</code>
Functions	function function_name(arg_1,...arg_n) block	<code>function adder(num_1, num_2) return num_1 + num_2</code>
	function_name(val_1,...val_n)	<code>adder(3, 4)</code>
Comments	# comment line	<code># some information</code>
Object-Oriented Notation	object.class_method()	<code>my_sentence.length() my_tree.grow(12)</code>
	object.attribute	<code>my_house.color</code>

Category	Notation	Example
Classes	<pre>class Class_Name(parent Class_Name, if any)  public/private attribute_name = default_value  public/private function class_function_name(arg_1,...arg_n)     block  class_instance = Class_Name(attr_1 = value,...attr_n = value)</pre>	<pre>class Tree(Plant)      public height = 10     public type = "oak"     private kingdom = "Plantae"      public function grow(height)         height = height + 2  my_tree = Tree(height = 9, type = "elm")</pre>

**MULTIPLE-CHOICE ANSWER SHEET**

<b>Question Number</b>	<b>Your Response</b>
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## MULTIPLE-CHOICE QUESTIONS

1. Which of the following strategies is recommended to prevent eyestrain when looking at a computer screen?
  - A. taking a two-minute break every four hours and looking into the distance
  - B. placing the screen an arm's length away and slightly below eye level
  - C. adjusting the room lighting so that it is as bright as possible
  - D. changing the color of the text to a light color against a white background
  
2. Researchers have found that interventions designed to reduce the time children spend viewing screens, playing video games, and using computers result in declines in which of the following health risks?
  - A. obesity
  - B. infectious disease
  - C. bipolar disorder
  - D. nutritional deficiencies
  
3. The primary difference between an email in a phishing attack and an email in a spear phishing attack is that an email in a spear phishing attack:
  - A. is personalized or includes personal information to make it appear legitimate.
  - B. is designed to mimic an email coming from a known business or organization.
  - C. attempts to trick a user into sharing sensitive account or financial information.
  - D. provides a link to a website where the user can enter the data requested.

4. A student playing an online video game receives a chat message that appears to come from a friend's account that includes a link to a new plugin. The student installs and uses the new plugin. Soon after, the student learns their friend did not send the message and discovers unexplained activity and unauthorized purchases in their online gaming account. The student has been the victim of a:
- A. trojan.
  - B. worm.
  - C. direct denial-of-service attack.
  - D. social engineering attack.
5. A proxy server is most likely to improve the security of an organization's network in which of the following ways?
- A. Critical data and system files can be backed up if the network is compromised.
  - B. The traffic load on the network can be balanced so that no one server is overloaded.
  - C. The IP addresses of network computers will be less vulnerable to attacks from hackers.
  - D. Data transmitted to and from the Internet will be blocked whenever a threat is detected.
6. A student computer user downloads and installs an antivirus software program. The user manually runs the software regularly, but opts to update only manually and infrequently. This situation is most likely to result in which of the following outcomes?
- A. Only files modified since the last update will be scanned.
  - B. The software may not identify files infected with newer virus signatures.
  - C. Data files scanned previously will not be scanned again.
  - D. The software may not be able to quarantine the infected files it finds.
7. Websites that comply with the European Union's General Data Protection Regulation (GDPR) must give visitors the option to opt out of the use of some cookies. Which of the following factors could jeopardize the privacy of visitors using this process?
- A. Opting out also prevents the use of security-enhancing cookies.
  - B. First-party cookies used by websites for functionality follow users from website to website.
  - C. Losing tracking data due to opt-outs could decrease the advertising revenue of a website.
  - D. Opt-out options may be hidden or deemphasized to prevent visitors from selecting them.

8. A student changes the settings in a Web browser to enable the private browsing mode. This action will have which of the following effects?
- A. The student will not be able to send or receive email while the browser is open.
  - B. The student's computer will not be visible on the Internet.
  - C. The websites the student visits will not be stored in the browser history.
  - D. The student's Internet activity will not be tied to the computer being used.
9. Which of the following strategies is likely to be most effective in preventing cyberbullying in a school setting?
- A. blocking personal mobile devices from logging on to the school network
  - B. encouraging students who have conflicts to meet with peer mediators to help resolve differences afterward
  - C. using specific cyberbullying incidents as examples of inappropriate online behavior
  - D. developing a school climate that emphasizes social-emotional learning, team building, and inclusion
10. To avoid unintentional software piracy, students should:
- A. refer to end-user license agreements for terms and conditions.
  - B. use software on computers in their own homes.
  - C. download software from peer-to-peer sites.
  - D. share copies of original software only after receiving an upgraded version.
11. Which of the following actions involving technology would most likely be considered unethical but not illegal?
- A. A hacker gains access to a company's network, copies personal financial data, and saves it on a hard drive for use at a later date.
  - B. The owner of a website that sells nutritional supplements allows customers to freely purchase medications that require a prescription from a doctor in their regions.
  - C. A theater teacher uses the school's network to send an email encouraging colleagues to attend an upcoming school fundraising performance.
  - D. An Internet blogger with thousands of followers knowingly posts partial statistics and slanted evidence related to a regional environmental issue.

12. The Children's Internet Protection Act (CIPA) requires that schools and libraries receiving E-Rate discounts have in place technologies to:
- A. store usernames and passwords safely and securely.
  - B. prevent minors from viewing obscene or harmful material.
  - C. deny access to questionable website content to all users.
  - D. monitor and log minors' total Internet usage time.
13. A digital literacy teacher plans to make a year-end video showcasing their fifth-grade class and the work students have done. One of the students in the class does not have a video/image release form on file with the school office. In which of the following ways can the student be represented in the class video without violating the Children's Online Privacy Protection Act (COPPA)?
- A. video of the class that shows the student, but not their face
  - B. images of work products captioned with the student's name
  - C. anonymous video samples of the student's digital art
  - D. audio interviews with the student in which they are not identified by name
14. During a lesson on cyberbullying prevention, an elementary teacher discusses characteristics of cyberbullying with students. Which of the following additional strategies would best promote positive and responsible digital citizenship skills among students in the context of this lesson?
- A. illustrating for students strategies and techniques that will help them distinguish between real and cyber experiences in the same way that adults do
  - B. familiarizing students with cyberbullying techniques, such as creating a fake persona or website to harass someone or hacking into someone's account and sharing private details and images
  - C. posting on the school's website links to parental control and monitoring software and step-by-step protocols for preventing or blocking student access to social media accounts
  - D. increasing students' knowledge of and empathy for the effects of cyberbullying, and emphasizing the necessity of not sharing, tolerating, or providing feedback to cyberbullying posts

15. Which of the following strategies would be most appropriate for student computer users who are interested in minimizing their passive digital footprint?
- A. sharing only videos created by well-known influencers
  - B. refraining from liking or sharing social media content
  - C. ensuring that all online subscription services are set to be renewed manually
  - D. avoiding posting photos of school events on the school's social media site
16. Which of the following uses of copyright-protected information is most likely to be permissible under fair use guidelines?
- A. A book reviewer quotes verbatim a few lines from a new novel as part of a review that appears in an online magazine.
  - B. A language arts teacher scans an anthology of poetry and distributes digital copies to students at the start of the school year.
  - C. A student downloads a graphic image from a non-profit website and uses it on their own site, attributing it to the original website.
  - D. A researcher uses references at the end of a journal article as background information for their own research.
17. A teacher has instructed students working on a research project to maintain separate files for their own writing and excerpts from outside sources. The teacher notices that a student has cut and pasted an academic journal excerpt into the file intended for their own writing. After instructing the student to move the excerpt to the file intended for outside sources, which of the following scenarios illustrates the best way to respond ethically in this situation?
- A. sharing this information with the student's other teachers so that they can reinforce appropriate use of resources
  - B. guiding the student away from the journal and toward similar open-access articles and works in the public domain
  - C. showing the student how to cite the journal article while describing basic copyright guidelines
  - D. instructing the student to sufficiently paraphrase the excerpt so that it does not need to be cited

18. A software developer has created a new software application. Creating a software license that users must review and accept before downloading the application will allow the developer to:
- A. disclose warranty disclaimers for the software.
  - B. ensure that the software is not shared with other individuals.
  - C. set the price the purchaser will pay for the software.
  - D. explain how to download and install the software.
19. A student downloads open-source code under the GNU General Public License from an online repository. Under this type of license, the student is allowed to:
- A. modify the code and then embed it in software that is distributed under a proprietary license.
  - B. use the original code for profit if licensing fees are paid to the repository.
  - C. freely modify and redistribute the code under the same copyright licensing terms.
  - D. distribute the code along with a school proprietary application.
20. A digital literacy teacher creates a website to explain project guidelines to students and parents/guardians and to model Web design. The teacher tests the site on several popular browsers before deploying it, but later receives feedback that the site does not display properly and cannot be easily read on smartphones or other mobile devices. Students would be at a disadvantage in this case if their households:
- A. tend to adopt new technologies early.
  - B. rely on mobile-based translation apps.
  - C. prioritize mobile devices and connections based on cost.
  - D. prefer mobile devices because heads-of-house are younger adults.
21. Which of the following uses of digital imaging is an example of the application of artificial intelligence to medicine?
- A. reviewing images of eyes with an algorithm to identify glaucoma risk
  - B. attaching CT scans to an electronic health care record
  - C. allowing review of X-rays by doctors and patients via mobile application
  - D. tracking the height and weight of children over time

22. The presence of near field communication (NFC) in mobile devices facilitates:
- A. seamless video chat while on the same network.
  - B. tap-to-pay mobile payments.
  - C. collection of step counts and other movement data.
  - D. instantly geotagging photographs.
23. A student uses a Bluetooth®-connected hearing aid to take in audio media, including from a clip-on microphone worn by their teacher during class. Which of the following factors is most important for the teacher to consider in order to facilitate the student's full participation in class activities?
- A. the distance between the student and the transmitting media source
  - B. whether the student has logon credentials for local Wi-Fi networks
  - C. the available bandwidth over cellular networks in the classroom
  - D. if the media volume is lower than an unaided student could hear
24. A common low-vision assistive technology is a screen magnifier, which enlarges a portion of the text on a screen. Which of the following features of screen magnification would most impede a student's ability to find information efficiently?
- A. cost of the device
  - B. amount of scrolling required
  - C. blurry magnified text
  - D. non-magnified mouse pointer
25. A teacher is expected to respond to parent/guardian emails within 24 hours and regularly upload content to the school's learning management system (LMS). The primary benefit of this type of electronic communication is that it:
- A. helps students assume greater accountability for their performance.
  - B. creates a public record to support assessment results.
  - C. allows the teacher to interact more frequently with students.
  - D. builds rapport and trust between home and school.

26. Which of the following statements best describes a significant disadvantage of real-time photo and video sharing during times of crisis?
- A. False and inflammatory information regarding events can be communicated just as quickly.
  - B. Governments can choose to block specific types of information from being disseminated.
  - C. The speed at which information can be delivered decreases as the number of people viewing it increases.
  - D. Businesses can also instantly capitalize on people's communication about particular events through targeted advertising.
27. Two students are discussing a controversial article that they read on their favorite social networking platform. The teacher can best help the students evaluate if the story is reliable by recommending that they:
- A. identify how many other people shared the story.
  - B. discuss the story with classmates to determine if they feel that the story is factual.
  - C. research the author's credentials and affiliations and consider potential bias.
  - D. find out if any of the network's most influential users have commented on the story.
28. A student is conducting online research on the health benefits and effectiveness of a particular type of nutritional supplement. The student has found two websites that discuss the benefits of the supplement and include testimonials from satisfied customers who have used it. Which of the following questions would best help the student determine whether the information found on these websites is accurate?
- A. When was the content last updated by the site owner?
  - B. Can the content be verified by other credible sources?
  - C. Do the links on the home page connect to other websites?
  - D. Has the content been reviewed and revised by others?

29. Middle school students will be conducting a research project on historical figures. Group members will collaborate with one another and groups researching the same figures will collaborate with one another. Individual students will conduct and contribute their own research, eventually creating a single, dynamic body of knowledge about each figure. Which of the following digital tools would best allow students to collaborate in this way?
- A. updateable Web page (wiki)
  - B. instant messaging
  - C. video recording (vlog)
  - D. photo editing suite
30. Teachers at several schools across the country will be discussing and making changes to a national set of digital safety guidelines for later presentation at a conference. Which of the following types of tools would best facilitate this collaboration?
- A. repository hosting service
  - B. videoconferencing application
  - C. shared email distribution list
  - D. message board
31. A student needs to scan a printed document so that the scanned document can be edited in a word processing program. The student is using a scanner that connects to the computer via a wireless network. To obtain an editable version of the scanned document, which of the following types of software must be installed on the computer?
- A. an up-to-date device driver
  - B. an image editing application
  - C. optical character recognition software
  - D. data encryption/decryption software

32. A student is creating a report using a word processing application. The student wants to include a graph from a spreadsheet program and would like the graph to be updated each time the report is opened. Knowledge of which of the following concepts will be most helpful in accomplishing this task?
- A. templates and styles
  - B. page layouts
  - C. macros and shortcuts
  - D. object linking
33. Which of the following types of software would be most useful for including styled text, images, and video in the same file while allowing for quick, simple edits and large-group visibility?
- A. presentation software
  - B. database software
  - C. word processing software
  - D. graphic design software
34. On a Web page, one significant difference between streaming video and traditional video is that streaming video:
- A. is saved on a hard drive before being viewed.
  - B. can be compressed for faster transfer across networks.
  - C. is permitted by only a limited number of Web browsers.
  - D. begins playing before the entire video is downloaded.
35. A teacher would like to move classroom roster data from a desktop spreadsheet application to an open-source gradebook software program that has been security vetted and approved by their district. Which of the following file types would the teacher most likely export from the spreadsheet application?
- A. .html
  - B. .csv
  - C. .pdf
  - D. .ods

36. A software application to create digital portfolios should grant student users the ability to:
- A. create and delete user accounts in large batches.
  - B. view and comment on the portfolios of others along with an up/down vote system.
  - C. upload or delete work samples in various common file types.
  - D. log on from multiple devices including smart televisions and watches.
37. High school students from different parts of the country are participating in a collaborative research project that will include professionals in the field who will help guide the research. Which of the following statements illustrates an important guideline that students should keep in mind when communicating with others via email or discussion group?
- A. Professionals are expected to easily understand new communication contexts.
  - B. Using all capital letters is the best way to emphasize a point.
  - C. Abbreviations and slang can be used in moderation.
  - D. Humor in electronic communication can be easily misinterpreted.
38. A teacher would like to support the open-access movement in information services. In which of the following ways could the teacher most effectively promote the principles of open access in the school environment?
- A. by subscribing personally to as many completely open resources as possible to remain up to date on free online resources
  - B. by suggesting that the school pay for most open-access content used in order to ensure fair copyright for authors
  - C. by conducting workshops for teachers and students on how to access, evaluate, and use open-access resources
  - D. by reminding teachers and students that open-access materials are not peer-reviewed and can be published by anyone

39. Which of the following search techniques would be most effective for determining if an image posted to a nature photography blog is actually the work of the listed photographer?
- A. reverse image searching the picture, sorted by date, to see if the oldest version of it is in the photographer's name
  - B. looking at the WHOIS information for the blog to determine the page's owner and the country in which they reside
  - C. viewing the social media accounts of the photographer to see if they have also personally posted the photo
  - D. checking the camera metadata for the image to see if it was taken with the same device as other photos by the same photographer
40. A student group is digitally collecting data on students' favorite lunch items served in the school cafeteria. Which of the following formats would best capture this data?
- A. closed-ended surveys
  - B. open-ended surveys
  - C. unstructured questionnaires
  - D. one-on-one interviews
41. As part of a project, a student plans to collect anonymous height and weight data from classmates using an online form. Which of the following techniques should be applied earliest in the data collection process to maximize the quality of the data collected?
- A. fitting a trendline to a graph of height versus weight data and removing points that do not fall on the trendline
  - B. filtering out values that are impossibly large or small based on knowledge of human physiology
  - C. using regular expressions to check potential inputs and prevent the entry of non-numeric characters
  - D. manually reviewing submitted values and deleting those that appear to include entry mistakes

42. Which of the following techniques would best allow students to compare research questions on the history and social impact of computing tools?
- A. posting a list of potential research questions to social media and asking followers to vote for one
  - B. reading and comparing the first-returned search result for each potential research question
  - C. evaluating information from an influential technology blogger and taking their written recommendation
  - D. searching the text of potential questions on news and scholarship databases and comparing the numbers of results returned
43. A teacher periodically assigns small groups of students to conduct Internet searches on topics related to class units of study. Students gather and summarize information and collaboratively develop products resulting from the searches, including Web pages, video clips, informational brochures, and oral reports. This practice demonstrates the teacher's awareness of the importance of:
- A. promoting students' development of study skills that support achievement.
  - B. maximizing the amount of class time during which students engage in computer work.
  - C. encouraging students to use reading and analysis skills for inquiry and research.
  - D. prompting students to develop criteria for identifying potential bias in Web-based content.
44. A middle school teacher wants to encourage students to use the Internet as a resource for research but is concerned that they will consult Internet sites that are not reliable sources of information. The teacher could best address this concern by implementing which of the following strategies before asking students to use online resources for a research project?
- A. engaging students in analyzing various Internet resources related to the project and establishing criteria for evaluating a resource
  - B. informing students that they will be required to provide a full citation of each Internet site from which information is taken
  - C. establishing a limit on the number of Internet sources students will be permitted to cite as research for their project
  - D. providing students with a list of general government Internet sites related to the project that are known for reliable information

45. A computer science student encounters a problem using a recently updated package in a larger project. The student consults a popular programming forum with a question-and-answer format and finds another user has posted a question very similar to the student's own problem. The question has generated many potential answers from other users. Which of the following characteristics should the student consider *first* to find relevant information?
- A. the length of time each writer has been active on the forum
  - B. the quality of each writer's forum profile biography
  - C. the number of upvotes the question has received from other users
  - D. the length of each response
46. The Web address or URL of online journal articles may change or become invalid over time. An author can best address this issue in citations by:
- A. including the source's digital object identifier (DOI).
  - B. bookmarking the websites in the Web browser.
  - C. keeping a record of when the source was accessed.
  - D. downloading and printing a copy of the online resource.
47. Which of the following steps would allow a student to use an image found on the Internet in a student publication?
- A. cropping and color correcting the image, then citing it as their own work
  - B. writing a citation including the URL of the Web page where they found the image
  - C. citing the image with a disclaimer that the student is not the rights holder
  - D. researching the license under which the image is published and following its guidelines

48. A computer user is editing a word-processing document, downloading a file from the Internet, and printing an email message. It appears to the user that these tasks are occurring simultaneously. The operating system accomplishes this by:
- A. assigning each process to a separate processor core in the computer.
  - B. allocating time slices to each process that needs to run.
  - C. waiting until each process is complete before starting a new one.
  - D. prioritizing the processes that require the fewest resources.
49. The primary task of a computer system's central processing unit (CPU) is to:
- A. manage available storage space on a hard drive.
  - B. facilitate communication between a peripheral and the computer.
  - C. carry out instructions of computer programs stored in memory.
  - D. send requests to Web servers and display the returning information.
50. Which of the following computer components is most closely associated with the Boolean operators AND, OR, and NOT?
- A. logic gates
  - B. read-only memory (ROM)
  - C. address buses
  - D. random access memory (RAM)
51. A computer user on a home network finds a document on the Web and wants to print it. The user sends the document to the wireless network printer, but receives an error message indicating that the printer is offline. The printer had been working well the day before, the power is on, and the printer screen does not indicate that anything is wrong. Which of the following *initial* questions will best help the user identify the source of the problem?
- A. Is the printer connected to the home network?
  - B. Are the printer USB and network cables connected securely?
  - C. Is the Web server hosting the document experiencing heavy traffic?
  - D. Have there been any operating system updates?

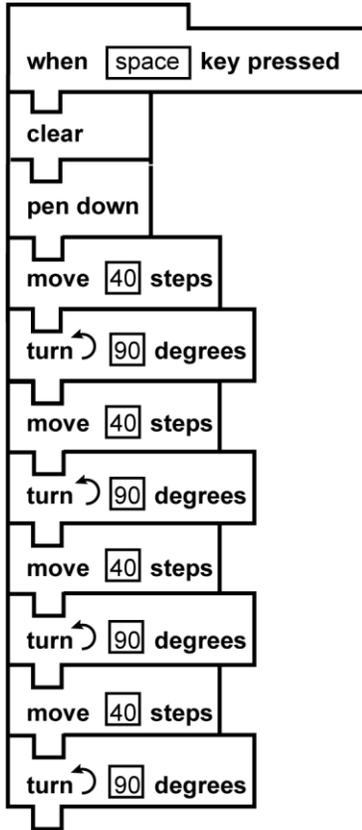
52. A computer system is slow to boot up and slow to switch between open applications. Which of the following steps would be most appropriate to take *first* when attempting to resolve the problem?
- A. restoring the operating system to a previous working version and rebooting
  - B. updating all software applications and device drivers and rebooting
  - C. deleting or archiving any desktop icons that are no longer being used and rebooting
  - D. minimizing the number of programs that launch when the computer starts and rebooting
53. Which of the following developments is a major factor responsible for the modern increase in the availability of Internet-connected smart home devices?
- A. the sharp decrease in the price of microprocessors
  - B. the increased availability of high-speed data over cellular networks
  - C. the growing adoption of the CAT 6 standard for cabling
  - D. the improvement of data security and privacy measures for consumers
54. Which of the following tasks is best accomplished through the use of a Global Positioning System (GPS)?
- A. locating a lost item carrying an electronic tag within a residential home
  - B. finding a landscape feature of interest while hiking
  - C. navigating to a particular floor in a high-rise building
  - D. measuring finish times for Olympic-qualifying marathoners
55. Rapid advancements in information storage capacity and performance have contributed most directly to explosive growth in which of the following areas of technology?
- A. automated manufacturing
  - B. online video gaming
  - C. data mining
  - D. mobile device technology

56. Which of the following systems would function most efficiently under a human-in-the-loop model to which both humans and autonomous systems contribute?
- A. playing chess at a grandmaster level
  - B. finding the line of best fit through experimental data
  - C. locating each instance of a given word in a digital text
  - D. moderating objectionable post content for a social network
57. An online company uses a content delivery network (CDN) so that when a user visits the website, the site content is delivered from the server that is closest to the user's geographic location. Which of the following network characteristics is most likely to be affected by the use of a CDN?
- A. network bandwidth
  - B. data security
  - C. network latency
  - D. data privacy
58. A customer at a coffee shop connects to the public Wi-Fi. Which of the following steps will best help the customer protect personal data while using the coffee shop's Wi-Fi connection?
- A. avoiding social media sites
  - B. using a virtual private network
  - C. refraining from sending email attachments
  - D. scanning for viruses frequently
59. Compared to a wired network, the privacy of data in a wireless network more heavily depends on which of the following technologies?
- A. software firewall
  - B. password protection
  - C. virus scanning
  - D. data encryption

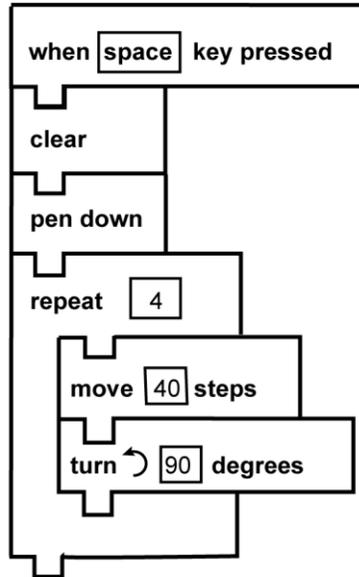
60. A significant difference between a wired local-area network (LAN) and a wireless local-area network (WLAN) is that a wired LAN:
- A. loses fewer packets during data transmission.
  - B. is more difficult to secure and monitor.
  - C. cannot operate during a power outage.
  - D. is more prone to infections by viruses and other malware.
61. Voice over Internet Protocol (VoIP) services use a network connection to relay phone calls under the User Datagram Protocol (UDP). At which layer of the TCP/IP model does this data exchange take place?
- A. application
  - B. transport
  - C. Internet
  - D. link
62. What is the most common function provided by network switches?
- A. managing access to network resources
  - B. providing a secure Internet connection
  - C. creating a virtual private network (VPN)
  - D. supporting voice over Internet Protocol (VoIP) communication
63. Which of the following recommendations is most likely to improve the performance of a long-range fiber optic network struggling with data loss and slow speeds over long distances?
- A. replacing the receiving-end router to increase the bandwidth it can process
  - B. installing a transponder to receive and send optical data midway through the network
  - C. adjusting the optical signal transmitter to increase its transmission frequency
  - D. installing a transceiver to supplement optical data with electrical data through the middle part of the network

64. A social networking company can use data mining, a deep analysis of internal data, to best address which of the following research questions?
- A. What types of advertisements attract the most interest in each region of a country?
  - B. Which user of the network has the longest contact list?
  - C. How many users will sign up to join the social network in the next year?
  - D. Which of the company's advertising relationships are most profitable?
65. Quality of Service (QoS) technologies most commonly manage network data traffic by:
- A. minimizing the time that networks are down.
  - B. compressing data before it is sent through the network.
  - C. setting priorities for certain types of data on the network.
  - D. increasing the speed at which user authentication occurs.
66. Which of the following effects is the most important advantage of using algorithmic abstraction in computer programming?
- A. It allows for easier modification.
  - B. It makes programs run faster.
  - C. It removes platform dependence.
  - D. It takes up less working memory.

67. Use the diagrams below to answer the question that follows.



Code A



Code B

Students are using a block-based program to draw geometric figures. The students first use code similar to that shown in Code A before learning the programming concept represented in Code B. Which of the following concepts are the students learning?

- A. recursion
- B. inheritance
- C. encapsulation
- D. iteration

68. Use the pseudocode below to answer the question that follows.

```
function f(n)
  if(n == 0)
    return 1
  else
    return n * f(n - 1)
```

Which of the following pseudocode algorithms is an alternative representation of the algorithm above?

A.

```
function f(n)
  result = 1
  for (i = 1; i <= n; i = i + 1)
    result = result * n
  return result
```

B.

```
function f(n)
  result = 1
  for (i = 1; i <= n; i = i + 1)
    result = result * i
  return result
```

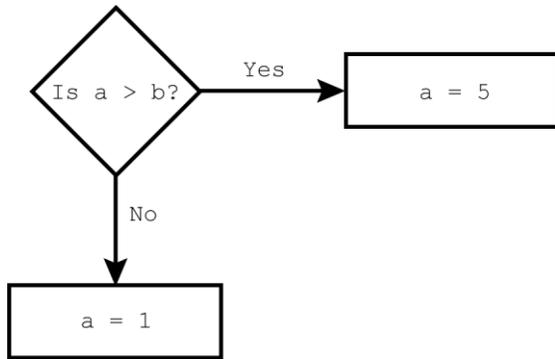
C.

```
function f(n)
  result = n
  for (i = 1; i <= n; i = i + 1)
    result = (n - 1) * i
  return result
```

D.

```
function f(n)
  result = n
  for (i = 1; i <= n; i = i + 1)
    result = n * (n - i)
  return result
```

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



Which of the following pseudocode segments produces the same output as the flowchart shown above?

A.

```

if (a > b)
    a = 5
else
    a = 1
  
```

B.

```

if (a > b)
    a = 1
    a = 5
  
```

C.

```

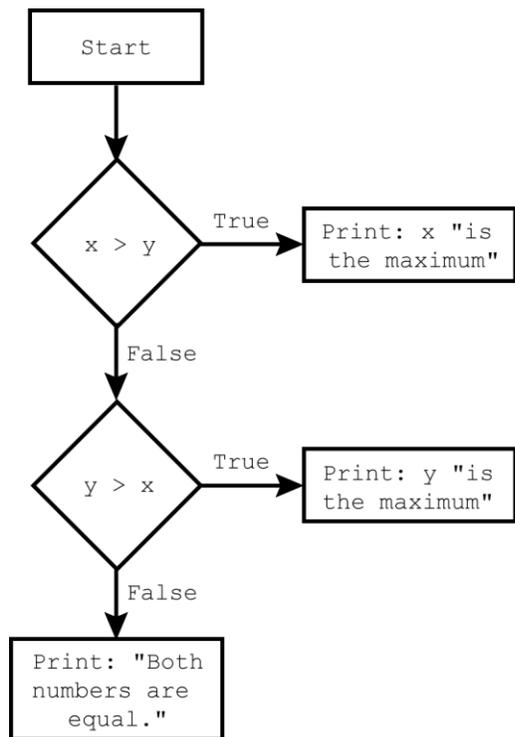
if (a > b)
    a = 5
if (a < b)
    b = 1
  
```

D.

```

if (a > b)
    a = 5
    a = 1
  
```

70. Use the flowchart below to answer the question that follows.



Which of the following pseudocode segments correctly represents the flowchart?

A.

```
if (x > y)
    print(x + " is the maximum")
else
    print(y + " is the maximum")
else
    print("Both numbers are equal")
```

B.

```
if (x > y)
    print(x + " is the maximum")
else
    if (y > x)
        print(y + " is the maximum")
    else
        print("Both numbers are equal")
```

C.

```
if (x > y)
    print(x + " is the maximum")
else
    if (y > x)
        print(y + " is the maximum")
    print("Both numbers are equal")
```

D.

```
if (x > y)
    print(x + " is the maximum")
if (y > x)
    print(y + " is the maximum")
print("Both numbers are equal")
```

71. Use the pseudocode segment to answer the question that follows.

```
function g(n)
    if (n == 0)
        return n
    else
        return 3 + g(n - 1)

print(g(4))
```

What will this code segment print?

- A. 6
  - B. 9
  - C. 12
  - D. 24
72. Assume that `sum` is initialized to 0. Which of the following algorithms finds the sum of the even integers from 2 to 20?

A.

```
for (i = 20; i > 2; i = i - 2)
    sum = i + 2
```

B.

```
for (i = 20; i > 2; i = i - 2)
    sum = sum + i
```

C.

```
for (i = 2; i <= 20; i = i + 2)
    sum = i + 2
```

D.

```
for (i = 2; i <= 20; i = i + 2)
    sum = sum + i
```

73. A user is asked to input any 10 positive integers. An algorithm is applied to find the sum of only the even positive integers that were input by the user. Part of the algorithm is shown below.

```
i = 1      # loop variable
sum = 0    # variable to hold the sum
num = 0    # variable to get input from user

#execute selected code here

print("The sum of the even numbers you input is: " + sum)
```

Which of the following missing code segments correctly completes the algorithm?

A.

```
if ((num % 2) == 0)
    while (i <= 10)
        print("Input a number")
        num = get_user_input()
        sum = num + sum
        i = i + 1
```

B.

```
while (i <= 10)
    if ((num % 2) == 0)
        print("Input a number")
        num = get_user_input()
        sum = num + i
        i = i + 1
```

C.

```
while (i <= 10)
    print("Input a number")
    num = get_user_input()
    if ((num % 2) == 0)
        sum = num + sum
    i = i + 1
```

D.

```
while (i <= 10)
    print("Input a number")
    num = get_user_input()
    if ((num % 2) == 0)
        sum = num + i
    i = i + 1
```

74. The decimal number 125 is equivalent to which of the following hexadecimal numbers?
- A. 7D
  - B. C5
  - C. 77
  - D. 80
75. The original basic ASCII character set was developed prior to the invention of the computer and was used for teletype machines. It encoded a set of characters using the decimal numbers from 0 to 127. How many bits were needed to encode a character in ASCII?
- A. 4
  - B. 7
  - C. 8
  - D. 16
76. A computer user compresses several executable files into a single ZIP file. Which of the following statements best describes a characteristic of the ZIP file?
- A. The compressed file can be read by more file systems than the individual files.
  - B. The files will be merged into a single file of the same type when they are compressed.
  - C. When the files are decompressed, they will be identical to the original files.
  - D. Redundant bits of information are lost during compression.
77. The concept of file synchronization is most relevant to which of the following situations?
- A. Online video gamers interact with each other in real time.
  - B. A company schedules a backup program to run automatically each night.
  - C. Employees collaborating from separate locations need their project files to contain the most recent modifications.
  - D. A photographer uses a cloud storage account to manually upload and store images taken from a variety of mobile devices.

78. A person wants to search a large database for books that contain the following words in the title: "History", "America", "Government". Which of the following searches will return the fewest results?
- A. "History" OR "America" OR "Government"
  - B. ("History" AND "America") OR "Government"
  - C. ("History" OR "America") AND "Government"
  - D. "History" AND "America" AND "Government"

79. **Use the table below to answer the question that follows.**

Id	FirstName	LastName	City	Country
1	Francoise	Okeke	Paris	France
2	Abal	Bashir	Doha	Qatar
3	Patricia	Ruiz	Madrid	Spain

The table represents a small section of a large database of customers from all over the world. A person would like to search for all the customers from the countries of France and Spain with a last name of Ruiz who have an annual purchase of at least \$10,000. Which of the following database queries should be used?

- A. `SELECT * FROM Customers WHERE LastName = "Ruiz" OR (Country = "France" AND "Spain") OR Purchase >= 10,000`
- B. `SELECT * FROM Customers WHERE LastName = "Ruiz" OR (Country = "France" AND "Spain") AND Purchase >= 10,000`
- C. `SELECT * FROM Customers WHERE LastName = "Ruiz" AND (Country = "France" OR "Spain") OR Purchase >= 10,000`
- D. `SELECT * FROM Customers WHERE LastName = "Ruiz" AND (Country = "France" OR "Spain") AND Purchase >= 10,000`

80. Which of the following techniques is an example of the application of machine learning to the development of language learning software?
- A. loading a dictionary into a database
  - B. using native speakers to gather feedback on performance
  - C. encoding linguist-created rules on the structure of the target language
  - D. analyzing large bodies of translated text for patterns
81. Which of the following statements identifies the most common relationship between data mining and Web scraping?
- A. Data mining and Web scraping are used to gather raw information for analysis.
  - B. Data mining may be used to find insights in data gathered through Web scraping.
  - C. Web scraping skims useful patterns from large data sets that have been mined.
  - D. Web scraping gathers Internet comments to compare to data-mined sentiment analysis.
82. Biology and computer science students are collaborating on a model of how a group of 50 bees pollinates a two-acre field of flowers. Which of the following factors would be the biggest limitation to the accuracy of the model?
- A. insufficient computing power to simulate the entire group of bees
  - B. insufficient scientific data on bee behavior
  - C. insufficient ability to collect data on the precise movement of bees
  - D. insufficient mathematical tools to calculate speed and acceleration values
83. A programmer wants to represent the number 1234 as a string. The programmer creates a string variable named `num_text`. Which of the following statements will correctly assign the string 1234 to this variable?
- A. `num_text = 1234`
  - B. `num_text = /*1234*/`
  - C. `num_text = "1234"`
  - D. `num_text = [1234]`

84. For which of the following purposes is the concatenation operator + used?
- A. adding two decimal numbers
  - B. changing a single-digit integer into a single character
  - C. rounding a decimal number to the nearest whole number
  - D. joining two strings to make a larger string

85. Use the information below to answer the question that follows.

**Ticket Prices**

Adult \$12

Student (18 and under) \$6

Senior (65 and over) \$8

Prices for Adult, Student, and Senior tickets to a community theater vary depending on the age of the attendee, as shown. Which of the following segments of pseudocode could be used to determine the price of a ticket?

A.

```
if (age <= 18)
    price = 6
if (age >= 65)
    price = 8
if (age > 18)
    price = 12
```

B.

```
if (age >= 65)
    price = 8
else
    if (age <= 18)
        price = 6
    else
        price = 12
```

C.

```
if (age > 18)
    price = 12
else
    if (age <= 18)
        price = 6
    else
        price = 8
```

D.

```
if (age <= 18)
    price = 6
if (age > 18)
    price = 12
else
    price = 8
```

86. Use the information below to answer the question that follows.

```

bonus = 0

if (qtr_sales >= 5000)
    commission = qtr_sales * 0.25
    if (qtr_sales + commission > 6500)
        bonus = 500
else
    if (qtr_sales >= 3000 AND qtr_sales < 5000)
        commission = qtr_sales * 0.20
    else
        commission = qtr_sales * 0.10

total_payment = qtr_sales + commission + bonus
print(total_payment)

```

Salesperson	Quarter Sales
1	6000
2	3000
3	5000
4	2500

The segment of pseudocode above calculates the total payment for each of four sales people with the quarterly sales given in the table. What will be the output of the pseudocode?

- A. 8000, 3600, 6250, 2750
  - B. 8000, 3300, 6250, 3000
  - C. 7500, 3600, 6750, 2750
  - D. 7500, 3300, 6750, 3000
87. In which of the following situations is it more appropriate to use a `while` loop than a `for` loop?
- A. The number of times a loop will execute is not known in advance.
  - B. The loop is called from within a procedure.
  - C. The number of statements in the loop body is greater than 10.
  - D. The loop continues until a condition is satisfied.

88. Use the pseudocode below to answer the question that follows.

```
x = 0
y = 0
for (i = 0; i <= 2; i = i + 1)
    if (x > y)
        y = x + 3
    else
        x = y + 2
print(x + ", " + y)
```

When this segment of pseudocode executes, what will be printed?

- A. 0, 2
- B. 2, 5
- C. 5, 2
- D. 7, 5

89. Use the pseudocode below to answer the question that follows.

```
1  function calc_score(suit, value)
2      score = 0
3
4      if (suit is "heart" OR suit is "red")
5          score = 2 * value
6      else
7          score = value
8
9      return score
10
11 #main body of program
12
13 score = calc_score("heart", 4)
14 print(score)
```

Which line in the segment of pseudocode illustrates the passing of arguments?

- A. line 1
- B. line 2
- C. line 9
- D. line 13

90. In an `array` data type, the index is used for which of the following purposes?

- A. identifying the size of the array
- B. locating elements within the array
- C. defining the first value in the array
- D. identifying duplicate data in the array

91. Use the pseudocode below to answer the question that follows.

```
1 # the index of list_one begins at 0
2
3 list_one = ["March", "April", "May", "June", "July"]
4
5 # execute selected code here
6     print(list_one[i])
```

A student wants to print out the elements in `list_one`. Which of the following replacements for `# execute selected code here` on line 5 is correct?

- A. `for (i = 0; i < 4; i = i + 1)`
- B. `for (i = 0; i <= 4; i = i + 1)`
- C. `for (i = 1; i < 5; i = i + 1)`
- D. `for (i = 1; i <= 5; i = i + 1)`

92. Which of the following lists of programming languages is ordered from lowest level to highest level of abstraction?

- A. machine, assembly, procedural, object-oriented
- B. object-oriented, machine, procedural, assembly
- C. machine, assembly, object-oriented, procedural
- D. procedural, assembly, machine, object-oriented

93. In a C-like programming language, which of the following outcomes will occur if a function's local variable has the same name as a global variable?
- A. The value of the local variable will be assigned to the global variable.
  - B. Within the function, the variable name will refer to the local variable.
  - C. The function will not compile and will give an error message.
  - D. The values of the global and local variables will always be the same.

94. Use the table below to answer the question that follows.

The table displays the output of a method call to the objects `my_table` and `table_2`.

Input	<code>print(my_table.set(4, "formal"))</code>	<code>print(table_2.set(4, "formal"))</code>
Output	a 0 0 0 1	Plates: 4
	b 0 0 1 0	Glasses: 4
	c 0 1 0 0	Spoons: 8
	d 1 0 0 0	Forks: 8

Which of the following statements is the most likely explanation for the behavior of the `set` method in the two cases shown?

- A. An attribute of one of the objects triggers a conditional statement in `set`.
- B. The "set" method is overloaded and different arguments trigger different versions.
- C. The first argument is interpreted as an `int` in one case and a `float` in the second, altering `set`.
- D. The two objects are of different classes that each have a `set` method that accepts similar arguments.

95. Which of the following is an advantage of using an iterative design process for creating a software product?
- A. facilitating the release of new versions to meet changing market demands
  - B. providing programmers with an opportunity to contribute to all phases of development
  - C. creating opportunities to incorporate user feedback throughout the process
  - D. ensuring that each phase of development is completed before moving to the next phase
96. Which of the following activities is generally addressed during the maintenance phase of software development?
- A. rewriting the software to incorporate all new technologies
  - B. improving the documentation and readability of the code
  - C. fixing bugs and incorporating customer feedback
  - D. creating and testing new algorithms and prototypes
97. For which of the following purposes would a Web developer want to gain access to an application programming interface (API)?
- A. creating a script to add interactivity to a Web page
  - B. building a style sheet to define a Web page's fonts and background colors
  - C. accessing the nodes of a Web page's document object model (DOM)
  - D. embedding a map from a search engine company onto a Web page
98. A programmer would most likely use the standard library of a programming language in order to:
- A. look up definitions of programming terms.
  - B. access pre-built classes and modules for use in a project.
  - C. download open-source software programs written in the language.
  - D. search through documentation that explains the programming language.

99. Creating a trace table is an effective method for:
- A. converting a flowchart into source code.
  - B. searching an array for a given value.
  - C. analyzing a loop that has an off-by-one error.
  - D. storing numerical values in a database.
100. A programmer who is uploading a coding project to an open-source software hosting site would include a `README.txt` file in order to provide:
- A. a text version of the source code for others to access.
  - B. a list of people who have downloaded and tested the software.
  - C. a clear description of what the project does along with user instructions.
  - D. a hypertext link and embedded multimedia to promote the sale of the project.

## DIRECTIONS FOR THE OPEN-RESPONSE ITEM ASSIGNMENTS

This section of the test consists of two open-response item assignments. You will be asked to prepare a written response of approximately 150–300 words for each assignment. You should use your time to plan, write, review, and edit your response for each assignment. You must write responses to both of the assignments.

For each assignment, read the topic and directions carefully before you begin to work. Think about how you will organize your response.

As a whole, your response to each assignment must demonstrate an understanding of the knowledge of the field. In your response to each assignment, you are expected to demonstrate the depth of your understanding of the subject area by applying your knowledge rather than by merely reciting factual information.

Your response to each assignment will be evaluated based on the following criteria.

- **PURPOSE:** the extent to which the response achieves the purpose of the assignment
- **SUBJECT KNOWLEDGE:** appropriateness and accuracy in the application of subject knowledge
- **SUPPORT:** quality and relevance of supporting evidence
- **RATIONALE:** soundness of argument and degree of understanding of the subject area

The open-response item assignments are intended to assess subject knowledge. Your responses must be communicated clearly enough to permit valid judgment of the evaluation criteria by scorers. Your responses should be written for an audience of educators in this field. The final version of each response should conform to the conventions of edited American English. Your responses should be your original work, written in your own words, and not copied or paraphrased from some other work.

Be sure to write about the assigned topics. You may not use any reference materials during the test. Remember to review your work and make any changes you think will improve your responses.

**OPEN-RESPONSE ITEM ASSIGNMENT #1**

**Use the information below to complete the assignment that follows.**

A ninth-grade digital literacy and computer science teacher is designing a lesson where students will program a small robot. The robot will use a single light sensor to follow a path of a black line on a white background. The students' projects must have the following characteristics:

- a computer program that controls the robot's movement without any sensor input;
- a description of the purpose of the light sensor and how it is used to control the robot; and
- a computer program that controls the robot to move along the path of the black line.

Use your knowledge of digital tools to create a response in which you develop a plan involving specific tools to create the digital artifact described. In your response:

- describe the steps needed for creating the digital artifact that meets the given project requirements;
- describe the computational tools and skills needed to create the artifact; and
- describe issues related to the safe and ethical use of technology in the creation of this digital artifact.

**OPEN-RESPONSE ITEM ASSIGNMENT #2**

**Use the information below to complete the assignment that follows.**

A columnist believes that a local politician uses certain phrases to excess in speeches. The columnist has a transcript of the politician's most recent speech. Design an algorithm that will determine the number of times a given phrase appears in the transcript. Your algorithm should accept an input phrase, print that phrase, and print the number of times it appears.

Use your knowledge of computational thinking and program development to write a response in which you design an algorithm to solve the above problem. In your response:

- briefly describe the steps needed to solve the problem;
- write an algorithm using pseudocode including any appropriate data types, data structures, conditional statements, loops, functions, and libraries; and
- describe how the algorithm should be documented and identify a method for testing and debugging the program.

Your pseudocode will not be evaluated for syntax, but instead on how well it demonstrates programming concepts to solve the presented problem.

## **PRACTICE TEST RESULTS**

## PRACTICE TEST RESULTS OVERVIEW

The practice test provides valuable information regarding your preparedness for the MTEL Digital Literacy and Computer Science (71) test. In this section, you will find information and tools to help you determine your preparedness on the various sections of the test.

### Multiple-Choice Questions

A Multiple-Choice Question Answer Key Worksheet is provided to assist you in evaluating your multiple-choice responses. The worksheet contains five columns. The first column indicates the multiple-choice question number, the second column indicates the objective to which the test question was written, and the third column indicates the correct response. The remaining columns are for your use in calculating the number of multiple-choice questions you answered correctly or incorrectly.

An Evaluation Chart for the multiple-choice questions is also provided to help you assess which content covered by the test objectives may require additional study.

### Open-Response Items

Evaluation Information, Sample Responses and Analyses, as well as a Scoring Rubric are provided for these items. You may wish to refer to this information when evaluating your practice test responses.

### Total Test

Practice Test Score Calculation information is provided to help you estimate your score on the practice test. Although you cannot use this practice test to precisely predict how you might score on an official MTEL Digital Literacy and Computer Science (71) test, you may be able to determine your degree of readiness to take an MTEL test at an operational administration. No passing score has been determined for the practice test.

**MULTIPLE-CHOICE QUESTION  
Answer Key Worksheet**

Question Number	Objective Number	Correct Response	Your Response	
			Correct?	Incorrect?
1	0001	B		
2	0001	A		
3	0001	A		
4	0001	A		
5	0001	C		
6	0001	B		
7	0001	D		
8	0001	C		
9	0001	D		
10	0002	A		
11	0002	D		
12	0002	B		
13	0002	C		
14	0002	D		
15	0002	B		
16	0002	A		
17	0002	C		
18	0002	A		
19	0002	C		
20	0003	C		
21	0003	A		
22	0003	B		
23	0003	A		
24	0003	B		
25	0003	D		
26	0003	A		
27	0003	C		
28	0003	B		
29	0004	A		
30	0004	B		
31	0004	C		
32	0004	D		
33	0004	A		
34	0004	D		

**MULTIPLE-CHOICE QUESTION  
Answer Key Worksheet (CONTINUED)**

Question Number	Objective Number	Correct Response	Your Response	
			Correct?	Incorrect?
35	0004	B		
36	0004	C		
37	0004	D		
38	0004	C		
39	0005	A		
40	0005	A		
41	0005	C		
42	0005	D		
43	0005	C		
44	0005	A		
45	0005	C		
46	0005	A		
47	0005	D		
48	0006	B		
49	0006	C		
50	0006	A		
51	0006	A		
52	0006	D		
53	0006	A		
54	0006	B		
55	0006	C		
56	0006	D		
57	0007	C		
58	0007	B		
59	0007	D		
60	0007	A		
61	0007	B		
62	0007	A		
63	0007	B		
64	0007	A		
65	0007	C		
66	0008	A		
67	0008	D		
68	0008	B		

**MULTIPLE-CHOICE QUESTION  
Answer Key Worksheet (CONTINUED)**

Question Number	Objective Number	Correct Response	Your Response	
			Correct?	Incorrect?
69	0008	A		
70	0008	B		
71	0008	C		
72	0008	D		
73	0008	C		
74	0009	A		
75	0009	B		
76	0009	C		
77	0009	C		
78	0009	D		
79	0009	D		
80	0009	D		
81	0009	B		
82	0009	C		
83	0010	C		
84	0010	D		
85	0010	B		
86	0010	A		
87	0010	A		
88	0010	D		
89	0010	D		
90	0010	B		
91	0010	B		
92	0011	A		
93	0011	B		
94	0011	D		
95	0011	C		
96	0011	C		
97	0011	D		
98	0011	B		
99	0011	C		
100	0011	C		

**Count the number of multiple-choice questions you answered correctly:**

\_\_\_\_\_ of 100 multiple-choice questions

**MULTIPLE-CHOICE QUESTION  
PRACTICE TEST EVALUATION CHART**

In the evaluation chart that follows, the multiple-choice questions are arranged in numerical order and by test objective. Check your responses against the correct responses provided to determine how many questions within each objective you answered correctly.

**Subarea I: Computing and Society**

<b>Objective 0001: Apply knowledge of safety and security concepts and appropriate digital interactions.</b>									
1B	2A	3A	4A	5C	6B	7D	8C	9D	___/9

<b>Objective 0002: Apply knowledge of the responsible, ethical, and legal use of technology resources and digital content.</b>									
10A	11D	12B	13C	14D	15B	16A	17C		
18A	19C								___/10

<b>Objective 0003: Apply knowledge of the impacts of technology on society.</b>									
20C	21A	22B	23A	24B	25D	26A	27C		
28B									___/9

**Subarea I (Objectives 0001–0003) Total \_\_\_/28**

**MULTIPLE-CHOICE QUESTION  
PRACTICE TEST EVALUATION CHART (CONTINUED)**

**Subarea II: Digital Tools and Collaboration**

<b>Objective 0004: Apply knowledge of the use of digital tools and resources to create content, communicate, and collaborate.</b>							
29A	30B	31C	32D	33A	34D	35B	36C
37D	38C						
							____/10

<b>Objective 0005: Apply knowledge of digital tools and techniques for conducting research.</b>							
39A	40A	41C	42D	43C	44A	45C	46A
47D							
							____/9

**Subarea II (Objectives 0004–0005) Total \_\_\_\_/19**

**Subarea III: Computing Systems**

<b>Objective 0006: Apply knowledge of characteristics, functions, and uses of computing devices and components.</b>							
48B	49C	50A	51A	52D	53A	54B	55C
56D							
							____/9

<b>Objective 0007: Apply knowledge of characteristics, functions, and uses of networks and services.</b>							
57C	58B	59D	60A	61B	62A	63B	64A
65C							
							____/9

**Subarea III (Objectives 0006–0007) Total \_\_\_\_/18**

**MULTIPLE-CHOICE QUESTION  
PRACTICE TEST EVALUATION CHART (CONTINUED)**

**Subarea IV: Computational Thinking**

<b>Objective 0008: Apply concepts related to abstraction and algorithms.</b>								
66A	67D	68B	69A	70B	71C	72D	73C	____/8

<b>Objective 0009: Apply concepts related to data representation, modeling, and simulation.</b>								
74A	75B	76C	77C	78D	79D	80D	81B	
82C								____/9

<b>Objective 0010: Apply concepts related to computer programming.</b>								
83C	84D	85B	86A	87A	88D	89D	90B	
91B								____/9

<b>Objective 0011: Apply concepts related to program development and testing.</b>								
92A	93B	94D	95C	96C	97D	98B	99C	
100C								____/9

**Subarea IV (Objectives 00008–0011) Total \_\_\_\_/35**

## OPEN-RESPONSE ITEM EVALUATION INFORMATION

### How Open-Response Items Are Scored

Open-response items are scored through a process called focused holistic scoring. Scorers judge the overall effectiveness of the response rather than individual aspects considered in isolation. Scorer judgments are based on the quality of the response, not on length or neatness. Responses must be long enough to cover the topic adequately and scorers must be able to read what is written.

### How to Evaluate Your Practice Responses

On the following pages, you will find two "strong" and two "weak" sample responses. PLEASE DO NOT REVIEW THE SAMPLE RESPONSES UNTIL AFTER YOU HAVE WRITTEN YOUR OWN RESPONSE. When you do review the two "strong" and "weak" sample responses and analyses included here, please note the following points:

- ✓ For the purposes of the practice test, responses are identified as "strong" or "weak" rather than given a score point of 1–4.
- ✓ The responses identified as "strong" may contain flaws; however, these responses do demonstrate the performance characteristics of a "strong response."
- ✓ The two "strong" responses demonstrate the examinees' appropriate understanding and application of the subject matter knowledge. However, these responses do not necessarily reflect the full range of "correct answers" that would demonstrate an understanding of the subject matter.
- ✓ The "Analysis" accompanying each "strong" and "weak" response discusses the main attributes of the responses, but does not identify all flaws or strengths that may be present.

Compare your practice responses to the Sample Responses to determine whether your responses are more similar to the strong or weak responses. Also review the Analysis on those pages and the Scoring Rubric to help you better understand the characteristics of strong and weak responses. This evaluation will help you identify specific problems or weaknesses in your practice responses.

**OPEN-RESPONSE ITEM  
SCORING RUBRIC, SAMPLE RESPONSES, AND ANALYSES**

Massachusetts Tests for Educator Licensure®

**SCORING RUBRIC FOR SUBJECT TESTS**

**Performance Characteristics:**

Purpose	The extent to which the response achieves the purpose of the assignment.
Subject Matter Knowledge	Accuracy and appropriateness in the application of subject matter knowledge.
Support	Quality and relevance of supporting details.
Rationale	Soundness of argument and degree of understanding of the subject matter.

**Scoring Scale:**

Score Point	Score Point Description
<b>4</b>	<p><b>The "4" response reflects a thorough knowledge and understanding of the subject matter.</b></p> <ul style="list-style-type: none"> <li>• The purpose of the assignment is fully achieved.</li> <li>• There is substantial, accurate, and appropriate application of subject matter knowledge.</li> <li>• The supporting evidence is sound; there are high-quality, relevant examples.</li> <li>• The response reflects an ably reasoned, comprehensive understanding of the topic.</li> </ul>
<b>3</b>	<p><b>The "3" response reflects an adequate knowledge and understanding of the subject matter.</b></p> <ul style="list-style-type: none"> <li>• The purpose of the assignment is largely achieved.</li> <li>• There is a generally accurate and appropriate application of subject matter knowledge.</li> <li>• The supporting evidence is adequate; there are some acceptable, relevant examples.</li> <li>• The response reflects an adequately reasoned understanding of the topic.</li> </ul>
<b>2</b>	<p><b>The "2" response reflects a limited knowledge and understanding of the subject matter.</b></p> <ul style="list-style-type: none"> <li>• The purpose of the assignment is partially achieved.</li> <li>• There is limited, possibly inaccurate or inappropriate, application of subject matter knowledge.</li> <li>• The supporting evidence is limited; there are few relevant examples.</li> <li>• The response reflects a limited, poorly reasoned understanding of the topic.</li> </ul>
<b>1</b>	<p><b>The "1" response reflects a weak knowledge and understanding of the subject matter.</b></p> <ul style="list-style-type: none"> <li>• The purpose of the assignment is not achieved.</li> <li>• There is little or no appropriate or accurate application of subject matter knowledge.</li> <li>• The supporting evidence, if present, is weak; there are few or no relevant examples.</li> <li>• The response reflects little or no reasoning about or understanding of the topic.</li> </ul>
<b>U</b>	The response is unrelated to the assigned topic, illegible, primarily in a language other than English, not of sufficient length to score, or merely a repetition of the assignment.
<b>B</b>	<b>There is no response to the assignment.</b>

## FIRST SAMPLE WEAK RESPONSE FOR OPEN-RESPONSE ITEM ASSIGNMENT #1

### Steps

There are a few steps involved to create the artifact. Prior to building the robot, use a digital drawing platform to draw a prototype of the robot. While building the robot, we need to use sound and light sensors. A 1.5 DC motor along with two AA batteries can help the robot move. The sensors can be attached to the end of the robot. The robot will also need wheels so it can roll to move on the lines. The light sensor reads a black line and moves on it. The robot can walk north or south, east or west, and an online simulation software can be used to control the robot. Simulation software will move the wheels and give the directions and angles for the turns. The robot should respond to the sensor to move in any direction along the black line.

### Computational tools and skills

Simulation software like Kodable can be used to explain the programming concepts to students. It will help the students to learn the basic programming blocks to run a virtual robot. Later, students can move to stronger coding software like Scratch, which will help students learn detailed coding instructions to move the robot. Scratch will have sensor blocks that can be used to code the sensors in the robot.

### Safety and ethical issues

Although robots improve efficiency and quality, if not handled properly they can pose a fatal risk to humans around them. Sometimes not coding the robot can pose a big risk. Everyone should write their own code.

## ANALYSIS FOR FIRST WEAK RESPONSE TO OPEN-RESPONSE ITEM ASSIGNMENT #1

**Purpose:** The purpose of the assignment is partially achieved. The candidate partially explains the steps by adding details of the simulation software and sensor in the hardware. However, there is no mention of moving the robot without sensor input, which is one of the characteristics that the project requires. The candidate mentions but does not adequately describe safety and ethical issues.

**Subject Matter Knowledge:** There is limited application of subject matter knowledge. The response mentions Kodable as a suitable computational tool, which is inappropriate in relation to the question because Kodable does not provide advanced coding tools of the kind required to program light sensors. In the discussion of Scratch, the response does not give details of what sensor blocks will be used to communicate with the light sensors on the robot.

**Support:** The candidate mentions adding sound sensors, which are not relevant to this task (only a light sensor is required). The response suggests using “a digital drawing platform to draw a prototype of the robot,” but the prompt does not require the building of a robot. In the discussion of safety and ethical issues, the response mentions risks if robots are “not handled properly” but does not explain what proper handling might involve.

**Rationale:** The response is poorly reasoned. There is no sense of how the software and hardware connect with each other. Additionally, there is no explanation of how the light sensor works to control the robot. Although there is a mention that “[e]veryone should write their own code,” there is no reasoning to explain why this is the case or how it relates to the ethical use of technology.

## SECOND SAMPLE WEAK RESPONSE FOR OPEN-RESPONSE ITEM ASSIGNMENT #1

### Steps needed to create the artifact

--Creating and using a robot is a great way to learn skills about electronics and programming languages. First, the robot should have all the necessary hardware parts to complete the program. It should also include wires that could represent the feet that help the robot move. For example, it can have eight feet. Each foot should move separately.

--Each foot should sense colors and move with the robot when the program is implemented. One must remember that movement occurs only on the black line using the light sensors. The light sensors will have LED lights on them.

--There should be a software tool that recognizes the feet and moves them independently.

### Computational tools and skills needed

--Skills to create a robot are needed. You can create it from scratch and understand its movements and hardware.

--You need to know what materials are needed to move the robot, such as a motor and wheels that can be programmed.

--Then you can program it by using coding languages. We can use JavaScript or Python to code the device. The program will have functions about movements, sensors etc.

--There should be a testing software to test the robot.

### Safety and ethical issues

All the connections should be checked properly. There should not be any electrical issues in the robot, otherwise it could lead to hazardous conditions for the students to work in. An ethical issue may include fairness in coding the machine. Also, since robots are machines, they should always be supervised.

## ANALYSIS FOR SECOND WEAK RESPONSE TO OPEN-RESPONSE ITEM ASSIGNMENT #1

**Purpose:** The purpose of the assignment is partially achieved. The steps needed to create the digital artifact are only partially outlined. The response states that the feet of the robot should sense color and move, but it does not explain the steps involved in achieving this. Additionally, there is mention of wheels as well as feet, which indicates an inconsistent view of how the robot would work. Some characteristics that the project requires, such as a description of the light sensor's purpose and how it functions, are missing.

**Subject Matter Knowledge:** There is a limited application of subject matter knowledge. There is no discussion of how the software and hardware will connect with each other. While the response mentions using JavaScript or Python to code the device, which could be relevant, there is no discussion of what specific coding blocks will be used to sense the black line and then move the robot.

**Support:** The supporting evidence is limited. In the discussion of issues related to the safe and ethical use of technology in the creation of the artifact, the response mentions that connections should be "checked properly," but it does not explain which connections, why they should be checked, or what proper checking would entail. The response states that robots "should always be supervised" but doesn't support this with a discussion of the safety issues that could result from unsupervised operation.

**Rationale:** The steps needed to create the digital artifact are poorly explained. The response describes the necessity for the software tool to recognize the feet, but the explanation of how the software interacts with the hardware is lacking.

## FIRST SAMPLE STRONG RESPONSE FOR OPEN-RESPONSE ITEM ASSIGNMENT #1

### Steps

1. We need a robot (e.g., an Ozobot) to be programmed and simulation software that works with the robot.
2. The software should contain user-defined or built-in functions that include movements like forward, backward, left turn/right turn at an angle (90 degrees). Initially, the robot should work without any sensors, irrespective of colors sensed, and keep working until all instructions have been executed.
3. Though most robots like Ozobots come with a built-in light sensor, we still need to add the light sensor feature to the program to control the robot's movement. The sensor detects the light levels that bounce back from a surface and returns information to the robot to make it identify a black line. The robot should be programmed to move only on the black line and stop if it senses a color other than black or white (e.g., a red line).
4. Test the robot (e.g., add a pause block after 5 steps to test).

### Computational tools and skills

- Operating the hardware of the robots (e.g., how to calibrate the Ozobot).
- Understanding the robot's interface or simulator software, which is used to program the instructions for the robot.
- Connecting the hardware (robot) and the user-written program (e.g., through a Bluetooth connection) to allow for the download of the program to the robot.
- Robot-compatible scripting languages and extensions to move the robot in various directions (usually provided along with the device; Ozoblockly is used for Ozobots).
- Knowledge of how light sensors work.
- Mathematical formulas to control the robot's motion (e.g., stop after 5 cms).

### Safety and ethical issues

Be watchful for any possible broken circuits that could lead to electrical shocks while connecting robots to their chargers. Students must learn to store and handle cords carefully to avoid broken circuits. A relevant ethical issue is to understand why it would be wrong to copy code from others.

## ANALYSIS FOR FIRST STRONG RESPONSE TO OPEN-RESPONSE ITEM ASSIGNMENT #1

**Purpose:** The response fully achieves the purpose of the assignment. It accurately identifies multiple steps required to complete the project with the given characteristics. It also explains in detail the computational tools and skills required to create the artifact. Finally, it describes issues related to both safe and ethical use of technology in the creation of the artifact.

**Subject Matter Knowledge:** Substantial, accurate subject matter knowledge is evident throughout the response. For example, understanding of how to control the robot with or without the sensors is demonstrated. The response also appropriately identifies computational tools and skills required, such as the need to calibrate the Ozobot. Further evidence of subject matter knowledge is seen in the statement that some of the computational tools required are “[r]obot-compatible scripting languages and [r] extensions to move the robot in various directions” and the statement that these are “usually provided along with the device; e.g., Ozoblockly is used for Ozobots.”

**Support:** The supporting evidence is sound. For example, relevant examples are included in the discussion of the computational tools and skills needed to create the artifact: “[c]onnecting the hardware (robot) and the user-written program (e.g., through a Bluetooth connection) to allow for the download of the program to the robot.”

The response does not simply describe the steps and tools needed, but also gives specifics. One example of this is seen in the statement: “Test the robot (e.g., add a pause block after 5 steps to test).”

**Rationale:** The response ably reasons through the steps to create the artifact, the computational tools and skills needed, and the safety and ethical issues involved. It also shows a comprehensive understanding of the relationships among different characteristics of the project. For example, when describing how the light sensor works, the candidate demonstrates awareness of how light levels are detected by the light sensors and used as an input to move the robot.

## SECOND SAMPLE STRONG RESPONSE FOR OPEN-RESPONSE ITEM ASSIGNMENT #1

### Steps

- Students will need a microcontroller board with light sensors connected to a DC motor that spins the wheels, e.g., Arduino based microcontroller.
- Also, a coding language to add a program; e.g., a compatible software like Arduino IDE 1.8.19.
- Initially, use a movement block to move the robot on any surface (any color).
- Next, activate the light sensor so the robot moves only on the black line (whether straight or curved) using follow line() function.
- The values returned by the light transmitter and receiver in the sensor are used to control the robot's movement.
- The transmitter in the sensor will throw light on the surface and the light receiver receives a response using read(). If the receiver detects and measures low light (black color), the movement block moves the wheels of the robot, else the robot turns to seek the black line.
- Finally, we can download and test the program (e.g., by making the robot move on a black triangle).

### Computational Tools and Skills

- How to connect the Arduino microcontroller hardware to the wheels.
- Understanding of programming blocks like movement and if-else block to move the robot.
- Knowledge of coding light sensor measurements; use this to move the robot on a black line and how to adjust when it finds it is on a white surface.
- Mathematical concepts like speed and angles to steer the robot in the correct direction and how to calculate the correct borderline between light readings of white and black.
- Knowledge of connecting the hardware to the software (coding language) using the USB connections and uploading the code to microcontroller to run it.

### Safe/Ethical Technology Use

While charging devices, the circuits or connecting wires may sometimes heat up quickly. It would be important to wait until the device cools down before proceeding. Students should be educated about intellectual property and the procedures to use open-source or Creative Commons code. Equity issues: if light sensors detect black and white differently, how does that affect where light sensors are used in the real world, such as using light sensors on restroom faucets if they cannot detect dark skin colors?

## ANALYSIS FOR SECOND STRONG RESPONSE TO OPEN-RESPONSE ITEM ASSIGNMENT #1

**Purpose:** The candidate has provided clear, detailed steps to create the project, listed the computational tools and skills required, and outlined some safety and ethical considerations involved. The response describes how the robot works with and without the sensor, along with the purpose of the light sensor and how the light sensor readings are used as input to control the robot. It discusses all the hardware and software required to complete the project and how the hardware and software interact. It also addresses relevant safety and ethical concerns.

**Subject Matter Knowledge:** The example of the microcontroller board connected to the DC motor is one appropriate way to complete the project and is evidence of strong subject matter knowledge. The discussion of the light transmitters and receivers shows detailed understanding of the concept behind the light sensors. For example, the response states, "If the receiver detects and measures low light (black color), the movement block moves the wheels of the robot." This explains how the input and output interact to move the robot on the black line. The response also correctly identifies some of the possible issues related to the safe and ethical use of technology in the creation of the artifact.

**Support:** The response includes high-quality examples to support the plan for how to complete the project. It also gives relevant, specific examples of the computational tools/skills required. For example, the candidate identifies one required skill as “Knowledge of coding light sensor measurements”; another skill identified is how to connect the hardware and software “using the USB connections and uploading the code to microcontroller to run it.”

**Rationale:** The response displays able reasoning by giving a sequential explanation of the hardware-to-hardware and hardware-to-software connections and the manipulations that happen in the software. The steps described and the computational tools and skills identified demonstrate a comprehensive understanding of how to complete the task.

## FIRST SAMPLE WEAK RESPONSE FOR OPEN-RESPONSE ITEM ASSIGNMENT #2

To find the duplicate word in the speech, below are the steps:

1. First, choose HTML to create an interactive web page that can take the user input word to be compared.
2. You can structure your speech using different headers like <h1><h2> and by adding buttons to add more backend coding.
3. Be watchful of the tags while writing your program.
4. Explain the steps required to manipulate the input value.
5. Decompose the speech into many words to compare with the input value.
6. Use a counter to count the number of times the word repeats.
7. Lastly, print the word and the number of times it is repeated using a print statement.

```
<html>
<h1> The input word is :</h1>
Var sp= " my words"
Speech= " Hello, My name is Mr. X. I am your future Councilor "
Compare the speech and the word
Print(sp)
Print("the number of occurrences");
</html>
```

Documentation of the algorithm includes initializing the variables and lists that store the information. Testing the program could involve comparing each word with each word in the sentence.

## ANALYSIS FOR FIRST WEAK RESPONSE TO OPEN-RESPONSE ITEM ASSIGNMENT #2

**Purpose:** The response partially explains the steps needed to solve the problem, but some elements remain unclear. For instance, there is a mention of using buttons for backend coding, but there is no clear explanation of why or how this processing will be done. Additionally, the algorithm is incomplete, and the documentation and testing/debugging sections do not provide specific examples of how these elements should be addressed. The response also searches for a single word, rather than searching for a phrase, as the problem requested.

**Subject Matter Knowledge:** There is an inappropriate application of subject matter knowledge. The candidate has added a discussion of using headings (“You can structure your speech using different headers like <h1><h2>”), which is inappropriate in response to the question because it pertains more to the style of the website text than to how the program will use the textbox value. The steps outlined to solve the problem are not appropriate, and the pseudocode is incomplete.

**Support:** There are few relevant examples. For instance, the discussion of documentation does mention “initializing the variables and lists,” but within the pseudocode only two variables have been defined (“Var sp= “ my words”” and “Speech= “ Hello, My name is Mr. X. I am your future Councilor ””). Additionally, although the steps mention the counter, no variable “counter” has been initialized.

**Rationale:** The response is poorly reasoned. For instance, the pseudocode includes the step “Compare the speech and the word,” but there is no indication of how this comparison would be implemented. The steps described and the pseudocode do not entirely connect. For example, the steps mention adding buttons to add backend coding, but no button tags have been shown in the pseudocode.

## SECOND SAMPLE WEAK RESPONSE FOR OPEN-RESPONSE ITEM ASSIGNMENT #2

You need to follow the steps below to solve the problem. First, you can browse through some of the websites that use an input value and process it. It will help you determine the variables and arrays needed to store and manipulate the input value. Initially, you should have a speech with words in it. You need to know the phrase that needs to be found within the speech. Make sure both the phrase and the speech include only letters. Compare each word in the speech with a specific phrase and add the existing count using a data structure. The loops and functions can be used to match the words in the speech. Finally, print the count and the phrase.

```
Algorithm
<Start of the program>
Initialize the phrase
a== speech // the variable a holds the words of the speech
Search the words of the phrase in the speech
Add +1 to the counter
Print counter and the phrase
<End>
```

The pseudocode should be documented by defining the variables and using different comparison methods. Testing is one of the important steps in programming. You can test the program by using any speech or paragraph. You can use a parser to read the text in the speech and ask it to compare it with phrases to be searched.

## ANALYSIS FOR SECOND WEAK RESPONSE TO OPEN-RESPONSE ITEM ASSIGNMENT #2

**Purpose:** The purpose of the assignment is only partially achieved. The steps described are incomplete in terms of achieving the goal. The response does not include any data structures or documentation of the word-by-word or character-by-character comparisons. Also, there is insufficient description of the testing methodology or test scenarios that could be used.

**Subject Matter Knowledge:** There is limited application of subject matter knowledge. The response states, “Compare each word in the speech with a specific phrase and add the existing count using a data structure,” but “count” should not be a data structure. Rather, it should be a number variable that increments every time it encounters the correct phrase. Additionally, the pseudocode is limited because it is missing the step where it would take the input value and process it.

**Support:** The supporting evidence is limited. Though the response suggests getting inspiration from other websites, it does not clearly describe how the frontend should be developed or how the backend processing is done. Additionally, there is a mention of using “loops and functions” to match the words, but no description is found in the pseudocode that shows how this comparison will take place. Although the steps do mention comparing the phrase and the speech, the algorithm is missing a code to get the input value from the user.

**Rationale:** There is a poorly reasoned understanding of the topic. For example, one of the steps described is to “Make sure both the phrase and the speech include only letters,” but there is no justification for why such a condition has been added to the steps. Additionally, the algorithm includes the statement “initialize the phrase,” but it doesn’t explain if this is a user-defined value or a variable with a set value.

## FIRST SAMPLE STRONG RESPONSE FOR OPEN-RESPONSE ITEM ASSIGNMENT #2

### Steps

1. "windows. Prompt()" takes the input phrase "of the community"
2. Store the speech transcript and phrase as strings
3. For easy comparison, use "toLowerCase()" to convert speech to lowercase
4. Assuming "blank space" is delimiter, separate the speech and phrase into words using a string method called .split() and store as arrays
5. Variable "counter" holds the number of repetitions
6. "While" loop reads all the words in the speech
7. Multiple "if" loops are used to find exact matches of words in the same order
8. If a match is found, increment "counter," else move to the next word
9. Continue the loop until the last word in the speech
10. Finally, print the phrase and the number of times it appears.

### Algorithm

```
// "speech" is a string
str speech = " We work towards the benefit of the community";
// "ph" is the three-word phrase
str ph = windows.Prompt ("Enter the Phrase: ");

int counter = 0; //counter is number of times the phrase is repeated
speech = speech.toLowerCase(); // .toLowerCase()-converts to lowercase
ph = ph.toLowerCase();

// .split() turns a string into an array of strings on every appearance of a delimiter, in this case, a space
str[] speechParts = speech.split(" ");
str[] phParts = ph.split(" ");

// while loop runs until it finds no more words assuming the phrase only contains three words
int i = 0;
while(i <= (len(speechParts)-len(phParts))) {
  if(speechParts[i]== phParts[0]){
    if (speechParts[i+1]== phParts[1]){
      if (speechParts[i+2]== phParts[2]){
        counter++; // increments the counter by 1 whenever finds match
      }
    }
  }
  // moves to next word in speech
  i++;
}
print("Phrase: " + ph); // This prints the phrase
print ("Phrase repeats: " + counter + " times"); // Prints number of occurrences
```

### Documentation & Testing

Documentation was added within each step of the algorithm. The program works with a three-word phrase, where each if statement searches for a word, but could be tested with longer or shorter phrases by varying the number of if statements, or by using different speeches, or different phrases. The algorithm currently works in punctuation-free situations but could be extended to handle phrases with punctuation.

## ANALYSIS FOR FIRST STRONG RESPONSE TO OPEN-RESPONSE ITEM ASSIGNMENT #2

**Purpose:** The purpose of the assignment is fully achieved. The steps to solve the problem are detailed and fully explained. The pseudocode includes the appropriate datatypes, conditional statements, and loops. The algorithm is fully documented, and the testing process is explained with some specific examples.

**Subject Matter Knowledge:** The candidate shows thorough knowledge of built-in functions like `split(" ")`, `windows.Prompt()`, and `toLowerCase()`. Strong subject matter knowledge is also seen in the function used to separate a sentence into discrete words (`str[] speechParts= speech.split(" ")`). Subject matter knowledge is also evident in the clear documentation (`“.split() turns a string into an array of strings on every appearance of a delimiter, in this case, a space”`).

**Support:** The supporting evidence is sound. For example, the candidate is aware that this pseudocode will work only if three words are searched. The candidate gives specific examples of suitable testing methodologies (using different transcripts or different phrases) that would work to ensure the program is functioning correctly.

**Rationale:** The response shows a comprehensive understanding of the problem. It also includes detailed steps to solve the problem along with pseudocode that elaborates on those steps. Additionally, the documentation of the pseudocode is ably reasoned, with each variable and data structure well defined. The use of “while” and “if” loops has been explained in a logical progression.

## SECOND SAMPLE STRONG RESPONSE FOR OPEN-RESPONSE ITEM ASSIGNMENT #2

### Steps

"myCompare()" breaks down the speech and phrase into characters and also treats a "space" as a character using the split(" "). A "for" loop iteration does the character-by-character comparison. A variable "counter" keeps a count of the repeated phrase. Increment "counter" if match is found in the same sequence. Print the phrase and value of "counter".

```
var speech_to_check = "Set this value equal to the text to be searched"
var phrase_to_find = "text to be searched"

function myCompare(speech_raw, phrase_raw) { //function starts here
  var counter=0
  var match = FALSE
  //.toLowerCase() converts all capital letters
  //.split() creates an array with a new element, broken on every
  //occurrence of a specified character
  //using "" as the delimiter makes each character in the string an element
  //of the split array
  const speech = speech_raw.toLowerCase().split("")
  const phrase = phrase_raw.toLowerCase().split("")

  //iterate through speech
  for(i=0; i<speech.length; i++) {
    // if this speech character == the first letter of the phrase, then
    // iterate through speech and phrase to compare
    if (speech[i] == phrase[0] {
      match = TRUE
      // iterate through speech and phrase, comparing letters
      for (j=1; j<phrase.length; j++) {
        // note: add error handling to trap if i+j is larger than the
        //length of speech

        // Compare characters - break out of for loop if they don't match
        if speech[i+j] != phrase[j] {
          match=FALSE
          break // break out of for loop
        }
      }
      if match { //only true if the whole phrase matched
        counter++
        //set speech index forward by phrase length
        i=i+j
      }
    }
  }
  // print counter value
  alert("There were " + counter + " matches of the phrase")
}
myCompare(speech_to_check, phrase_to_find)
```

### Documentation/Testing

The pseudocode documents all the variables, arrays, and functions that are used, such as .split(""), .toLowerCase(), and myCompare(). The algorithm could be tested by using different phrases from the speech, or by purposefully embedding the phrase in the speech in different locations and forms. These could include the beginning and end of the speech, twice or more in a row, doubling a word within the phrase, or placing it adjacent to punctuation.

## ANALYSIS FOR SECOND STRONG RESPONSE TO OPEN-RESPONSE ITEM ASSIGNMENT #2

**Purpose:** The response identifies an appropriate way to solve the problem and provides detailed steps explaining what the pseudocode needs to do to find a phrase in the transcript. The pseudocode gives a detailed explanation of how a character-by-character comparison occurs. The discussion of documentation and testing/debugging addresses both areas thoroughly.

**Subject Matter Knowledge:** The response demonstrates strong subject matter knowledge in its effective use of built-in functions. The computation in the script is efficient and clear, and the representation of the algorithm is internally consistent. The use of nested loops shows a strong understanding of the concept of iteration. The count variables “i” and “j” are consistently and effectively used.

**Support:** There are high-quality examples of how to use the functions in the given program. For example, the use of the `split("")` function is appropriate here to allow the comparison of characters based on index position. The candidate has a good grasp of test scenarios and suggests multiple relevant approaches to testing.

**Rationale:** The response is ably reasoned, using an appropriate method for solving the problem; there are clear steps to execute the code. The algorithm flexibly accomplishes the task, no matter the length of the speech or of the phrase. It counts the occurrences of the target phrase efficiently, not wasting loop iterations on unnecessary checks, for example by iterating the count variable “i” by “i+j” on finding a match. The candidate has ably justified the use of the `.split("")` function for splitting the sentence into characters and then comparing the two strings (the speech and the phrase); furthermore, the candidate has used specific functions to manipulate that data to implement the algorithm.

## PRACTICE TEST SCORE CALCULATION

The practice test score calculation is provided so that you may better gauge your performance and degree of readiness to take an MTEL test at an operational administration. Although the results of this practice test may be used as one indicator of potential strengths and weaknesses in your knowledge of the content on the official test, it is not possible to predict precisely how you might score on an official MTEL test.

The Sample Responses and Analyses for the open-response items may help you determine whether your responses are more similar to the strong or weak samples. The Scoring Rubric can also assist in estimating a score for your open responses. You may also wish to ask a mentor or teacher to help evaluate your responses to the open-response questions prior to calculating your total estimated score.

### How to Calculate Your Practice Test Score

Review the directions in the sample below and then use the blank practice test score calculation worksheet on the following page to calculate your estimated score.

<b>Multiple-Choice Section</b>	
Enter the total number of multiple-choice questions you answered correctly:	<u>72</u>
Use Table 1 below to convert that number to the score and write your score in <b>Box A</b> :	<b>A:</b> <input style="width: 50px; border: 1px solid black;" type="text" value="192"/>

<b>Open-Response Section</b>	
Enter the number of points (1 to 4) for your first open-response question:	<u>3</u>
Enter the number of points (1 to 4) for your second open-response question:	<u>3</u>
	=====
Add those two numbers (Number of open-response question points):	6
Use Table 2 below to convert that number to the score and write your score in <b>Box B</b> :	<b>B:</b> <input style="width: 50px; border: 1px solid black;" type="text" value="53"/>

<b>Total Practice Test Score (Estimated MTEL Score)</b>	
Add the numbers in <b>Boxes A and B</b> for an estimate of your MTEL score:	<b>A + B =</b> <input style="width: 50px; border: 1px solid black;" type="text" value="245"/>

**Practice Test Score Calculation Worksheet: Digital Literacy and Computer Science**

Table 1:

Number of Multiple-Choice Questions Correct	Estimated MTEL Score	Number of Multiple-Choice Questions Correct	Estimated MTEL Score
0 to 25	103	61 to 65	174
26 to 30	112	66 to 70	183
31 to 35	121	71 to 75	192
36 to 40	130	76 to 80	201
41 to 45	139	81 to 85	210
46 to 50	148	86 to 90	219
51 to 55	156	91 to 95	228
56 to 60	165	96 to 100	236

Table 2:

Number of Open-Response Question Points	Estimated MTEL Score
2	39
3	43
4	46
5	50
6	53
7	57
8	60

Print the form below to calculate your estimated practice test score.

**Multiple-Choice Section**

Enter the total number of multiple-choice questions you answered correctly:

Use Table 1 above to convert that number to the score and write your score in **Box A:**      **A:**

**Open-Response Section**

Enter the number of points (1 to 4) for your first open-response question:

Enter the number of points (1 to 4) for your second open-response question:

=====

Add those two numbers (Number of open-response question points):

Use Table 2 above to convert that number to the score and write your score in **Box B:**      **B:**

**Total Practice Test Score (Estimated MTEL Score)**

Add the numbers in **Boxes A and B** for an estimate of your MTEL score:      **A + B =**