AlphaPlus

Preparing adult learners for the new Canadian Adult Education Credential

An analysis of CAEC sample tests and recommendations for instruction

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The comprehensive analysis that made this report possible was completed by experienced GED® instructors and researchers for the following subjects and topics.

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About AlphaPlus

AlphaPlus champions the use of technology in adult education to create equity and access to learning and enhance learning experiences. Our specialized team members have expertise in the use of digital technology in education, as well as experience in and understanding of the adult education field.

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Learn more about AlphaPlus by visiting their website.

Contents

Executive summary

The release of the Canadian Adult Education Credential (CAEC) in the spring of 2024 is a breakthrough for Canadian adults who want a secondary equivalency credential for work, personal goals and further learning. Provinces and territories previously relied on the US-based General Educational Development test (GED®) to grant a high school equivalency certificate. The new CAEC is substantially different from the GED® as a result of its digital platform, Canadian content and use of a cognitive complexity framework. This report provides an in-depth analysis of the CAEC sample tests and outcomes to support adult educators and curriculum developers so they can provide test preparation and instruction to adult learners.[1]

Digital platform

The online delivery of the CAEC exams has implications for both test-taking and developing knowledge and skills in each subject. Instructors need to prepare candidates for taking the tests and completing the reading and writing tasks in a more complex, digital environment than the GED® tests. To access and take the test, candidates will need to read and understand a large amount of information online. This can be challenging for those with limited access to digital devices and those lacking the digital skills, knowledge, and confidence needed to navigate online spaces effectively. Our analysis shows four new ways in which the CAEC tests require digital skills and knowledge:

1. Interpreting a large amount of information displayed on the screen
2. Navigating the test interface and using a variety of digital tools
3. Answering at least 13 different kinds of multiple-choice questions that require a variety of digital skills and knowledge
4. Reading content from online environments, particularly in the reading section.

While digital skills and knowledge are not the focus of the CAEC tests, they are essential for success. The digital skills are not separate from the content but are a means through

[1] The report is focused on supporting test preparation and instruction. It does not provide details of the test administration process, including access to the paper-based version, special arrangements and accommodations. Please consult the CAEC Test Administration Guide, the Supporting diverse learners webpage, and your provincial or territorial test administration body for this information.

which learners can show what they know in the content areas. Instructors across all subject areas should be aware of the digital demands of the tests and should receive training to understand and manage the cognitive load that some learners will feel.

Can-con and other content changes

Although the 2002 GED® Canada English test had some content adaptations, they were limited and didn't involve Canadian curriculum expertise.[2] Most of the changes were made in the social studies section. However, 60 percent of those test items explored concepts and issues from a global and American perspective, and the remaining test items referenced either the United States or Canada.[3] In the CAEC social studies test and other subjects, all topics, content and perspectives are Canadian.

In addition to Canadian content, other content changes in the reading, science, and social studies tests emphasize foundational knowledge that adults need in today's society, whether acquired in secondary school or outside of formal education, rather than specific curriculum knowledge. For example, the majority of texts in the CAEC reading test (60 to 80 percent) are informational online texts that refer to scenarios an adult could encounter in day-to-day living. In contrast, up to 75 percent of the content in the GED® reading test covered literary texts that could be assigned in secondary schhool, such as non-fiction excerpts, reviews and essays. In the CAEC, only 20 to 40 percent of the texts are literary. The writing test includes a range of content that must be read and incorporated into the writing task, a persuasive letter. Based on the sample test, community issues will make-up the content. The science test no longer assesses content knowledge, such as physical science, life science and earth and space science, a focus of the GED®. Instead, the CAEC assesses broader scientific topics that transcend disciplinary knowledge and typical secondary curriculum topics.

Science and social studies require background knowledge, including the knowledge of specific concepts and content. Shorter texts and more digitally-mediated texts in reading, writing, science, and social studies require less intensive reading than the GED®, but the trade-off is reading and interpreting a variety of digital elements and online sources. The

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[2] The French language arts and writing tests were developed by the Quebec ministry of education. More information about the development of both Canadian versions of the GED is available in the Technical Manual: 2002 Series GED® Tests.

[3] Technical Manual: 2002 Series GED® Tests, p. 21

readability of texts varies, similar to the GED®, and both tests include texts with a readability range from Grades 7 to 12+.[4] In addition, the reading and writing demands of the CAEC reflect the Canadian Language Benchmarks (CLB) Levels 5 - 8.[5]

Cognitive complexity

Organizing and shaping the development of test questions is a cognitive complexity framework based on Webb's Depth of Knowledge (DOK).[6] The framework is designed to analyse and evaluate curriculum standards. In the CAEC, these are referred to as outcomes. The CAEC outcomes are aligned with three levels of cognitive complexity and most test questions are at the moderate complexity level. Rather than simply ask a test-taker to define a term or concept, for example, (a low complexity test-question) the test-taker is asked to apply the concept, often in an authentic situation, to demonstrate their knowledge and abilities (a moderate complexity test-question).

CAEC cognitive complexity framework	
Low complexity focused on recall and reproduction	Items require recognition of previously learned information, such as a fact, a definition, a term, a concept, a principle, or performance of a simple procedure.
Moderate complexity focused on the application of skills and concepts	Items require the application of knowledge of one or more concepts and knowledge of underlying concepts.
High complexity focused on strategic thinking	Items require interpretation, analysis, generalization, abstract reasoning, judgement, or connection of information and evidence in context.

The GED®, on the other hand, relies on Bloom's Taxonomy to guide the development of test questions. The two frameworks are different. To rigorously compare the two tests, the DOK framework would need to be applied to the GED®. Based on our more general

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[4] We used the site Analyse my Writing to analyse particular CAEC and GED® source texts in reading, writing, science and social studies.

[5] Refer to Canadian Language Benchmarks: English as a Second Language for Adults for more information about the reading and writing benchmarks.

[6] Learn more about the DOK framework developed by Norman Webb, and its use as a tool to gauge cognitive complexity of a test-item, task, standard or assignment in the article An Inside Look at Webb's Depth of Knowledge. The article, written by the author and his associates, also identifies misuses of the framework.

reading of test questions, the GED® places more emphasis on low complexity test questions rather than moderate complexity questions.

The emphasis on moderate complexity test questions in the CAEC requires more active learning. For example, to apply science concepts like validity, reliability, bias, placebo and variable, test-takers will need to engage in discussions and some hands-on learning that could involve the design and implementation of small science studies.

Mathematics is more like the GED® but limits the types of test questions and has a more condensed set of objectives. There is a reduced emphasis on performing calculations without a calculator. Most of the more abstract math has been removed. The remaining questions are similar to those found on the GED®, both in terms of content and question design. Like the GED®, many of the questions will involve identifying relevant information and sequencing multiple operations.

New test preparation and instructional resources are needed

The substantial digital, content and cognitive complexity changes in the CAEC will alter test preparation and instruction. Previously, GED® instructors relied on a comprehensive workbook, produced by an educational publisher, which mimicked the test design. However, the workbook is no longer useful for comprehensive test preparation. Rigorous test preparation needs to be in an online environment that mimics the digital sources and variety of interactive test-questions in the CAEC. In addition, test preparation resources must incorporate the cognitive complexity framework and emphasis on moderate complexity questions, along with content changes. While instructors wait for new test preparation resources, which are currently being developed, we hope this report provides some guidance.

Background

Brief history of the GED® in Canada and transition to the new CAEC

The GED® was introduced in the United States in 1942 as a way for military personnel who didn't complete high school to demonstrate an equivalent proficiency. In 1969, Nova Scotia became the first province to begin using the GED®. Other provinces and territories adopted the test over the next decade. In the early 2000s a Canadian version of the US test was created. However, the 2002 GED® Canada English tests were developed without direct involvement from Canadian curriculum experts. (The French version involved the Quebec education ministry, which created the writing and language arts tests.[7])

In 2014, the American GED® was modified, but similar modifications in the Canadian version weren't made. Five years later, the Council of Minsters of Education, Canada (CMEC) issued a call to develop a new Canadian high school equivalency test to replace the GED®.[8] The Government of Alberta received the contract to develop a Canadian test.

The need for a secondary equivalency credential

A secondary equivalency credential is important for Canadians who don't have a provincial or territorial secondary diploma. Although current high school graduation rates are high, 11 percent of youth might not complete high school even after an extended period.[9] Also, the graduation rate was lower in the past, and many older adults entered the labour force when a high school credential wasn't required. Some of these adults may need to get the credential for a new job or if workplace policies change.

The need for alternative high school completion pathways, including the CAEC, will likely remain in the future to support Indigenous Peoples and new Canadians. Indigenous Peoples living on reserves have not had equitable access to secondary education and continue to experience lower education completion rates compared to those who live off reserve.[10] New Canadians, often those who are refugees, might not have completed a

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[7] Technical Manual: 2002 Series GED® Tests

[8] High School Equivalence Assessment Model: Call for interest

[9] High school graduation rates in Canada, 2016/2017 to 2019/2020 https://www150.statcan.gc.ca/n1/pub/81-599-x/81-599-x2022002-eng.htm

[10] Brief Factsheet: High school completion/graduation rates, Indigenous peoples, Census 2021

secondary education or might not have access to paperwork proving their credentials. Whether they have a secondary credential or not, some newcomers might use the CAEC to improve their academic English or French language abilities and digital skills.

An equivalency test is an important secondary completion pathway

The CAEC is one pathway an adult can pursue to gain a high school credential. In addition, depending on the province or territory, adults could earn the same diploma awarded to youth with prior learning recognition, a modified adult diploma or an equivalency certificate based on course work. Instructional programs supporting the pathways are offered in school boards/districts, colleges and in the community. In Ontario, for example, the GED®/CAEC is a recognized goal in the Literacy and Basic Skills (LBS) program, which also funds AlphaPlus. Adult learners in LBS, including Indigenous Peoples, French, Deaf and Deafblind adults, newcomers, adults with disabilities and older workers can access free online and in-person instruction and test preparation in both distance learning and in-person programs.

Importance of open and free instructional support for adult learners

Free and equitable access to a high school level education and credential, including the new CAEC, is fundamental to citizenship, democratic participation in society, further learning and the workforce. The adults who want to earn the credential often have low-incomes. At AlphaPlus, we advocate for free and open access to instructional resources, expertise and test preparation. This report is an attempt to contribute to that aim by openly and freely sharing knowledge with GED® and CAEC instructors.

Currently, there is no dedicated national funding or infrastructure in place to support the development of new knowledge, resources, and professional development for the adult educators who work with CAEC candidates. It's not only professionally beneficial to share insights, pool resources, develop a learning community of educators, and create online learning activities nationally, but it's also far more efficient and effective. We strongly recommend a federally funded mechanism to support such work.

In the report, we present an in-depth analysis of each subject along with the digital changes, which are presented first since they have such far-reaching implications. Before the in=depth analysis, the following table provides a quick overview of the GED®, which can be compared to the CAEC overview on the next page.

GED® Subjects	GED® test topics	Number of test questions and time
Language Arts reading • 75 percent literary • 25 percent non-fiction	• Comprehension • Application • Analysis • Synthesis	40 questions 65 minutes
Language Arts writing, Part 1	• Sentence structure • Organization • Usage • Mechanics	50 questions 75 minutes
Language Arts writing, Part 2	• Well focused main points • Clear organization • Development of ideas • Sentence structure, punctuation, grammar, word choice and spelling	One writing task 45 minutes
Mathematics, Part 1 (calculator) Mathematics, Part 2 (no calculator)	• Numbers and operations • Geometry • Measurement and data analysis • Algebra	25 questions (calculator) 25 questions (no calculator) 90 minutes
Science	• Life science • Earth and space science • Physical science • Unifying concepts and processes • Science as inquiry • Science and technology • The nature of science	50 questions 80 minutes
Social studies	• Canadian history • World history • Civics and government • Economics • Geography	50 questions 70 minutes
		240 questions **7 hours**

CAEC / CCÉA
Canadian Adult Education Credential
Certificat canadien d'éducation des adultes

CAEC Subjects	CAEC test topics	Number of test questions and time
Reading • 60-80 percent informational • 20-40 percent literary	• Content and context • Structure, elements and techniques • Grammar, syntax, and language conventions	50 questions 75 minutes
Writing Write a persuasive text on the assigned topic	• Position and support • Voice and presentation • Conventions, mechanics and syntax	One writing task 75 minutes
Math Part 1 (no calculator)	• Computational fluency and mental math	12 questions 30 minutes
Math Part 2 (calculator)	• Number sense • Patterns and relations • Geometry and measurement • Data management and probability	30 questions 90 minutes
Science	• Nature of science • Scientific inquiry skills • Science, tech, society and environment	35 questions 90 minutes
Social studies	• Citizenship and government • Economics and systems • Historical and contemporary Canada • Geography/ environment	40 questions 90 minutes
		209 questions **9 hours**

Digital

Summary

The CAEC tests and practise tests are presented in an online environment. While test-takers can request paper-based CAEC tests, the primary delivery mode is computer-based test environments. While the GED® tests were also in a computer-based environment, our analysis shows four new ways in which the CAEC tests require test-takers to use digital skills and knowledge.

1. Interpreting a large amount of information displayed on the screen.

The CAEC tests and practise tests are presented in an online environment. Test-takers need to read and understand a large amount of information displayed on the screen. This can be challenging for those with limited access to digital devices and those lacking the digital skills, knowledge, and confidence needed to navigate online spaces effectively.

2. Navigating the test interface and using a variety of digital tools

The CAEC tests and practise tests have built-in digital tools to support test-takers, referred to as **universal supports**. They include text-to-speech, a line reader and zoom tools.[11] The tools are universally offered to test-takers and do not require special accommodations. They do, however, require digital skills and knowledge to be used effectively. They require an understanding of specific digital vocabulary words (e.g., right-click, hover over, drag and drop, cursor) and digital symbols and icons (e.g., ).

The CAEC sample test also includes a section to support test-takers called CAEC Try the Tools. This section includes 15 pages of explanations about the built-in digital tools and how to use them. However, many learners can find it challenging to engage with this content on their own because it contains digital vocabulary words and symbols that can be unfamiliar. To benefit from these tools and build confidence, learners will need

[11] The text-to-speech feature is under development and currently only available in the science test.

guidance and support. A single workshop or lesson on navigating the tools and the tests might not provide enough time and practise for some learners to become comfortable and proficient. Ongoing support and opportunities for hands-on practise are essential to help learners engage meaningfully with the digital tools available to them in the tests.

3. Answering different types of test questions require digital skills

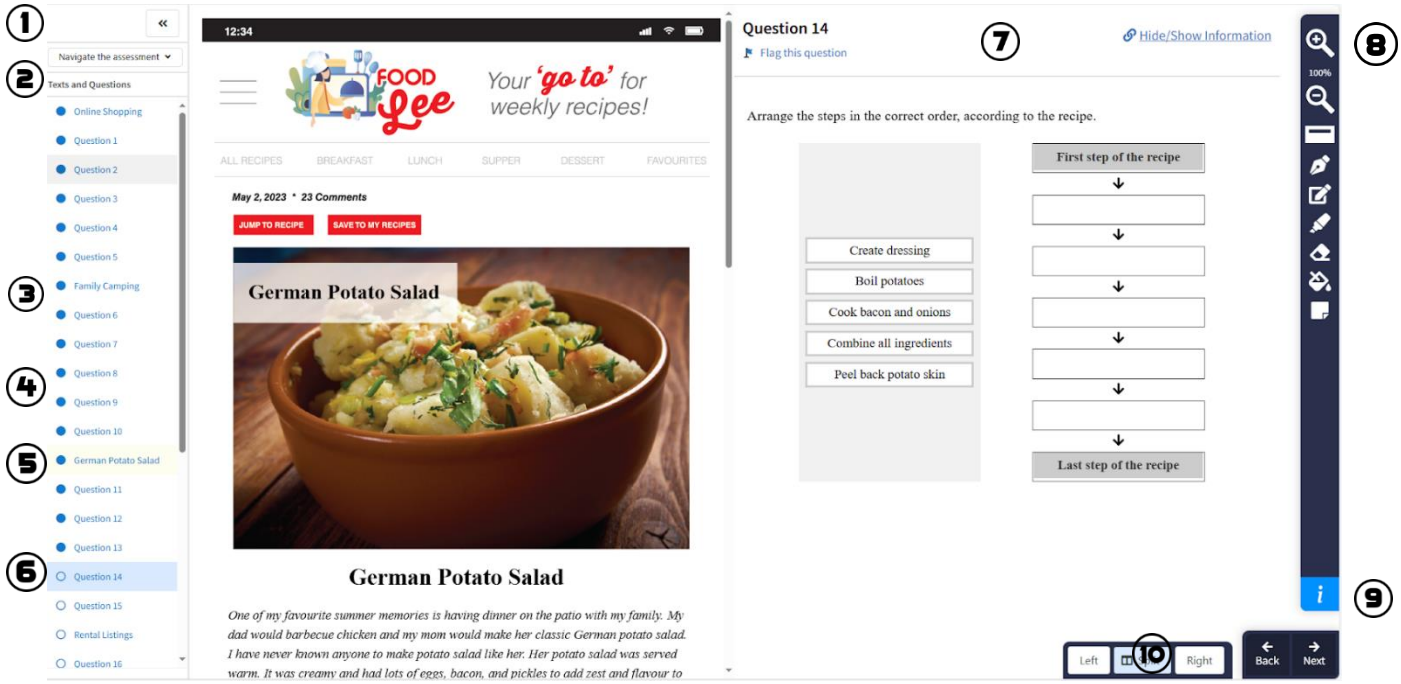
The CAEC tests (except for the writing test) contain several different kinds of multiple-choice style questions. This differs from the multiple-choice questions in the GED® tests, which were consistently single-select questions where the test-taker chose one best answer from the options provided. In contrast, the CAEC practise tests show that there are at least 13 distinct styles of test questions. To answer these questions correctly, test-takers must possess not only content knowledge but also digital skills. They need to read and understand the information presented on screen, navigate the computer interface to select answers and move them to the correct locations depending on the question, know how to change their responses, and recognize when they have completed the question.

4. Reading content from online environments.

The CAEC tests reflect society's increasing reliance on digital texts such as emails, text messages, blogs, and websites. The online tests present digital content and assume that test-takers are familiar with this form of communication, including its symbols, graphics, and other elements. However, this shift and the accompanying assumptions can disadvantage test-takers with limited access to digital communication and information. Additional information about this change can be found in the reading section.

Interpreting a large amount of information displayed on the screen

The image below shows an excerpt from the CAEC sample reading test. Notice the amount of information presented to test-takers through digital signs, symbols, and vocabulary words.



1. A navigation pane with symbols to hide » and show « the information.
2. A drop-down menu titled “Navigate the assessment” with the options to go to “Instructions” or “Texts and Questions”.
3. A long list of blue hyperlinks (not underlined) to the texts and the questions, including a scroll bar to scroll up and down through the list, indicating that the full list is not visible.
4. Some items in the list on the navigation pane have blue circles next to them and some have white circles.
5. One item with a blue circle, “German Potato Salad”, is highlighted soft yellow.
6. Question 14 is highlighted blue with a white circle.
7. Two sets of blue hyperlinks, one underlined and one not underlined.

8. A vertical toolbar along the right-hand side of the image with several icons and the number “100 percent”.
9. A blue square with the letter “i” at the bottom of the vertical toolbar.
10. Five words in various boxes and background colours, some with arrows, some without, and the word “Split” has a square with a line in it.

None of the information listed pertains to the source text, test questions, or possible answers. Instead, it consists solely of navigational details for the test interface.

Note also that the source text is designed to look like a webpage, with its digital symbols such as  and  plus its own scroll bar to indicate that the source text is not fully visible.

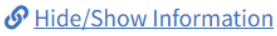
Navigating the test interface and using a variety of digital tools

When examining the navigational information provided for test-takers, it's clear that engaging with the online practice test requires a variety of digital skills and knowledge, even without considering the source text or test questions.

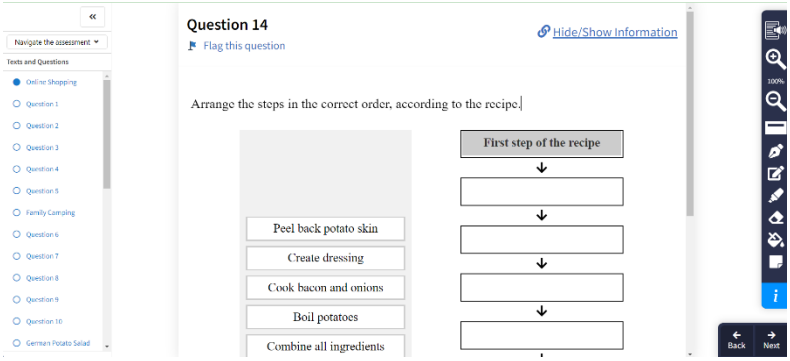
This amount of information puts a **cognitive load** on test-takers, and will be particularly demanding for people with limited access to technology or lower confidence in using digital interfaces.

Reducing the amount of information visible on the screen can reduce some of the cognitive load test takers will face. Here are three ways test takers can reduce how much information is visible on their screen.

Hide Source Text

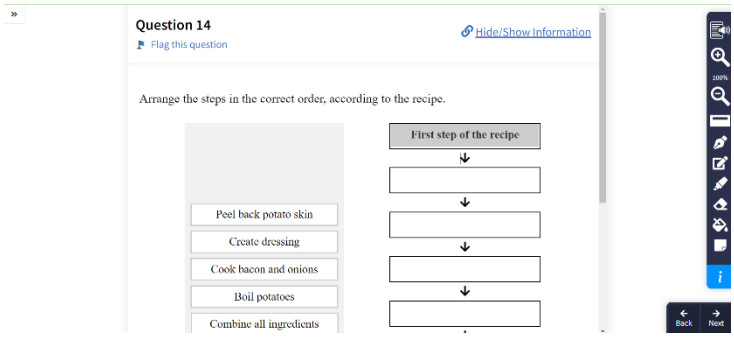
Use the 

button to hide the source text and see only the questions. The image below is The German Potato Salad question with the source text hidden so there is less information on the screen.



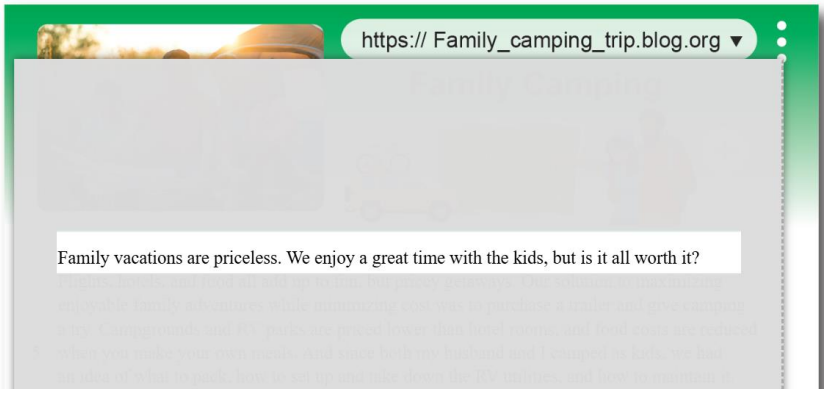
Hide Navigation Pane

Hide the navigation pane or list of questions (using «) in the upper left corner so the same question has even less information on the screen, as shown below.



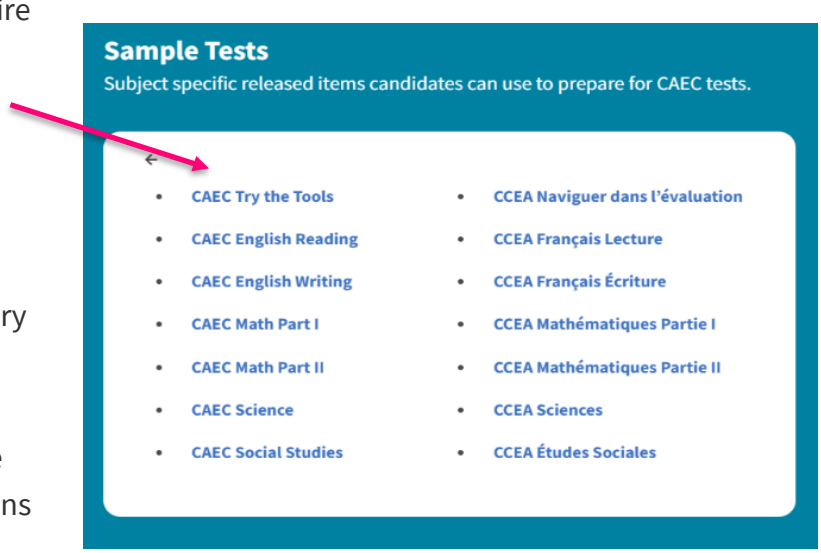
Use the line reader

The line reader tool covers text and allows test takers to read one line at a time. The screenshots below show the same reading text, Family Camping, with and without the line reader. Test takers will need digital skills to use the line reader effectively, so some people will need extra hands-on practise and support to become familiar and confident with the tool.



Using the built-in digital tools

The CAEC tests and practise tests have built-in digital tools to support test-takers. These tools are universally offered to test-takers and do not require special accommodations. Their use, however, does require digital skills and knowledge, which test-takers may or may not have.



On the CAEC sample test webpage, in the list of sample tests, there is a link to "CAEC Try the Tools". This is a section designed to help test-takers understand the tools available and how to use them. It contains 15 pages of explanation of the built-in digital tools.

Assumptions made about digital vocabulary words and symbols

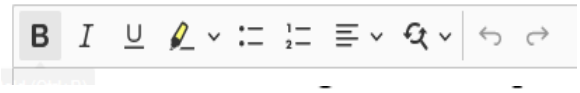
The "CAEC Try the Tools" webpage includes instructions on how to use the tools, but it assumes that test-takers are familiar with a large amount of digital vocabulary words and symbols. People who are less familiar with digital tools and are less confident using computers might need extra support to understand the words and symbols as well as how to use the tools.

Each of the tools has at least a word(s) and an icon(s) associated with it.

- Highlighter tool
- Text-to-Speech tool
- Zoom tool

Some tools have multiple words, icons, and tools associated with them.

- Text formatting tools

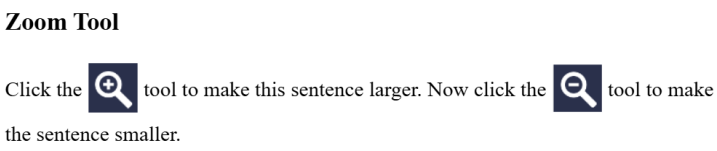


- Spell check tools

Teach vocabulary when using the tools, not in isolation

Here are some of the specific digital vocabulary words that are assumed in the "CAEC Try the Tools" section. For some test-takers, these will not be familiar terms.

Click	Delete	Hover over	Tabs
Click and drag	Disable	Menu	Toggle
Click and hold	Drag	Right-click	Tool
Cursor	Enable	Select	Toolbar
Default	Highlight	Submenu	Web browser



To use the tools effectively, it's essential to not only grasp their functions but also to learn how to manipulate them to achieve the desired outcomes. Test-takers must familiarize themselves with the tools' operations and develop the digital skills needed to interact with the tools, such as toggling toolbars on and off and navigating sub-toolbars by clicking icons. “CAEC Try the Tools” encourages test-takers to practise using the tools by offering practise opportunities.

However, individuals who are less familiar with digital tools and who lack confidence in using computers might find it challenging – and even frustrating – to manipulate these resources. They will need more practise opportunities than what is available in the “CAEC Try the Tools” section.

Importantly, digital skills and confidence are highly context dependent. When people feel stressed and anxious, such as when they are preparing for an important test, they can need more support, more time, and more repetition to learn challenging new things. While the tools available in the tests can be beneficial, they assume a certain baseline of digital proficiency. Therefore, an essential component of preparing test-takers will be to offer targeted practice and support aimed at developing the necessary digital skills.

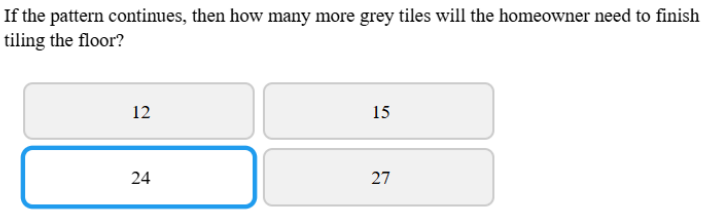
Increased variety of question types in the CAEC sample tests

Test-takers will need to recognize and learn to respond to many different types of test questions in the CAEC tests. All but two types in the sample tests are variations of multiple-choice questions. This is a complex and demanding change compared to the GED®, which consistently used a standard single select multiple-choice question format. Here is a list of 13 types of questions we found in the practise tests and some of the specific digital actions they require.

1. Select one text box answer (standard single select multiple-choice question)

Click on a text box.

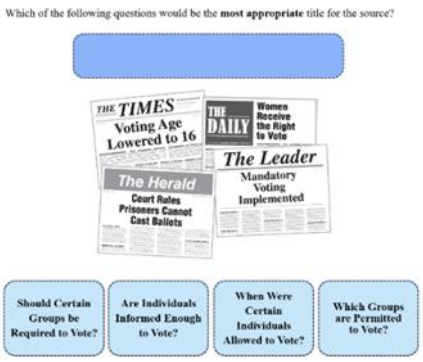
The border of the text box you select changes colour to show that it has been selected. This means the test-takers has answered the question.



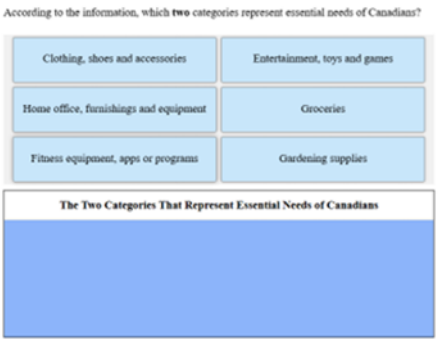
Example: math part 2, question 1

2. Select one or more text box answers, then drag and drop in the answer window

The border of the text box you select changes to show that it has been selected, but you have not yet answered the question. You must “drag and drop” the selected text box into the larger coloured box.



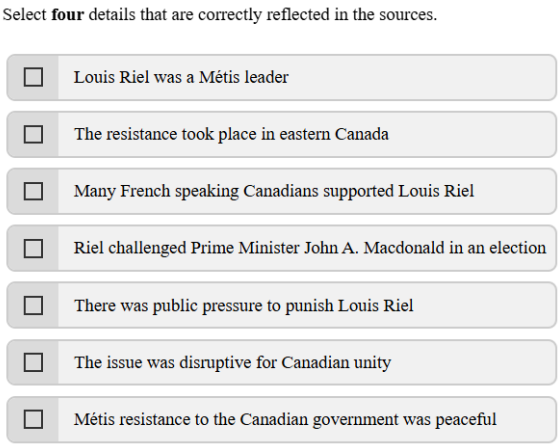
Example: social studies, question 10



Example: reading, question 3

3. Select more than one text box answer in a list

Click on multiple text boxes from a list.



If you select less than the required number of items, there is nothing that prevents you from continuing to the next question. In the navigation pane on the left, however, the small white circle beside that question stays white and does not become a dark circle as it does when you have completed a question.

Once you select the required number of items, the small circle beside that question in the navigation pane turns dark.

If you try to select more than the required number of items, a pop-up window appears that says you have reached the maximum. You must manually deselect an answer to be able to select another.

Example: social studies, question 4

4. Select one or more graphic items

Graphic items can contain text.

Example: social studies question 9 - click on the image of **one** of the newspapers

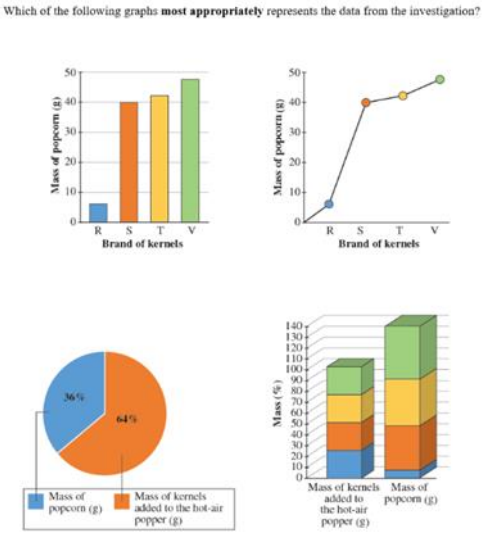
Graphic items can contain *images* only

Example: science question 17 - select **two** of the four pictograms

Graphic items can contain the same images with different words

Example: science question 15 - each answer choice has the same image of a pair of plants, but the words below each image are different

Graphic items can contain different images and different words



Example: science question 13 - click on the image of a graph with words

5. Select a paragraph in a longer text

Click on the source text to highlight a paragraph.

If you click on a paragraph, it gets highlighted with a blue border.

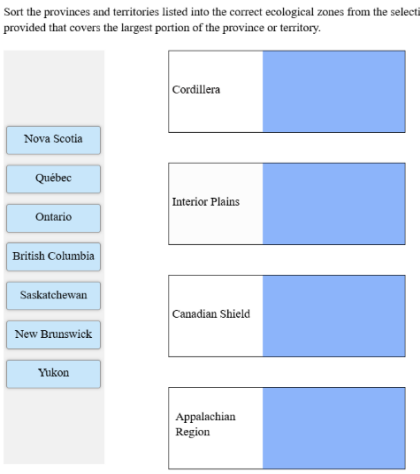
If you click another paragraph, the first one gets deselected automatically.

Example: social studies question 14

6. Sort a list of text box items into groups by dragging and dropping them into the correct spot

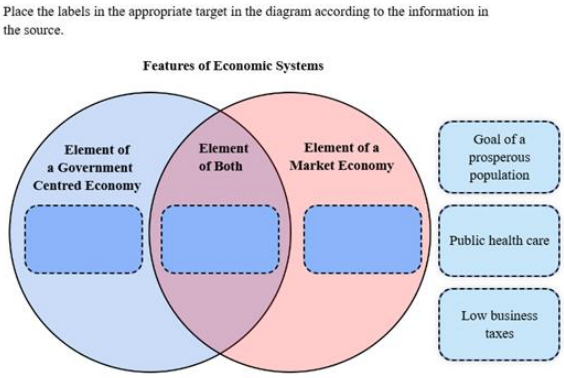
You can see the following variations on this type of question.

When there are more items than categories to put them in, it does not say specifically to sort them all. It can seem like you should only put one item in each category.



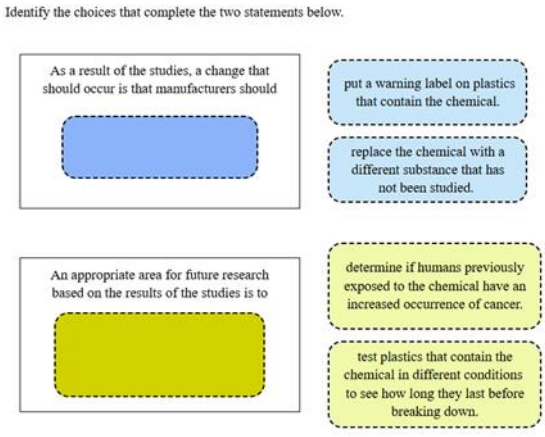
Example: social studies, question 3

When there are the same number of items to arrange as places to arrange them, it is potentially less confusing.



Example: social studies, question 18 - Venn diagram with 3 items to be sorted into 3 locations

Sometimes, colour-coded choices are presented, but this is not explained. This question has two answer boxes (one blue and one yellow) and four potential answers (two blue and two yellow). Any answer choice can go into either the blue or yellow answer box. Nothing prevents the test-taker from mixing the colours, and nothing indicates the colours are cues, even though the correct answers are paired in the same colour as the respective answer box.

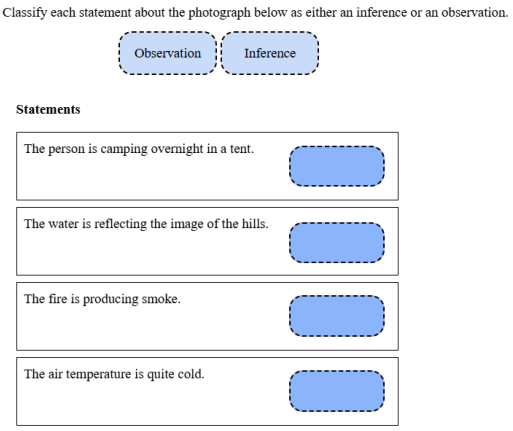


Example: science question 31

7. Classify multiple statements with either of two words - must reuse the answer choices

Similar to a sorting question except that it allows the test-taker to use the same answer choice in multiple answer boxes.

Example: Science, question 32 - four statements to be classified in one of two categories.



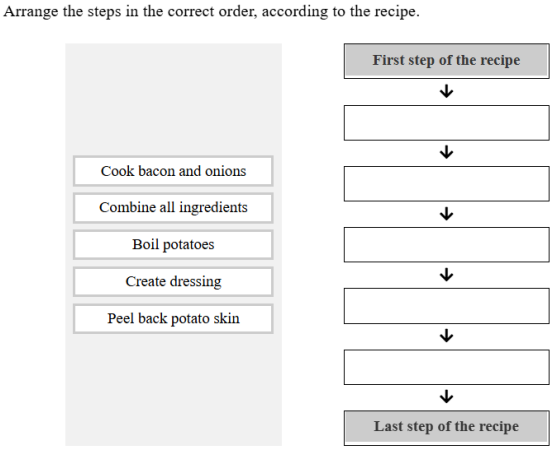
8. Match or sort a list of text boxes by dragging and dropping them into the correct spot

Only one answer is allowed in each location.

If you change your answer, the new one replaces the old one.

When you remove an answer and drop it back into the list of choices, it automatically shifts back to its original location in the list regardless of where you drop it.

Example: reading, question 14



9. Match or sort a list of graphic items by dragging and dropping them into the correct spot

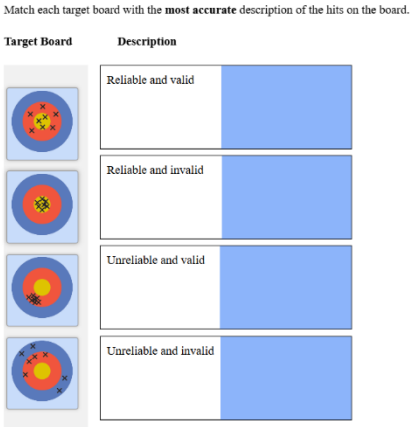
Choose which graphic item fits in each of two answer spaces.

Only one answer is allowed in each location.

If you want to change your answer, the new one *does not* replace the old one. You must manually remove one answer to put in a new answer.

When you remove an answer and drop it back into the list of choices, it automatically shifts back to its original location in the list regardless of where you drop it.

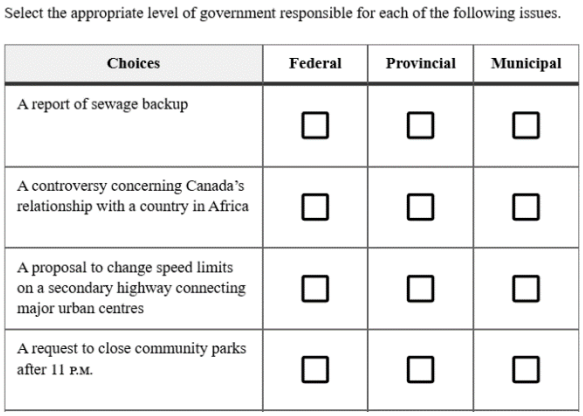
Example: science, question 4



10. Put a check mark in multiple boxes in a table

Limited number of check marks allowed

Click the box to make a check mark appear. Click another box in the same row and the previous check mark disappears. Only one check mark in each row. Remove check marks by clicking on them. Nothing prevents you from leaving any row blank. If you leave a row blank, the white circle beside that question in the navigation pane does not become a dark circle, as it does when you have completed a question.



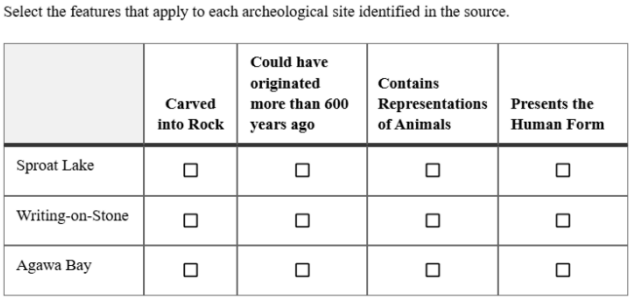
Select the appropriate level of government responsible for each of the following issues.

Choices	Federal	Provincial	Municipal
A report of sewage backup	☐	☐	☐
A controversy concerning Canada's relationship with a country in Africa	☐	☐	☐
A proposal to change speed limits on a secondary highway connecting major urban centres	☐	☐	☐
A request to close community parks after 11 P.M.	☐	☐	☐

Example: social studies, question 34

Unlimited number of checkboxes allowed

Click as many boxes as you want. Remove a check mark by clicking on it. When at least one check mark is in the table, the small white circle beside that question in the navigation pane turns to a dark circle, indicating that you have answered the question. To answer correctly, however, you must check off several boxes.



Select the features that apply to each archeological site identified in the source.

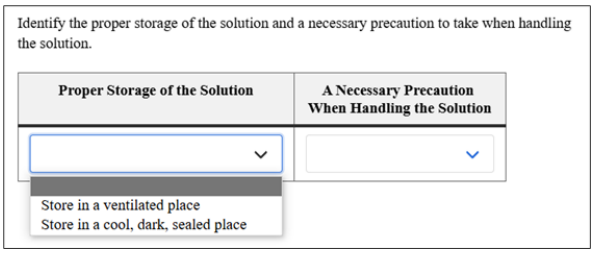
	Carved into Rock	Could have originated more than 600 years ago	Contains Representations of Animals	Presents the Human Form
Sproat Lake	☐	☐	☐	☐
Writing-on-Stone	☐	☐	☐	☐
Agawa Bay	☐	☐	☐	☐

Example: social studies, question 29

11. Select an answer from a drop-down list

There can be one or more different drop-down lists within a question.

Answer boxes are empty until you click on the drop-down list and choose one answer.



Identify the proper storage of the solution and a necessary precaution to take when handling the solution.

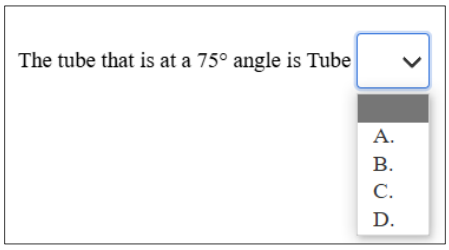
Proper Storage of the Solution	A Necessary Precaution When Handling the Solution

Store in a ventilated place
Store in a cool, dark, sealed place

Answers you have previously chosen from the drop-down list automatically swap out if you choose a new answer.

Sometimes answers in the drop-down box are text that can stand alone, like a number or a phrase. *Example: science, question 18*

Sometimes answers in the drop-down box are labels that cannot stand alone and refer to specific information in the source.



Example: science, question 23

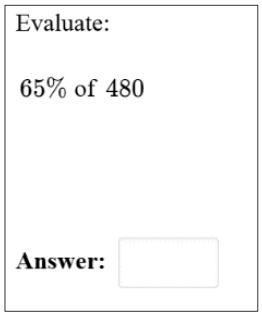
To see what the answers in the drop-down box are referring to, either switch back and forth from the question page view to the information page view or use the split screen view to see both pages at the same time.

12. Enter a number in an empty answer box (fill-in-the-blank)

To enter a number, click on the empty box, then type in a number. To change the answer, use the delete or backspace buttons.

All questions in math Part 1 use this style of fill-in-the-blank question.

There are restrictions on what you can type in the empty box. For example, depending on the question, you can type between 1-4 digits, as well as a negative sign, but you cannot type in letters or other symbols.

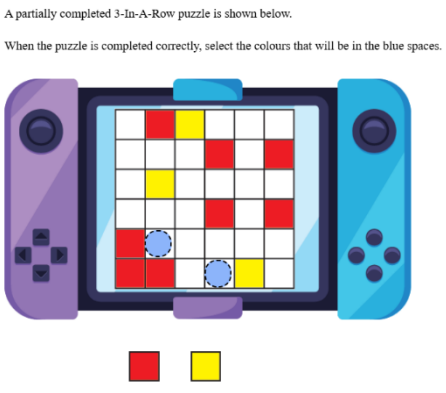


As soon as any allowable character is typed in the empty box, the small white circle beside that question in the navigation pane turns to a dark circle, indicating that you have answered the question.

Example: math Part 1, question 1

13. Place the correct coloured square(s) in a location on a puzzle

Drag and drop coloured pieces into a puzzle image of a digital gaming unit.



There are only two places where the coloured squares can be placed. To change your answer, either remove the coloured square from the location or put another colour on top of it. Answers automatically swap out.

Example: math Part 2, question 22

Recommendations for digital instruction

While digital skills and knowledge are not a subject of the CAEC tests, they are crucial for success. **The digital skills are not separate from the content but are a means through which learners can show what they know in the content areas.** Instructors in all subject areas should be familiar with the digital demands of the tests and should receive training and support to understand and address the cognitive load that some learners will feel.

Understand where learners are at with their digital skills and confidence

- Use conversation and observation to determine how much learners can do and how confident they feel in digital environments.
- Notice the gaps in digital skills and confidence. Many learners will need support to learn how to successfully navigate the tests.
- Expect fragmented skills and knowledge. People can be familiar and confident with some signs, symbols, and actions in the digital interface, but can struggle with others. Try to notice and explicitly fill the gaps.
- Expect changing levels of confidence and skills due to contextual factors such as stress, health, subject area, and other factors.

Perceive and address emotions

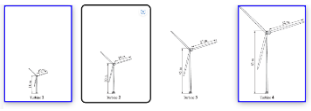
- Pay attention to the role of emotions in navigating a computer-mediated test interface. Test-takers can experience many stressors. The frustrations that can come when things do not work as expected are real and have an impact on test-takers' confidence and ability to succeed. Recognize that stressful digital experiences can provoke emotional responses, and the effect can be exacerbated for people with a history of trauma.
- Pay particular attention to people with less confidence in, and access to, digital environments. They may need a slower pace of explicit instruction and repeated practise to develop familiarity with the computer-mediated test interface and support tools.
- Introduce the tools thoughtfully and gradually, giving learners time to iron out the challenges and idiosyncrasies of the digital tools in the tests.
- Reduce the cognitive load that digital environments place on test-takers. Proceed step-by-step. Slow down if the amount of information is too much.

Provide explicit instruction and time to practise with the test

- Use explicit instruction on how to navigate the test interface.

- Use the CAEC “Try the Tools” webpage along with wise instructional practices to support learners to become familiar with the tests and tools in a safe and encouraging environment, and at an appropriate pace.
- Use instructional materials that mimic the digital skills and knowledge needed.
- Practise using the built-in word processor. Create opportunities for learners so they gradually build up their digital skills and confidence when writing online.
- Practise using the built-in ruler and protractor for both math and science.
- Practise using the math formula sheets and calculator. There are two formula sheets in different tabs but only one is visible. The digital calculator might not be similar to calculators that learners have used before. Learners may need a lot of practise to feel confident using the tools.

Support learners to understand and control what they see on the screen

- Learn how to turn tools on and off to avoid having an overwhelming number of tools open on the screen at once.
- As learners use the interface, check in with them to ensure they understand what they are seeing.
- Encourage learners to choose the view that works best for them. Help them understand that using the line reader and hiding the source text and/or the navigation pane, does not mean that the information is gone or deleted; it is just hidden.
- Changes on the screen can be disorienting, especially when they are unexpected. Practice noticing and managing changes that happen on the screen. For example, notice automatic changes to the screen view (e.g., social studies question 14) and practise clicking on the line numbers in hyperlinks (e.g., reading test) to see how the view changes.
- Work with learners to notice and understand clues on the screen. For example, in math Part II, question 6,  notice how different colours and shapes of the borders around answers have meaning. The meaning of these clues might be assumed by confident digital users but might be completely missed by others. Notice this kind of assumed information and make it more explicit and transparent for test takers.

Reading

Summary

CAEC reading is markedly different from GED® language arts reading and reflects a societal shift to digitally-mediated reading. All the texts to read are presented in online environments. The CAEC primarily tests the ability to read a variety of informational texts that mimic those an adult may encounter in day-to-day living. The content is engaging, and the tone is friendly. Literary texts make-up only a minority of the test items.

GED® Canada language arts reading texts	CAEC reading texts
Literary texts (75 percent) including drama, poetry and prose from British and American writers of the 20th century	Literary texts (20 to 40 percent) including excerpts from novels, poems, essays, dramas, short stories, etc.
Non-fiction texts (25 percent) including prose, critical reviews, articles, and "business-related" documents	Informational texts (60 to 80 percent) include essays, comics, editorials, news articles, photographs and other visual texts, brochures, maps, tables, graphics, infographics, surveys, advertisements, emails, websites, workplace documents, etc.

Not only are the CAEC reading texts presented on an online testing platform, but the texts themselves are digital items, such as an infographic, a recipe posted on a blog, an informational post, an email and results from an online search on a short-term rental platform.

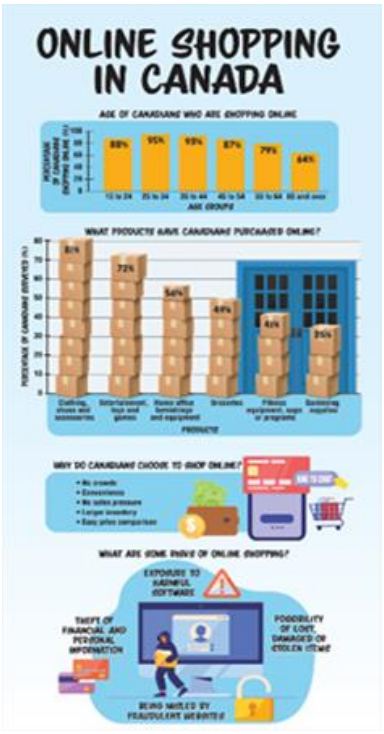
In addition to navigating, managing, and interpreting the test interface, test-takers will also need to interpret, navigate and read numerous design elements that accompany the digital texts, such as colour, photos, graphics, inactive navigational buttons, comments, charts, and tables.

Rather than a separate section focused on language structure, elements, techniques, grammar, syntax, and conventions, (i.e., GED® language arts, writing part 1), CAEC integrates these types of questions into the reading test.

Source texts to read and interpret

The sample test contains five text-based sources to read and interpret, and each has five test questions for a total of 25 questions. This represents only half the length of the actual CAEC reading test, which will have 50 test questions. Not yet available in the sample are examples of literary texts.

Online shopping



The online shopping infographic is the most complex text in the sample test with a variety of elements to read and interpret:

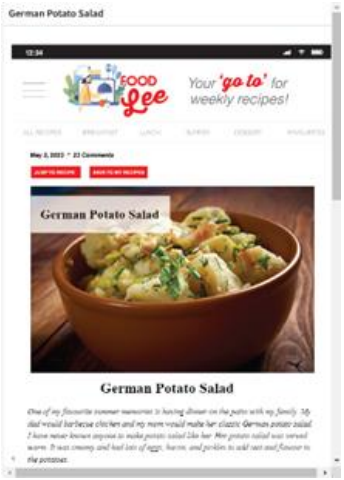
- Vertical flow of an infographic
- Bar chart (X and Y axis, age ranges, percentages)
- Images used with a bar chart
- Images accompanying information
- Changes in upper and lower case

The infographic is a very complex digital text that will require both explicit instruction, focused on its elements, along with a base of experience reading a variety of texts that rely on the presentation of data.

Family camping

The family camping text, which mimics a blog post, is the most straightforward text in the sample reading test. It is mostly text-based, and the images and symbols are secondary. It's also the longest text at 491 words. It has an average grade 8.1 readability level based on an analysis that combines scores from Gunning Fog, Flesch-Kincaid, SMOG, Coleman-Liau, and the Automated Readability Index on the site Analyze My Writing.

German potato salad

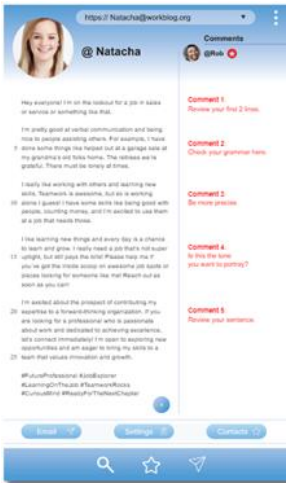


The recipe text was used in the digital section to demonstrate the complexity of the digital interface. The source itself reproduces some typical features of recipe blogs and web pages with images, photos, sharing icons and navigation buttons (the icons and buttons are inactive). Test-takers will need to be familiar with online recipe conventions and structures to respond to the questions. The average readability level is grade 8.9. based on the combined score analysis provided on the site Analyze My Writing.

Short-term rental

This source combines two distinct types of texts: 1) an email and 2) search findings that could appear on a short-term rental site. The two text types require different reading skills. The email scenario sets up a context and provides relevant background information. It requires thorough reading. The search findings provide snippets of information, requiring skimming and scanning. Images provide some additional information to interpret. The email has average grade 7 readability, but the search results are much more challenging and have grade 13.4 readability based on Coleman-Liau (the only tool that produced a result) available on the site Analyze My Writing.

Networking cover letter



The networking cover letter is somewhat similar to a shared document with comments. Test-takers will have to read and interpret both the main body of the text and the comments. They will also need to understand the scenario and be familiar with the idea of asking a trusted colleague to review a high-stakes piece of writing like a cover-letter. The average readability is grade 8.5. based on the combined score analysis provided on the site Analyze My Writing.

How CAEC test questions are constructed

Instructors need to understand how test questions are constructed using the following three elements:

1. CAEC outcomes
2. Cognitive complexity
3. Type of test question.

The three elements are discussed in relation to reading. However, the approach is used in all subjects.

CAEC outcomes

Each subject has a list of outcomes organized by topics. The outcomes provide information about the content related skills, knowledge and abilities that are assessed. Also provided is an indication of the proportion of questions focused on particular topics. Half the questions in the reading test are focused on the content and context of the text. In other words, questions that assess the test-taker's ability to make meaning of the text. The reading outcomes are below.

Reading outcomes

Content and context (50 to 55 percent)

- ☐ Locate and retrieve explicit ideas or information from texts.
- ☐ Interpret the literal or figurative meaning of words and phrases based on the contextual information presented in a text.
- ☐ Determine and analyze supporting ideas or information within texts.
- ☐ Evaluate, integrate, and synthesize ideas or information from texts to make connections and draw conclusions.

Structure, elements and techniques (25 to 30 percent)

- ☐ Identify and analyze organizational structures and features of literary and informational texts.
- ☐ Determine and evaluate the purpose and effect of literary devices in texts.

Grammar, syntax and language conventions (20 to 25 percent)

- ☐ Apply and analyze usage and correctness of grammar and punctuation.
- ☐ Determine and assess purpose and effectiveness of syntactic structures.

Cognitive complexity and the reading outcomes

Each CAEC outcome also addresses one of three levels of cognitive complexity. The outcomes aren't organized by cognitive complexity, but the relationship can be discerned. The table below cross-references the reading outcomes and cognitive complexity levels.

Complexity	CAEC reading outcomes
Low complexity	Items require recognition of previously learned information, such as a fact, a definition, a term, a concept, a principle, or performance of a simple procedure. ☐ Locate and retrieve explicit ideas or information from texts. ☐ Interpret the literal or figurative meaning of words and phrases based on the contextual information presented in a text. ☐ Identify and analyze organizational structures and features of literary and informational texts. ☐ Apply and analyze usage and correctness of grammar and punctuation.
Moderate complexity	Items require the application of knowledge of one or more concepts and reproduction of knowledge of underlying concepts. ☐ Determine and analyze supporting ideas or information within texts. ☐ Determine and evaluate the purpose and effect of literary devices in texts. ☐ Determine and assess purpose and effectiveness of syntactic structures.
High complexity	Items require interpretation, analysis, generalization, abstract reasoning, judgement, or connection of information and evidence in context. ☐ Evaluate, integrate, and synthesize ideas or information from texts to make connections and draw conclusions.

Although it appears you can recognize a cognitive complexity level using only verbs, such as **analyze** or **evaluate** or **identify**, this is misleading.[12] For example, the verb **analyze** appears in both low and moderate complexity outcomes. In addition, the noun form **analysis** appears in a high complexity descriptor.

1. Apply and **analyze** usage and correctness of grammar and punctuation (low complexity reading outcome).
2. Determine and **analyze** supporting ideas or information within texts (moderate complexity reading outcome).

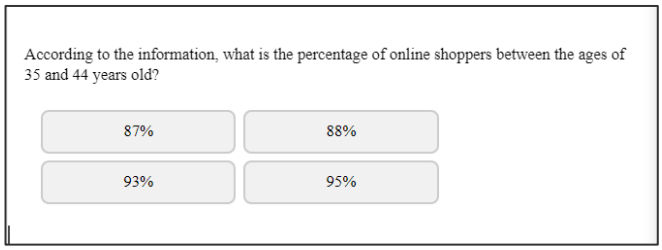
[12] Read more about misleading uses of Webb's DOK in An Inside Look at Webb's Depth of Knowledge

3. Items require interpretation, **analysis,** generalization, abstract reasoning, judgement, or connection of information and evidence in context (high complexity descriptor).

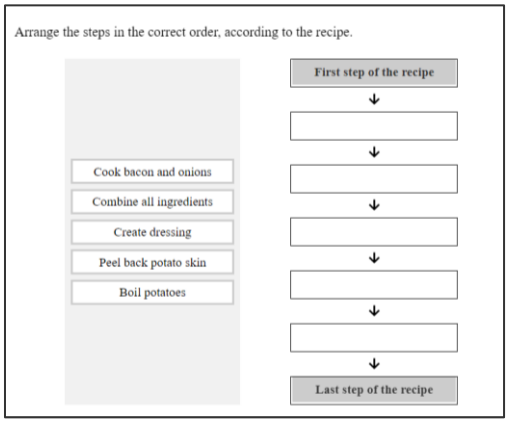
Another way to recognize cognitive complexity is to consider how many tasks a test-taker must do. Complexity increases with the number of tasks. For example, candidates might need to take information from one context and apply it to another in science or combine information from multiple sources in reading and social studies. Similarly in math, candidates might need to manipulate a formula and then do a calculation. Cognitive complexity is also dependent on the source text to read and interpret. In other words, how the information is displayed. Complexity increases when the information is presented in multiple paragraphs instead of one or even a single line. It can also increase when the source text is presented in a graph or diagram.

Type of test questions

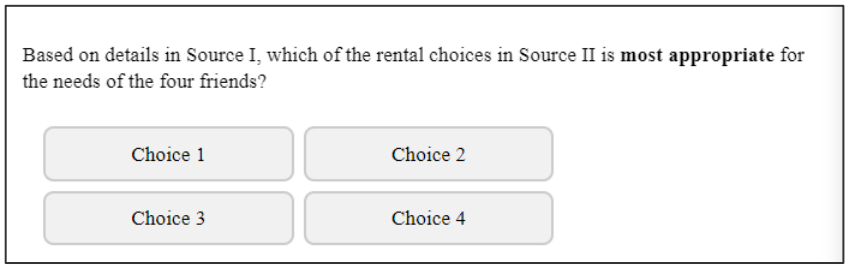
The third element that can influence a test-taker's ability to respond correctly is the type of test question, as previously discussed in the digital section. The sample reading test appears to limit the variation, containing mostly straightforward, single-select multiple-choice test questions. However, the other subjects have more variation. A few examples from the reading sample test demonstrate how different types of test questions can be used to assess various outcomes and complexity levels. The example on the right (question 1 in the sample reading test) is a low complexity question that uses a straightforward, single-select multiple-choice response format.



A low complexity question (question 14) could also require a different type of response. In this example on the right, test-takers must sort a list of text box items into groups by dragging and dropping them into the correct spot.



Conversely, a high complexity question (question 19) could rely on a straightforward, single-select multiple-choice response, as shown in this example. Test question type and cognitive complexity do not have predictable alignments. This question also demonstrates how the complexity increases with the number of cognitive tasks a single question requires a test taker to do to get to the correct answer. Candidates must combine information from multiple sources to form a conclusion. This type of question can also occur in social studies.



Combining the elements for test preparation

To prepare test-takers, instructors will need to do a bit of analysis of their own to make the operation of the test explicit. It's helpful to understand how all the elements work together, since test-takers need to understand, process and respond to multiple elements at the same time.

1. Review sample test questions. Model and narrate the thought processes involved in understanding the test questions.
    a. Consider the type of test question so its response format can be explained to candidates.
    b. Align the test question with an outcome so you are able to explain what the question is asking candidates to do and demonstrate. The outcomes will also guide your test preparation instruction.
    c. Identify the cognitive complexity of test questions based on the number of tasks, the complexity of the source information, the number of sources and the CAEC cognitive complexity framework.
2. When planning instruction, align the test question, outcome and cognitive complexity to determine the depth of preparation required to respond. Moderate and high complexity test questions will need more in-depth and active test preparation compared to low complexity test questions.

Recommendations for instruction

CAEC reading measures a range of abilities using texts that are associated with general reading topics. The emphasis on non-literary and informational texts doesn't necessarily require specific background knowledge, depending on the candidate's life experiences. It's best however, to ask candidates if they are familiar with the sample scenarios or have done something similar in their lives. If not, some background knowledge must be developed.

Before beginning a focused test preparation program, candidates need to have comprehensive and confident reading skills, strategies and knowledge, usually gained from reading a variety of texts and engaging in both deep and superficial reading. This foundation is needed for all subjects. Candidates should be able to independently read similar texts tested in the CAEC, which have an average readability between grades 7 and 9. A grade 8 readability is considered an appropriate target when developing materials that most adults can comprehend without specific background knowledge. The readability level only applies to the reading test. Texts in the science, social studies and writing tests have higher readability levels since they require background knowledge and knowledge of specific concepts.

Instruction and test-preparation should combine both explicit strategies that address how the test works and more general and active instructional approaches that build a foundation of knowledge and confidence.

Active instruction and deep reading

Reading online is different from reading on paper, and individuals will have different experiences, attitudes and circumstances that shape their abilities and confidence.[13] In general, research and our own experience suggest we prefer to read on paper when reading deeply, reflectively and critically, particularly when engaged with highly relevant and meaningful text as part of our work and learning.[14] Reading online, on the other hand, promotes more superficial skimming. Both deep and superficial strategies are needed in our lives and deep reading is necessary for overall reading development. The challenge is

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[13] Digital versus Paper Reading: A Systematic Literature Review on Contemporary Gaps According to Gender, Socioeconomic Status, and Rurality

[14] Reading on-screen vs reading in print: What's the difference for learning?

finding opportunities to support deep reading since so much everyday reading is superficial. Deep reading is not just an important choice or strategy, it's also needed to support on-going learning in different disciplines and careers.[15]

To introduce deep reading, which involves personal and meaningful engagement with texts, consider the following strategies.

- Help learners find short-stories, personal essays and books that connect with their lives, interests and lived experiences.
- Encourage learners to choose material written by compelling and interesting writers even if it seems too difficult. The priority at first is engagement with the text, not independent reading. Use audio books accompanied by texts, such as those found on ESL Bits and Now Comment.
- Engage in discussions about the reading, encouraging questions and comments that explore individual reactions, connections with experience, authorial intentions and perspectives, along with character motivations and perspectives.

These strategies set the foundation for intrinsically motivated reading that results in more reading, in-depth reading, greater confidence and overall improved reading abilities.

Explicit instruction

Explicit instruction, focused on developing the specific skills, knowledge and strategies that are assessed, is also needed. The texts for explicit instruction should be similar to those assessed. Avoid using deep reading texts for this purpose. In general, choose literary texts (i.e. excerpts from novels and complete poems, essays, dramas, short stories) to read together that are different from learners' choices for deep reading and engagement. Read a variety of online informational texts of interest to adults. Choose topics that could appear in the CAEC tests such as

- Hiring processes
- Recreation and camping in national and provincial parks
- Personal and family health, food preparation and nutrition

[15] What happens when we lose deep reading?

- Money management, budgeting and consumer issues
- Housing and accommodations.

Look for texts that also integrate images, photos, graphs, tables, etc. Introduce, model, discuss and provide focused practise on the use of following:

- Tables and charts to convey data-driven information
- Literary devices
- Basic punctuation
- Grammatical structures
- General reading vocabulary and specific word choices to enhance meaning.

Intentionally allocate time and effort to both explicit and active instructional strategies.

Suggested resources

Helping Students Learn How Best to Read on Digital Devices – tips for teachers

How we Read Digital Texts – tips for teachers

A Closer Read – OER reading skill-building and strategies collection for pre CAEC readiness

Read Faster, Understand More – OER reading resource at the secondary level for CAEC test preparation

Writing

Summary

The CAEC writing test is markedly different than the GED® essay. The test-taker must produce a piece of persuasive writing on an issue. To build an argument, the test-taker must read background information about a particular situation. Accompanying the background information are four information sources. Test-takers can refer to the information sources plus their own knowledge to build an argument. Similar to the sample test, test-takers can choose to respond to one of two situations. **Reading is as important in the writing section as writing, and the text to read is more difficult than the texts in the reading section.**

GED® Canada Language Arts writing task	CAEC writing task
Compose a five-paragraph essay based on personal knowledge (i.e. experience, observation, reference to past reading, etc.).	Compose a persuasive argument in the form of a formal letter or email using background information, sources provided and/or personal knowledge.
A one sentence topic and one-sentence task were provided.	Extensive information is provided to help build the argument: 1. Situation (background information) 2. Task 3. Sources

Similar to the online GED®, the argument is composed using a built-in simplified word-processor, allowing multiple rewrites and writing development. Basic word-processing features, such as bold, underline, bulleted and numbered lists, find and replace, highlighting, text alignment and undo/redo, are included. Incorrectly spelled words are highlighted, and some possible corrections are provided, but the feature is not as intuitive as major word-processing applications.

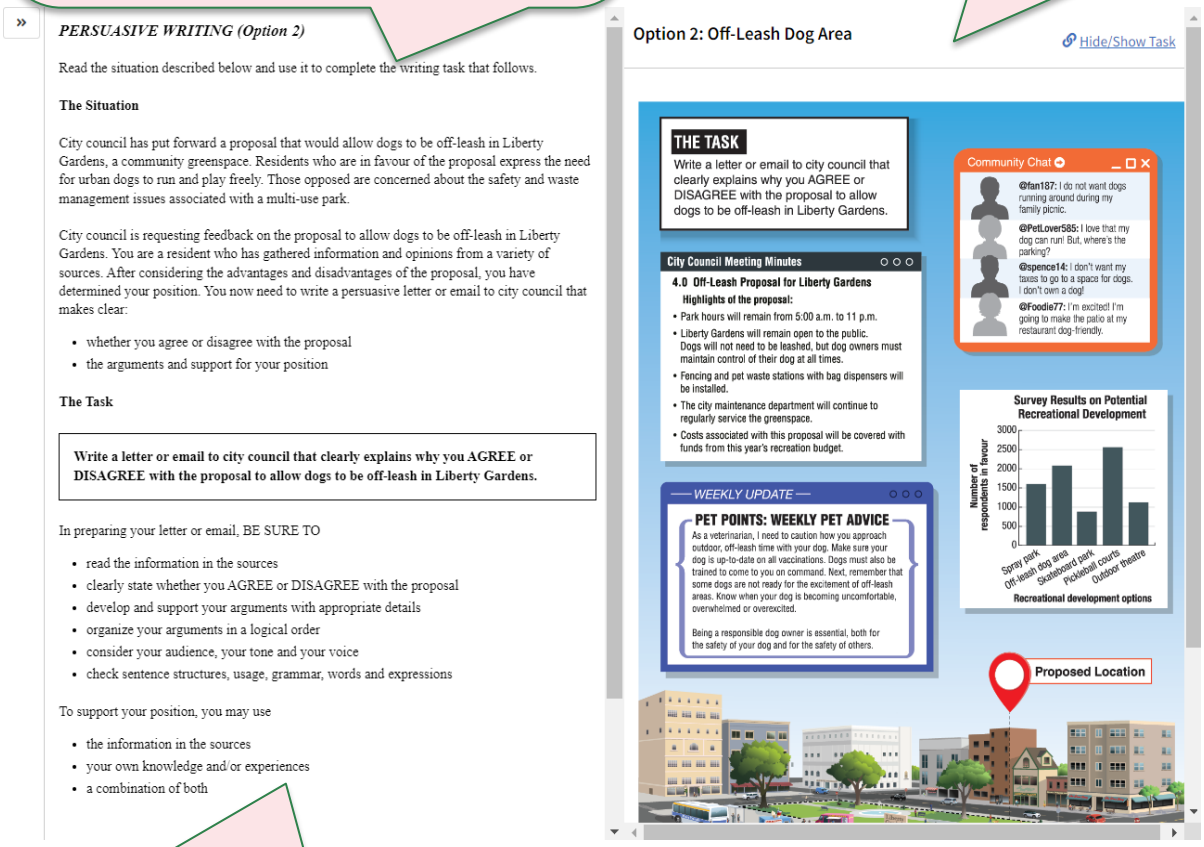
Test-takers will need to understand the genre, elements, moves, and phrases of persuasive writing that draws on evidence to complete the written test. They will also need to carefully read the background information and source texts.

CAEC writing sample question

Test-takers are presented with three different types of information to read and understand **before** starting their writing.

The **situation text** provides background information. It has an average grade 14 readability level based on the combined score generated on the site Analyze My Writing. The text is more challenging due to its sentence construction, use of abstract words (i.e. proposal, position, determined) and phrases (i.e. put forward and in favour).

The **source texts** provide evidence that can be used to shape a persuasive argument. Although test-takers can choose not to use the sources, arguably, their knowledge and experience needs to be as persuasive or more persuasive than the source texts.



PERSUASIVE WRITING (Option 2)

Read the situation described below and use it to complete the writing task that follows.

The Situation

City council has put forward a proposal that would allow dogs to be off-leash in Liberty Gardens, a community greenspace. Residents who are in favour of the proposal express the need for urban dogs to run and play freely. Those opposed are concerned about the safety and waste management issues associated with a multi-use park.

City council is requesting feedback on the proposal to allow dogs to be off-leash in Liberty Gardens. You are a resident who has gathered information and opinions from a variety of sources. After considering the advantages and disadvantages of the proposal, you have determined your position. You now need to write a persuasive letter or email to city council that makes clear:

- whether you agree or disagree with the proposal
- the arguments and support for your position

The Task

Write a letter or email to city council that clearly explains why you AGREE or DISAGREE with the proposal to allow dogs to be off-leash in Liberty Gardens.

In preparing your letter or email, BE SURE TO

- read the information in the sources
- clearly state whether you AGREE or DISAGREE with the proposal
- develop and support your arguments with appropriate details
- organize your arguments in a logical order
- consider your audience, your tone and your voice
- check sentence structures, usage, grammar, words and expressions

To support your position, you may use

- the information in the sources
- your own knowledge and/or experiences
- a combination of both

Test-takers need to carefully read **the task** and identify components that must be included in their writing. The task and two bullets above will be the same for all CAEC tests. It might be wise to rely primarily on the source texts and include an optional personal anecdote as evidence.

Recommendations for instruction

Active learning

Discuss, read about and respond in writing (online and offline) to a variety of community issues and local news stories. Use community news sites, pages or email updates and printed community newspapers, if available. Choose topics of interest together and create a scenario. Include snippets of information found in the various sources.

Develop a scenario (the background information) that mimics the tone, complexity, and readability level of the ones provided in the sample test.

Engage in discussions and informal debates so students can practise making oral arguments backed by evidence. Encourage the use of formal transition terms in the discussions (e.g., moreover, however, furthermore, in conclusion, etc.) to facilitate their use in writing.

Explicit instruction and the CAEC writing outcomes

Writing exemplars are not available yet. However, you can create or collect models of strong writing that address the CAEC outcomes. Together with learners, make explicit connections between the model and each of the CAEC outcomes. Emphasize that this writing is very analytical and strategic rather than expressive or creative. Comparing strong and weak examples can help learners acquire these analytical skills. Working together and engaging in a discussion will help learners see their writing more objectively.

Listed below are the indicators used for marking found in the CAEC Test Administration Guide. Each indicator is a re-wording of the CAEC writing outcomes. Ensure learners understand how to recognize and respond to each indicator.

Writing indicators aligned to the CAEC outcomes

Position and support (33.3 percent)

- ☐ Sufficient understanding of the issue is demonstrated by taking a position in agreement or disagreement
- ☐ Arguments are apparent and adequate
- ☐ Support for the arguments is appropriate and connected to the writer's arguments

Voice and presentation (33.3 percent)

- ☐ Appropriate tone for the intended audience is generally maintained
- ☐ Diction and stylistic choices create a clear voice but may lack emotions
- ☐ Discussion is developed in a logical order with a distinct closure

Conventions, mechanics and syntax (33.3 percent)

- ☐ Words and expressions are generally used appropriately
- ☐ Usage and correctness of grammar are commonly controlled

Suggested resources

Teach learners about the genre, elements, moves, and phrases of persuasive writing. The following resources could be useful:

- Mastering Persuasive Writing | How to use evidence effectively
- Mastering Persuasive Writing | Using anecdotes
- Persuasive Letters | Learning for Justice
- Persuasive Writing: A Letter to a Newspaper for a Caring Community | Facing History & Ourselves
- Communicating on Local Issues: Exploring Audience in Persuasive Letter Writing
- Persuasive Writing: Signal Words TRANSITIONAL PHRASES

Mathematics

Summary

CAEC mathematics assesses a more condensed set of math skills and knowledge than the 2002 Canadian GED®. Questions on the CAEC sample test are modeled very closely to those on the Alberta Provincial Achievement Tests (PATs), including some questions that were directly repurposed for the CAEC sample test.

Part I (no calculator)

Relative to the GED®, the calculator-free section of the CAEC is half the length and value (25 questions down to 12 and 50% down to 25%). Part I contains no word problems, only expressions to be simplified or equations to be evaluated.

GED®	CAEC
16. A company charges $60 per day plus $0.50 per mile for truck rentals. If Greg rents a truck for 3 days and drives it a total of 150 miles, what will the company charge? (1) $110 (2) $135 (3) $230 (4) $255 (5) $300	Evaluate and express your answer as an improper fraction in simplest form. $2\frac{1}{2} - \frac{2}{3}$ Answer: ____

Part II

Many of the questions in Part II of the CAEC are similar to those found on the GED®, both in terms of content and question design. Most will be source-based word problems. Topics include area, average, chart reading, costs, discounts, rates, scale and proportion, speed/distance/time, and wages. Like the GED®, many of the questions involve identifying relevant information from textual passages, diagrams, data tables, charts, and graphs, and then sequencing multiple operations.

The more abstract content found in the GED® is not present. There are no questions about quadratics, lines on a Cartesian plane, inequalities, laws of exponents, scientific notation, or properties of lines or angles.

Part II of the CAEC will require answers rounded to specified precision – most often to the tenths or hundredths.

Basic exponents will typically be seen in questions structured around order of operations, area, volume, and the Pythagorean Theorem. Geometry questions can require radicals, limited to square and cube roots, to solve the Pythagorean Theorem, and to determine side length of a square/cube from an area/volume. Part II questions may also include square roots in a list of numbers to be sorted or placed on a number-line.

Algebraic representations and manipulations on the CAEC are fewer and simplified. Questions will test basic skills such as manipulating equations to solve for unknowns. These algebraic questions can include exponents or require taking the square root of an expression. When a formula not found on the formula sheet is needed, it will be provided. Questions based on given formulas will require substituting unknowns and managing the order of operations. While there are questions that can be modeled algebraically, other strategies often become more viable due to restrictions on possible answers.

Linear algebra questions on the CAEC will require an understanding of general patterns. Some questions will involve identifying a rate from a graph or table to interpolate or extrapolate a value. Test-takers won't be asked to plot points, calculate the distance between points, calculate slope, or derive/match equations from/to lines or points graphed on a Cartesian plane.

Statistics questions will require an understanding of the impact of outliers on mean, median and mode. There may also be questions regarding the impact of sampling choices on collected data.

Questions will require making measurements with the digital measurement tools inside the testing interface — that is, the ruler and protractor.

The CAEC contains visual pattern extension problems that were not found on the GED®. These questions are unique enough to require specific attention. Examples of these problems will be shown later in this section.

The vast majority of the test questions have a moderate complexity, requiring test-takers to apply skills and concepts to make decisions about how to approach a question or problem, how ideas relate, or what tools to use.

Comparing GED and CAEC math skills and techniques

The following table compares the use of specific mathematics skills and techniques in the GED® and CAEC, which will help instructors make the transition to the new test. The table can also serve as a test-readiness checklist for both candidates and instructors.

		GED® Canada	CAEC
Number operations and number sense	Compare or sort numbers (including fractions)	✓	✓
	Use place value for rounding	✓	✓
	Represent and use numbers in a variety of equivalent forms (integers, fractions, decimals, percents, exponents)	✓	✓
	Represent and use numbers in scientific notation	✓	
	Perform addition, subtraction, multiplication, and division with and without a calculator	✓	✓
	Choose and sequence operators to solve problems	✓	✓
	Identify relevant information from passages and other sources.	✓	✓
	Use exponents and roots in geometric problem solving	✓	✓
	Apply properties of exponents to simplify expressions	✓	
Rate and ratio	Solve rate problems involving distance/time/speed	✓	✓
	Solve rate problems involving wage/costs	✓	✓
	Solve ratio problems involving scale (e.g. maps and diagrams)	✓	✓
	Solve ratio problems involving equivalent triangles	✓	✓
	Solve ratio problems involving part-to-part ratios	✓	✓
	Solve ratio problems involving part-to-whole ratios	✓	✓
	Solve ratio problems involving part-to-part-to-part ratios (e.g., 5:12:13)		✓
	Perform metric/metric conversion (no rate provided)	✓	✓
	Perform metric/imperial conversion (rate provided)		✓
	Calculate simple interest (with a provided formula)	✓	✓
Algebra	Simplify expressions and solve equations using order of operations (with both known and unknown values)	✓	✓
	Evaluate expressions after substitute values for unknowns	✓	✓
	Recognize expressions which appropriately model problems	✓	

		GED® Canada	CAEC
	Create algebraic equations to solve problems	✓	✓
	Manipulate polynomials with unknowns	✓	✓
	• Colleting like terms	✓	✓
	• Using the distributive property	✓	✓
	• Requiring factoring	✓	
Solve problems with linear algebra	Extrapolate or interpolate from linear relationships shown in table or graph form	✓	✓
	Understand and use the slope-intercept formula	✓	
	Calculate slope	✓	
	Identify or calculate x and y intercepts from an equation or graph	✓	
	Solve for an unknown x or y when given the other	✓	
	Verify points on a line	✓	
	Identify and graph points and lines on a Cartesian plane	✓	
	Solve two-step linear equations	✓	
	Solve and graph inequalities	✓	
	Solve quadratics (limited to assessing possible solutions in a multiple-choice setting)	✓	
Geometry	Calculate area, perimeter, and surface area of simple and compound shapes (polygons and circles)	✓	✓
	Calculate volume of prisms, pyramids, and cones.	✓	✓
	Apply properties of lines and angles	✓	
	Apply properties of polygons to solve problems - side lengths of regular and symmetrical polygons	✓	✓
	Apply properties of polygons to solve problems - sum of interior angles	✓	
	Solve problems using the Pythagorean relationship.	✓	✓
	Identify congruent figures	✓	✓
Probability and statistics	Calculate probability of independent events	✓	✓
	Identify and calculate mean, median, and mode	✓	✓
	Identify the effect of outliers on mean, median, and mode		✓
	Analyze impact of sampling choices on collected data		✓
Graphs	Use information from line, bar, and pie charts	✓	✓

CAEC math outcomes and comments

In this section, the CAEC math outcomes are presented with some examples form the test and detailed insights to help you prepare learners for the test.

Part I: No calculator/mental math (25 percent)

- ☐ Add, subtract, multiply, and divide fractions and mixed numbers.
- ☐ Add, subtract, multiply, and divide decimals, percentages, and integers.
- ☐ Solve linear equations of the form x + a + b = c, where a, b, and c are decimals or integers.
- ☐ Evaluate expressions using order of operations including whole numbers, integers, decimals, fractions, and powers.

- Questions may involve numbers written as words (e.g. *three thousand fifty-four, three-fifths, or twenty-five percent*).
- Fractional answers should be reduced to the simplest form.
- This section will not include word problems.
- Candidates can expect precision to the thousandths.
- Long division questions will terminate.
- Addition/subtraction questions will likely be comprised of numbers with different numbers of decimals.
- More decimal places in the subtrahend of a subtraction question seems to be a pattern.
- Both an explicit multiplication operator and multiplication by justification were shown on the practice test.
- Decimals and fractions may be mixed.

Evaluate:

$82.6 \div 7$

Evaluate:

$502 - 298.1$

What is the value of $-\frac{2}{5} + 0.5 + 0.75$ expressed as a fraction in simplest form?

Part II: Calculator (75 percent)

Calculators may not include graphing functionality, programmed memory content, built-in notes, libraries, or formulae, upgraded or downloaded programs, remote communication capability, symbolic manipulation capabilities, the ability to manipulate algebraic expressions, external (peripheral) devices and other support materials such as manuals, printed or electronic cards, printers, memory expansion chips or cards, or external keyboards.

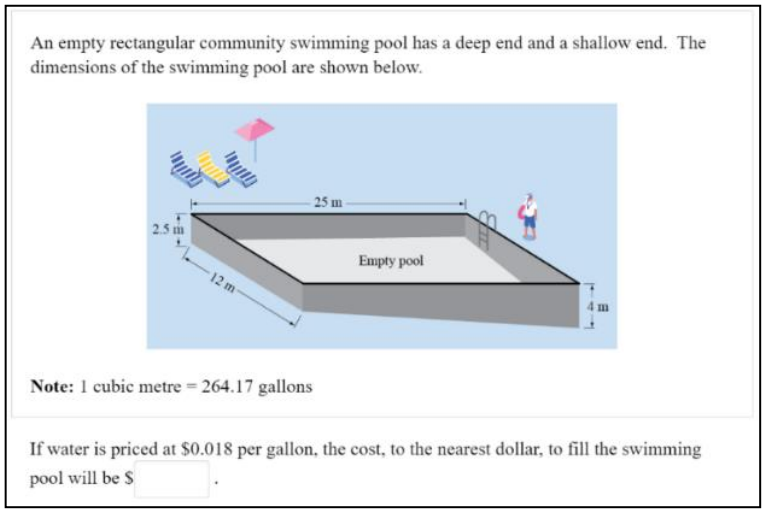
While any calculator that avoids these prohibitions is acceptable, sample approved calculator include the TI-30XIIS, TI-30Xa, CASIO fx-260, and Casio fx-300 MS Plus 2nd ed.

Number sense (25 to 30 percent)

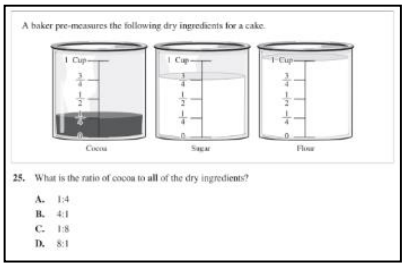
- ☐ Solve problems in financial or other contexts that involve fractions, decimals, and percentages, such as gratuity, discounts, commission, taxes, interest, and salary.
- ☐ Solve problems in financial and real-world contexts that involve rates, ratios, and proportions, such as speed or scale.

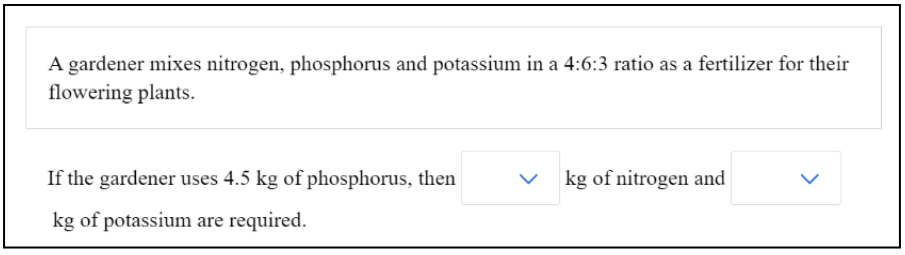
Part II of the test will require both multiple-choice and numeric entry responses.

- Exponents will only use natural numbers as bases or powers.
- Many questions in Part II, including rate questions, will likely require a multi-faceted approach that combines different parts of math to find a final answer.
  For example, the question on the right requires the calculation of a volume in metric and the conversion of that volume to imperial before the final rate can be applied.

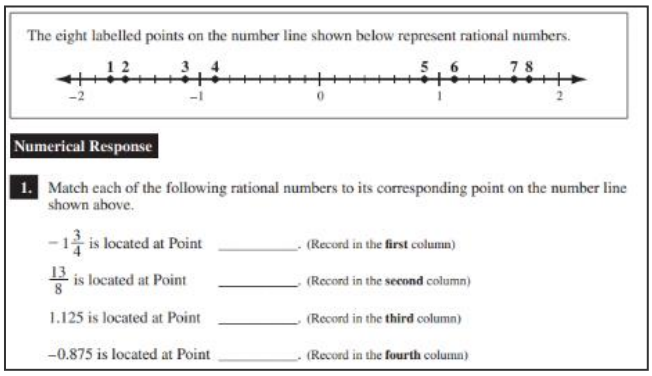


- Candidates can expect to ratio questions that involve three components in either as part-to-part-to-part or part-to-whole form.





- Questions may require the sorting of a list of values or the placing of values on a number line. These questions could involve integers and square roots.



The eight labelled points on the number line shown below represent rational numbers.

Numerical Response

1. Match each of the following rational numbers to its corresponding point on the number line shown above.

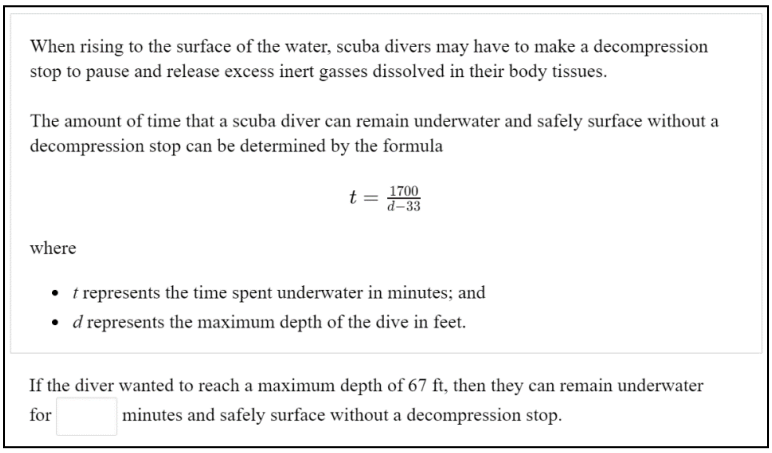
$-1\frac{3}{4}$ is located at Point _____. (Record in the **first** column)

$\frac{13}{8}$ is located at Point _____. (Record in the **second** column)

1.125 is located at Point _____. (Record in the **third** column)

−0.875 is located at Point _____. (Record in the **fourth** column)

- When a formula is given, the desired value will most likely be isolated. For example, in the following question the value to be calculated (time) is already isolated, and the value for the other variable (depth) is provided. However, while less likely, the question design space allows for an equation which much be rearranged to isolate the desire value – using this example, being given time and asked to calculate depth.



When rising to the surface of the water, scuba divers may have to make a decompression stop to pause and release excess inert gasses dissolved in their body tissues.

The amount of time that a scuba diver can remain underwater and safely surface without a decompression stop can be determined by the formula

$$t = \frac{1700}{d-33}$$

where

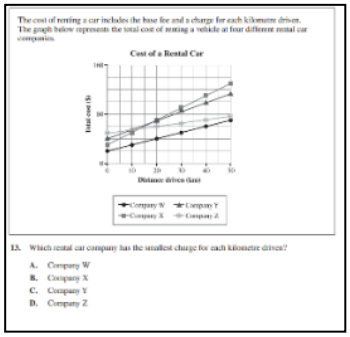
- t represents the time spent underwater in minutes; and
- d represents the maximum depth of the dive in feet.

If the diver wanted to reach a maximum depth of 67 ft, then they can remain underwater for _____ minutes and safely surface without a decompression stop.

Patterns and relations (10 to 20 percent)

- ☐ Interpret and extend patterns and relationships.
- ☐ Write and solve linear equations that model real-world contexts.
- ☐ Apply and manipulate a given equation or formula.
- ☐ Analyze and solve problems using numerical and logical reasoning.

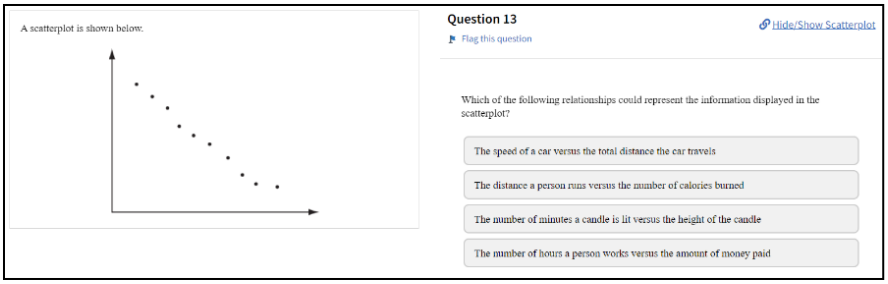
- The questions on the right and below does not require any calculations but do require a conceptual understanding of linear relationships.



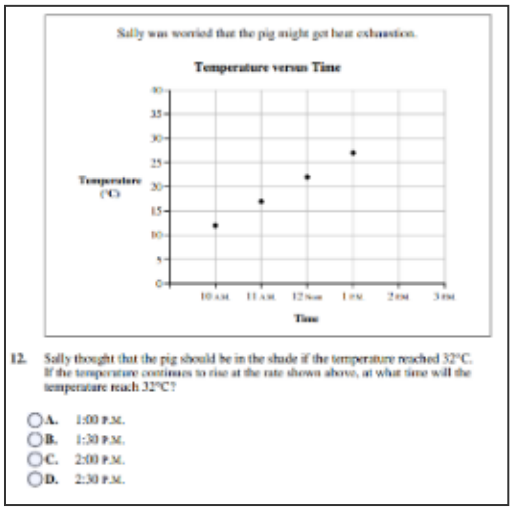
The cost of renting a car includes the base fee and a charge for each kilometre driven. The graph below represents the total cost of renting a vehicle at four different rental car companies.

13. Which rental car company has the smallest charge for each kilometre driven?

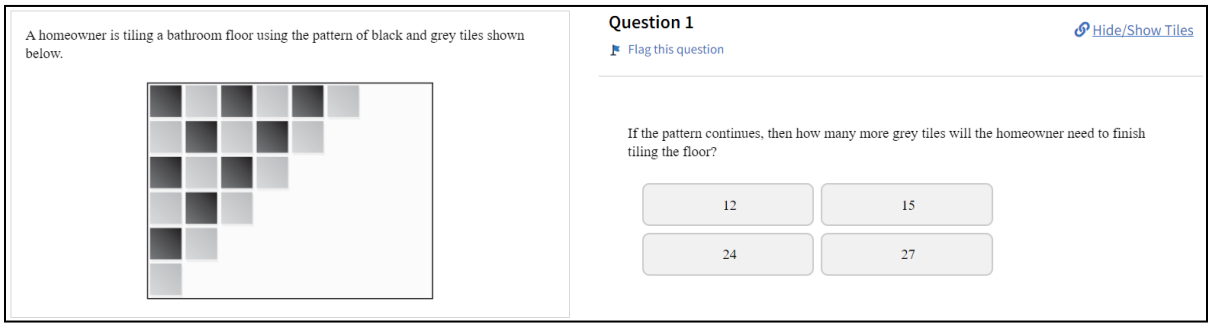
A. Company W
B. Company X
C. Company Y
D. Company Z



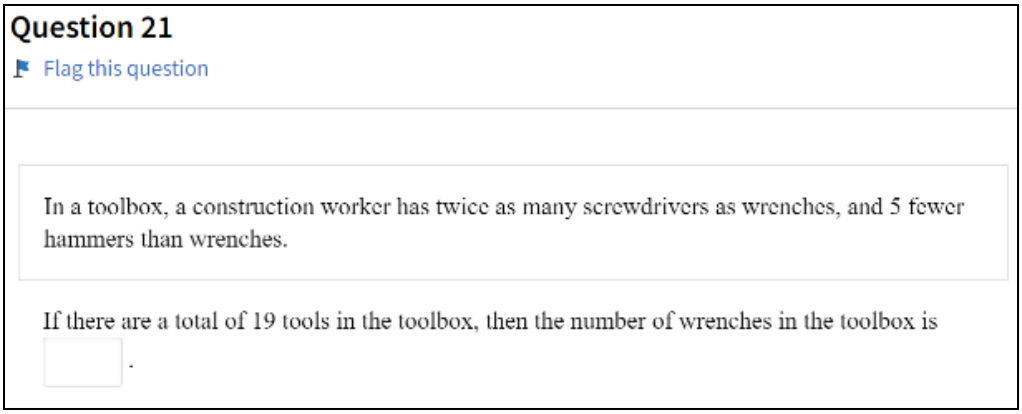
- Some questions may require interpolation or extrapolation of values given a graph or table of values based on a real-world example. These questions will not involve points on a Cartesian plane.



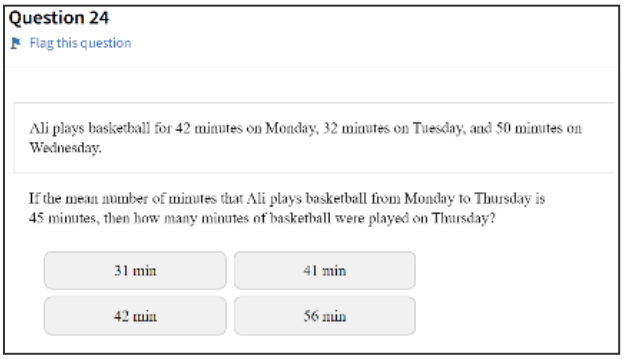
- Pattern extension questions and logical reasoning questions, as shown below, will often be based on visual sources. These questions may feel unfamiliar to people and should be given specific attention.



- While the question design space allows for questions which may require an algebraic approach, the need to model a problem algebraically to find a solution will often be eliminated by whole number answers, restrictions on range, and/or multiple-choice options that provide limited testable possibilities. In the example below, while the following question could be modeled algebraically, because tools can only exist in whole numbers and less than five wrenches and greater than nine create illogical values, there are only four options to test. Creating a table to record the results for each test value makes the problem much easier.



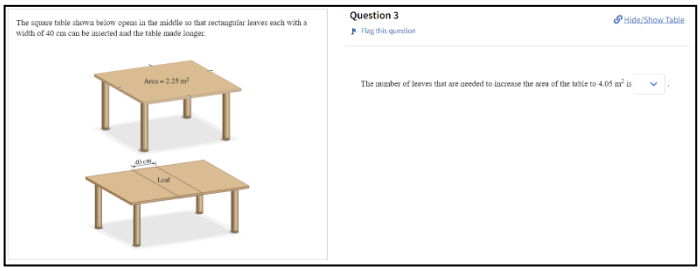
- The multiple-choice format of the question on the right makes testing each of the options the easiest approach for many people. Alternatively, averaging the first three numbers shows that only one of the provided answers is sensible. Neither approach requires an algebraic equation.



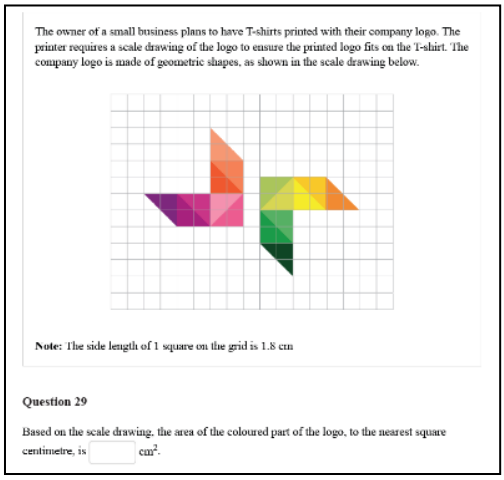
Geometry and measurement (25 to 35 percent)

- ☐ Convert between various units of measure, including Système International dunnites (SI) (without a conversion rate provided in the question), Imperial (with conversion rate provided), and U.S. Customary units of measure (with conversion rate provided).
- ☐ Apply scale factor and properties of similar shapes to solve problems.
- ☐ Apply the Pythagorean Theorem to solve problems that involve right triangles.
- ☐ Apply formulas to determine the perimeter and area of two-dimensional shapes, including composite two-dimensional shapes.
- ☐ Apply formulas to determine the surface area and volume of three-dimensional shapes, including composite three-dimensional shapes.

- Questions will often involve working backwards from an area, volume, or perimeter to find a length.



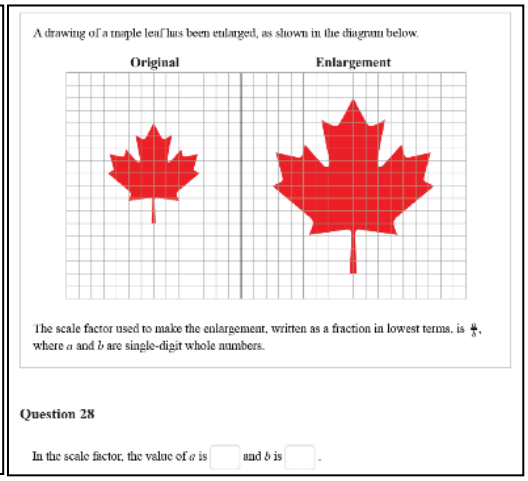
- Questions will involve working with scale. These may include working from or calculating a model scale (model real world). A grid may be used in geometric problems related to area or scale. The scale of the grid itself may not be 1:1.


The owner of a small business plans to have T-shirts printed with their company logo. The printer requires a scale drawing of the logo to ensure the printed logo fits on the T-shirt. The company logo is made of geometric shapes, as shown in the scale drawing below.

Note: The side length of 1 square on the grid is 1.8 cm

Question 29

Based on the scale drawing, the area of the coloured part of the logo, to the nearest square centimetre, is ____ cm^2.


A drawing of a maple leaf has been enlarged, as shown in the diagram below.

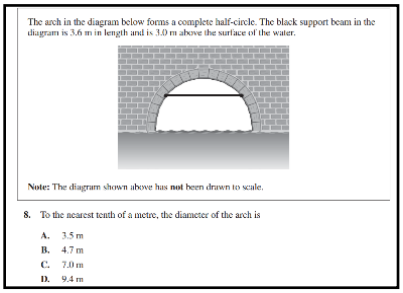
Original Enlargement

The scale factor used to make the enlargement, written as a fraction in lowest terms, is $\frac{a}{b}$, where a and b are single-digit whole numbers.

Question 28

In the scale factor, the value of a is ____ and b is ____.

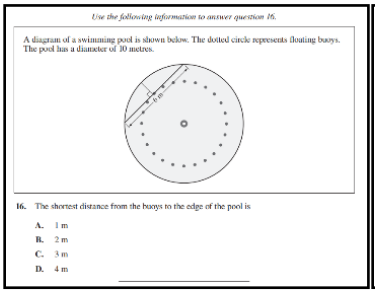
- The Pythagorean formula might appear in a question related to a chord on a circle.


The arch in the diagram below forms a complete half-circle. The black support beam in the diagram is 3.6 m in length and is 3.0 m above the surface of the water.

Note: The diagram shown above has **not** been drawn to scale.

8. To the nearest tenth of a metre, the diameter of the arch is

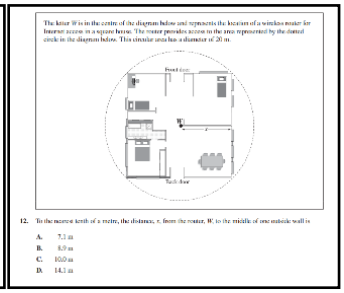
A. 3.5 m
B. 4.7 m
C. 7.0 m
D. 9.4 m


Use the following information to answer question 16.

A diagram of a swimming pool is shown below. The dotted circle represents floating buoys. The pool has a diameter of 30 metres.

16. The shortest distance from the buoys to the edge of the pool is

A. 1 m
B. 2 m
C. 3 m
D. 4 m

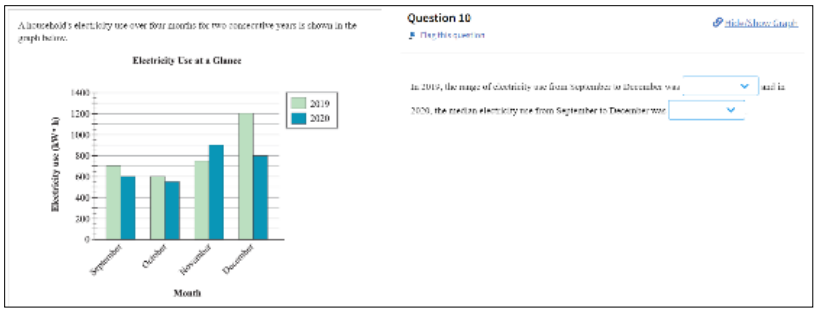


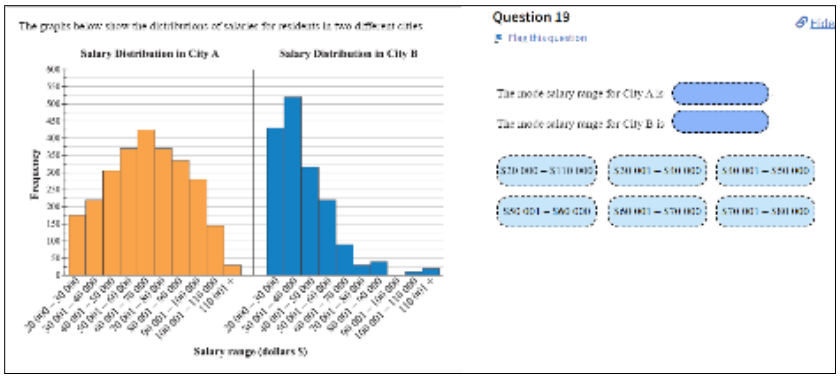
- Candidates should be familiar with all of the formulas, which appear in both the test and CAEC Test Administration Guide.
- As indicated on the formula sheet, the calculator's value for pi should be used.
- Conversion between metric units will be required (e.g., cm to m, m to km, mL to L)
- While the conversion rate for any imperial measurements will be provided when required, test-takers should be practiced in working with yards, feet, and inches.

Data management and probability (20 to 30 percent)

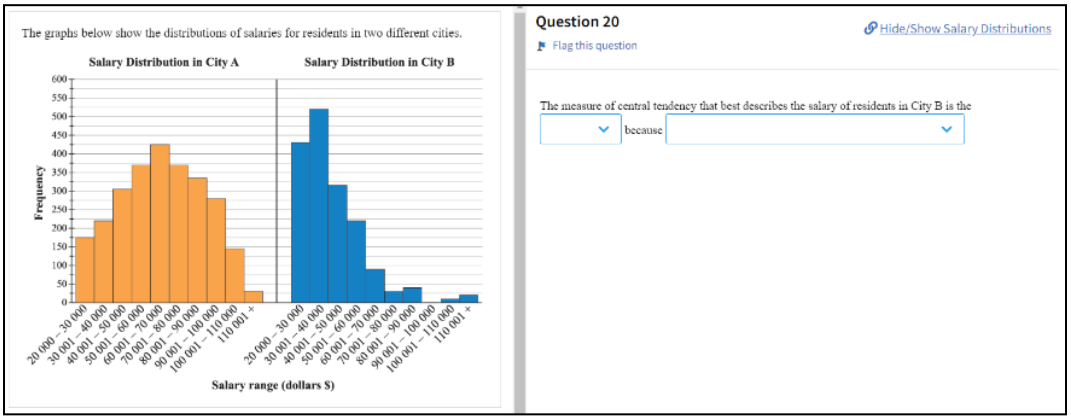
- ☐ Interpret data represented in tables, spreadsheets, and graphs, such as line graphs, bar graphs, histograms, circle graphs, and scatterplots.
- ☐ Calculate and analyze mean, median, mode, and range with consideration of any outliers.
- ☐ Solve problems that involve the probability of independent events and mutually exclusive events.

- Questions will require the calculation of mean, median, mode, and range from given values or information presented in a graph as shown below.





- A conceptual understanding of the impact of outliers on median will be necessary



- Candidates will need to understand how to evaluate the probability of indepdendent events and of mutually exclusive events, but will not need to recognize probability notation.

Recommendations for test preparation and instruction

Build math skills using a variety of resources. Many of the same resources, whether online or offline, that instructors used to build candidates' math skills, knowledge and abilities for the GED® can be repurposed. Learners should engage in a variety of active and explicit learning activities to develop their mathematics fluency and confidence.

Prepare for the CAEC test using similar questions. Use questions like those found on the CAEC sample test and Alberta Provincial Achievement Tests (see Subject area resources for mathematics for samples). Note that that the CAEC is not a copy of the Alberta PATs, so care should be taken to select questions that reflect CAEC outcomes. Keep the math content and question structures, but where necessary, update question context to reflect an adult learner.

Mix multiple-choice and direct entry answers into question sets. Both test-taking skill sets will be necessary.

Develop multi-step questions and questions that work backwards.

1. Example 1 - Apply a rate to the end-result of a multi-step process
    - Apply a $/m^2 rate to surface a rectangular area calculated from imperial units.
2. Example 2 - Work backwards from volume or area
    - Determine the height of a stack of identical cubes by calculating the side length of an individual cube given its volume.
    - Determine the required diameter for a cylinder of a given height to provide a given volume.

Provide multiple strategies for solving problems that could be solved by creating a linear equation. These types of questions were likely included to meet the *Mathematics: Patterns and relations: Write and solve linear equations that model real-world contexts* objective. However, building a table and testing reasonable answers will be a more stable approach for most people.

Build skills for identifying and collecting relevant information. Focus should be placed on understanding questions before collecting values, as questions will often involve extraneous data. Providing strategies for organizing data, such as using tables, will help simplify problem-solving.

Don’t overfocus on specific manual calculations such as long division. The weight of this section is reduced. The potential trade-off of a few extra questions for a learner’s self-confidence is not worthwhile.

Review pattern extension problems. Focus should be given to the visual pattern extension and logic problems.

Suggested resources

Since many topics are similar, repurpose most GED® materials but make adjustments and selections that respond to the changes identified in this analysis.

To build skills and confidence in an online environment Moving on Up: CAEC math from the Dartmouth Learning Network is a free and interactive learning site that doesn’t require an account to access.

Science

Summary

Three major changes mean the CAEC Science test is very different from the GED® and will require a different approach to preparing for the test.

First, the CAEC science test doesn't assess particular content knowledge. Most (60 percent) of the GED® was focused on three content areas: physical science, life science, and earth and space science. Instead, the CAEC only assesses broader scientific topics. The CAEC topics are: 1) the nature of science, 2) scientific inquiry skills, and 3) science, tech, society and the environment. Similar topics were also assessed in the GED® but to a lesser extent (only 40 percent of the questions).

Second, most (50 to 80 percent) of the questions are moderately complex. Test-takers not only need to know what a concept like validity means, they will also have to apply it to respond to a test question. Moderate complexity could also involve making decisions about how to approach a question or problem, understanding how ideas relate and knowing what tools to use to respond. In comparison, the GED® mostly posed science questions that required recall and reproduction of facts, concepts, terms, procedures, and principles—what is considered low complexity in the CAEC.[16] Test-takers may also have to respond to high complexity questions involving interpretation, analysis, generalizations, abstract reasoning, and connecting information and evidence.

Third, the CAEC poses some questions without providing a source to read and interpret. Test-takers will have to draw on their scientific knowledge to answer some questions without source information. Background knowledge of the following is required:

- Scientific procedures such as experimental design
- Scientific concepts like validity, reliability, hypothesis, placebo, double-blind, etc.
- Specific topics like WHMIS 2015 and Système International d'unités (SI), and
- Math skills related to measurement and presenting data in tables and graphs.

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[16] Technical Manual: 2002 Series GED® Tests, p 23

Source texts to read and interpret

Some (six out of 35) questions in the sample test don't have any source text or visuals. Test-takers need to understand the following concepts in order to respond:

- Characteristics of science
- The difference between observation and inference
- The nature of scientific inquiry
- Reliability and validity
- Research objectives and experimental design priorities
- Testable scientific questions
- Scientific hypothesis

Most questions are accompanied by a source. The sample test included the following visual elements in addition to text-based sources:

- Charts
- Graphs
- Diagrams
- Illustrations
- Photos

Background knowledge will be needed to interpret some sources.

Test questions

The sample test is made up of approximately 94 percent multiple-choice questions (33 out of 35) and six percent fill-in-the-blank questions (2 out of 35). It includes nine different styles of multiple-choice questions that ask the test-taker to do the following.

1. Select more than one text box answer in a list.
2. Select an answer from a drop-down list.
3. Select one text box answer (standard single select multiple-choice question).
4. Select one or more text box answers, then drag and drop in the answer window.
5. Classify multiple statements with either of two words - must reuse the answer choices.
6. Sort a list of text box items into groups by dragging and dropping them into the correct spot.
7. Put a check mark in multiple boxes in a table.

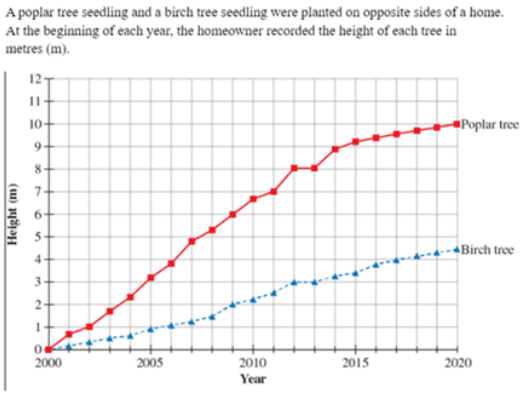
8. Match or sort a list of graphic items by dragging and dropping them into the correct spot.
9. Select one or more graphic items.

Test-takers are asked to answer multiple questions related to the same passage or visual. Approximately 57 percent of questions (20 out of 35) on the sample test are grouped sets.

Most questions and responses are text-based (22/35). Nine of the questions combine text and an image (e.g., match a pictogram with its description). The remaining four questions are unique; two depend on visual interpretation and two depend on a combination of visual, text-based meanings plus the use of a measurement tool (i.e., protractor and ruler).

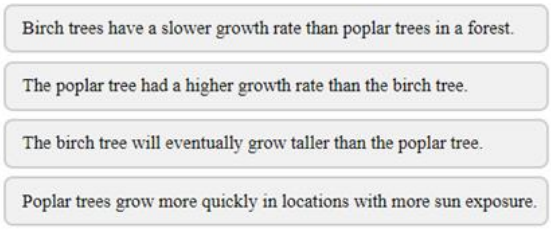
Interpret a graph

Similar to the GED®, test-takers are asked to identify and interpret information on a graph. However, the type of test questions could make this more challenging. In addition, a higher complexity question will require the application of a scientific concept.



Two of the questions (questions 27 and 28) require a fill-in-the-blank response, which means test-takers will have to provide a response without viewing multiple-choice options. They require the identification of the height of the birch tree in 2009 and the identification of the year a drought occurred which impacted growth. Both questions are considered low complexity but require knowledge about the use of line graphs to represent data.

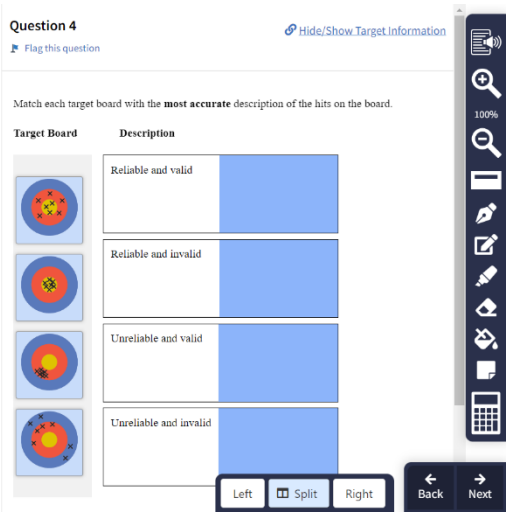
A third question (question 29), which is moderate complexity, asks test-takers to pick the most appropriate scientific conclusion supported by the data.



The graph is is also an example of a grouped question, in which multiple questions are based on a single source.

Interpret an illustration and scientific concepts

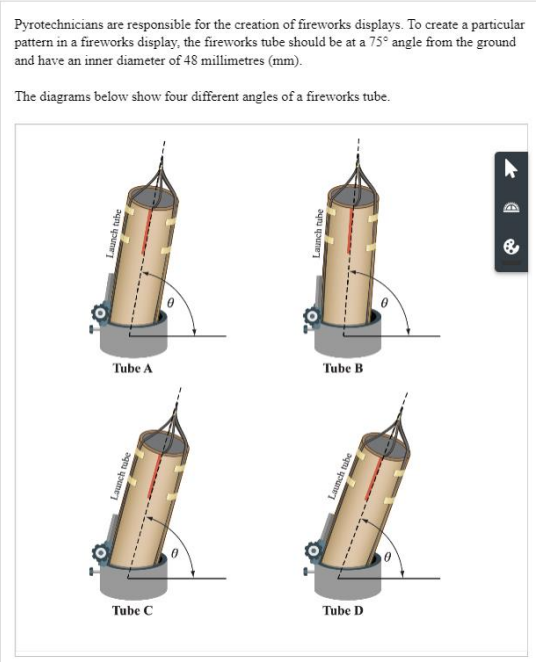
The following example is challenging. In question 4, test-takers will have to have a solid understanding of two concepts—reliability and validity—and then associate both concepts with an abstract representation. They will have to apply some reasoning and interpretation to figure out a response, making this a high complexity question.



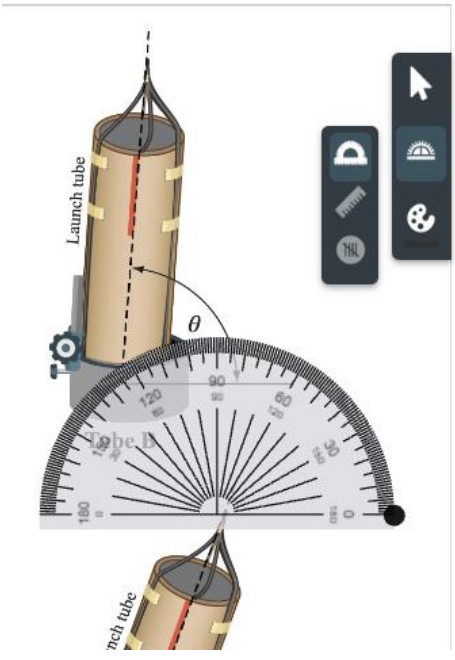
Use provided tools

A couple of questions ask test-takers to provide a specific measurement using a digital ruler and a digital protractor. For example, in question 23, test-takers must access the protractor in the vertical menu, know how to manipulate it on the screen, and know how to use the tool in order to produce a response.

Question 23 requires the measurement of angles using a virtual protractor.



A close-up screenshot shows the protractor and how it is accessed in the vertical menus.



Recommendations for instruction

Active learning: Do and discuss science

Most of the CAEC science outcomes require the application of knowledge through real-life scenarios and scientific investigations. Use real-life examples to make linkages with the assessed science topics. CAEC science puts greater emphasis on the application of scientific concepts. Test-takers will need to demonstrate and apply their understanding of science concepts to be successful on the test. Support your learner with understanding the components of scientific inquiry.

Explicit instruction

In addition, test-takers need more specific skills and knowledge to respond to test questions.

- Practise using a protractor and ruler on and offline.
- Practise analyzing and interpreting scientific information from tables, graphs, and diagrams. The CAEC science sample test uses visual materials to assess outcomes. Test-takers must be able to analyze, estimate and evaluate visual materials to draw conclusions and communicate scientific concepts.
- Review the Workplace Hazardous Materials Information System (WHMIS 2015) and its pictograms.
- Review the metric system (i.e., Système International d'unités) for all measures and conversions.

Quality online materials to get you started

To help you organize your instruction, using quality online materials, take a look at Science News Explores, a comprehensive online science learning publication with articles and features written by experienced science journalists. The general readability aligns with grades 3 to 8. Importantly, state the developers, the “breadth of technical subjects, tone and ease of reading continues to make Science News Explores a go-to source for adults, too."

- Help learners understand and apply key scientific concepts using the comprehensive list of concepts. Here is an example for hypothesis. Each entry includes a brief explanatory text and audio narration.

- Review the collection of experiments that you could conduct with adult learners. Look for experiments of interest to learners or connected to a theme. Integrate discussions about scientific inquiry and the nature of science.
- Teach learners how to read and interpret "data, graphs, visualizations and more" using the section Analyse this!
- Organize a theme or topic using more in-depth articles called Explainers.

Additional resources for addressing specific science outcomes

In addition to the resources found on Science News Explores, the following resources will help you address specific CAEC outcomes.

Nature of Science (10 to 25 percent)

- ☐ Identify characteristics of science, such as how scientific ideas are developed through a process of ongoing inquiry.
- ☐ Distinguish between observations and inferences.
- ☐ Distinguish between questions that can be investigated through scientific inquiry and questions that cannot be tested through scientific inquiry, such as aesthetic, moral, and ethical judgements, and the supernatural.
- ☐ Explain ways in which reliability, validity, integrity, and credibility of scientific work is maintained, including through scientific methods, placebos, double-blind studies, large sample sizes, random sampling, peer review, and replicating research.
- ☐ Identify factors that may introduce bias, such as preconceptions of researchers, funding of research by interest groups, and selective reporting of evidence.

The nature of science video from Bozeman Science

The nature of science resource collection from the Ontario Science Centre

The nature of science activities and resources from the Perimeter Institute

Design your own experiment activity from Canada Science and Technology Museum

Science, Technology, Society and Environment (5 to 15 percent)

- ☐ Identify intended and unintended consequences for humans and the environment emerging from scientific solutions and technologies.
- ☐ Evaluate risks and benefits of scientific solutions and technologies.
- ☐ Evaluate factors that influence scientific research.

Resources

Humans and the environment | Essentials of environmental science

Influence of Science, Engineering and Technology on Society and the Natural World

Scientific Inquiry Skills (60 to 85 percent)

- ☐ Formulate testable questions, for a given situation, that can be investigated through scientific inquiry.
- ☐ Formulate a hypothesis or prediction based on prior knowledge or an observed pattern of events.
- ☐ Determine the design elements of scientific investigations, including control groups and variables (independent, dependent, and controlled).
- ☐ Identify procedures that set appropriate conditions, limit bias, and use appropriate methods for collecting data.
- ☐ Identify the appropriate techniques for storing, handling, and disposing of materials according to WHMIS 2015 and consumer product symbols.
- ☐ Demonstrate effective selection and use of scientific tools for data collection, such as a ruler, protractor, thermometer, or graduated cylinder.
- ☐ Select appropriate units of measurement to collect and communicate data, including conversions within Système International d'unités (SI).
- ☐ Visualize and communicate data in appropriate formats, such as tables, graphs, and diagrams.
- ☐ Analyze patterns and trends to describe relationships among variables and data.
- ☐ Estimate information from data, graphs, tables, and spreadsheets.
- ☐ Evaluate scientific investigations for sources of error and formulate reasonable explanations of the results.
- ☐ Evaluate the reliability, validity, and credibility of scientific investigations.
- ☐ Transfer conclusions from scientific investigations to everyday life and future investigations.

Resources

Scientific Inquiry: A Teacher's Guide

PBS The scientific method

PBS Applying the scientific method

WHMIS Introduction and Overview - WHMIS pictograms

Social studies

Summary

In the CAEC, all topics, content and perspectives in the sample test are focused on Canada, a significant difference. The GED® content often referenced American and global issues. In the GED® Canada version, 60 percent of the concepts and issues examined global or international issues and 40 percent referenced **either** the United States or Canada.[17]

The CAEC social studies test requires the test-taker to respond to a series of questions that reference a variety of sources, such as a short text, newspaper headlines, graphic narrative, historical and contemporary cartoon, diagram, article, maps, tables, and graphs or a combination, which is similar to the GED® social studies assessment. However, in the sample CAEC test, when there are text-based passages, they are usually presented in a different format such as a table, list, or diagram. When straightforward text is presented, it is much shorter than the textbook-like passages in the GED® and provides less information that could be used to respond to test questions. CAEC test-takers need to rely more on background knowledge related to the main topics: 1) citizenship and government, which is emphasized most, along with 2) economics and economic systems, 3) historical and contemporary Canada, and 4) geography and environment.

Most questions (50 to 70 percent) are moderately complex, requiring the application of knowledge of one or more concepts (e.g., governance models, individual and collective rights of citizens, economic systems, primary and secondary sources, environmental stewardship), making decisions about how to approach a question or problem, how ideas relate or what tools to use. Test-takers must answer 40 questions in 90 minutes, allowing them a greater amount of time per question compared with the GED®, likely to accommodate the increased cognitive complexity, digital test-taking platform and various types of test-questions.

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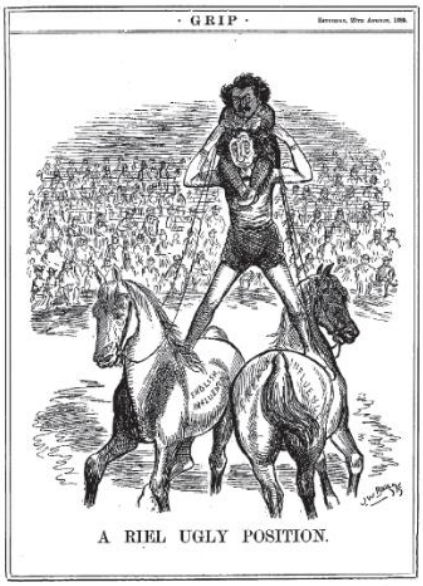
[17] Technical Manual: 2002 Series GED® Tests, p 23

Source texts to read and interpret

One or more sources are presented to test-takers followed by a series of questions. Sources to read and interpret are followed by two, three or four questions. The sample test includes the following sources:

- Thematic maps of Canada
- Contemporary and historical cartoons
- News headlines
- Articles
- List of features/concepts
- Graphic narratives
- Information posters
- Diagrams
- Lists
- Graphs
- Charts
- Tables



Background knowledge and experience are needed to interpret some sources, such as charts and graphs. Also included in the sample test is a historical political cartoon. Although it is accompanied by two pieces of textual information, some background knowledge related to the Red River and North-West Resistances, along with interpreting political cartoons is needed. Even a text-based source, like one that lists features of a market economy, will likely need background knowledge to understand abstract terms like market economy, supply, demand, property rights and self-reliance.

Canada relies on elements of a market economy to create prosperity. A market economy focuses more on businesses to supply the needs of individuals and less on the government to do so.

Some Features of a Market Economy

I.	Prices are set by supply and demand.
II.	Private property rights are guaranteed.
III.	Self-reliance is central for individuals to succeed.
IV.	?

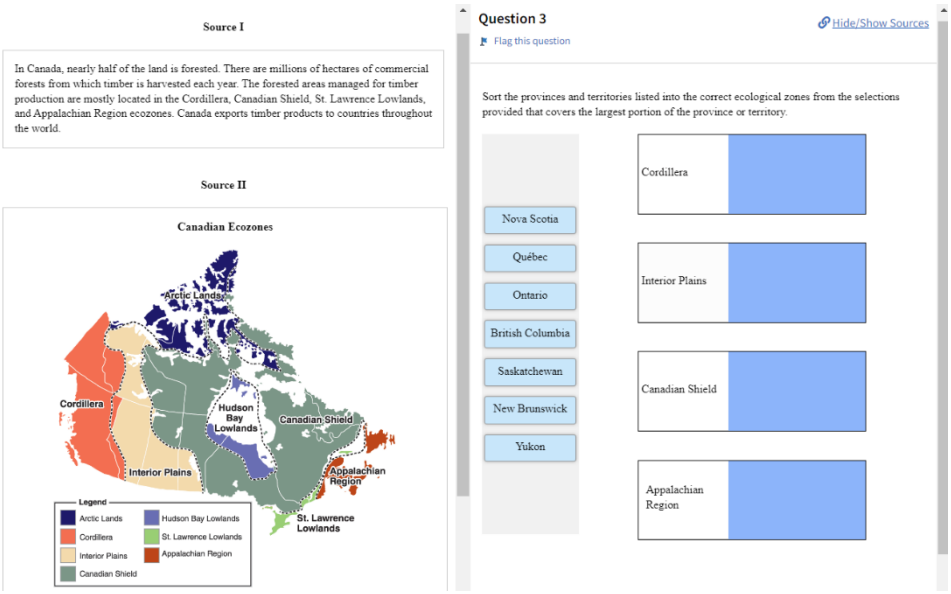
As the test evolves, and new items are created, the positioning of First Nation, Métis, and Inuit history, on-going issues, and contemporary culture needs to be carefully reviewed. In the above example, the political cartoon focuses on English and French relations during the Red River and Northwest Resistances, rather than focus on the impetus—resistance to British colonial intrusion in traditional Métis territory. Also important is understanding Canada from the perspective of French history, culture, and language, rural and urban representation and diverse diversity.

Test questions

The sample test includes 11 different styles of test questions that ask the test-taker to do the following.

1. Select one text box answer (standard single select multiple-choice question).
4. Select more than one text box answer in a list.
5. Select an answer from a drop-down list.
6. Select one or more text box answers, then drag and drop in the answer window.
7. Classify multiple statements with either of two words - must reuse the answer choices.
8. Sort a list of text box items into groups by dragging and dropping them into the correct spot.
9. Put a check mark in multiple boxes in a table.
10. Select more than one text box answer in a list.
11. Match or sort a list of text boxes items by dragging and dropping them into the correct spot.
12. Select one or more graphic items.
13. Select a paragraph in a longer text.

In the CAEC, test-takers need more background knowledge to interpret sources and respond to test questions. For example, they must be able to identify the Canadian provinces and territories on a map showing major ecology zones in order to respond to the test-question. The same knowledge is required in question 31, as shown below.



In another example, which is a text-based source, test-takers are asked to consider the impact of changes to voting eligibility in comparison to previous elections. However, they aren't provided with information about existing eligibility criteria. As such, test-takers will need prior knowledge of voter registration criteria to confidently address this question.

Recommendations for instruction

The CAEC sample assessment suggests that test-takers cannot rely solely on source materials provided to answer the related questions, as was often the case with GED®. Ensure test-takers are developing their understanding of the concepts covered, and not relying on reading comprehension alone to answer questions. CAEC test questions also require a greater level of digital competency compared to GED® tests, which were entirely multiple-choice with a single correct response.

Some content from the commonly used Nelson/Steck-Vaughan preparation workbook could be used to build *some* background knowledge. However, the workbook can't be used for test preparation, and an online solution is needed. Background knowledge can

also be developed using Discover Canada, developed by the Government of Canada to help new Canadians pass the citizenship test. The materials are available at no cost in a variety of accessible formats, and address topics related to many of the outcomes of the CAEC. However, the questions designed for the citizenship test don't reflect the levels of complexity in the CAEC so instructors will need to develop additional learning activities. In addition, Discover Canada doesn't adequately address CAEC outcomes related to First Nations, Métis, and Inuit history, culture and on-going issues.

Active learning

Classroom discussions, informal debates, mock elections, quizzes and hands-on activities using maps will help test-takers engage with and develop a deeper understanding of the main topics and specific outcomes. Focus the activities on the four main topics addressed by the outcomes.

1. Citizenship and government
2. Economics and economic systems
3. Geography and the environment
4. Historical and contemporary Canada.

Ensure candidates have a confident knowledge of the main concepts and terms associated with each of the social studies topics. Primary source concept cards with information and images, produced by the archives of Ontario, could be helpful.

Explicit instruction

As many CAEC questions require the test-taker to engage with more visual/ graphic prompts, resources that support the development of visual literacy (ability to interpret maps, graphs, charts, images, political cartoons) will be needed. An excellent resource is the document analysis worksheets from the US National Archives and Records Administration.

The following pages suggest specific resources and learning activities that could be used to support the CAEC outcomes. All are online resources, don't require accounts and are sharable. Some are also open resources which permit modifications. The worksheets from the US national archives are in the public domain.

Social studies outcomes and suggested resources

Citizenship and government (30 to 40 percent)

- ☐ Identify and analyze features, structures, processes, and practices of the *executive, legislative, and judicial branches of governments in Canada*.
- ☐ Analyze and compare *political systems and models of governance*, including those of First Nations, Métis, and Inuit in Canada.
- ☐ Examine democratic, electoral, and justice systems in Canada alongside the rights, roles, and responsibilities of individuals within them.
- ☐ Identify and compare local, provincial/territorial, and federal government structures and responsibilities in Canada.
- ☐ Identify and interpret *individual and collective rights* in Canada through various lenses, such as legislation, human rights, treaties, title, and land claims.
- ☐ Examine how *individual and collective citizenship, leadership, and activism* can be expressed in local, national, and global contexts.
- ☐ Analyze how *individual and collective identities and diverse perspectives* can influence political decision-making in Canada.
- ☐ Examine factors that contribute to *individual and collective identities* and that signify Canada's contributions to global affairs.

Resources

Discover Canada

- Rights and Responsibilities of Citizenship
- Who We Are
- How Canadians Govern Themselves
- Federal Elections
- The Justice System

Indigenous Peoples Atlas of Canada: Governance

Office of the Treaty Commissioner: Treaty Boundaries Map

Native Land Digital

Elections Canada learning resources

Canadian Museum for Human Rights teaching resources

Canadian Charter of Human Rights: Graphics and learning resources

Introduction to the Justice System in Canada

Economics and economic systems (15 to 25 percent)

- ☐ Analyze Canada's economic system and compare it with the features, structures, processes, and practices of other economic systems.
- ☐ Analyze and compare features of current, traditional and subsistence economic activity.
- ☐ Analyze and evaluate how supply, demand, and price influence production, consumption, distribution, and exchange of goods and services.
- ☐ Apply and analyze factors that contribute to economic conditions of growth and decline, stability and instability, sustainability, and interdependence.
- ☐ Evaluate and analyze economic factors and decision-making at personal, local, regional, national, and international levels.
- ☐ Identify and analyze roles and relationships of consumers, producers, financial institutions, and governments in local, national, and global markets.
- ☐ Estimate and evaluate factors that contribute to economic disparity and quality of life in Canada and the world.

Resources

Discover Canada: Canada's Economy

What is Economics? An Intro to Economics

Intro to Economics: Crash Course Econ #1

Geography and the environment (15 to 25 percent)

- ☐ Distinguish between various human, regional, political, cultural, and geographic features of Canada.
- ☐ Make connections between people, the land, and the environments in Canada.
- ☐ Examine past and present movement of peoples to, from, and within Canada and changes in demographics.
- ☐ Identify and analyze cultural, political, social, geographic, and environmental factors that contribute to sense of place and identity.
- ☐ Identify and evaluate factors that contribute to environmental stewardship and influence sustainability in local, national, and global contexts.

Resources

Discover Canada: Canada's Regions

Native Land Digital

Immigration History Educational Package

Play Geography: Provinces and Territories

Historical and contemporary Canada (15 to 25 percent)

- ☐ Analyze and interpret authentic and designed primary and secondary sources (e.g. cultural referents, opinions, photographs, cartoons, illustrations, maps, diagrams, graphs, tables, graphic narratives, infographics, timelines, and excerpts from speeches, newspaper articles, government documents or other published works).
- ☐ Interpret and analyze experiences, perspectives, and contributions of diverse social and cultural communities in Canada.
- ☐ Recognize and consider diverse cultures, traditions, worldviews, and histories of First Nations, Métis, and Inuit.
- ☐ Recognize and consider diverse Francophone perspectives, histories, and contributions in Canada.
- ☐ Analyze cause and consequences of significant events and developments in what is now Canada.
- ☐ Analyze Canada's regional, national, and international contributions to cooperation and conflicts.
- ☐ Recognize the significance of remembrance, commemoration, redress, and reconciliation in relation to historical and ongoing legacies and injustices.

Resources

Discover Canada

- Canada's History
- Modern Canada

Indigenous Peoples Atlas of Canada

Key Moments in Indigenous History Timeline – Historica Canada

Black History in Canada - Historica Canada

Education Resources – Historica Canada

National Archives: Document analysis worksheets

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