

Writing Diploma Examinations Using Calculators

OVERVIEW

Calculators are required to be used when writing mathematics and science diploma examinations. To ensure fairness and equity to all students, only calculators that have been approved by Alberta Education may be used when writing mathematics and science diploma examinations (see list of approved graphing calculators below).

At minimum, a **scientific** calculator is required when writing a science diploma examination; both scientific and approved graphing calculators are permitted to be used for this purpose. An approved **graphing** calculator is required when writing mathematics diploma examinations. To be approved by Alberta Education for diploma examination writing purposes, a graphing calculator must be a hand-held device designed primarily to perform mathematical computations, including logarithmic, trigonometric, and graphing functions. At minimum, a graphing calculator must have the following properties:

- Function graphing and display capabilities, including displaying more than one function at a time and tracing a function
- Standard scientific calculator operations, e.g., sine, cosine, tangent, inverse functions, logarithms, power (x^n)
- Statistical functions in 1 and 2 variables, e.g., mean, median, mode, standard deviation, bivariate data
- Regression modeling functions, i.e., linear, quadratic, exponential, and sinusoidal functions
- List capabilities
- Matrix capabilities including scalar multiplication, addition, and subtraction

Note: Students who use calculators that don't meet the minimum properties will be disadvantaged when writing mathematics diploma examinations.

Alberta Education has **approved** the use of the following graphing calculators when writing diploma examinations in 2011–2012 (this list is updated annually):

Casio

- fx 9750 G Plus
- fx 9750 GII

Sharp

- EL-9900
- EL-9600 (no longer manufactured)
- EL-9600C (no longer manufactured)

Texas Instruments

- TI-83 Plus, TI-84 Plus, or TI-84 Plus Silver
- TI-89 Titanium
- TI Voyage 200
- TI-*n*spire (with TI-84 keypad only; the TI-*n*spire keypad is **not approved**)
- TI-83 (no longer manufactured), TI-83 Plus Silver (no longer manufactured)
- TI-86 (no longer manufactured), TI-89 (no longer manufactured)
- TI-92 (no longer manufactured) or TI-92 Plus (no longer manufactured)

DIRECTIVES

The following directives apply to the use of calculators when mathematics and science diploma examinations are being administered and written.

Principals

1. Principals shall ensure that, at the beginning of any mathematics or science diploma examination course, teachers and students are advised of the types of calculators that are currently approved for use when writing a diploma examination.
2. Prior to each diploma examination administration session, the principal of a school or designated writing centre shall:
 - 2.1. communicate to students and teachers the expectations and requirements related to the use of calculators when writing diploma examinations
 - 2.2. ensure that students are provided the opportunity to learn to clear and reset their own calculators
 - 2.3. ensure that teachers who are designated to supervise the administration of mathematics and science diploma examinations are appropriately prepared for that role.
3. Prior to each diploma examination administration session, the principal of a school or designated writing centre shall establish appropriate procedures to ensure that:
 - 3.1. only approved calculators are brought into the examination room
 - 3.2. calculators used to write diploma examinations are appropriately cleared and configured to safeguard test security and fairness and to minimize distraction to students.

Examination Supervisors

1. Examination supervisors who supervise mathematics and science diploma examination administrations shall:
 - 1.1. understand and implement the directives, rules, and procedures related to that role
 - 1.2. develop and implement procedures to ensure that only approved calculators are brought into the examination room and that they have been appropriately cleared and configured before and after the official scheduled examination administration period.
2. Prior to the commencement of the examination administration, examination supervisors shall review with students the diploma examination calculator use directives, rules, and procedures, and students' responsibilities for implementing them.

Students

1. Students who write mathematics and/or science diploma examinations shall:
 - 1.1. understand all diploma examination calculator use directives, rules, and procedures, and their responsibilities for implementing them
 - 1.2. bring an approved and appropriately configured calculator to the examination room *for their exclusive use*
 - 1.3. demonstrate that their calculators are appropriately configured by clearing and resetting them prior to the commencement of the examination.

CALCULATOR USE RULES

1. Permitted Calculator Materials

Students may bring the following materials into the examination room, *for their exclusive use*, when writing a mathematics or science diploma examination:

- scientific calculators that are appropriately configured
- approved graphing calculators that are appropriately configured
- extra batteries

2. Prohibited Calculator Materials, Properties, and Configurations

The following calculator materials, properties, and/or configurations are not permitted in the examination room:

- programmed memory content
- built-in notes, libraries, or formulae (e.g. definitions or explanations in alpha notation)
- downloaded programs
- remote communication capability
- external (peripheral) devices and other support materials such as manuals, printed or electronic cards, printers, memory expansion chips or cards, external keyboards
- calculator cases

3. Calculator Configurations

Prior to the commencement of a diploma examination and before leaving the examination room, students must clear their calculators of all information that is stored in programmable or parametric memory. Calculators must be set to operate in silent mode.

CALCULATOR CLEARING AND CHECKING PROCEDURES

The keystrokes required to clear the memories of approved graphing calculators are presented in the table below. To verify that nothing remains in programmed or parametric memory, after students have cleared them, a calculator's remaining memory value should be checked to ensure that it reflects its factory setting. The factory set memory values of approved graphing calculators are presented in the table below. The value of a calculator's remaining memory after clearing and resetting is dependent on the calculator's operating system. Because some calculator manufacturers use various operating systems for the same calculator model, their memory values upon reset may vary slightly from those shown in the table.

If, after clearing, the memory values in a calculator are not reasonably close to the values presented in the table, then the calculators should be turned off and reset a second time. If the values fail to change, the calculators should not be used when writing the examination.

To prepare *Texas Instruments* calculators for diploma examination writing purposes, it is recommended that the APPS program *TestGuard*™ 2.0 or the *Press-to-Test* feature in operating system 2.40 or higher be used. *TestGuard*™ 2.0 overrides shells or emulators that students may have installed on their *Texas Instruments* calculators. Many of these shells or emulators mimic the screens that should appear when the memory of a calculator is clear, even if it hasn't been cleared. If *TestGuard*™ 2.0 is not used to clear students' calculators, then the instructions in the table below for fully quitting a shell or emulator on the TI 83 and TI 84 series of calculators should be followed. For more information, refer to <http://education.ti.com/educationportal/sites/US/location/westerncanada.html?bid=5> . If this link is broken, please refer to the Texas Instruments web site or contact the Texas Instrument representative in your area.

Mode settings may be altered when calculator memories are cleared. Students should check the mode settings on their calculators before proceeding to write their diploma examination.

For further information about clearing calculators contact the Director, Diploma Examinations (see *Contacts* section).

Keystrokes to Clear and Check Approved Graphing Calculators

<i>Casio</i>			
Calculator Model	Keystrokes to Clear Memory	Keystrokes to View Remaining Memory	Remaining Memory Display
fx-9750G Plus	Go to Menu Cursor to MEM EXE Reset EXE F1 yes-reset	Go to Menu Cursor to MEM EXE	Memory Usage (28628 Bytes Free)
Fx-9750 GII	Go to Menu Cursor to SYSTEM EXE F5: Reset F2: Main Memories F1 yes EXIT	Go to Menu Cursor to MEM EXE	Memory Usage (61904 Bytes Free)
<i>Sharp</i>			
Calculator Model	Keystrokes to Clear Memory	Keystrokes to View Remaining Memory	Remaining Memory Display
EL-9600 EL 9600 C	2nd XθTN (Option) Log (Reset) 2 (All memory) CL (Clear all data)	2nd XθTN ↓	18562
Note:			
• There is also a reset switch on the back of the calculator; press switch using tip of pen, then press CL			
EL-9900	2nd + - (Option) x + Ln (Reset) 2 (All Memory) CL (Clear all data)	2nd + - (Option) x + Cos (MEMCHK)	47447

<i>Texas Instruments</i>			
Calculator Model	Keystrokes to Clear Memory	Keystrokes to View Remaining Memory	Remaining Memory Display
TI-83	2 nd + (MEM) 5 (Reset) 1 (All memory) 2 (Reset)	2 nd + 1	RAM 27118
<p>• Notes: If the screen is blank after clearing, the contrast needs to be reset by pressing the 2nd and ↑ keys repeatedly.</p>			
TI-83 Plus TI-83 Plus Silver TI-84 TI-84 Plus TI-84 Plus Silver	2 nd + (MEM) 7 (Reset) ➤➤ (All) Enter 2 (Reset)	(TI-83 Plus or TI-84) 2 nd + 2 (TI-84 Plus) 2 nd + 2 (TI-83 Plus Silver or TI-84 Plus Silver) 2 nd + 2	RAM 24317 ARC 163840 RAM 24317 ARC 491520 RAM 24317 ARC 1540K
<p>Notes:</p> <ul style="list-style-type: none"> • The “➤➤ (All)” step is very important: if not followed, the memory may not be properly cleared. • The application “Finance” is the only one that remains after following the clearing instructions. • If, on clearing, the screen is blank, the contrast needs to be reset. To do this, use both 2nd and ↑ repeatedly. 			
TI-86	2 nd 3 (MEM menu) F3 (Reset) F1 (All) F4 (Yes)	2 nd 3 F1	MEM FREE 98226
<p>Notes:</p> <ul style="list-style-type: none"> • If the screen is blank after clearing, the contrast needs to be reset by pressing the 2nd and ↑ keys repeatedly. 			
TI-89	2 nd 6 (MEM) F1 (Reset) 1 (All) Enter	2 nd 6	RAM 199154 ARC 393204
TI-92 TI-92 Plus	2 nd 6 (MEM) F1 (Reset) 1 (All) Enter	2 nd 6	System 61064 Memory Free 70008
<p>Notes:</p> <ul style="list-style-type: none"> • If the screen is blank after clearing, the contrast needs to be reset by pressing ◊ (green) and + or – repeatedly. 			
TI Voyage 200 TI-89 Titanium	2 nd 6 (MEM) F1 (RESET) 3 (All Memory) Enter (YES)	2 nd 6	TI Voyage 200: System 70516 RAM free 191628 Flash ROM free 2818018 TI-89 Titanium: System 68098 RAM free 194046 Flash ROM free 2686896
<p>Notes:</p> <ul style="list-style-type: none"> • If the screen is blank after clearing, the contrast needs to be reset by pressing ◊ (green) and + or – repeatedly. 			

Writing Part(ie) A Diploma Examinations Using Computers

BACKGROUND

Examinees are permitted to use computers when writing some diploma examinations. The principles, directives, and procedures presented below address the writing of diploma examinations using computers.

GUIDING PRINCIPLES

Computers and word processing applications may be used when administering the Part(ie) A portions of humanities diploma examinations (English Language Arts 30–1, English Language Arts 30–2, Français 30–1, French Language Arts 30–1, Social Studies 30–1, and Social Studies 30–2). The use of computers for this purpose must not compromise the security of the examinations or fairness of their administration.

A school principal may allow a student who normally produces extended written work on a computer, and who is proficient at using that school's or writing centre's computers and word processing application, to use them when writing any of the aforementioned diploma examinations.

Students who choose to use computers and word-processing applications when writing a diploma examination are responsible for ensuring that they understand and follow all of the directives, rules, and procedures established for writing diploma examinations in this manner.

COMPUTER USE DIRECTIVES

Principal

1. The principal of a school or designated writing centre shall decide whether to provide the opportunity for students to write humanities Part(ie) A diploma examinations using the school's computers. This decision shall be based on the principal's certainty that the school or designated writing centre can comply with all diploma examination writing and administration rules, and with the directives, rules, and procedures that follow.
2. The principal of a summer school or designated writing centre shall notify Exam Administration that he or she will be able to provide this opportunity to students writing diploma examinations.
3. The principal shall communicate to students and teachers the availability of and requirements related to the use of computers and word processing applications when writing the Part(ie) A portion of humanities diploma examinations.
4. The principal shall ensure that only those students who understand and are able to follow all of the directives, rules, and procedures established for writing Part(ie) A diploma examinations using a computer are permitted to do.

5. If a school or designated writing centre has more students who request this option than it has computers, students who have documented learning needs which specify the use of a computer shall be given priority when assigning access for diploma exam writing purposes.
6. If a school or designated writing centre has more students who request this option than it has computers, and it wishes to address that shortage through alternative exam administration scheduling, the principal shall submit a specific written proposal to the Director of Examination Administration for approval.
7. The principal shall ensure that only school-owned computers, that have no internet or external network access, are used for examination writing purposes.
8. The principal shall ensure that all computer equipment, applications, and printers used for diploma examination administration purposes are appropriately configured to safeguard test security and fairness and to minimize distraction to students.
9. The principal shall ensure that all facilities and computer equipment that have been set up for examination writing purposes are secured and remain secured until after the examination writing session and follow-up administrative procedures are completed.
10. Before implementing the use of computers for writing diploma examinations, the principal shall establish technical and examination administration contingency plans and emergency procedures to address unexpected issues and problems that may arise.
11. The principal shall ensure that teachers who are designated to supervise the administration of diploma examinations that are being written using computers are appropriately prepared for that role, including being aware of and able to implement contingency plans and emergency procedures, should the need arise.
12. The principal shall ensure that no student responses, including rough work, remain on computers or network drives once students have stapled their printed copies into their examination booklets.

Technical Personnel

1. Technical personnel shall configure all computers, word processing applications, and printers so as to ensure the security and fairness of the examination administration (see *Rules and Procedures* below).
2. Technical personnel shall develop and implement a system testing plan prior to each examination administration session to ensure that all equipment and processes function as required (see *Rules and Procedures* below).
3. In co-operation with the principal and examination supervisors, technical personnel shall develop a **technical contingency plan** that can be implemented, as required, to address unexpected network, computer, or printer problems.
4. Technical personnel shall ensure that the facility and all designated and configured computers are secured until the time the scheduled examination is written and, following the

examination writing, until all printed work is correctly stapled into the appropriate examination booklets and all computers are cleared of all student work.

Examination Supervisors

1. Teachers who are designated to supervise the administration of diploma examinations that are being written using computers shall be familiar with and able to implement the guiding principles, directives, rules, and procedures related to the administration of diploma examinations using computers.
2. Examination supervisors shall develop and implement procedures for the pick-up and distribution of printing during and after the official scheduled examination administration period. These procedures shall safeguard test security and fairness and minimize distraction to students.
3. In co-operation with the principal and technical personnel, examination supervisors shall develop an **exam administration contingency plan** that can be implemented, as required, to address unexpected issues or problems that arise while examinations are being written using computers.
4. Examination supervisors shall ensure that students are aware of and understand the rules and procedures for writing a diploma examination using a computer, *and their responsibilities for implementing them*, prior to the commencement of the official scheduled examination administration.
5. Examination supervisors shall ensure that no student accesses the internet or other prohibited online or electronic resources while writing a diploma examination using a computer.
6. Examination supervisors shall ensure that no student responses, including rough work, remain anywhere in the school's computer system or in the school once students have stapled their printed copies into their examination booklets.

Students

1. If a principal allows computers to be used when writing Part(ie) A diploma examinations, the decision to participate shall be the individual student's.
2. Students who choose to write diploma examinations using school or writing centre computers shall be proficient at using those computers and word-processing applications as a normal means of producing written work.
3. Students who choose to write diploma examinations using school or writing centre computers shall be familiar with and *are responsible for implementing* all of required rules and procedures for writing a diploma examination using a computer (see *Rules and Procedures* below).

RULES AND PROCEDURES

Technical and Administrative Set-up

1. Prior to the commencement of the official scheduled examination administration, all computers to be used for examination writing purposes must be networked and configured to:
 - enable secure and ready access to designated printers only, during and after the official scheduled examination administration
 - enable the saving of each student's written work in a manner and/or to a network location that ensures its security during, and permits school personnel to readily access and remove those documents following the official scheduled examination administration
 - disable access to the internet and other online or electronic resources that are **not** permitted
2. Prior to the commencement of the official scheduled examination administration, all word-processing applications to be used for examination writing purposes should be configured to enable
 - automatic insertion of footers that include the student's index number on each page of written work
Note: The index number (test booklet number) is the six-digit number that appears in the bottom right corner of the student's label. Unregistered students will not have an index number, so they must create a six-digit number and place that number on the back of their test booklet.
 - automatic and frequent saving of word documents to a designated location only
 - access to routine tools, such as a spell-checker, that are integrated into the software
Note: The "auto correct" feature of these tools must be disabled.
3. Prior to the commencement of the official scheduled examination administration, all computers, printers, and word-processing applications must be online and ready for use.

Examination Administration

1. Students writing diploma examinations on computer must be given a paper form of the examination prior to the commencement of the official scheduled examination administration and must staple a hard copy of their word-processed written work to that booklet at the end of the examination session.
2. Students writing diploma examinations on computer may access all of the examination materials that are available to students who write paper forms of the examination (e.g., print references such as an English dictionary or authorized writing handbook).
3. Students may revert to writing with pen or pencil at any time during the examination administration.
4. Students may do rough work or planning in whatever manner they choose (i.e., either in the examination booklet or on the computer).

5. Students may print interim hard copies of their written work at any time during the examination administration.
6. Students may compose and edit their written work until the end of the official scheduled administration time.
7. Student may not access the internet or other prohibited online or electronic resources while writing a diploma examination using a computer. To do so is a breach of security.

Preparation and Submission of Written Work

1. It is the **students'** responsibility to print and staple their final written response(s) to their examination booklets. This includes verifying that the final printed hard copy of their writing is accurately and completely printed and attached to their booklet in proper page order. This step may occur after the officially scheduled time limit; however, this verification step does *not* allow any revision to finished work.

Note: A **mark of zero** will be assigned to any examination **question** or **assignment** that has **no** written response, or the **wrong** written response, attached to it, **for whatever reason**, at the time of marking.

2. Students writing Part(ie) A diploma examinations on computer must clearly label each page of their finished work according to its assignment title or question number and must staple the work into the appropriate place(s) in the examination booklet.
3. Each student must include his or her six-digit index number on every page of the finished work stapled into the examination booklet.
4. Students writing Part(ie) A diploma examinations on computer must indicate in the space provided on the back cover of the examination that they have attached word-processed pages to the exam booklet.
5. Students writing Part(ie) A diploma examinations must submit their final written work double-spaced and in an easy-to-read 12-point font. (See the instruction page in the specific examination for details.)
6. Each student writing Part(ie) A diploma examinations must clearly label all word-processed rough work or early drafts as “rough” and must staple these documents into the examination booklets on pages designated “Planning.”
7. Final printing and stapling of written responses may occur after the officially scheduled time for examination writing, but **no** editing may be done after the scheduled time.

GUIDELINES

1. Principals of schools or designated writing centres should consider allowing students to write Part(ie) A diploma examination on computer only if:
 - the participating students normally compose extended written work on computer
 - each participating student knows how to use the school's or designated writing centre's computer

- technical expertise is available before, during, and after examination writing to ensure smooth and secure system functioning
 - security, fairness, and confidentiality will in no way be compromised.
2. Students should be given sufficient time to log on to the computer system and review the rules and procedures for writing Part(ie) A diploma examination on computer in advance of the time scheduled to begin the examination. (It is recommended that students be instructed to arrive at least 20 minutes early.)
 3. In the event of an emergency or disruption, contact the Director, Examination Administration, immediately by telephone at (780) 427-0010; for a toll-free connection, dial (780) 310-0000.

***NEW USE OF PERSONALLY OWNED DEVICES**

Currently, schools are not permitted to allow students to use personally owned computers (PC or Mac OS) when writing diploma examinations, unless specifically authorized by Examination Administration to do so. To be authorized to do so, schools must participate in a pilot project that involves the use of Alberta Education's *Quest A+* exam administration application. When used for examination writing purposes, *Quest A+* and its associated locked browser temporarily block access to hard drives, network drives, and the internet, but enable access to specified printers. For more information about this pilot project, contact Dan Karas, Senior Manager, Digital Systems and Services, by telephone at 780-415-0666 or by email at dan.karas@gov.ab.ca.

