

Writing Mathematics and Science Diploma Exams Using Calculators

Overview

To ensure equity and fairness to all students, only calculators that have been approved by Alberta Education may be used when writing diploma exams.

Both **graphing** and **scientific** calculators, with no prohibited properties (see *Prohibited Calculator Materials and Properties for Scientific and Graphing Calculators*) may be used during a diploma exam. To be approved by Alberta Education for diploma exam writing purposes, a graphing calculator must be a hand-held device designed primarily to perform mathematical computations, including logarithmic, trigonometric and graphing functions.

The following graphing calculator properties are permitted for diploma exams:

- Function graphing and display capabilities, including displaying more than one function at a time and tracing a function
- Standard scientific calculator operations: sine, cosine, tangent, inverse functions, logarithms and exponents (x^n)
- Regression modelling functions

Alberta Education has approved the use of the following **graphing** calculators, **if properly cleared and configured**, when writing diploma exams; this list is updated annually.

Casio

- fx-9750 GII
- fx-9750 G Plus (no longer manufactured)
- fx-9860 GII

Sharp (no longer manufactured or supplied to Canada)

- EL-9600
- EL-9600C
- EL-9900

Texas Instruments

- TI-83 Plus
- TI-84 Plus
- TI-84 Plus CE
- TI-84 Plus Pocket SE (no longer supplied to Canada)
- TI-Nspire CX II
- TI-Nspire CX II CAS (CAS must be disabled)

The following Texas Instrument calculator models are approved, but are no longer manufactured.

- TI-83
- TI-83 Plus Silver
- TI-84 Plus Silver
- TI-84 Plus C Silver Edition
- TI-Nspire (with Touchpad or Clickpad)
- TI-Nspire CX Handheld

Rules

The following rules apply to the use of calculators when diploma exams are administered and written.

Principals

1. Principals shall ensure that, at the beginning of any mathematics or science diploma exam course, teachers and students are advised of the types of calculators that are currently approved for use when writing a diploma exam.
2. Prior to each diploma exam administration, the principal of a school or designated writing centre shall
 - 2.1. communicate to students and teachers the rules related to the use of calculators during diploma exams
 - 2.2. develop procedures for teachers to ensure that approved calculators are properly cleared and configured
3. Prior to each diploma exam administration, 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 diploma exam writing room
 - 3.2. teachers are able to properly clear and configure approved graphing calculators to safeguard test security, validity and fairness to all students and to minimize distraction to students.

Exam supervisors

1. Exam supervisors who supervise diploma exam administrations shall:
 - 1.1. implement procedures to ensure that only approved calculators are brought into the diploma exam writing room and that they have been appropriately cleared and configured **before** and **after** the official scheduled diploma exam administration
2. Prior to the commencement of the diploma exam administration, diploma exam supervisors shall review with students the diploma exam calculator use rules and procedures, and students' responsibilities for implementing them

Students

1. Students who write mathematics and science diploma exams shall:
 - 1.1. understand all diploma exam calculator use rules and procedures, and their responsibilities for implementing them
 - 1.2. only bring an approved and appropriately configured calculator to the diploma exam writing room **for their exclusive use**.

Calculator use rules

1. Permitted Calculator Materials

Students may bring the following materials into the diploma exam writing room, for their exclusive use, when writing diploma exams:

- approved graphing calculators that are appropriately cleared and configured
- scientific calculators that are appropriately configured and do not have prohibited properties
- extra batteries

2. Prohibited Calculator Materials and Properties for Scientific and Graphing Calculators

The following calculator properties and materials are **not** permitted when writing diploma exams:

- programmed memory content
- symbolic manipulation capabilities
- ability to provide trigonometric calculation exact values
- ability to simplify radicals and rationalize denominators
- wireless communication capabilities
- built-in notes, libraries, or formulae (e.g. definitions or explanations in alpha notation)
- downloaded programs
- 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. **Prior** to the commencement of a diploma exam and **before leaving** the exam room, calculators must be cleared of all information that is stored in programmable or parametric memory and properly configured. Calculators must be set to operate in silent mode (see *Calculator Clearing and Checking Procedures*).

Calculator clearing and checking procedures

The instructions required to clear the memories of approved graphing calculators and appropriately configure them are presented in the following table. The factory set memory values for certain approved graphing calculator are also presented in the tables.

For Casio models, the calculator's memory value should be checked after clearing to ensure that it reflects its factory settings. If the memory values do not reflect the factory settings, then the operating system version should also be checked.

For Texas Instrument models, the calculator's remaining memory after clearing and resetting is dependent on the calculator's operating system. Because this calculator manufacturer uses 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 diploma exam.

Scientific calculators

The following scientific calculators are not permitted when writing diploma exams due to its prohibited properties. This is **not** an exhaustive list as all scientific calculators must be checked and approved.

- Casio fx-115 ES Plus
- Casio fx-CG10 or fx-CG5
- Casio fx-991 ES Plus (ES Plus C or EX)
- Casio fx-300 ES (ES Plus)
- Casio fx-82 ES Plus
- Casio fx-85 ES Plus
- Casio fx-95 ES Plus
- Casio fx-350 ES Plus
- Sharp EL W516X Writeview
- Sharp EL W535X Writeview
- TI 36X Pro
- TI 30XS Multiview

When checking scientific calculators for prohibited properties, it is advisable to check both trigonometric and radical values. For example, the calculations $\sqrt{12}$ and $\cos(30^\circ)$ should result in decimal values and not exact values. With these calculations, the button that converts fractions to decimals, and vice versa, should also be tested.

For further information about clearing calculators contact the Director, Diploma Programs.

Keystrokes to clear, configure, and check approved graphing calculators

Casio

Calculator Model	Keystrokes to Clear Memory	Keystrokes and Information Regarding Cleared Calculator
fx-9750 GII	Select Menu Cursor to SYSTEM EXE F5: Reset F2: Main Memories F1: Yes “Reset main memories” EXIT	Select Menu Cursor to MEM EXE Calculator will display: 61904 Bytes Free
fx-9750 G Plus	Select Menu Cursor to MEM EXE Reset EXE F1: Yes-Reset	Select Menu Cursor to MEM EXE Calculator will display: 28628 Bytes Free
fx-9860 GII	Select Menu Cursor to SYSTEM EXE F5: Reset F6: Next Page F1: Main & Storage F1: Yes “Reset main memories, storage memories” EXITMENU	Select Menu Cursor to MEM EXE F1: Main Memory Calculator will display: 61904 Bytes Free

Note: The fifth and sixth digits of the OS version **cannot** be 20 for the fx-9750 GII or fx-9860 GII models, i.e., operating system version 2.0X.020X is **prohibited** on these models.

Sharp

Calculator Model	Keystrokes to Clear Memory	Keystrokes and Information Regarding Cleared Calculator
EL-9600 EL-9600C	2^{nd} XθTN (Option) Log (Reset) 2 (All Memory) CL (Clear all data)	2^{nd} XθTN (Option) ▼ Calculator will display: 18562 Bytes Free
EL-9900	2^{nd} +\pm (Option) Ln (Reset) 2 (All Memory) CL (Clear all data)	2^{nd} +\pm (Option) ▼ Calculator will display: 47447 Bytes Free

Texas Instruments

To prepare Texas Instruments calculators for diploma exam writing purposes, we recommend referring to the step by step instructions for using TestGuard, Press-to-Test, or memory reset available at <https://education.ti.com/en/resources/calculator-set-up>. If this link is unavailable or you have questions, please contact 1-800-TI-CARES, ti-cares@ti.com, or your local representative.

Teachers should ensure that students are using the latest version of the calculator Operating System.

Students and teachers are encouraged to access the free updates to the OS as needed on the TI website <http://education.ti.com>. 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 exam.

To prepare Texas Instruments Nspire calculators (all approved Nspire models) for diploma exam writing purposes, the *Press-to-Test* feature **must** be used. *Press-to-Test* disables specific programs and apps and allows them to be restored after the diploma exam.

Note: When using the *Press-to-Test* feature, make sure to exit *Press-to-Test* so that all data and documents are cleared from the calculator after the diploma exam administration. Failure to exit *Press-to-Test* will allow all calculations and graphs to remain in the scratchpad.

To use the *Transfer Press-to-Test* Feature on TI-Nspire (recommended):

1. Teacher sets up one TI-Nspire unit in Press-to-Test. See the link above for more details on the initial set up. Ensure that *disable log template and summation functions* line is **unchecked** and all other lines are checked. This should be done for all Mathematics and Science diploma exams.
2. When the unit reboots there is an option to Transfer Press-to-Test on the Press-to-Test Page.
3. Using the mini to mini cable, connect the unit that has been configured to a student handheld unit and select the transfer option.
4. You can then unplug and move on to the next student. It is not necessary to wait until the student calculator completes processing. Using this method, each calculator will be configured to the Press-to-Test format determined by the teacher.

Calculator Model	Keystrokes to Clear Memory	Information Regarding Cleared Calculator
TI-Nspire (with Clickpad) (OS 3.9)	With handheld off, hold down the “esc”, and “on” keys until the Press-to-Test dialog is displayed	Remaining memory may vary depending on the documents that are locked on the unit. These documents are inaccessible while in Press-to-Test.
TI-Nspire (with Touchpad) (OS 3.9)	Uncheck only the line “disable $\log_b x$ template and summation functions” for all diploma exams	
TI-Nspire CX (OS 4.5)	Select Enter Press-to-Test and then select “ok”	
TI-Nspire CX II (OS 5.0)	The handheld will reboot. After rebooting, a “Press-to-Test invoked” dialog box will appear on the screen, the LED light will blink amber , and a ‘lock’ icon will appear beside the battery icon.	
TI-Nspire CX II CAS (OS 5.0)		

Notes: For TI-Nspire models

- Resetting the memory on TI-Nspire models is not sufficient as it fails to disable prohibited features
- Check that the calculator is in the correct Press-to-Test mode by watching for the flashing ‘amber’ LED on the top of the handheld unit
- The presence of an amber light does not ensure that the calculator has been correctly set unless the calculator clearing instructions have been followed or transfer Press-to-Test has been performed. i.e., an amber light indicates that a function has been disabled, but not which function.
- A blinking green light indicates that the calculator is in Press-to-Test mode, but no features have been disabled
- To exit Press-to-Test, the calculator must be connected to another TI-Nspire using a mini-USB cable. Use the following keystrokes:

From the homepage, press  and then 

Select **9** (Press-to-Test)

Select **1** (Exit Press-to-Test)

No light will be blinking once the calculator is out of Press-to-Test mode.

To prepare Texas Instruments calculators (TI-83 or TI-84 models) for diploma exam writing purposes, the APPS program Test Guard or the Press-to-Test feature can be used as indicated:

- Test Guard 4.3 for TI-83 Plus models (will clear calculator) and TI-84 Plus models (will disable or clear with setup)
- Test Guard 5.3 for TI-84 Plus CE models only (not compatible with older models of TI-84 Plus)
- Press-to-Test for TI-84 Plus models (with OS 2.55 or higher)

For TI-83 Plus and TI-84 Plus models, calculator memory can also be completely reset instead, using the steps outlined on the next page.

Calculator Model	Keystrokes to Clear Memory	Keystrokes and Information Regarding Cleared Calculator
TI-83 (OS 1.19)	2^{nd} + (MEM) 5 (Reset) 1 (All Memory) 2 (Reset)	2^{nd} + (MEM) 1 Calculator will display: 61904 Bytes Free
TI-83 Plus (OS 1.19) TI-83 Plus Silver (OS 1.19) TI-84 Plus (OS 2.55) TI-84 Plus Silver (OS 2.55) ¹ TI-84 Plus Pocket SE (OS 2.55) ¹ Not available for purchase in North America	2^{nd} + (MEM) 7 (Reset) >> (All)** Enter 1 (All Memory) 2 (Reset)	Remaining memory may vary depending on the model, operating system and age of the calculator. 2^{nd} + (MEM) 2 Currently most operating systems will display: RAM Free 24317
TI-84 Plus C Silver (OS 4.0)	2^{nd} + (MEM) 7 (Reset) >> (All)** Enter 1 (All Memory) 2 (Reset)	Remaining memory may vary depending on the model, operating system and age of the calculator. 2^{nd} + (MEM) 2 Currently most operating systems will display: RAM Free 21840
TI-84 Plus CE (OS 5.3 or higher)	2^{nd} + (MEM) 7 (Reset) >> (All)** Enter 1 (All Memory) 2 (Reset)	Remaining memory may vary depending on the model, operating system and age of the calculator. 2^{nd} + (MEM) 2 Currently most operating systems will display: RAM Free 152891

*Additional notes for clearing these calculator models are on the next page.

Notes: For TI-83 and TI-84 models

**The ►► step above is very important: If not followed, the memory may not be properly cleared.

- The application “Finance” is the only app that remains after following the clearing instructions.
- If, after clearing the calculator, the screen is blank, the contrast needs to be reset. To do this, use the 2nd and then ▲ repeatedly.
- Press-to-Test or Test Guard can be used rather than the directions above for some of these calculators in order to preserve stored programs, applications and other data if desired
- On the TI-84 Plus models, Press-to-Test can also be enabled with the following keystrokes:

With the calculator Off, press the left arrow, right arrow, and On key simultaneously

Select NO disable logBASE

Select NO disable $\Sigma(\$

Press ZOOM (OK)

- To exit Press-to-Test on TI-84 Plus models, the calculator must be connected to another TI-84 Plus model. Use the following keystrokes:

On the calculator that is in Press-to-Test mode, press 2nd (link), ► Receive

On the calculator you have connected it to, press 2nd (link), 4: List, Select L1, ► Transmit

Note: A calculator program called “FAKE” has been identified which, when initiated, facilitates student attempts to fake a calculator Reset. When the FAKE program is running, screens may appear normally, however, calculator key presses do not respond in typical fashion. Pressing the “on” key will cause the FAKE program to break. Continue with proper clearing or configuration procedures above. If you have questions, please contact 1-800-TI-CARES, ti-cares@ti.com, or your local representative.