Writing Diploma Exams Using Calculators

OVERVIEW

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

Both **scientific** and **graphing** calculators, with no prohibited properties, (see *Calculator Use Rules*) may be used when writing a mathematics or science diploma exam. To be approved by Alberta Education for diploma exam writing purposes, a graphing calculators 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 mathematics and science 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 modeling functions

Alberta Education has **approved** the use of the following **graphing** calculators when writing mathematics and science diploma exams; this list is updated annually.

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

Hewlett-Packard
- HP Prime

Sharp (no longer manufactured or supplied to Canada)
- EL-9900
- EL-9600
- EL-9600C

Texas Instruments
- TI-83 Plus, TI-84 Plus, TI-84 Plus Silver, or TI-84 Plus Pocket SE
- TI-83 (no longer manufactured), TI-83 Plus Silver (no longer manufactured)
- TI-84 Plus CE
- TI-84 Plus C Silver (no longer manufactured)
- TI-Nspire (with Touchpad or Clickpad) (no longer manufactured)
- TI-Nspire CX Handheld

DIRECTIVES

The following directives apply to the use of calculators when mathematics and science diploma exams are being 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 directives and rules related to the use of calculators when writing diploma exams
   - 2.2. develop procedures for teachers to ensure that students are able to clear and reset their own calculators
   - 2.3. ensure that teachers who are designated to supervise the administration of mathematics and science diploma exams are appropriately prepared for that role

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 verify that calculators used to write diploma exams are appropriately cleared and configured to safeguard test security, validity and fairness to all students and to minimize distraction to students (see *Calculator Clearing and Checking Procedures*)

Exam Supervisors

1. Exam supervisors who supervise mathematics and science diploma exam 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 diploma exam writing room and that they have been appropriately cleared and configured **before** and **after** the official scheduled diploma exam administration
   - 1.3. ensure that students are not sharing calculators

2. Prior to the commencement of the diploma exam administration, diploma exam supervisors shall review with students the diploma exam calculator use directives, 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 directives, 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**
   1.3. demonstrate that their calculators are appropriately configured by clearing and resetting them **prior** to the commencement of, and **following,** the diploma exam.

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 mathematics and science diploma exams:

- scientific calculators that are appropriately configured
- approved graphing calculators that are appropriately configured
- 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, students must clear their calculators of all information that is stored in programmable or parametric memory and properly configure their calculators. 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 table below. The factory set memory values for each 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 and Hewlett-Packard models, the calculator's remaining memory after clearing and resetting is dependent on the calculator's operating system. Because these 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 diploma exam.

Note: 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 FX115ES Plus**
- **Casio FXCG10**
- **TI-36X Pro**

Note: **When checking scientific calculators for prohibited properties it is advisable to check both trigonometric and radical values. For example, the calculations $\sqrt{12}$ and sin(30°) should result in decimal values and not exact values.**

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

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-9860 GIIs	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
Fx-9750G Plus	Select **Menu** Cursor to **MEM** EXE **Reset** EXE **F1:** Yes-Reset	Select **Menu** Cursor to **MEM** **EXE** **Calculator will display:** 28628 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.		

Hewlett-Packard

To prepare HP Inc. calculators (HP Prime) for diploma exam writing purposes, the *Exam Mode* feature must be used. For more information, refer to: http://h41112.www4.hp.com/ca/documents/HP_Prime_Custom_ExamMode_2015.pdf. If this link is unavailable, please refer to the Hewlett-Packard website or contact HP Calculators at calculators@hp.com.

The following information for regression and the HP Prime may also be useful: Exponential Regression is in the form $y = B*e^{M*x}$ whereas Exponent Regression is in the form $y = B*M^x$. When students are asked to determine an exponential regression function, they should pay attention to the *of the form* instruction in the question. Also, Logarithmic Regression on the HP Prime is in the form y = m*ln x + b, which is different than the form shown on the Mathematics 30-2 formula sheet.

Calculator Model	Keystrokes to Clear Memory	Information Regarding Cleared Calculator
HP Prime (firmware 1.3 or greater) *Note: this is a touch screen calculator	1. Press **Menu**, 3: **Messages**, **Shift**, **Clear**, tap OK 2. Press **On** and then **ESC** simultaneously **Configuration:** Use the drop down menu to select Custom Mode **Timeout**: Set an appropriate length of time, ensuring that the calculator will remain in Exam Mode for the entire writing period **Default Angle**: No change **Password**: Entered by exam supervisor and **not** shared with the student Check **Blink LED** Tap Config on the menu bar on the bottom of the screen and check each line listed below to disable features A) **System Apps**: click ⊞ to expand this menu and check all lines **except:** - Function - Statistics 1Var - Statistics 2Var - Spreadsheet B) **User Apps** C) **Physics** D) **Help** E) **Units** F) **Matrices** G) **Complex** H) **CAS** I) **USB** J) **Notes and Programs** K) **New Notes and Programs** L) **Mathematics**: click ⊞ to expand this menu and check "Trigonometry" line Tap OK 3. Tap Start and swipe the lock icon to the right to begin Exam Mode LED lights on top of the handheld unit will be on	Remaining memory may vary depending on the applications that are locked on the unit. These applications are inaccessible while in Exam Mode

Notes: For HP Prime models

- Message screen does **not** get cleared when set in Exam Mode, therefore it is necessary to clear any information saved on the Message screen before **and** after the exam. (Please refer to Step 1 above.)
- To ensure the device remains in Exam Mode for the entire duration of the exam, it is suggested that the Timeout period be set longer than the allowable writing time for the student.
- To exit Exam Mode and clear all memory, use the following keystrokes:

  - To Exit Exam Mode: Press **On** and then **ESC** simultaneously
    Input password, tap OK
  - To Clear All Memory: Press **Shift**, 

, **Shift**, **Clear**, tap OK
  - To Clear All Messages: Press **Menu**, 3: **Messages**, **Shift**, **Clear**, tap OK

Sharp

Calculator Model	Keystrokes to Clear Memory	Keystrokes and Information Regarding Cleared Calculator
EL-9600 **EL-9600C**	**2nd** **XθTN** (Option) **Log** (Reset) **2** (All Memory) **CL** (Clear all data)	**2nd** **XθTN** (Option) ⮟ **Calculator will display:** 18562 Bytes Free
EL-9900	**2nd** + − × ÷ (Option) **Ln** (Reset) **2** (All Memory) **CL** (Clear all data)	**2nd** + − × ÷ (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 http://education.ti.com/en/us/solutions/test-preparation-tools/tabs/exam-acceptance. 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 OS as needed using 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 (TI-Nspire and Nspire CX models) for diploma exam writing purposes, the *Press-to-Test* feature **must** be used. Note: *Press-to-Test* disables specific programs and apps and allows them to be restored after the diploma exam.

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.

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:

- TI-84 Plus models *Press-to-Test* (with OS 2.55 or higher)
- Test Guard 4.2 for TI-83 Plus models (will clear calculator) and TI-84 Plus models (will disable or clear with setup)
- Test Guard 5.0 for TI-84 Plus CE models only (not compatible with older models of TI-84 Plus)

For TI-83 Plus and TI-84 Plus models, calculator memory can also be completely reset instead, using the steps outlined on pages 8 and 9.

Calculator Model	Keystrokes to Clear Memory	Information Regarding Cleared Calculator
TI-Nspire (with Clickpad) (OS 3.9 or higher)	With handheld off, hold down the "esc", and "on" keys until the Press-to-Test dialog is displayed Uncheck only the line "disable $\log_b x$ template and summation functions" for all diploma exams then select Press-to-Test and then select "ok" 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.	Remaining memory may vary depending on the documents that are locked These documents are inaccessible while in Press-to-Test
TI-Nspire (with Touchpad) (OS 3.9 or higher) **TI-nspire CX** (OS 4.2 or higher)	With handheld off, hold down the "esc", and "on" keys until the Press-to-Test dialog is displayed Uncheck only the line "disable $\log_b x$ template and summation functions" for all diploma exams then select Press-to-Test and then select "ok" 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.	Remaining memory may vary depending on the documents that are locked These documents are inaccessible while in Press-to-Test

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
- 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.

Calculator Model	Keystrokes to Clear Memory	Keystrokes and Information Regarding Cleared Calculator
TI-83 (OS 1.19)	2nd + (MEM) 5 (Reset) 1 (All Memory) 2 (Reset)	2nd + (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	2nd + (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. 2nd + (MEM) 2 **Currently most operating systems will display:** RAM Free 24317
TI-84 Plus **C Silver** (OS 4.0)	2nd + (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. 2nd + (MEM) 2 **Currently most operating systems will display:** RAM Free 21840
TI-84 Plus CE (OS 5.2 or higher)	2nd + (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. 2nd + (MEM) 2 **Currently most operating systems will display:** RAM Free 152891

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 Σ(
  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 L_1, ➤ Transmit