



# Handbook of procedures for the Diploma Programme

## Calculators

Updated March 2011

This section of the *Handbook of procedures for the Diploma Programme* must be available to all invigilators of IB examinations for those examinations that require calculators.

## Introduction

It is essential that all invigilators of IB Diploma Programme examinations have access to this section of the handbook. It is not a requirement to provide each invigilator with their own personal copy, but a copy of this section on electronic calculators must be available in the examination room.

# Electronic calculators

## 1.1 Introduction

A graphic display calculator (GDC) is capable of displaying tabular, matrix, list, geometrical and graphical representations, in addition to having all the functions found on scientific calculators. GDCs can run programs and flash ROM applications (Apps).

Not all programs or Apps are suitable for use in examinations (see list in 1.3). Not all GDCs are suitable for use in examinations that require GDCs (mathematical studies SL, mathematics SL, mathematics HL and further mathematics SL). Further information on recommended, approved and prohibited calculators may be found on the Online Curriculum Centre (OCC) in the calculator forum and on the home pages of subjects that require calculators.

All candidates in the Diploma Programme will require a calculator for one or more subjects. It is strongly recommended that candidates have access throughout the subject course(s) to a single GDC from the list of recommended models.

## 1.2 Groups and subjects

Calculators of the types indicated as suitable are allowed only in the subjects listed in the table below.

Subjects	Calculators
Business and management Environmental systems and societies	A four-function calculator, scientific calculator or GDC is required for all examinations.
Biology Chemistry Design technology Physics	Calculators are not allowed on paper 1.  On paper 2 and paper 3, a calculator with the following minimum functionalities is required (a GDC is recommended): <ul style="list-style-type: none"><li>• decimal logarithms</li><li>• values of <math>x^y</math> and <math>x^{1/y}</math></li><li>• value of <math>\pi</math> (pi)</li><li>• trigonometric functions</li><li>• inverse trigonometric functions</li><li>• natural logarithms</li><li>• values of <math>e^x</math></li><li>• scientific notation</li></ul>

Subjects	Calculators
Mathematical studies SL Further mathematics SL	<p>A GDC with the following minimum functionalities is required on all papers:</p> <ul style="list-style-type: none"> <li>• draw graphs with any viewing window</li> <li>• solve equations numerically</li> <li>• add and multiply and find inverse matrices</li> <li>• find a numerical derivative at a point</li> <li>• find a numerical definite integral</li> <li>• find <math>p</math> values.</li> </ul> <p>Examiners will set questions assuming that all candidates have a GDC with the minimum functionalities listed here. Candidates using only four-function or scientific calculators, or using a less able GDC, will be at a disadvantage.</p>
Mathematics SL Mathematics HL	<p>Calculators are not allowed for paper 1.</p> <p>A GDC with the following minimum functionalities is required on all other papers:</p> <ul style="list-style-type: none"> <li>• draw graphs with any viewing window</li> <li>• solve equations numerically</li> <li>• add and multiply and find inverse matrices</li> <li>• find a numerical derivative at a point</li> <li>• find a numerical definite integral</li> <li>• find <math>p</math> values (not required for mathematics SL).</li> </ul> <p>Examiners will set questions assuming that all candidates have a GDC with the minimum functionalities listed here. Candidates using only four-function or scientific calculators, or using a less able GDC, will be at a disadvantage.</p>

### 1.3 General restrictions applying to all calculators used in examinations

Restrictions in the use of certain technology are in place to discourage malpractice and maintain fair and reasonable access to technology that is generally required in the good practice of teaching and assessment.

- Telephones, pagers, calculator-watches, personal computers (PCs) and personal data assistants (PDAs) are not allowed in any subject examinations.
- Only the manufacturer's operating system may be used.
- **Computer Algebra Systems Enabled** (symbolic manipulation whether inbuilt or programmed) calculators are not allowed in any subject examinations.
- Candidates may not use or store data, programs or flash (ROM) applications (Apps) in their calculators that may assist them in an examination by removing the need to recall facts or formulae. In order to achieve these conditions:
  - the RAM memory must be reset or initialized on all calculators

- the ROM memory must be reset, initialized or modified such that only approved Apps remain in the calculator memory. See table below for a list of approved Apps.

Further guidance may be found in the calculator forum on the Online curriculum centre (OCC)

## List of approved flash (ROM) applications

“Flash” (ROM) applications (Apps) are sophisticated programs written by expert programmers. They are stored in the flash ROM memory of the GDC.

Menu Name	Full program/Apps name and version	Description
CBL/CBR	CBL™ v1.0 © Texas Instruments	Connectivity/set-up of CBL™ data collection system (Other connectivity Apps for USB-type probes are also acceptable and do not need to be removed.)
Chinese	Chinese Help v1.01 © Inventec 1999	Chinese version of Catalog Help
CtlgHelp	Catalog Help v1.0 © Texas Instruments 2000	Catalog Help provides easy access to calculator function information
Dansk	Dansk v1.02 © Texas Instruments 1999	Danish language localizer—this App will translate all prompts, error messages and most functions into Danish
Deutsch	Deutsch v1.02 © Texas Instruments 1999	Language localizer—this App will translate all prompts, error messages and most functions into German
Español	Español v1.02 © Texas Instruments 1999	Language localizer—this App will translate all prompts, error messages and most functions into Spanish
Finance	Finance	Finance operations—part of the Operating System
Français	Français v1.02 © Texas Instruments 1999	Language localizer—this App will translate all prompts, error messages and most functions into French
Italiano	Italiano v1.02 © Texas Instruments 1999	Language localizer—this App will translate all prompts, error messages and most functions into Italian
Magyar	Magyar v1.02 © Texas Instruments 1999	Language localizer—this App will translate all prompts, error messages and most functions into Hungarian
Nederlan	Nederlan v1.02 © Texas Instruments 1999	Language localizer—this App will translate all prompts, error messages and most functions into Dutch
Norsk	Norsk v1.02 © Texas Instruments 1999	Language localizer—this App will translate all prompts, error messages and most functions into Norwegian
Polski	Polski v1.02 © Texas Instruments 1999	Language localizer—this App will translate all prompts, error messages and most functions into Polish

PolySmlt	Polynomial Root Finder and Simultaneous Equation Solver v. 1.0 © Texas Instruments 2001	Combination of two programs, one that finds polynomial roots and one that finds solutions to systems of equations
PolySmlt2	Polynomial Root Finder and Simultaneous Equation Solver v. 2.0 © Texas Instruments 2001	Combination of two programs, one that finds polynomial roots and one that finds solutions to systems of equations
Portug	Portug v1.02 © Texas Instruments 1999	Language localizer—this App will translate all prompts, error messages and most functions into Portuguese
Suomi	Suomi v1.02 © Texas Instruments 1999	Language localizer—this App will translate all prompts, error messages and most functions into Finnish
Svenska	Svenska v1.02 © Texas Instruments 1999	Language localizer—this App will translate all prompts, error messages and most functions into Swedish

For particular models, please refer to the following conditions of use in examinations.

- Calculators with wireless/infrared communication are not allowed in any subject examinations.
- Examination questions must not be stored in or recorded into the memory of a calculator.
- Peripheral hardware must not be taken into the examination room (for example, keyboards, link cables etc).
- Calculators must not be shared or exchanged during examinations.
- Calculator manuals must not be taken into the examination room.
- More than one approved calculator per candidate may be brought into the examinations room. However, a spare set of batteries is a preferable alternative to several calculators.
- The TI Nspire (Numeric) must be in “press to test” mode (with the correct features blocked in versions 2.1.1 and higher, see the document “Use of calculators in examinations from May 2011” available on the Online curriculum centre for more details).

## 1.4 Responsibilities

### Coordinator

The coordinator must ensure that these requirements are understood and are being followed by all candidates, teachers and invigilators. Schools are responsible for monitoring the use of calculators by candidates on a continuous basis. If a coordinator finds that a candidate has used inappropriate material or technology, the matter should be reported in the same way as any other breach of examination regulations. The coordinator should expect to show visiting representatives of the IB regional office that this checking procedure is being followed.

### Teachers and candidates

Teachers of all Diploma Programme subjects that permit or require the use of calculators in examinations should discuss the requirements with their candidates. Candidates should be aware of both the requirements and restrictions of use. The potential consequences of breaches of these requirements by candidates would be similar to consequences of any other breaches of Diploma Programme examination regulations.

Teachers are responsible for monitoring the use of calculators by candidates on a continuous basis by informal conversation and by spot-checking calculators. Methods of monitoring individual calculators include manually checking, transferring memory to a PC, or using tools provided by the calculator manufacturer, such as Test Guard®.