



Brussels, 31 May 2021

MEMORANDUM

Ref.: 2021-04-M-6-en

Orig.: FR

Cancels and replaces Memorandum 2020-04-M-7 of 6 May 2020

To: Directors, Deputy Directors for the secondary cycle of the European Schools and of the Accredited Schools

From: Andreas BECKMANN – Deputy Secretary-General

Subject: **1/ Decision taken by the group of experts concerning the arrangements for acquisition and the procedure for purchase of the technological tool with the characteristics required by the mathematics syllabuses, as approved by the Board of Governors at its meeting of 14-16 April 2010, by the parents and by the teachers**

2/ Decision taken by the group of experts concerning the technological tool matching the characteristics required by the new mathematics and physics syllabuses approved by the Joint Teaching Committee at its February 2019 meeting (2019-01-D-48-2 and 2019-01-D-49-2) and at its February 2020 meeting (2019-01-D-48-3 and 2019-01-D-49-3).

On behalf of the group of experts responsible for choosing the technological tool to be deployed in the context of the mathematics and physics syllabuses, I am writing to inform you, by means of this memorandum, of the decision taken by the group, which convened remotely on 23 April 2021. This decision was taken during the meeting, chaired by Mr Alper YILMAZ, the Inspector in charge of mathematics for the secondary cycle of the European Schools and in the presence of Ms Urszula LACZYNSKA, the Inspector in charge of physics for the secondary cycle of the European Schools.

Decision

1/ In accordance with the arrangements for acquisition of the technological tool with the characteristics required by the mathematics and physics syllabuses, as defined in documents 2010-D-242-en-3 and the annexes thereto, approved by the Board of Governors, and 2020-01-D-76, approved by the Joint Teaching Committee, and following an analysis of developments in the hardware and software available, the group of experts charged with choosing the technological tool, which convened remotely on 23 April 2021, recommends the following:

- To accompany the mathematics and physics syllabuses for year **s4** of the European Schools, for the 2021-2022 school year beginning in September 2021, a **non-graphing and non-programmable scientific calculator** (the model used in **s3**, where applicable, is sufficient).
- To accompany the mathematics and physics syllabuses for year **s5** and the new mathematics and physics syllabuses for year **s6** of the European Schools (entering into force in September 2021) for the 2021-2022 school year beginning in September 2021:
 - a device allowing **GeoGebra Suite software or GeoGebra 6 software to be used in the classroom and in the second semester examinations**, at least in offline mode (see characteristics of the device below);
 - a **non-graphing and non-programmable scientific calculator** for the first semester examinations of the 2020-2021 school year (the model used in **s4**, where applicable, may be sufficient).

From feedback on experience of implementation of the recommendations for the 2020-2021 school year and detailed analysis of the hardware and software available, the group of experts charged with choosing the technological tool recommends avoiding the Chrome OS and Linux OS, in its different distributions, for the following reasons:

- for those operating systems, examination mode is neither available nor announced;
- no development of GeoGebra Suite software, the version adopted for the long term, is planned for the time being.

It should be noted, however, that:

- for devices using the Linux OS, the installation of Windows software via a dual boot enables this problem to be resolved;
 - for devices using the Chrome OS, an in-house solution might easily be found.
- To accompany the mathematics syllabuses for year **s7** of the European Schools, for the 2021-2022 school year beginning in September 2021, **TI-Nspire CAS software**:
 - **in version 4.5.4.48** for students equipped with the **TI-Nspire CX CAS** calculator;
 - **in version 5.3.0.564 or higher** for students equipped with the **TI-Nspire CX II-T CAS** calculator.

At the same time, and again within the framework set by the Board of Governors and the Joint Teaching Committee for the arrangements for acquisition of the technological tool for the mathematics and physics syllabuses, the group of experts would request you to communicate, in the form of a memorandum, to the Directors of the European Schools, the text below, so that it is included in the list of books for the 2021-2022 school year for the mathematics and physics courses in years **s4p4** and **s4p6** or **s5p4**, **s5p6**, **s6p3**, **s6p5** and **s6ma** or **s7p3**, **s7p5** and **s7ma**, as the case may be.

This memorandum will replace the memorandum with the reference number 2020-04-M-7 dated 6 May 2020.

Minimum recommendations for devices running GeoGebra Suite or GeoGebra 6 in the classroom / examination room:

GeoGebra **Suite** or GeoGebra **6** can run on several devices (tablet or laptop) online or offline. The group of experts does not specify a model. However, the group recommends at least the following, for adequate use of GeoGebra **Suite** or GeoGebra **6** (these are minimum specifications, but the choice of more powerful devices would allow for more diverse and in-depth uses):

- Operating system: any operating system supporting GeoGebra **Suite** or GeoGebra **6** (complete name in EN: GeoGebra Classic 6)
- Minimum RAM: 1 GB for a tablet and 4 GB for a laptop
- Minimum storage: 16 GB for a tablet and 32 GB for a laptop
- Screen size and resolution: 7" can be allowed provided there is a good display resolution (minimum 720 p), but at least 9" for comfortable viewing with minimum 1080 p. resolution.

For students with an educational support agreement in place, the relevant special arrangements should be applied.

I would also draw your attention to the following recommendations:

- For the 2021-2022 school year, the group of experts also recommends that teachers use GeoGebra **Suite** or GeoGebra **6** software in class in years s1, s2 and s3 to make the environment familiar to the youngest pupils.
- For harmonisation purposes, the group of experts recommends use of GeoGebra **Suite** or GeoGebra **6** software in the school. Reasons for using any complementary software will need to be justified by the difficulty of solving a given problem with this 'generalist' recommended software.
- It should be remembered that, due to the introduction of the new syllabuses, the JTC approved in February 2020 the recommendations of the group of experts to postpone for one-year use of GeoGebra software in examinations (see Annex 1) – solely for the particular school year 2020-2021.

Using it in the classroom, during lessons, remained compulsory, but not for the semester examinations in s5 in the year 2020-2021.

It is therefore important to note that use of GeoGebra Suite or GeoGebra 6 software will now be compulsory during the second semester during lessons and examinations in the 2021-2022 school year for years s5 and s6.

- In order to make optimum preparations for that due date, **s5** students need to start practising using GeoGebra **Suite** software or GeoGebra **6** software as from the beginning of the 2021-2022 school year, **hence the recommendation that students should have their own device and this software.**
- This recommendation also applies to use by **s4** students of this same software for work in dedicated ICT rooms or 'ordinary' classrooms on hardware, a tablet or a computer, made available by the school. This recommendation is in line with the learning objectives of the new syllabuses and is applicable immediately, following approval by the Joint Teaching Committee at its February 2020 meeting of the new document specifying the characteristics of the technological tool (ref. 2020-01-D-76).

- *Finally, this recommendation also takes account of the future introduction of the syllabuses for years s6 to s7, which will lead to use of this type of software, in particular in agreement with the development of students' digital competence.*
- *Additional recommendations regarding general training and 'exam mode' training for teachers and general training and 'exam mode' training for students during the 2021-2022 school year:*

GeoGebra software: face-to-face and remote training for teachers

Until face-to-face training courses can be run, the Experts Working Group would draw attention to the various options for distance learning and self-study that were proposed for the 2020-2021 school year and remain in place. They are as follows:

- *remote interactive training session(s) for small groups;*
- *more 'classic' training session(s) (interaction restricted to chat);*
- *'question-answer' type session(s) concerning the versions of the software, the possible aids and exam mode;*
- *sharing of online documents via Teams, including lists of links to existing training possibilities (You Tube videos in particular).*

In setting up these remote training tools, the specific needs of physics teachers should not be overlooked. One possible idea is to draw on teachers' existing skills in using TI-Nspire software to adapt them to the GeoGebra platform.

In addition, it should be borne in mind that GeoGebra software can be used for teaching, learning and assessment purposes in the other scientific subjects, even though no binding decision on use of the software has been expressly made.

GeoGebra software: use in examinations (general training and training in 'exam mode' of students)

Some schools have been involved for varying periods of time in BYOD pilot projects, something which gives them an advantage to some extent in terms of practical experience gained. But all the schools are invited to 'experiment' in tests and/or mock exams in years s5 and s6, with use of GeoGebra Suite or GeoGebra 6. Such tests may possibly contribute to the student's A mark. This will allow useful data to be gathered in order to decide on the best way to proceed and to produce instructions governing use of the software in examinations. In order to explore different options, the group of experts will draw up guidelines, which will be communicated to the schools at the earliest opportunity.

Text for the list of books for 2021-2022

s4

In accordance with the characteristics required by the mathematics and physics syllabuses for secondary year s4 of the European Schools and by decision of the group of experts, which convened on 23 April

2021, for the beginning of the 2021-2022 school year in September 2021, year **s4** students must have a **non-graphing and non-programmable scientific calculator** (the model used in **s3**, where applicable, may be sufficient).

For students going into **s4** in a class for which a BYOD project is applicable, **a device of their own allowing GeoGebra Suite or GeoGebra 6 software to be used in the classroom**, at least in offline mode. It is recommended that the Chrome OS and Linux OS, in its different distributions, be avoided, for the following reasons:

- for those operating systems, examination mode is neither available nor announced;
- no development of GeoGebra Suite software, the version adopted for the long term, is planned for the time being.

In addition, the hardware chosen will need to be compatible with the recommendations concerning BYOD.

s5 and s6

In accordance with the characteristics required by the mathematics and physics syllabuses for secondary years **s5** and **s6** of the European Schools and by decision of the group of experts, which convened on 23 April 2021, for the beginning of the 2021-2022 school year in September 2021, years **s5** and **s6** students must have:

- **a device allowing the GeoGebra Suite or GeoGebra 6 software to be used in the classroom and in the second semester examinations**, at least in offline mode (see characteristics of the device below);
- **a non-graphing and non-programmable scientific calculator** for the first semester examinations of the 2020-2021 school year (the model used in **s4**, where applicable, may be sufficient).

From feedback on experience of implementation of the recommendations for the 2020-2021 school year and detailed analysis of the hardware and software available, the group of experts charged with choosing the technological tool recommends avoiding the Chrome OS and Linux OS, in its different distributions, for the following reasons:

- for those operating systems, examination mode is neither available nor announced;
- no development of GeoGebra Suite software, the version adopted for the long term, is planned for the time being.

It should be noted, however, that for students of schools involved in a BYOD project and already equipped since **s4** or **s5**, solutions exist:

- for devices using the Linux OS the installation of Windows software via a dual boot enables this problem to be resolved;
- for devices using the Chrome OS, a solution will be proposed.

In addition, **a non-graphing and non-programmable scientific calculator is required for the first semester examinations of the 2021-2022 school year** (the model used in **s4**, where applicable, may be sufficient).

Furthermore, the hardware chosen will have to be compatible with the recommendations concerning BYOD.

Minimum recommendations for devices running GeoGebra Suite or GeoGebra 6 in the classroom / examination room:

GeoGebra **Suite** or GeoGebra **6** can run on several devices (tablet or laptop) online or offline. The group of experts does not specify a model. However, the group recommends at least the following, for adequate use of GeoGebra **Suite** or GeoGebra **6** (these are minimum specifications, but the choice of more powerful devices would allow for more diverse and in-depth uses):

- Operating system: any operating system supporting GeoGebra **Suite** or GeoGebra **6** (complete name in EN: GeoGebra Classic 6)
- Minimum RAM: 1 GB for a tablet and 4 GB for a laptop
- Minimum storage: 16 GB for a tablet and 32 GB for a laptop
- Screen size and resolution: 7" can be allowed provided there is a good display resolution (minimum 720 p), but at least 9" for comfortable viewing with minimum 1080 p. resolution.

For students with an educational support agreement in place, the relevant special arrangements should be applied.

s7

In accordance with the characteristics required by the mathematics and physics syllabuses for secondary year **s7** of the European Schools, for the beginning of the 2021-2022 school year in September 2021, year **s7** students must have

- **a TI-Nspire CX CAS calculator equipped with version 4.5.4.48 of TI-Nspire software**

or

- **a TI-Nspire CX II-T CAS calculator, equipped with version 5.3.0.564 or higher of TI-Nspire software.**



Andreas BECKMANN
Deputy Secretary-General

Annex 1: Overview of use of the technological tool as from s4

cc: 'Experts in charge of choice of the technological tool' Working Group

Annex 1: Overview of use of the technological tool as from s4

Classroom and exam 2021-2022

	Classroom	Exam
s4	Scientific calculator and school device ¹ or BYOD	Scientific calculator
s5	BYOD	Scientific calculator ² or BYOD ³
s6	BYOD	Scientific calculator ² or BYOD ³
s7	TI Nspire CX CAS or TI Nspire CX II-T CAS	TI Nspire CX CAS or TI Nspire CX II-T CAS

Classroom and exam 2022-2023 and following years

	Classroom	Exam
s4	Scientific calculator and school device ¹ or BYOD	Scientific calculator or BYOD ⁴
s5	BYOD	BYOD
s6	BYOD	BYOD
s7	BYOD	BYOD

¹ computer labs or trolleys

² first semester exam

³ second semester exam

⁴ needs to be decided