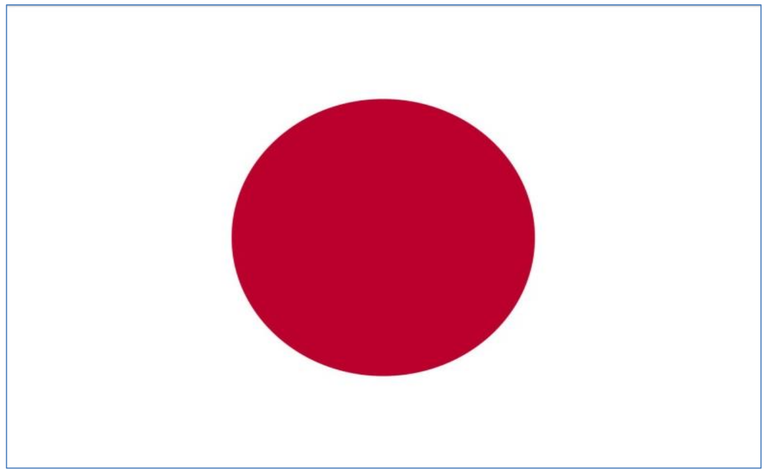
CASIO

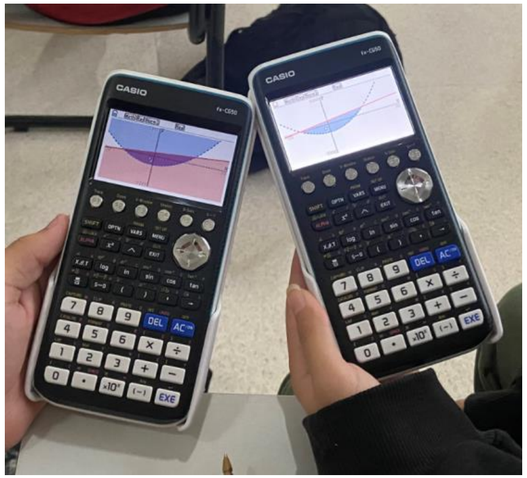
Global Teachers Meeting



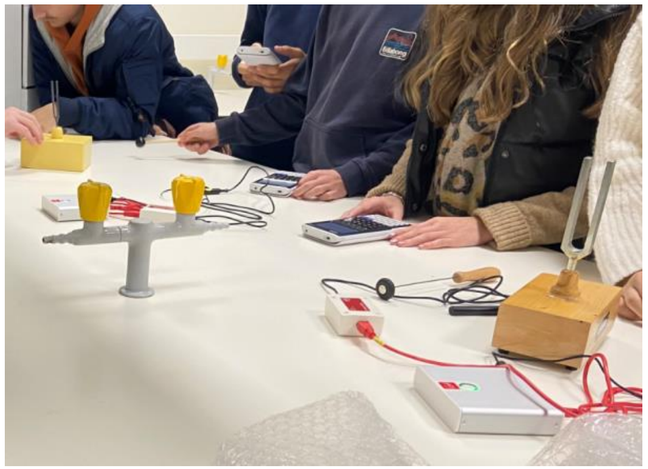
Ana Margarida Dias – *Portugal School Coordinator*
Jorge Teixeira - *Physics and Chemistry Teacher*

23/08/2023

Calculator usage situation in classroom



1) Structure of education in Portugal;
2) “EDU Pyramid structure” - CASIO Activities;
3) Using the calculator in math's lessons;
4) Using the calculator in physics and chemistry lessons;
5) More physics activities;
6) MATH & PHYS Activities (Summary).



1) Structure of education in Portugal

School Structure	Pre-School	Basic Teaching			Secondary School	University
		1st Cycle	2nd Cycle	3rd Cycle		
		1º 2º 3º 4º	5º 6º	7º 8º 9º	10º 11º 12º	
	0-5 Years old	6-9 Years old	10-11 Years old	12-14 Years old	15-17 Years old	> 18 Years old
Usage Calc	Not allowed		Scientific Allowed	Mandatory Scientifics FOCUS: CW	Math + Physics Class+Exam Mandatory Graphics (Exame Mode) FOCUS: CG50	Allowed (*) (Scientifc or Graphic) (*) It depends if the Univ or the teacher want to use Calculator FOCUS: CG50 or FX991SPX
# Schools # IB School	5836	4178	1190	1477	960 (655) 10	125 Univ 165 Poly
# Students # Potencial	770.000			366.000 (122.000 per year)	405.000 (135k per year) +/-40.000 potencial	300.000 (+/-30.000) 15K SCI + 15K GC
# Mat Teach # FQ Teach	+/- 8.000 Math Teachers +/- 6.000 Phy teachers					

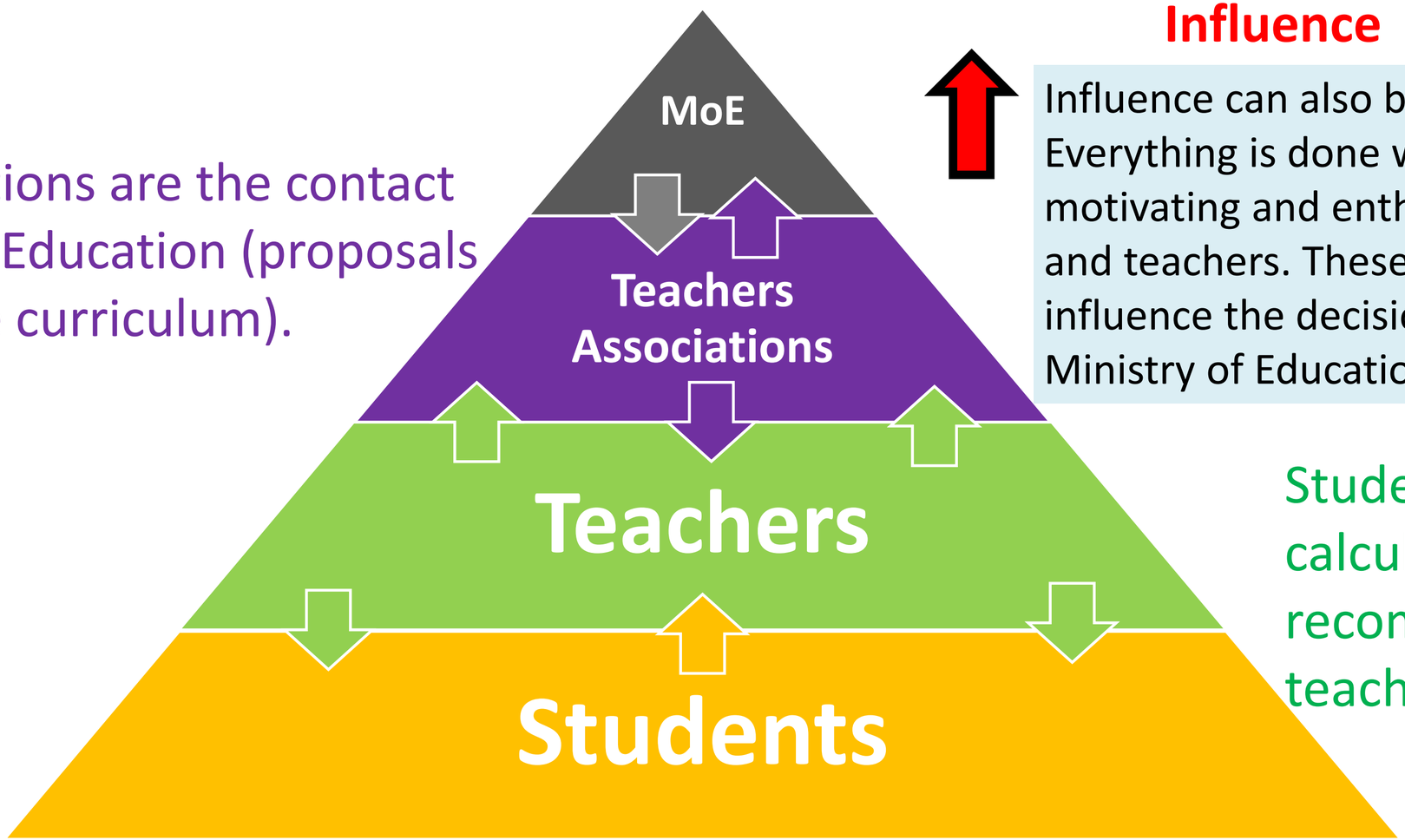
2) “EDU Pyramid structure” - CASIO Activities

Influence

The Ministry of Education gives instructions for using the calculator in exams and classrooms.

Teachers' associations are the contact in the Ministry of Education (proposals for changes in the curriculum).

The students are the ones using the calculators.



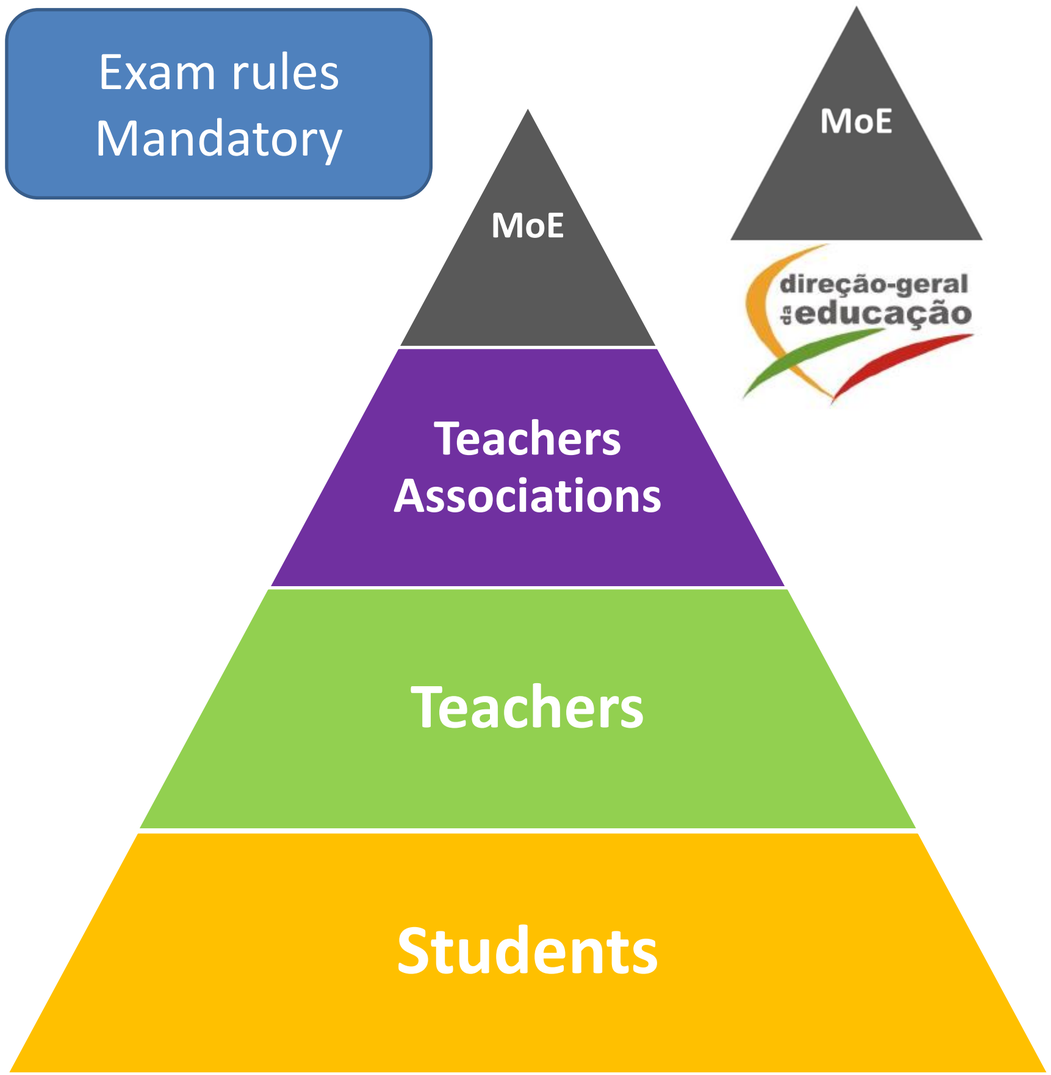
Influence

Influence can also be bottom-up. Everything is done with the aim of motivating and enthusing students and teachers. These groups influence the decisions of the Ministry of Education.

Students buy / use calculators recommended by teachers.

2) “EDU Pyramid structure” - CASIO Activities

Exam rules Mandatory



direção-geral da educação

Os professores dos grupos de recrutamento 500 – Matemática e 510 - Física e Química poderão colaborar com o professor coadjuvante, em cada uma das provas, apenas nos procedimentos de verificação dos modelos das calculadoras, da ativação da funcionalidade *modo de exame* e da limpeza da memória da calculadora, caso se justifique.

Calculadoras permitidas

Segue em anexo uma lista exemplificativa de marcas e modelos de calculadoras gráficas autorizados nos exames suprarreferidos no presente ano letivo de 2022/2023.

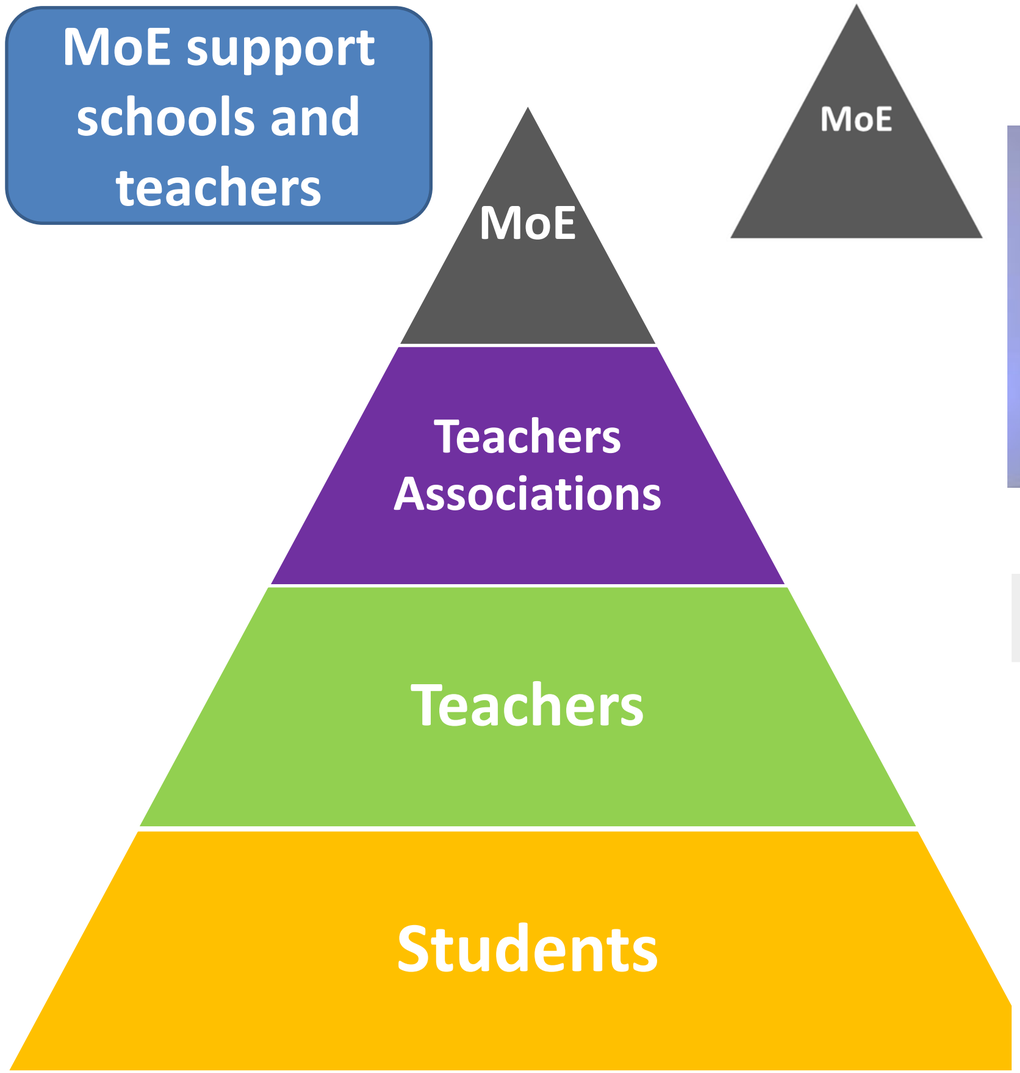
A lista apresentada é **apenas indicativa**, **não é exaustiva** e não exclui, portanto, a utilização de máquinas calculadoras de outras marcas ou modelos não referenciados desde que **satisfaçam cumulativamente** as seguintes condições:

- ***serem silenciosas;***
- ***não necessitarem de alimentação exterior localizada;***
- ***não terem cálculo simbólico (CAS);***
- ***não terem capacidade de comunicação à distância;***
- ***não terem fitas, rolos de papel ou outro meio de impressão;***
- ***não serem Opensource.***

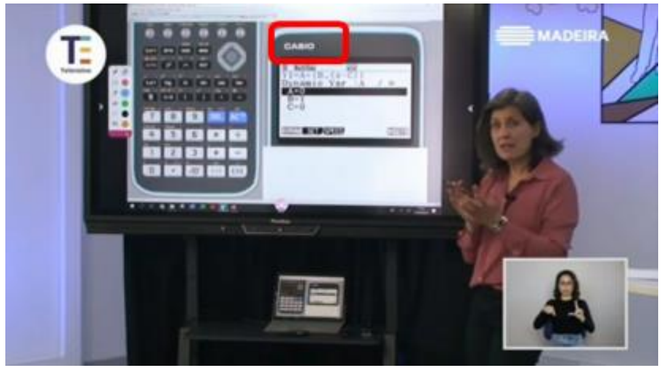
Marca	Texas Instruments	Casio	NumWorks
Modelo	TI - 84 TI - 84 PLUS TI - 84 PLUS SE TI - 84 PLUS C SE TI - 84 PLUS CE-T TI - Nspire[1] TI - Nspire Touchpad[1] TI - Nspire CX TI - Nspire CX II-T TI-84 PLUS CE-T Python Edition	fx-9860GII (versão com Power Grafic2) fx-9860GII SD (versão com Power Grafic2 fx- CG20 fx-CG50 fx- 9860 GIII	N0120 EX (Ver no verso da calculadora)

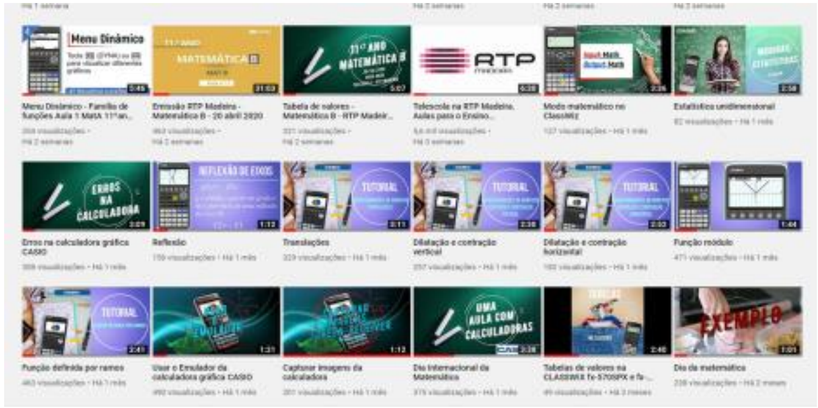
2) “EDU Pyramid structure” - CASIO Activities

MoE support schools and teachers



Home lessons contents; Tutorial videos

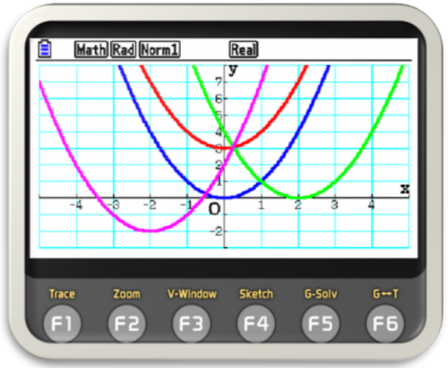




REPÚBLICA PORTUGUESA | EDUCAÇÃO #EstudoEmCasa@

Recursos | Comunidade | Destaques | Ajuda | Entrar

Continue the tutorials



Fonte: #EstudoEmCasa@

Proveniência do Recurso: #EstudoEmCasa@

Translações de gráficos de funções com a calculadora gráfica

Vais utilizar a calculadora gráfica para estudar as translações de gráficos de funções. Visualiza o vídeo, realiza a tarefa proposta e por fim explora outros recursos sobre transformações de funções.

Palavras-chave: Transformações; Funções; Translações; Gráficos; Calculadora gráfica.

Área: Ciências Exatas e Experimentais

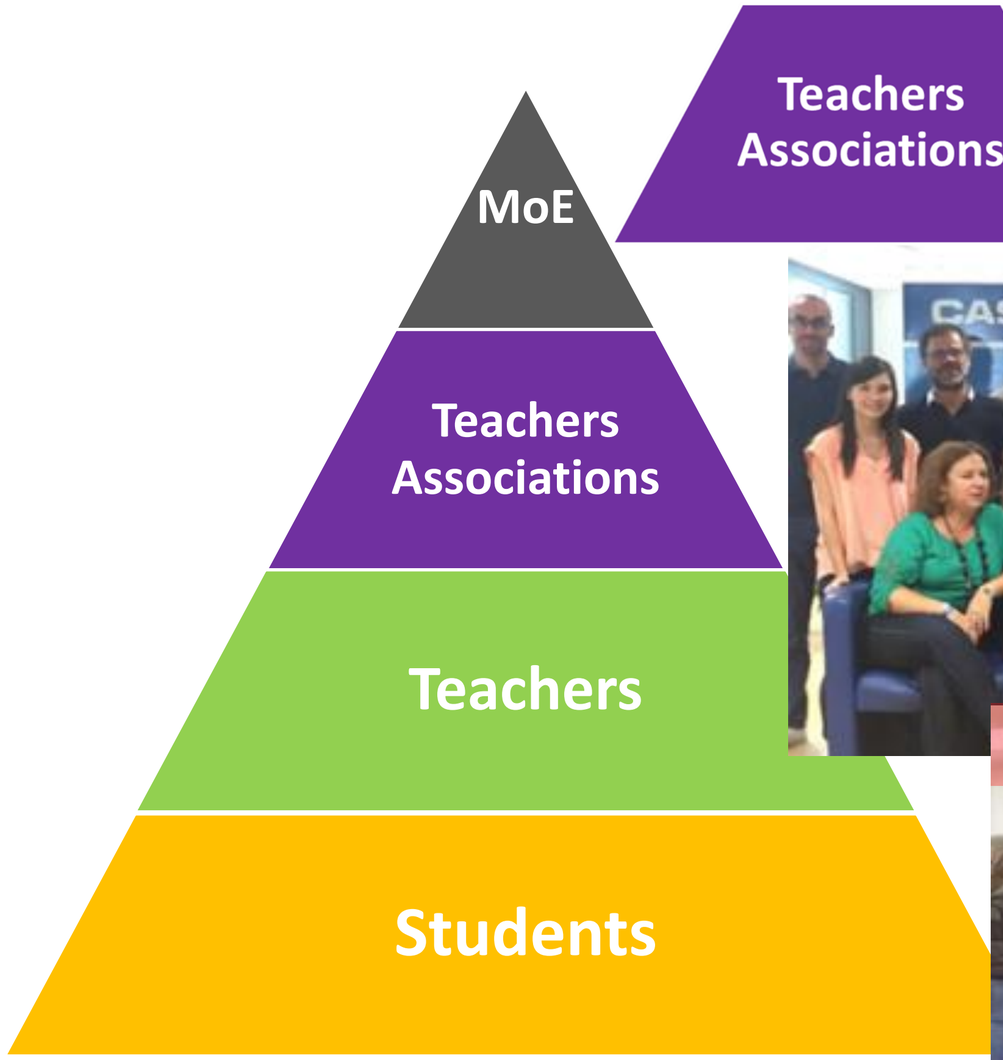
Ano de escolaridade: 10.º ano

Nível/Disciplina:

Secundário | Formação Específica | Matemática B | Matemática A

2) “EDU Pyramid structure” - CASIO Activities

Partnership with Teachers Association / Presence in EDU Fairs

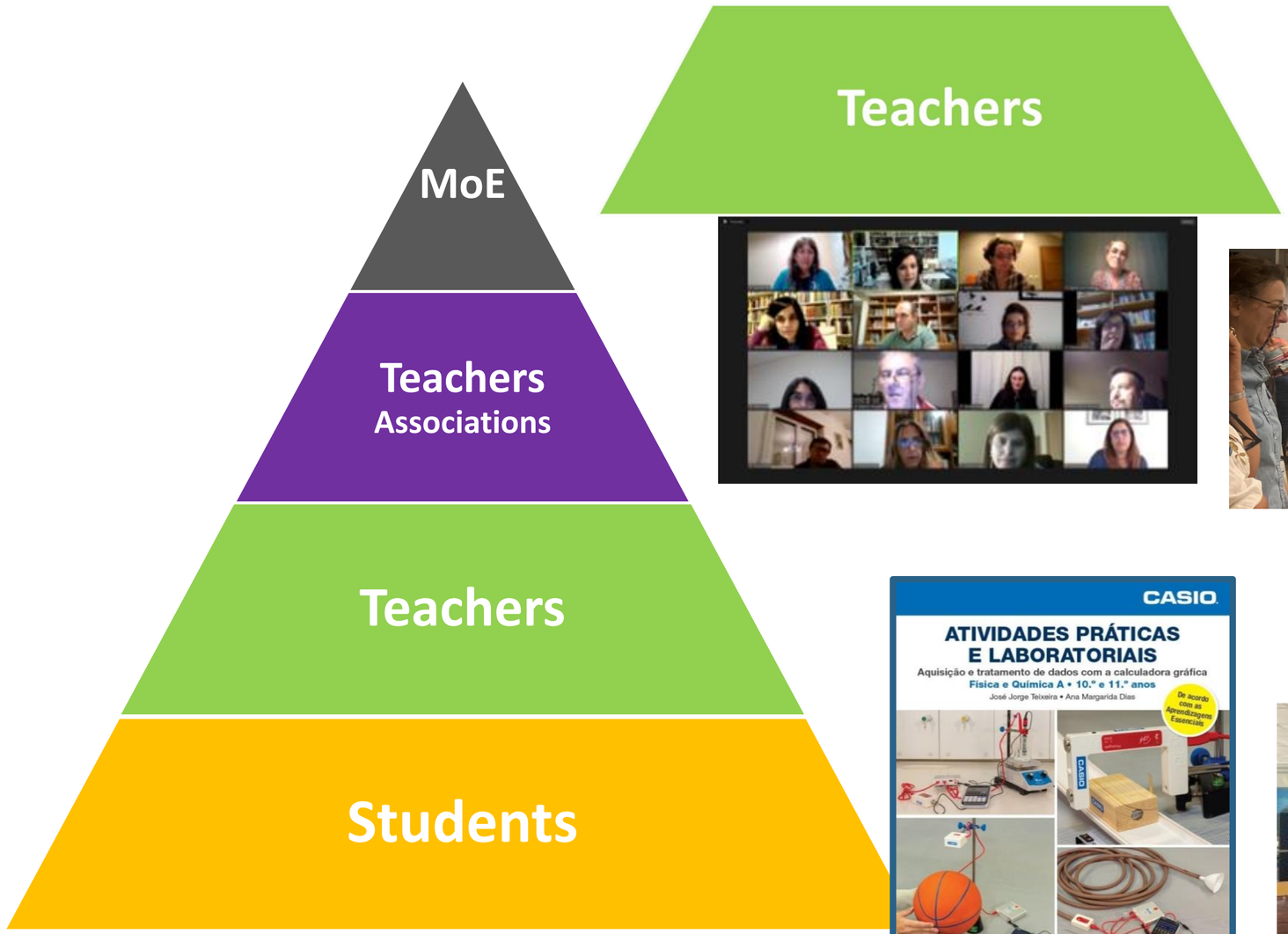


Casio+ Group (only math teachers at APM).

Support Teacher Association
Their own contest/activities.

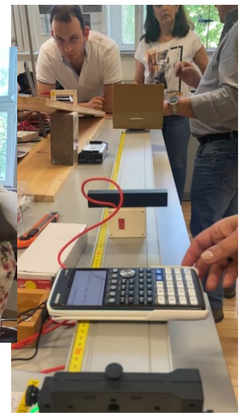
Posters / Communications at events.

2) “EDU Pyramid structure” - CASIO Activities

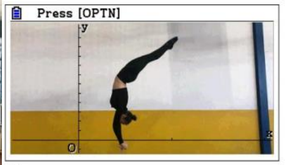


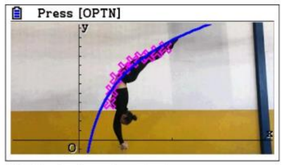
1) **Trainnings** (Phy = b-Lerning (after Covid) / Math = Online)

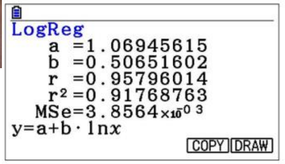
2) **Book with the main laboratory activities** of the Portuguese physics and chemistry curriculum (+200 pages)

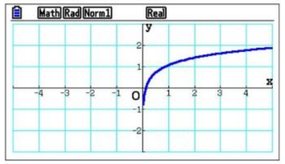


Teachers & Schools support Local contest/activities

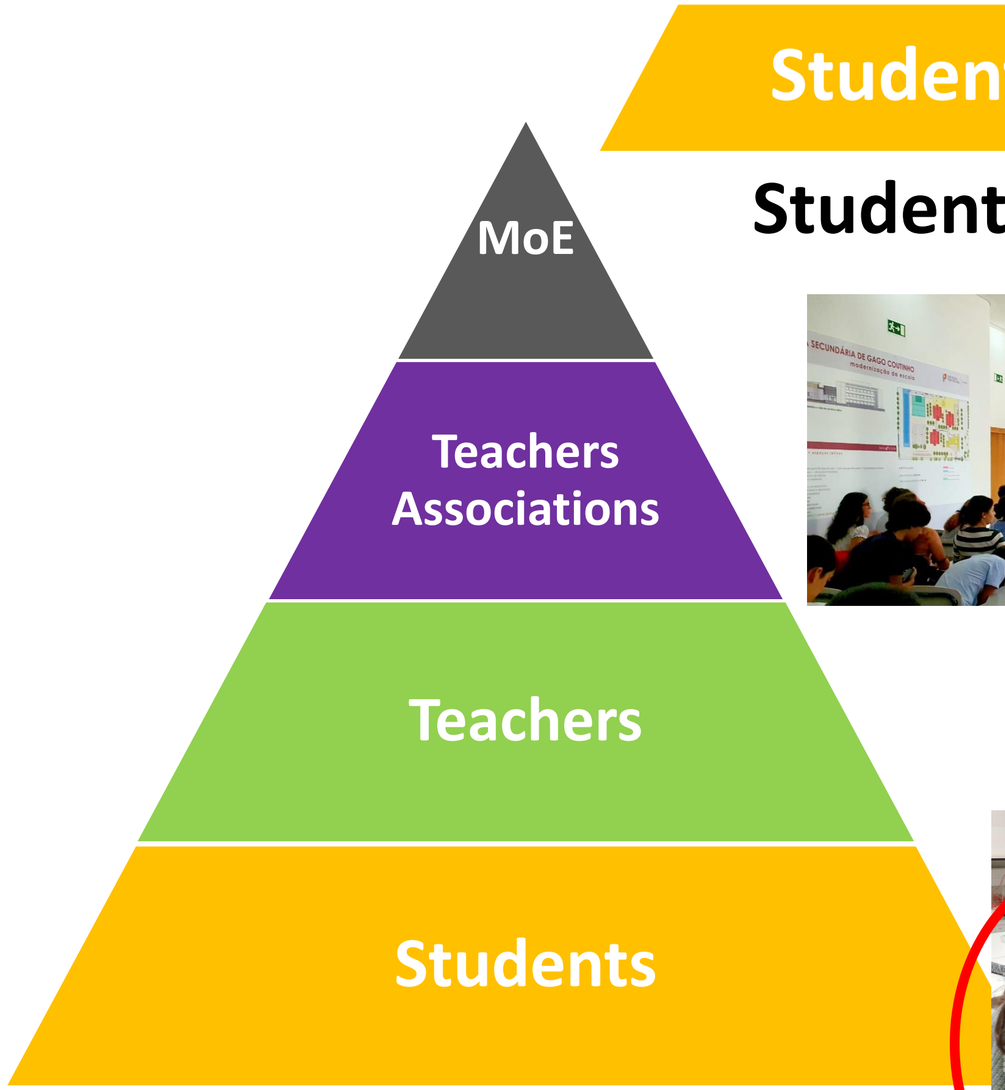








2) “EDU Pyramid structure” - CASIO Activities



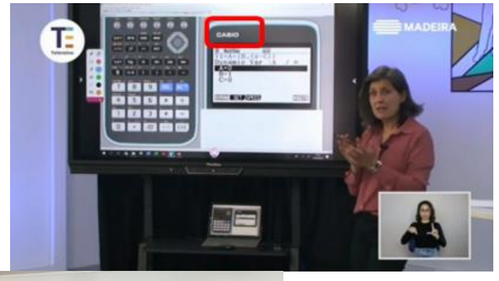
Student Workshops

Students Support / Offer calc

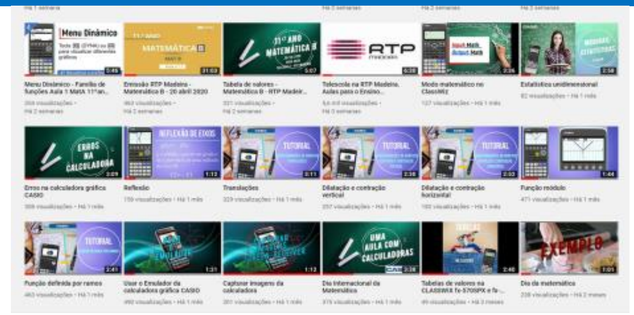
Students also teach teachers

2) “EDU Pyramid structure” - CASIO Activities

Influence



MoE support
Covid
Home lessons contents
Titurial videos



Partnership with Teachers Association | Presence in EDU Fairs

MoE

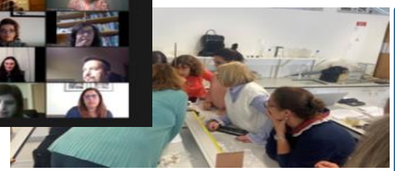
Teachers Associations

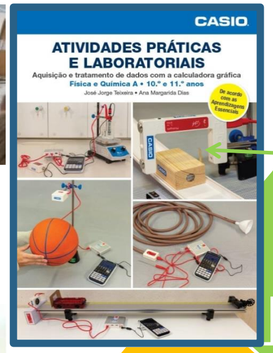
Teachers

Students

Support Teacher Association
Their own contest/activities

Teachers & Schools **support**
Local contest/activities





1) **Trainnings** (Phy = Off/On / Math = Online)
2) **Book with the main laboratory activities** of the Portuguese physics and chemistry curriculum (+200 pages)

Student **Trainnings**

Students **Support**
Offer calc

3) Using the calculator in math's lessons

For 3 years, pupils use the calculator in tests during lessons. At the end of the 3 years, they take the national exam. The questions with the calculator are never straightforward. The pupils have to think and solve.

8. Uma empresa está a desenvolver um programa de testes para melhorar a propulsão de foguetes.

Os foguetes utilizados partem do solo e seguem uma trajetória vertical.

Em relação a um dos modelos de foguete utilizados, admita que, após o lançamento e até se esgotar o combustível, a sua distância ao solo, a, em metros, é dada, a cada instante t, em segundos, por

$$a(t) = 100\left[t + (10 - t)\ln\left(1 - \frac{t}{10}\right)\right] - 4{,}9t^2 \text{, com } t \in [0, 8]$$

Determine, utilizando a calculadora gráfica, o instante a partir do qual, durante 3 segundos, esse foguete percorre 25 metros.

Apresente o resultado em segundos, arredondado às décimas.

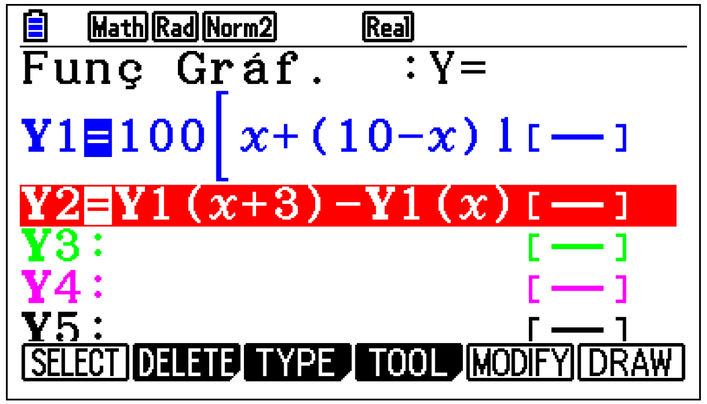
Não justifique a validade do resultado obtido na calculadora.

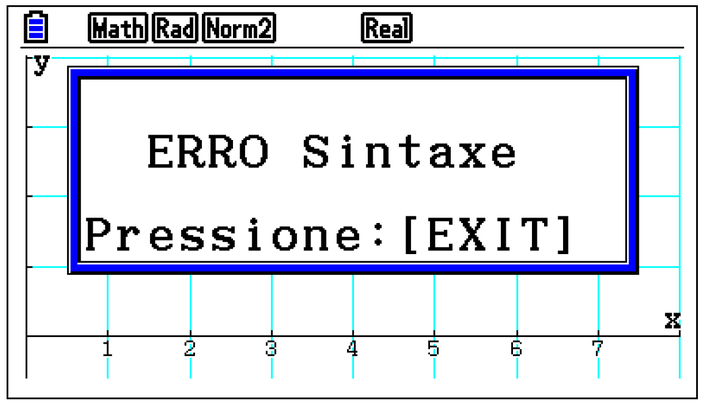
Na sua resposta:

- apresente uma equação que lhe permita resolver o problema;
- represente, num referencial, o(s) gráfico(s) da(s) função(ões) visualizado(s) na calculadora e assinale o(s) ponto(s) relevante(s), que lhe permitem resolver a equação.

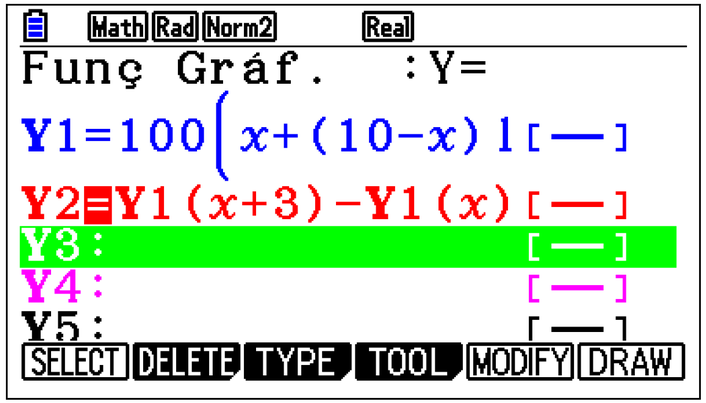
3) Using the calculator in math's lessons

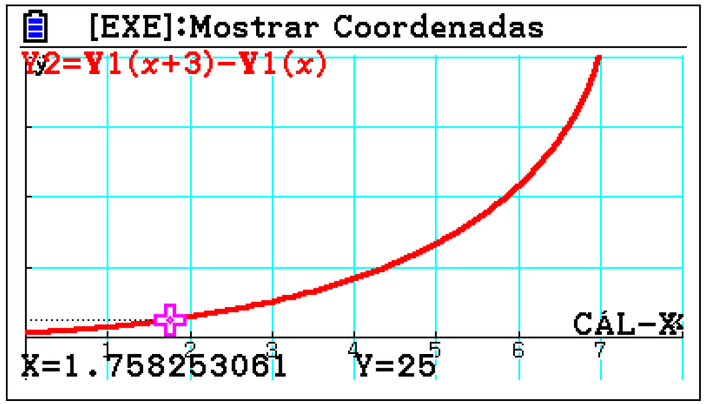
$$a(t) = 100\left[t + (10 - t)\ln\left(1 - \frac{t}{10}\right)\right] - 4{,}9t^2 \text{ , com } t \in [0, 8]$$





This year (jun 23), the students who had TI, got the question wrong which was worth 4 out of 20.





3) Using the calculator in math's lessons

9. Na Figura 4, está representado um cabo suspenso pelas suas extremidades em dois postes iguais, distanciados 10 metros entre si. Os postes estão instalados perpendicularmente ao solo, num terreno plano e horizontal. O ponto do cabo mais próximo do solo é equidistante dos dois postes.

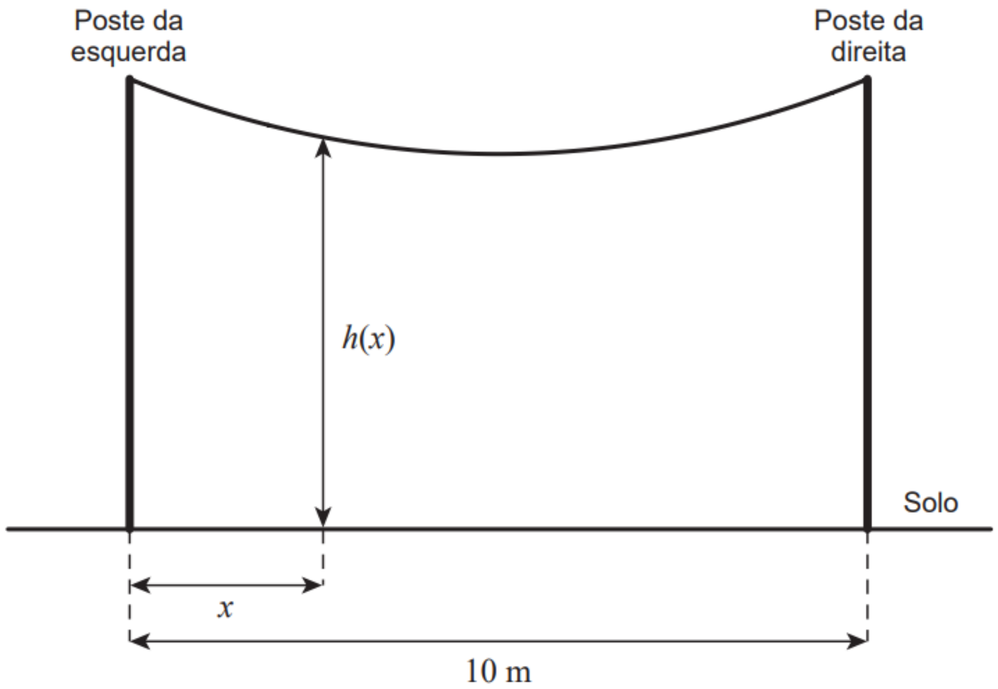


Figura 4

Seja h a função, de domínio $[0,10]$, definida por $h(x)=6{,}3\left(e^{\frac{x-5}{12{,}6}}+e^{\frac{5-x}{12{,}6}}\right)-7{,}6$.

Admita que $h(x)$ é a altura, relativamente ao solo, em metros, de um ponto do cabo situado a x metros do poste da esquerda.

REPÚBLICA PORTUGUESA
EDUCAÇÃO

IAVE INSTITUTO DE AVALIAÇÃO EDUCATIVA, I.P.

Exame Final Nacional de Matemática A
Prova 635 | 1.ª Fase | Ensino Secundário | 2022
12.º Ano de Escolaridade

9.2. Para um ponto do cabo situado a d metros do poste da esquerda, verifica-se que, diminuindo 50% essa distância, a altura, relativamente ao solo, diminui 30 centímetros.

Determine, recorrendo à calculadora, o valor de d, sabendo-se que este valor existe e é único.

Apresente o resultado arredondado às décimas de metro.

Não justifique a validade do resultado obtido na calculadora.

Na sua resposta:

- apresente uma equação que lhe permita resolver o problema;
- reproduza, num referencial, o(s) gráfico(s) da(s) função(ões) visualizado(s) na calculadora que lhe permite(m) resolver a equação e apresente a(s) coordenada(s) do(s) ponto(s) relevante(s) arredondada(s) às centésimas.

$$h(x)=6{,}3\left(e^{\frac{x-5}{12{,}6}}+e^{\frac{5-x}{12{,}6}}\right)-7{,}6$$

3) Using the calculator in math's lessons

Pupils have to think about the problem. The answer is never straightforward, the calculator helps with graphing and getting answers, but if students don't know math's, they won't solve the problem.

9. Na Figura 4, está representado um cabo suspenso pelas suas extremidades em dois postes iguais, distanciados 10 metros entre si. Os postes estão instalados perpendicularmente ao solo, num terreno plano e horizontal. O ponto do cabo mais próximo do solo é equidistante dos dois postes.

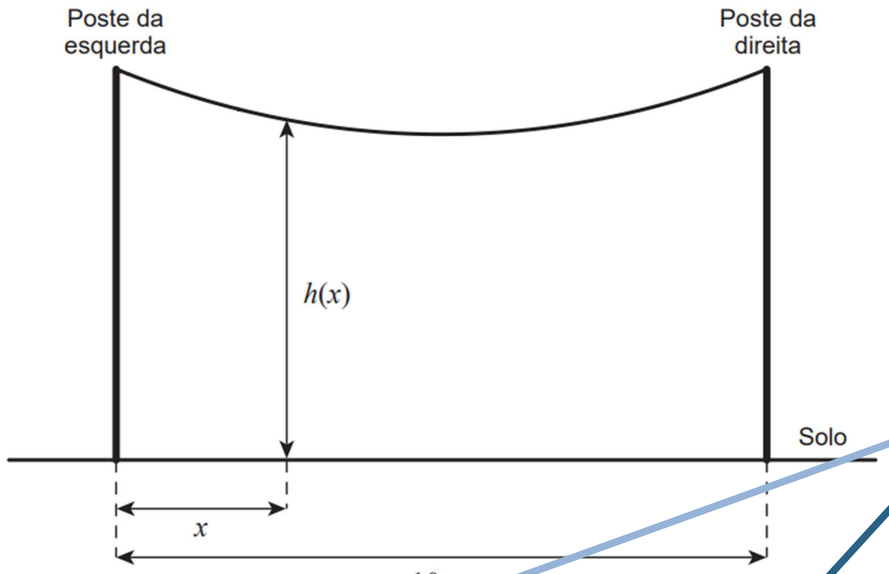
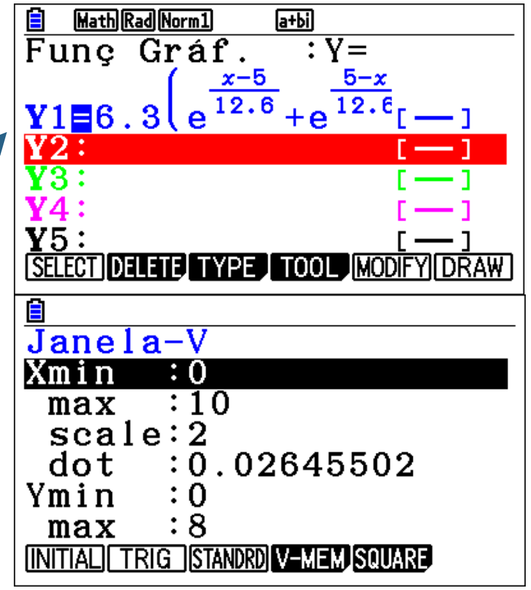
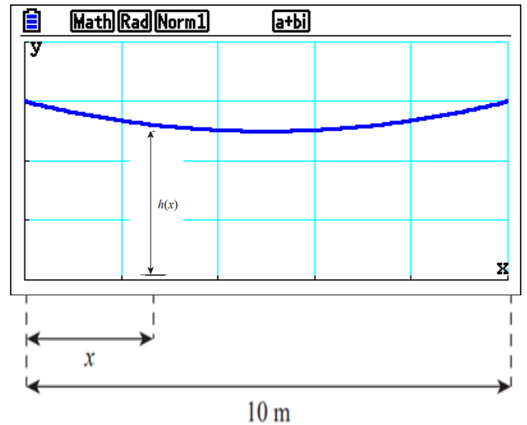


Figura 4

Seja h a função, de domínio $[0,10]$, definida por $h(x) = 6{,}3\left(e^{\frac{x-5}{12{,}6}} + e^{\frac{5-x}{12{,}6}}\right) - 7{,}6$.

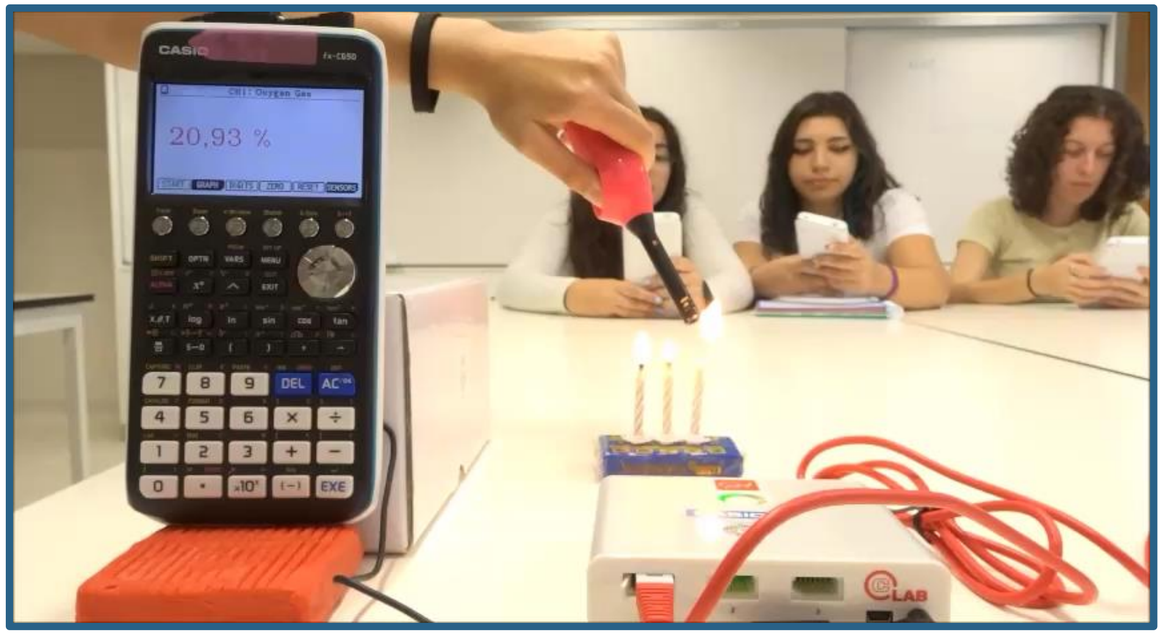
Admita que $h(x)$ é a altura, relativamente ao solo, em metros, de um ponto do cabo situado a x metros do poste da esquerda.



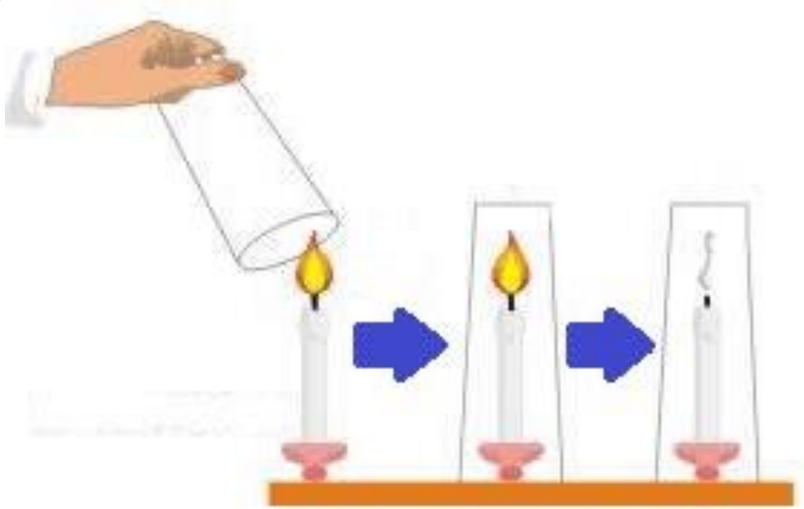


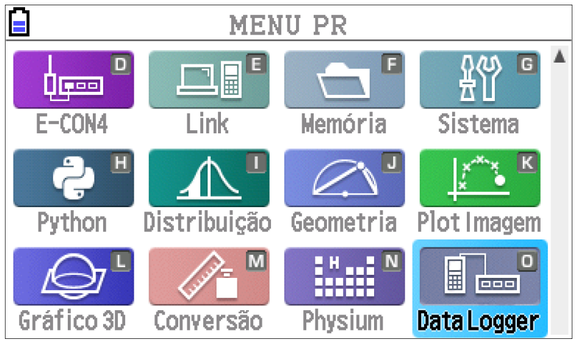
4) Using the calculator in physics and chemistry lessons

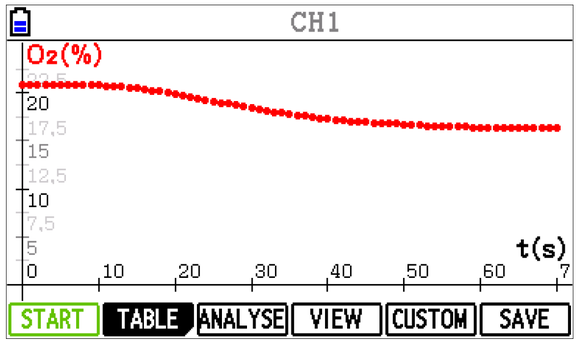
Teaching to think

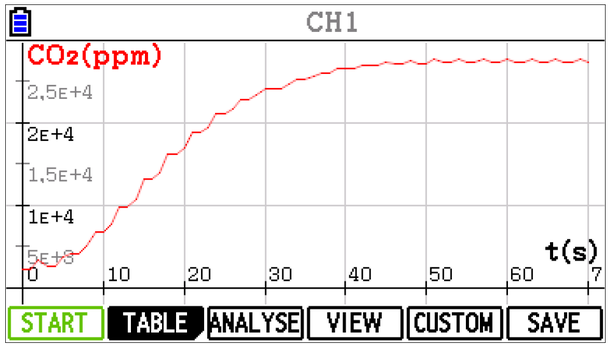


The figure shows the combustion of candle in an inverted glass. Why does the candle go out?



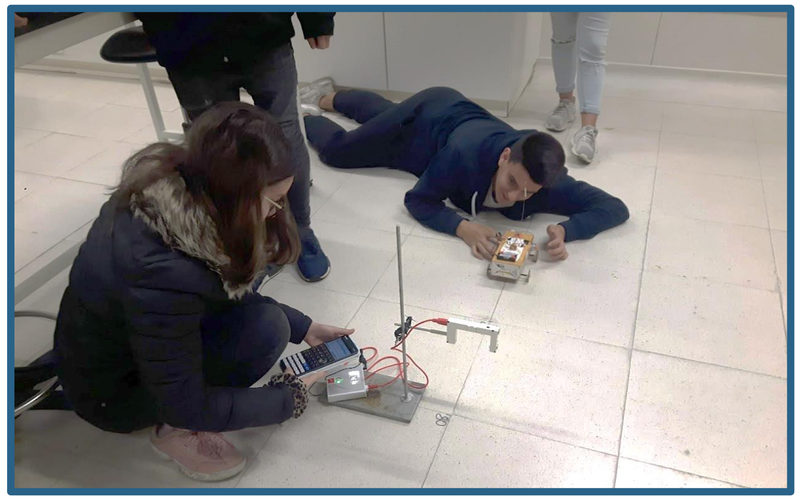




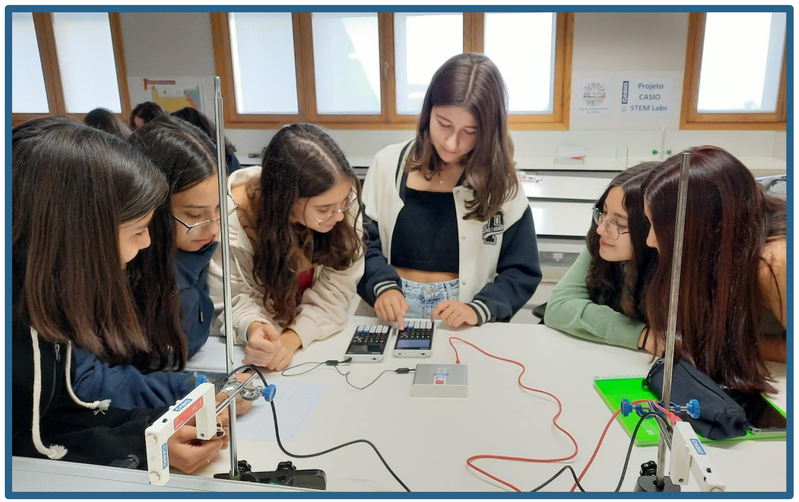


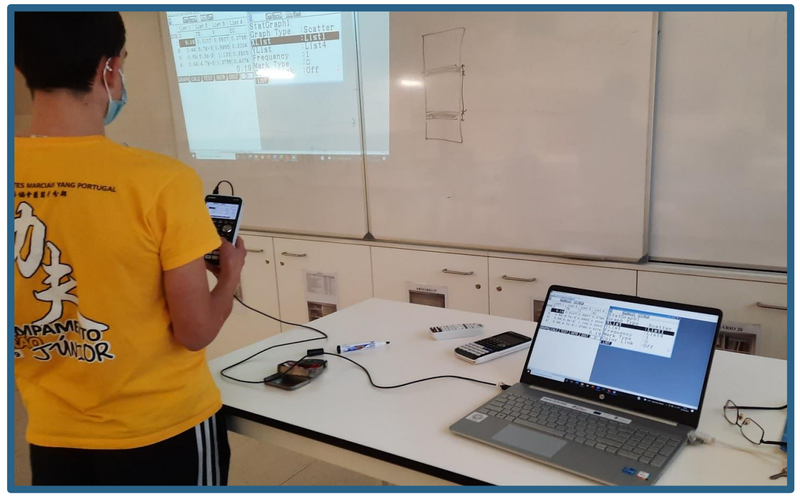
4) Using the calculator in physics and chemistry lessons

Used in problem solving and laboratory activities



Teamwork



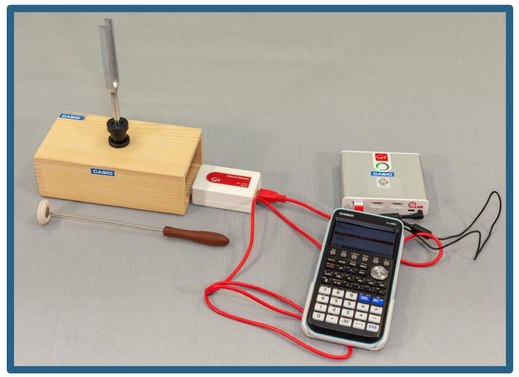


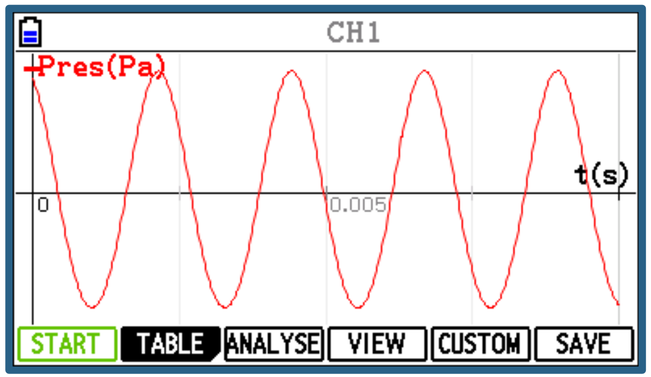
Investigate

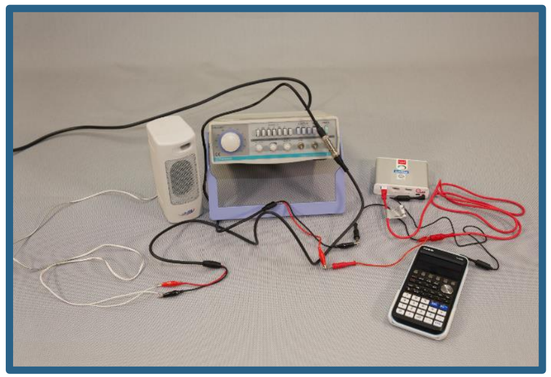
Reporting results

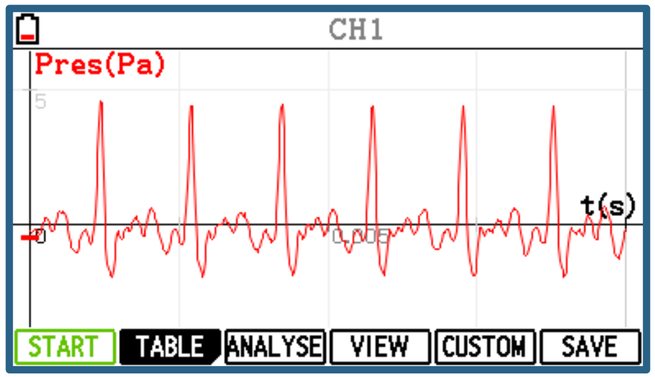
4) Using the calculator in physics and chemistry lessons

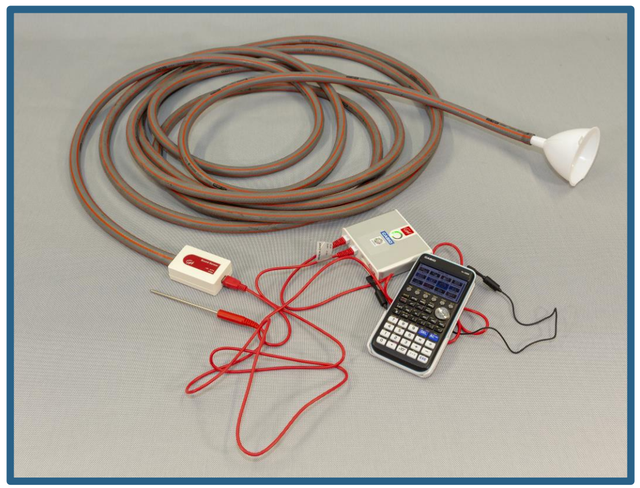
Curriculum - laboratory activities

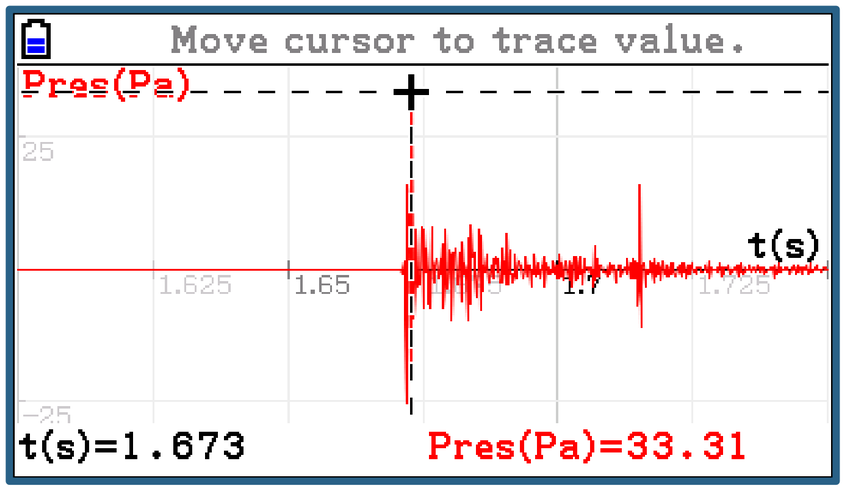












4) Using the calculator in physics and chemistry lessons

Student testimonials

4) Using the calculator in physics and chemistry lessons

National examination

7.3. Na tabela seguinte, estão registados os valores da diferença de potencial, U, e da corrente elétrica, I, medidos para cada valor de resistência elétrica introduzida no circuito.

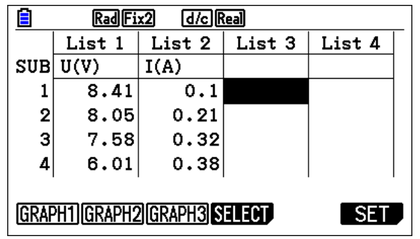
Ensaios	1.º	2.º	3.º	4.º	5.º	6.º
U / V	8,41	8,05	7,58	6,01	6,31	5,70
I / A	0,10	0,21	0,32	0,38	0,61	0,74

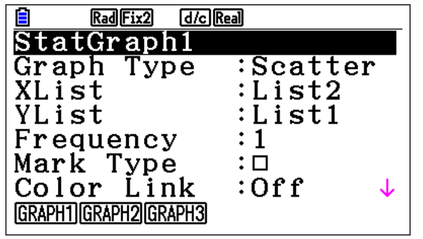
Ao traçar o gráfico de U, em função de I, os alunos perceberam que um dos pares de valores experimentais não acompanhava a tendência linear dos restantes. Na determinação das características da pilha, decidiram eliminar esse par de valores.

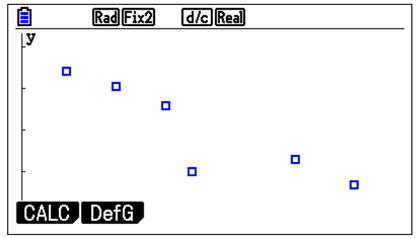
Apresente as características da pilha, com dois algarismos significativos.

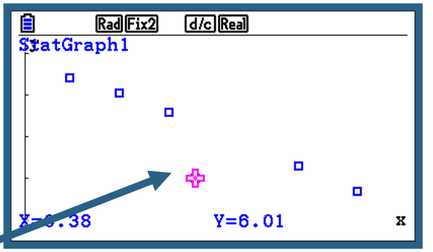
Na resposta:

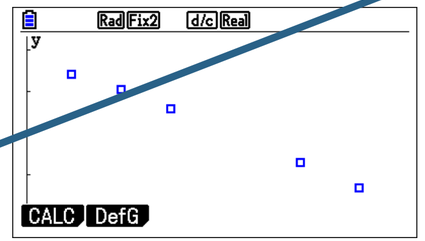
- identifique o par de valores experimentais que os alunos eliminaram;
- apresente a equação da reta de ajuste ao gráfico de U, em função de I (para os cinco ensaios considerados).

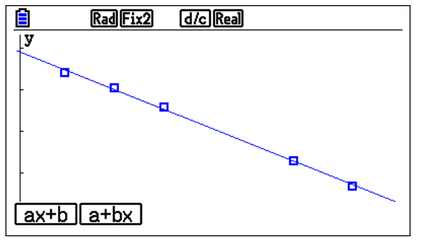


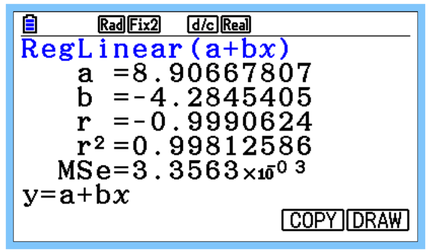








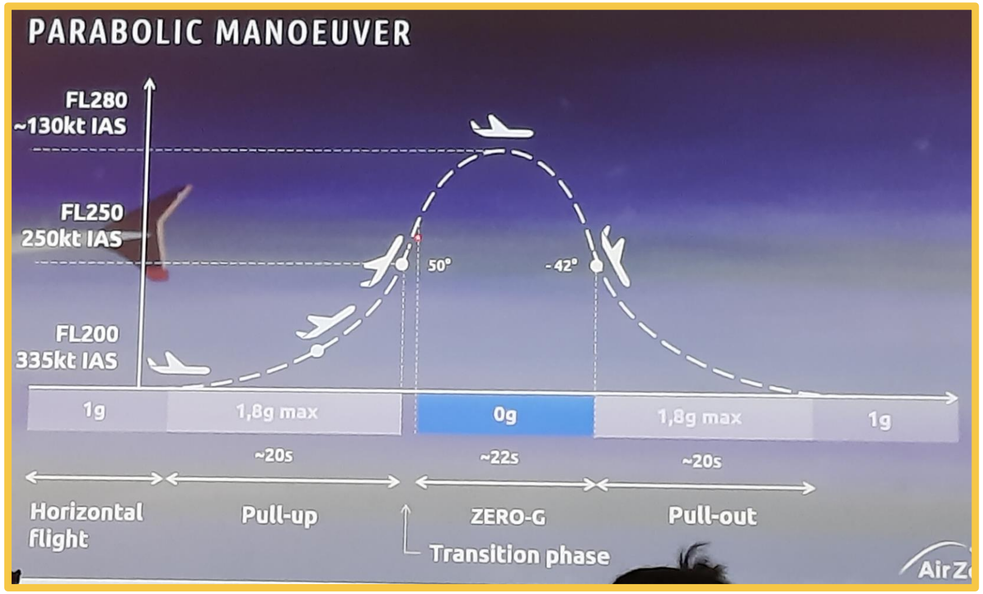




$$U = 8,91 - 4,28 \times I$$

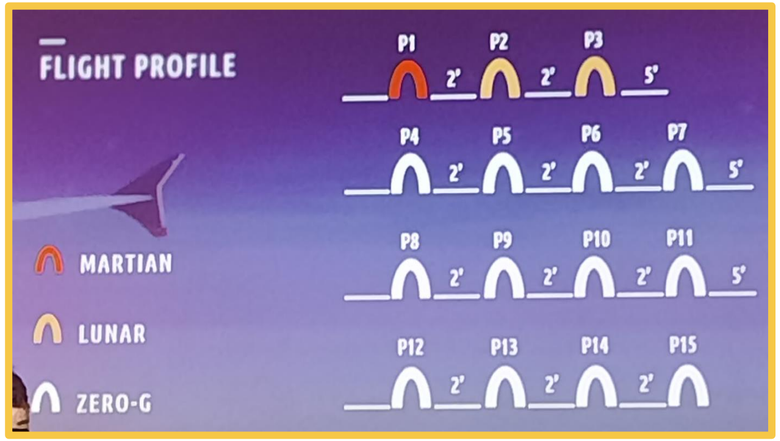
5) More physics activities

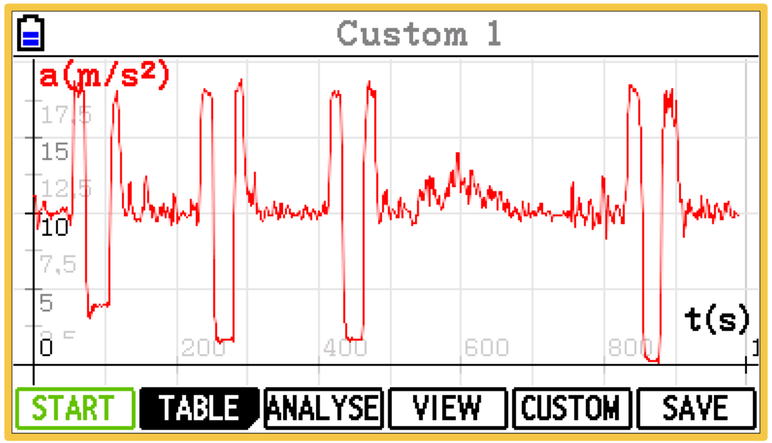
Parabolic flight

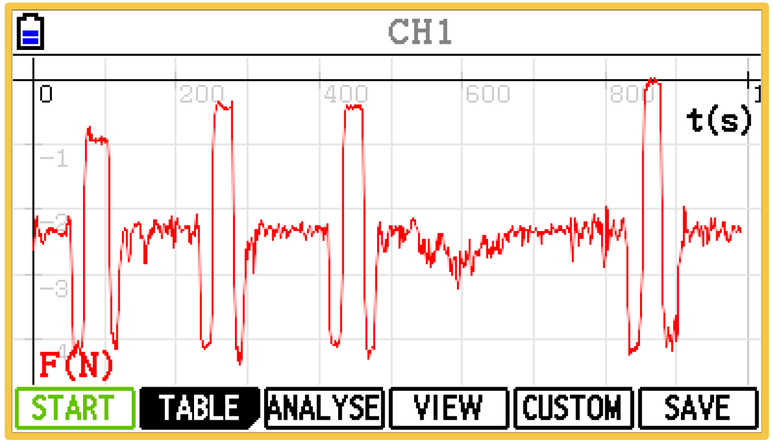


5) More physics activities

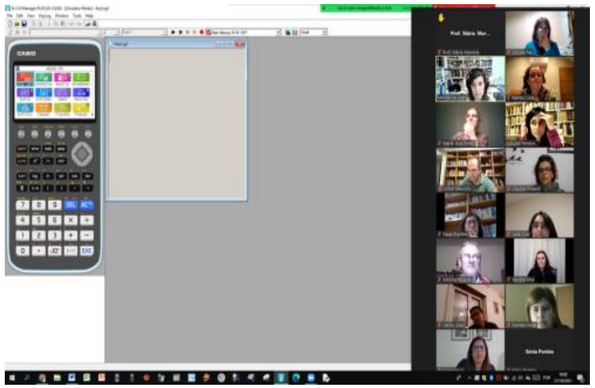
Parabolic flight







6) MATH & PHYS ACTIVITIES (school year Sep-Jul)



25 hours (Online or b-Learning (sensors))

Set - july								
Activity	#			23 vs 22	# persons			23 vs 22
	2021	2022	2023		2021	2022	2023	
Teachers training	36	21	33	157%	571	218	562	258%

90 minutes in schools

Set - july								
Activity	#			23 vs 22	# persons			23 vs 22
	2021	2022	2023		2021	2022	2023	
Workshop Students	36	21	30	143%	571	218	1251	574%

3 hours, more for physics teachers

Set - july								
Activity	#			23 vs 22	# persons			23 vs 22
	2021	2022	2023		2021	2022	2023	
Workshop Teachers	36	21	27	129%	571	218	258	118%

1 hour, online

Set - july								
Activity	#			23 vs 22	# persons			23 vs 22
	2021	2022	2023		2021	2022	2023	
Webinares	0	4	5	125%	0	1414	1558	110%

Set - july				
Activity	#			23 vs 22
	2021	2022	2023	
Newsletter	12	16	26	163%
Tut Videos (Youtube)	4	11	15	136%

facebook

YouTube

Youtube 1.17K subscribers

Facebook: 20K followers

Teachers data base: 6K +/- 128% vs LY

Introducing ICT device and apps usage situation in classroom

- DIGITALIZATION – THREAT ?!
- Use of ICT devices and applications in the classroom.

DIGITALIZATION – THREAT ?! (UPDATE JUN23)

Infrastructure Challenges

During the 2 lockdowns when we have online lessons it was clear that PT it is not ready to support the digitalization because in several areas we don't have internet coverage, including schools

Our Govnerment received money from EU to improve IT, so, to justify the investment the MoE <u>loan</u> a LapTop to all the students and teachers…

MoE Focus/Orientations

GOVERNO DE PORTUGAL

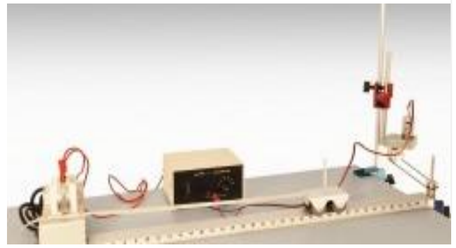
MINISTÉRIO DA EDUCAÇÃO E CIÊNCIA

Final Exams - IT tools are not allowed

Our schools and also our familys are not prepared (€) to have Digital tools to all the students.
MoE wants the equality among all students, so digitalization in schools are not planned.

…as a consequence the intermediate knowledge assessment national exams (2nd+5th+8th grade)… were made via PC…

FOCUS STEM



<u>FOCUS STEM</u>
The Physics teachers Group are having more importance in the school community and work with sensors, CLabs's will be more important in the future.

…Physics continue to have more importance inside the schools. Casio PT Increased the sells of Lab Material.

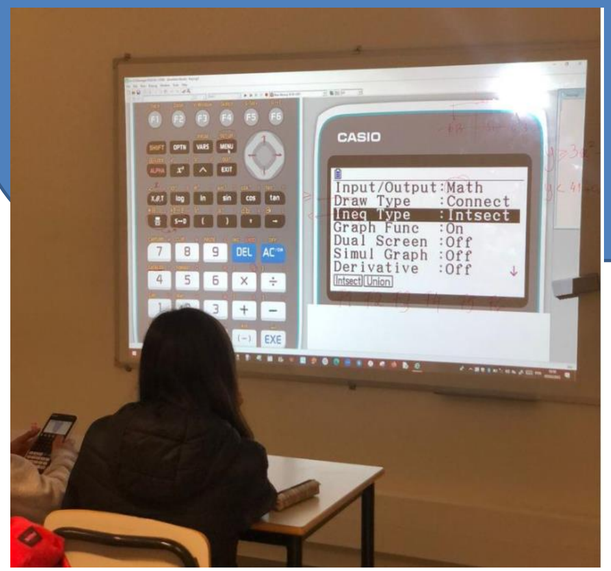
<u>STATUS BTS22-23 (exams via PC)</u>: The feedback from the EDU community it is not positive (too fast, not available to all the students (economic reasons), bad IT/NET conditions in some areas/schools …) but … from the Political side the pressure is very high to accelarate this change process

Use of ICT devices and applications in the classroom

In math classes.

Students have to use the graphing calculator. Since the 10th grade, they have to use the calculator in mathematics and in physics and chemistry. Used for 3 years.

Teachers use machine software and other software that is easy to use (eg Geogebra). They also use the physical calculator in class preparation, test correction, etc.



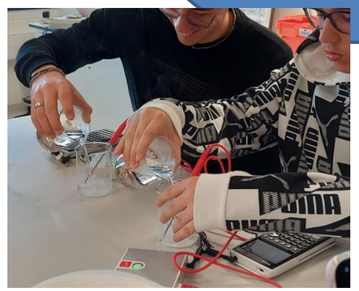
GeoGebra

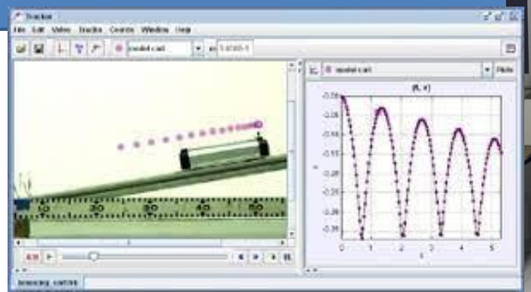
In physics and chemistry classes.

Students must use the graphing calculator in theoretical classes and in practical classes (laboratory activities). It's mandatory used in laboratory activities.

Teachers use the GC software (Manager) and ScreenReceiver to display, process and collect data from the graphing calculator and sensors. They also use the physical calculator in class preparation, test correction, etc.

In physics, modeling can also be used (film with an object falling, for example), but most teachers still don't get used to it. They use Traker, as it is easier to use.





Current educational trend by ministry (intention of using ICT device etc.)

- Mathematics and physics curriculum
- BUSINESS RISKS
- Micro:bit
- Competitors Sensors – Wireless Sensors
- CMA with Wireless Sensors
- Unesco concerned about excessive use of smartphones in schools

Mathematics and physics curriculum

New math curriculum points to:

1) much on computational thinking using the Python programming language to implement it. Good computer software needed, to avoid using free python ones. More libraries

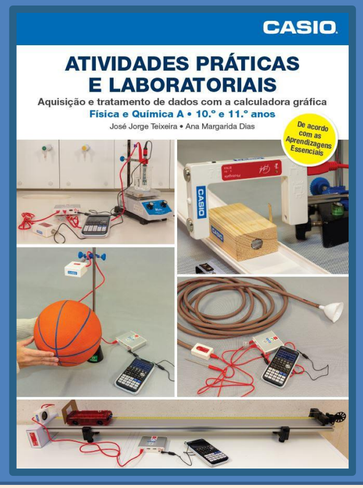
2) mathematical modeling where teachers are free to choose, the possible choices being: data imported from Excel to the calculator, images and videos, sensors.

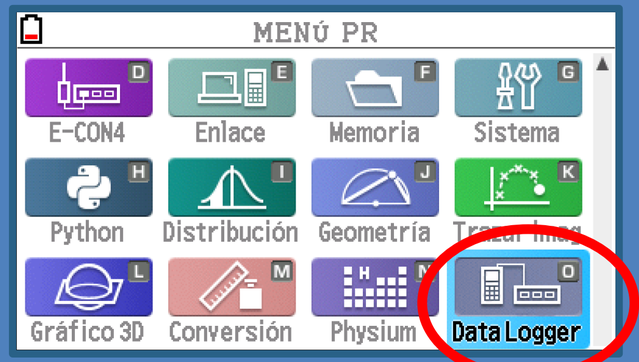
Objective: to treat real data.

Physics curriculum points:

1) The use of numerical and/or graphing capabilities of calculators should be a common practice in the classroom context, in the teaching and learning process.

Ministry of Education, 2022





The current CG50 model is in line with the Portuguese CV, it is a very successful machine, but it needs to be improved and many bugs fixed

BUSINESS RISKS !!!!

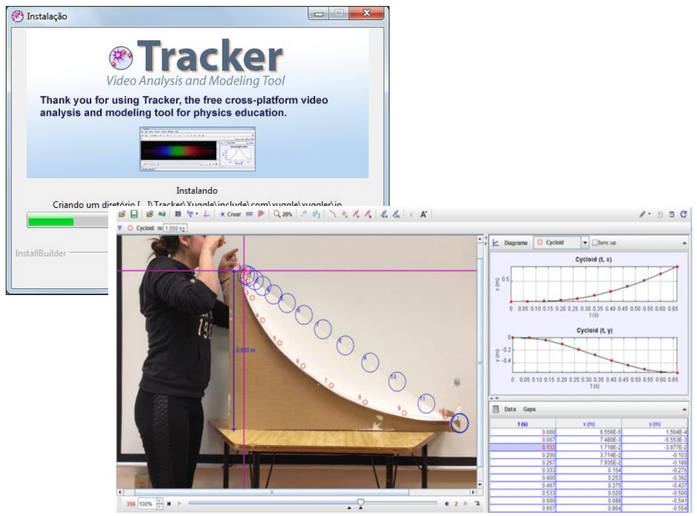
COMPETITORS HARDWARE/SOFTWARE

Texas Instruments

NUMWORKS

python™

GeoGebra



DIGITALIZATION FINAL EXAMS

Urgent needs:

- Need to improve computer software for teacher (math - Python).
- Better CG software needed.
- NW has free software for students (students then have to buy the machine).
- We need to be prepared to move to online (national exams).

Micro:bit

- Connecting the calculator to the micro:bit

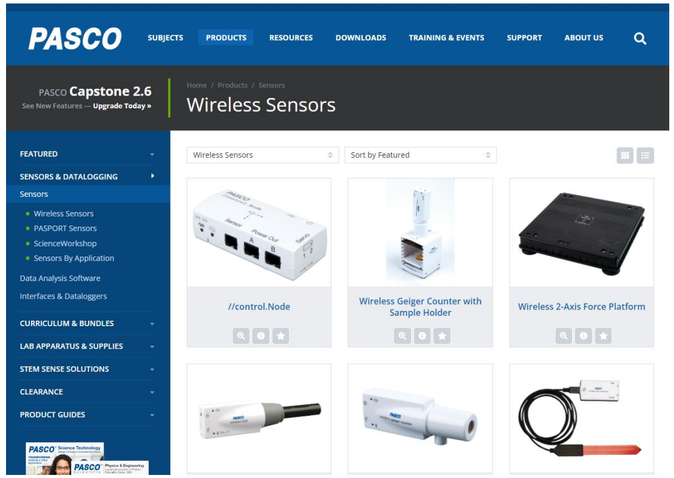
Connecting the BBC micro:bit with a Graphic Calculator.

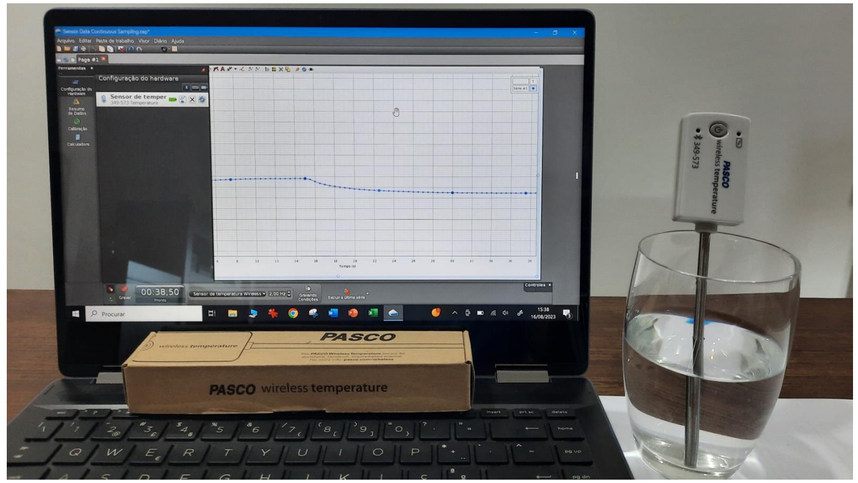
Python graphing calculator creates a powerful new way for students to learn coding on the go and unlock a unique combination of technologies to explore core math and science concepts in groups, at home or in STEM camps — virtually anywhere.

Until now, only TI is on the market with this possibility

Competitors Sensors –Wireless Sensors

PASCO scientific





Vernier SCIENCE EDUCATION

Why Choose Go Direct Sensors?

With over 50 sensors to choose from, our Go Direct® family of sensors offers an affordable solution that includes free software. Go Direct sensors are easy to use—just connect and start collecting data with your device.

What You Need to Get Started

A *Go Direct Sensor*

These versatile sensors connect to your device via Bluetooth® wireless technology or USB.

B *Device*

Go Direct® sensors connect to a wide variety of devices commonly used in classrooms, including Chromebooks, computers, compatible mobile devices, and LabQuest® 3.

C *Vernier Graphical Analysis® App*

Our free data-collection app facilitates student understanding with real-time graphs of experimental data. No additional software purchase is necessary.

D *Lab Book*

Step-by-step instructions at your fingertips save valuable time when integrating probeware into your curriculum. Most of our lab books for elementary school provide support for Go Direct sensors and the Graphical Analysis app.

Our lab books come with a generous site license. Purchase once and share files schoolwide.

CMA with WIRELESS SENSORS

WIRELESS SENSORS

Our wireless sensors can be used to measure directly without an interface. They connect via Bluetooth or USB. They are also equipped with their own digital display showing the battery level and the measured sensor value.

READ MORE ABOUT WIRELESS SENSORS

SHOP NOW

CMA Wireless Sensors can be used to measure directly without an interface. They use Bluetooth wireless technology and can be used anywhere without the need for a power source or wired connection. They are equipped with an OLED digital display which shows the battery level and the measured sensor value. This makes these sensors quite unique and suitable to use also as independent measuring instruments.
Additionally, sensors can be used wired via the USB connection.

All these features make the sensors highly versatile and suitable for a wide range of applications.

Available in September 2023.

School Level:

Primary | Middle | High

SHOP NOW

Advantages | Disadvantages | Devices | Software

The advantage of wireless sensors is ease of use. This is even more significant with the CMA wireless sensors, as they are also equipped with their own display i.e. even without software they can be used as measuring instruments.

Suggestion:
Contact CMA, make a partnership so that the new GC can have this technology

Unesco concerned about excessive use of smartphones in schools

Nações Unidas | ONU News
Perspectiva Global Reportagens Humanas

https://news.un.org/pt/story/2023/07/1818137

Will smartphones, tablets and computers have a future in the classroom?

Those ***who defend*** its use say that students have access to many more resources. Savings money with school textbooks that become digital.

Those ***who are not in favor*** say that it harms learning by spending a lot of time in front of a computer and greater distraction.

CASIO

Ana Margarida Dias – *Portugal School Coordinator*
Jorge Teixeira - *Physics and Chemistry Teacher*