université PARIS DIDEROT PARIS 7

IREM

INSTITUT DE RECHERCHE SUR L'ENSEIGNEMENT DES MATHÉMATIQUES

EdUmatics

European development for the use of mathematics technology in classrooms

Atelier « modélisation de poursuites avec Géogébra»

Michèle Artigue, Claire Cazes, Françoise Hérault, Gilles Marbeuf

Fabrice Vandebrouck

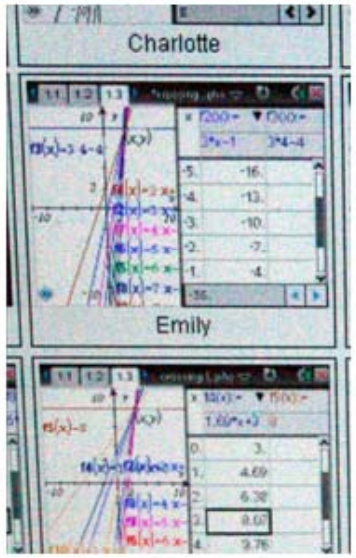
Contexte : Edumatics

- Un projet Européen avec 18 partenaires (9 universités et 9 établissements secondaires)
- 5 pays : France, Italie, Allemagne, Angleterre, Pays Bas
- Conception collaborative et expérimentation de ressources pour la formation des enseignants à l'utilisation des technologies
- Création d’un site internet pour la formation des enseignants à l’usage des technologies

EdUmatics







- Home
- Resources
- About EdUmatics
- About The Partners
- Technical Info
- Links
- Contacts

Welcome to EdUmatics

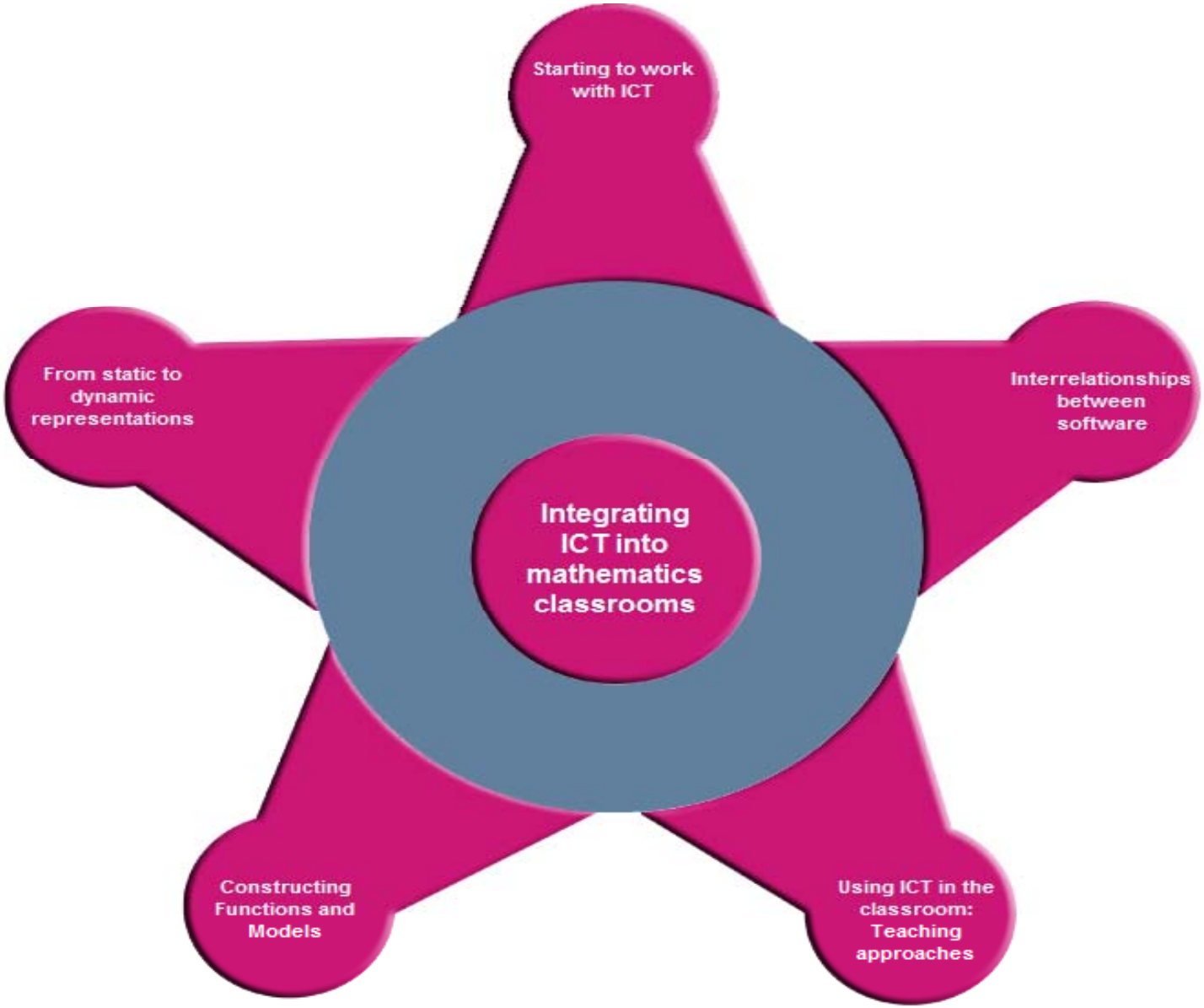
The EdUmatics project aims to provide teachers of secondary mathematics with support to learn to use and integrate technology within their classrooms.

The resources for professional development, whilst aimed at teachers, include a range of tasks for students to enable them to use technology within modelling and problem-solving activities. These are available in the different project languages.

The resources include links to free and trial software, applications and animations in addition to tasksheets and helpsheets that can be adapted for different scenarios.

If you are a teacher trainer, there is additional guidance to support you to use the professional development modules with teachers and trainee teachers.

There are five professional development modules in the EdUmatics Project. We recommend that you begin by working on the module 'Starting to work with ICT'. You may need to check the Technical information page first to ensure that you have the software and applications that you may need.



Un format commun pour les modules

EdUmatics
European development for the use of mathematics technology in classrooms

Module 1 | **Module 2** | Module 3 | Module 4 | Module 5

- Getting started
  - Introduction
    - Why this title ?
    - History and authors
    - Didactics fundament
  - Prerequesites
    - Mathematics
    - Technology
  - Aims
  - Outcomes
  - Overview of the module
- Statistics: "Reaction"
  - The problem
  - A scenario in the classr
  - Role of technology
  - Knowledge construction
  - Implementation guidelin
  - Teachers' reports
- Patterns and functions: "Wh
  - The problem
  - A scenario in the classr
  - Role of technology
  - Knowledge construction
  - Implementation guidelines
  - Teachers' reports
- Geometry: "The walking problem"
  - The problem
  - A scenario in the classroom
  - Role of technology
  - Knowledge construction
  - Implementation guidelines
  - Teachers' reports
- Evaluation of the module

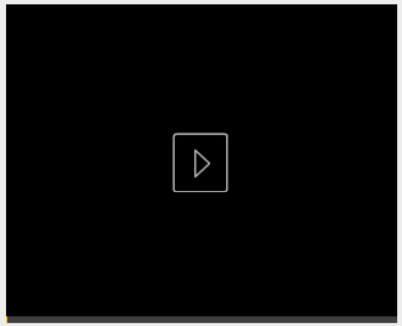
FROM STATIC TO DYNAMIC REPRESENTATIONS AND BACK

In this module we would emphasized the possibilities ICT offer to represent in a dynamical way mathematical objects.

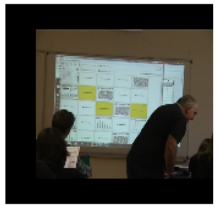
Two different round in this module:

- if you are teacher trainer, this module gives you clues to organize and to propose an in-training course: follow the TT link
- if you are maths teacher, this module is a part of the EdUmatics course *Here we should situate the module 2 related to the other modules*; it's purpose is the help ICT can bring to represent mathematical objects in different ways;

Dynamic representations put at stake both different representations produced and linked within a tool or different representations shared by students in a classroom, as ilustrated on the film above (have a look on the students screens'wall behind the teacher):



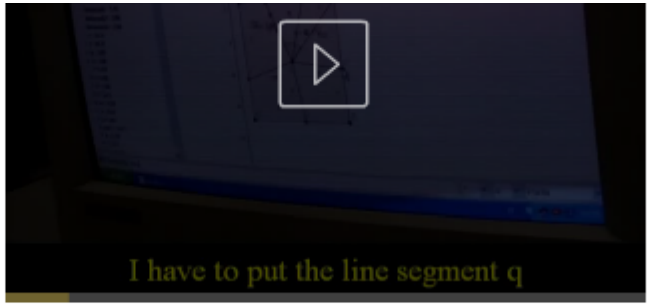
Dice and statistics.



Wall of screens.

Exemple dans le Module 2 : walking problem

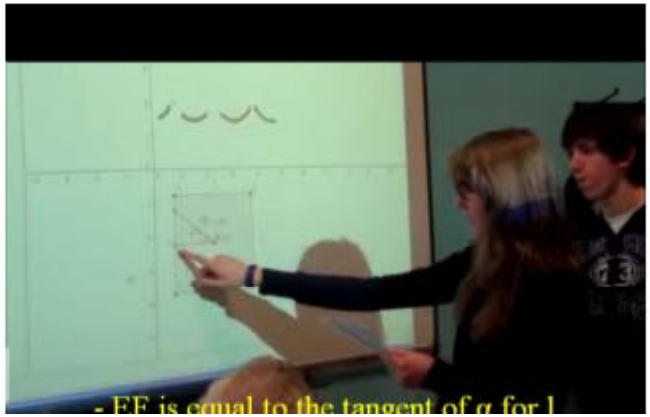
- ole of technology
- nowledge construction
- nplementation guideline
- eachers' reports
- ation of the module



Do you think this methodology may be useful for the students to reach your fixed class objectives?
How do you think technology would change students' strategies at the current stage?
How do you think technology would change students' representations at the current stage?
Think of a personal scenario about this situation.

TT link

Third part: a short piece of a dialogue among the students of a group and the teacher.



Module 3 : constructing functions and models

EdUmatics
European development for the use of mathematics technology in classrooms

Module 1 | Module 2 | **Module 3** | Module 4 | Module 5

WHAT WILL I LEARN THROUGH THIS MODULE?

In this module you will learn how to use digital technologies (spreadsheet, dynamic geometry, computer algebra) for introducing students with functions as modelling tools in a diversity of contexts, and for exploring their properties through the dynamic interplay between representations that technology makes possible.

WHAT SHOULD I ALREADY KNOW?

Before you begin this module, we suggest that you get some familiarity with the digital resources used in this module, especially spreadsheet and dynamic geometry. This can be achieved using the EdUmatics Module 1.
For fully benefiting from this module, it is certainly better to have already some experience of teaching functions at middle or high school level, but the module can also be used without this experience. In that case, we suggest that you look at the ways functions are introduced and technology used for their teaching in your country.

HOW DOES THIS EDUMATICS MODULE LINK WITH THE OTHER MODULES?

You will also find other insightful examples of the use of technology for the teaching of functions in modules 2 and 5, and useful tools for the analysis of classroom video clips in module 4.

WHAT ACTIVITIES DOES THIS MODULE INCLUDE AND HOW LONG WILL IT TAKE FOR ME TO COMPLETE?

In this module, you will be successively proposed three different contexts for approaching the teaching of functions with digital technologies. In the first one, you will use functions and technology for investigating the variation of areas of shop signs having different geometrical forms; in the second you will use functions and technology for exploring and discussing the intersections of curves; in the third one, starting from videos, you will use functions and technology for modelling different types of pursuit games and exploring their characteristics. You will be asked to analyse the potential of these three contexts for the teaching of functions, both from a mathematical and technological perspectives (12 – 15 hours), to analyse video clips coming from classroom trials (3 hours), and to propose a scenario of use adapted to your particular educational context and aims (6 hours). A least one trial and a subsequent posteriori analysis would be welcome (4-6 hours). Finally, you will be also asked to read and comment one article of suggested readings attached to this module (4 hours), and to create a portfolio for presenting your activities on this module (6 hours).

Comparaison de Poursuites

- Ball Trap
- Bip Bip
- Guépard
- Plage

Progression proposée en seconde MPS

- Séance 1 : visionnage de films et 1er exemple
- Séance 2 : Recherche d'une relation fonctionnelle $t=f(V_C)$
- Séance 3 : 2ème exemple – poursuite avec anticipation
- Séance 4 & 5 : Relation fonctionnelle $V_C = g(\alpha)$
- Séance 6 & 7: 3ème exemple – courbe du chien

1er exemple : modélisation simple

- Modélisation avec Géogébra
- Travail avec les élèves jusqu'à une relation fonctionnelle

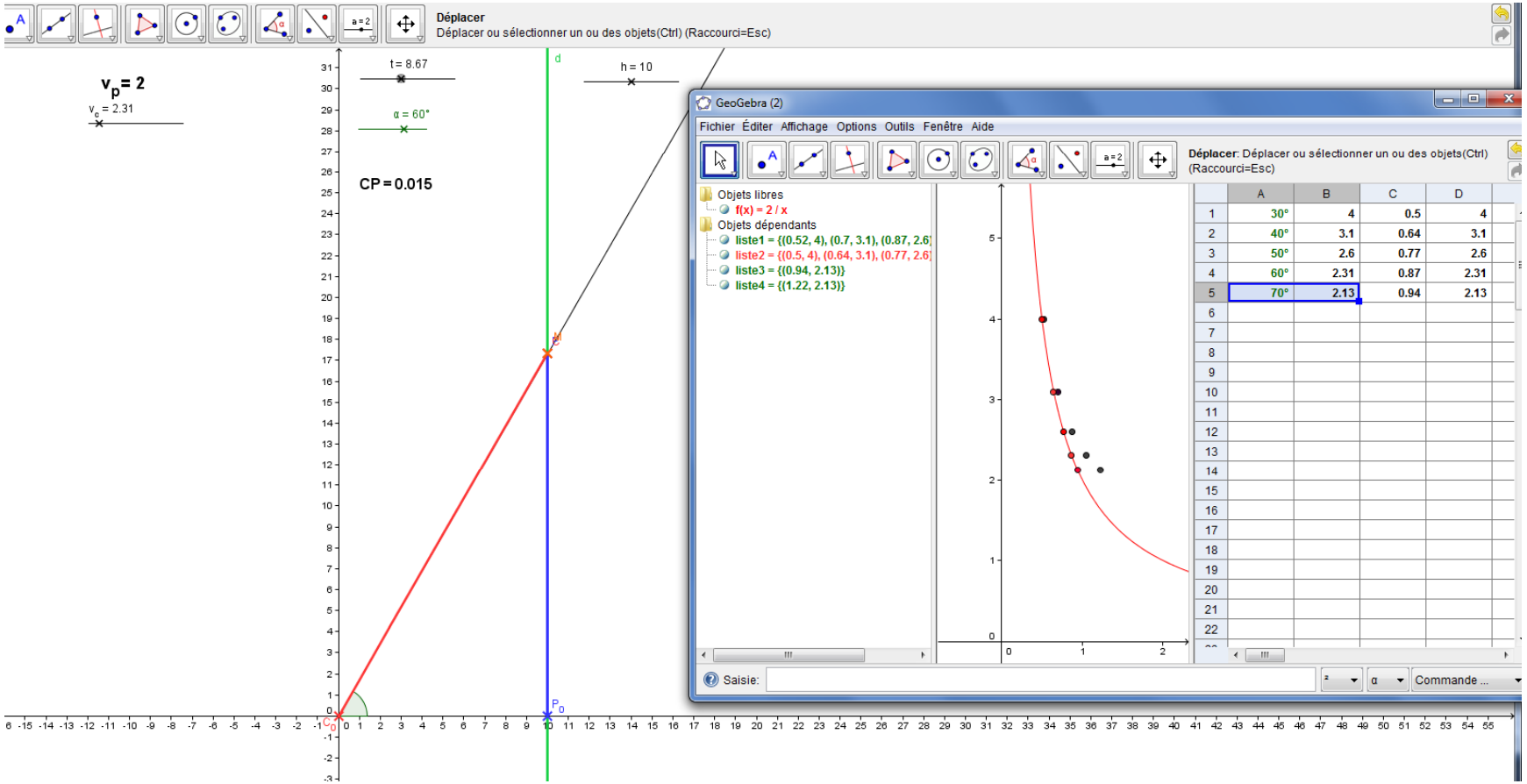
2ème exemple : poursuite avec anticipation

Un 2ème exemple :

La proie P part d'une position P_0 et se déplace à la vitesse constante v_0 sur une droite (d) toujours dans la même direction. Le chasseur C tente d'intercepter P sur (d) en partant de la position initiale C_0 qui n'est pas sur (d) et telle que $(C_0P_0) \perp (d)$ en P_0 et C_0P_0 est connue, à la vitesse constante V_C . On n'impose pas de délai au chasseur.

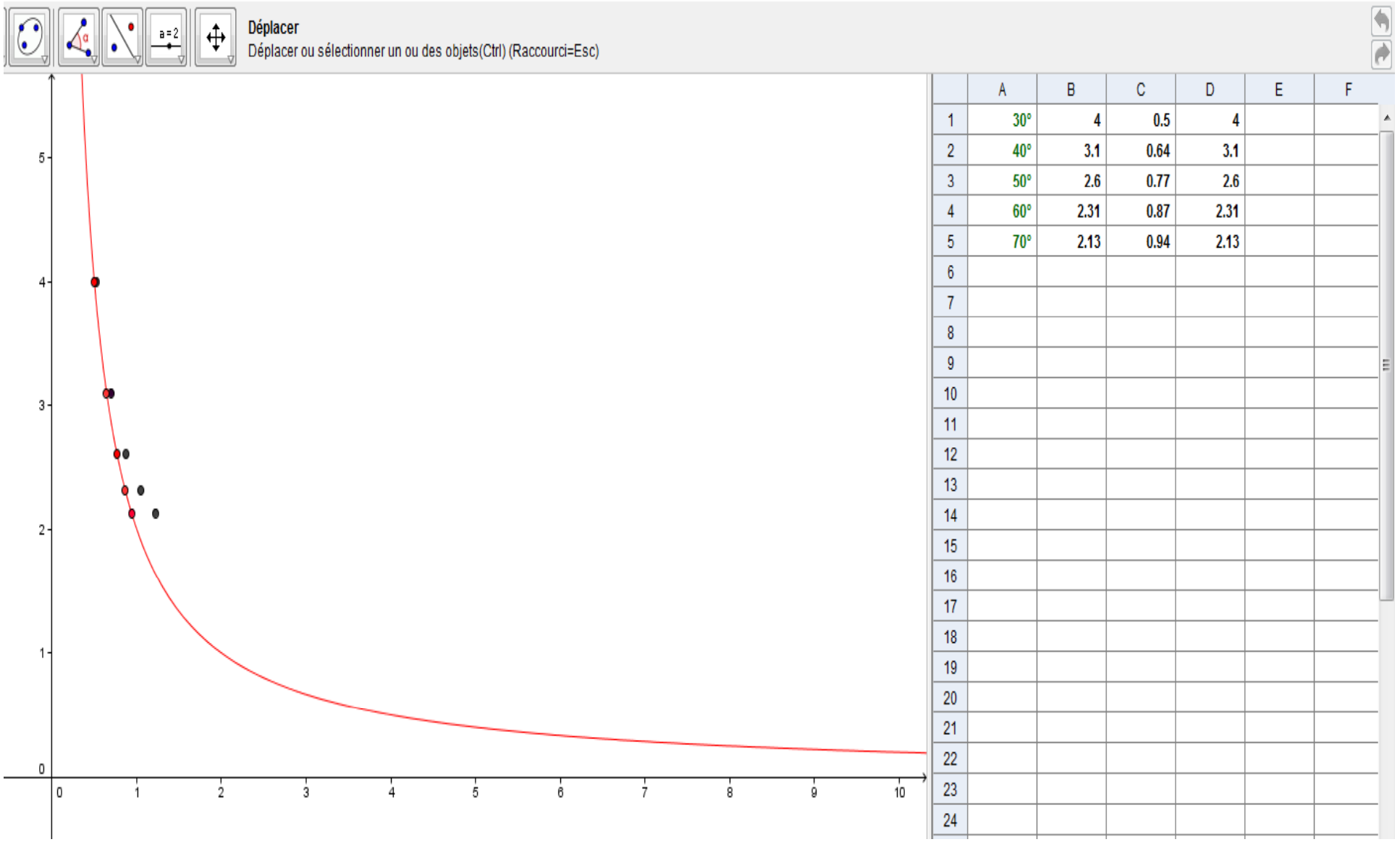
Créer une animation Géogébra qui permette de conjecturer des relations fonctionnelles (à définir) entre les différentes variables, accessibles à des élèves de seconde.

« sinus »



	A	B	C	D
1	30°	4	0.5	4
2	40°	3.1	0.64	3.1
3	50°	2.6	0.77	2.6
4	60°	2.31	0.87	2.31
5	70°	2.13	0.94	2.13

« sinus »



	A	B	C	D	E	F
1	30°	4	0.5	4		
2	40°	3.1	0.64	3.1		
3	50°	2.6	0.77	2.6		
4	60°	2.31	0.87	2.31		
5	70°	2.13	0.94	2.13		
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						