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[Who I am](#)

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Les maths comme je les aime ... et comme je les raconte ! 😊

All episodes published : <https://www.mathaslikeit.com>

## Math as I like it /0



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### How it all began 😊

It was just an **introduction to geometry**, but 10 years later, I still have wonderful memories of it.

13-year-old students I had only known for a month, during which we had worked on numbers.

A month isn't long, but it's enough to start learning to work together, to make it natural for these students to have nothing in front of them during the thirty minutes set aside for class as such, except for a pad and a pen on their desks.

It was also natural for them to talk to each other and to me, with one absolute rule: never interrupt anyone (and, I'm not going to lie, give me some priority).

A class of 30 students, all active, but to avoid a Tolstoy-esque proliferation of first names, I will very arbitrarily assign the dialogues in this reconstruction to five of them... and keep only the most significant of the many contributions, whether for the progression or the atmosphere.

"Shall we begin? Name some geometric shapes off the top of your head."

They politely list a few: triangles, quadrilaterals, parallelograms, circles.

"Okay, okay! And what basic geometric element are all these shapes made up of?"

Lounès takes the plunge...

– Lines? Well, segments?

... Ilona corrects him:

– No, not circles!

– No, not circles. So what is it?

After a few seconds of intense thought, she frowns, and her friend Clothilde beats her to it:

– Points! Points everywhere, even inside!

– Well spotted. And even "inside"... except that for me, well, not just for me, apart from the circle, all the shapes you've mentioned are surfaces. So the points you're talking about aren't "inside," they're points on the shape. But we'll talk about that later. For today: **what is a point?**

Lounès again:

– The intersection of two straight lines!

– And what is a straight line?

– A line that goes straight! (\* Actually, it does make sense... in French! Check out the end of the episode 😊)

– Yes, yes, yes... and what is this line made of?

– Well, points?

*He frowns in turn, sensing what's coming:*

*– Are you listening to yourself? You're telling me that a point is what two things made up of points have in common. Doesn't that bother you? It's like if in a dictionary, under "point" it said "see line" and under "line" it said "see point," right?*

*A smile and a grimace – that's Lounès through and through, all fire and brimstone but always ready to admit his mistakes.*

*Ilona doesn't let up:*

*"You're annoying! So what is a point?"*

*"Oh no! That's **my** question! So... what is a point?"*

*Sighs – now it's Clothilde who can't sit still, who jumps into the fray. Literally, she stands up, asks me with her eyes and a gesture for permission to go to the board, takes a marker, and taps it discreetly on the white surface:*

*– That's it!*

*"No, that's a stain!"*

*– Sir! You're nitpicking, it's a point-shaped stain!*

*"Okay, I'm nitpicking..."*

*I take the marker back from him and scribble a sort of disk one or two centimeters in diameter:*

*"Is that a point?"*

*"Well, no, obviously! THAT'S a stain!"*

*"Obviously! Except that if you stand at the back of the classroom, you'll tell me it's a point... and if you look at YOUR point with a big magnifying glass, you'll tell me it's a smudge!"*

*A grimace. She's too logical to get further into this:*

*– OK, so what is a point? A very, very small stain?*

*– I don't know, do you know of any very, very small stains? OK, for now let's say yes, all right. But just for now! So now, if you erase your very, very small stain, is there no longer a point?*

*"Well, no. Well, yes, there!"*

*Naturally pointing to the place where I just erased "her stain".*

*– Wait a minute!*

*With the marker, I "make a stain" on a piece of paper, which I then hold up on the board where I erased her mark:*

*– That's your stain, okay?*

*– Yes, okay.*

*With a very suspicious look on his face. And rightly so, I move away, holding the paper at arm's length, far from the board:*

– Now where's your point?

Exasperated shrug:

– Oh, I don't know! There? Or maybe there?

Pointing successively at the board and then at the piece of paper... and she bursts out laughing because a point in two different places bothers her. Ilona triumphs:

"You've been caught!"

Demba just smiles broadly, scratches his head, and points to the board:

"I'd say there. A point doesn't move... and it doesn't rub off either. What you erased earlier was the ink, not the point."

A definitive statement. When he speaks, it's rarely pointless.  
Good sports, the other three applaud, followed by all the students.

"Yes, well done, Demba. Just one clarification: you say I 'erased' the ink. What does that mean, that I made it disappear? Is it magic?"

Another big smile, a slight shrug of the shoulders, the others wait, counting the blows:

"No, only now it's on the cloth."

"OK, we're making progress. Ink is made up of crystals of matter, and I moved them from the board to the cloth. So why couldn't I do that with the point?"

"Because a point isn't matter?"

"Okay. What is it?"

A long silence, then a new voice from the back of the classroom, where Sébastien had discreetly moved a few minutes earlier – yes, he asked my permission with a glance – to check that, from a distance, the little mark I had scribbled on the board looked like Clothilde's "point":

– Just an empty space? Since there's nothing in it, you can't remove anything!

With an anxious look behind his glasses, as if to say, "Am I saying something stupid?"

I gloat:

"Just" a place, and a place can't be moved, it is where it is! Well done, Sébastien. But ink crystals are objects, not places... and objects can be moved. Or they move by themselves!

Indignant interruption from Clothilde (who has returned to her seat):

"Hey, I'm not an object!"

Sure enough, the class bursts out laughing:

"No, you're not! But words don't have the same meaning for everyone. **For us**, 'object' can **also** be a human being or any other animal, or a plant... anything that isn't a place!"

– A plant doesn't move.

– Of course it does, it moves, it grows. And its roots grow into the ground.

"Okay, but school is... it's a building, not a place, and we can't move it!"

– We could... with a very big truck. Or destroy it, that's also a way of "moving" it, isn't it? In many years' time, you could walk down the street and point to where you used to see our windows and say, "That was the maths classroom"... but there might not be anything there anymore. Or just a big park?

A cry from the heart:

– **Not my school!**

– Okay, fine, we'll turn it into a museum, is that okay with you? But we could still move it.

A new definitive statement from Demba:

"The Earth isn't a place. But we still can't move it."

At this point, I can't hold back, even if for them it must date back to prehistoric times:

– First of all, Archimedes made a comment about that, but anyway, let's not get ahead of ourselves. Yes, we do! We move the Earth all the time – or it moves, whichever you prefer – except that it doesn't decide anything. In any case, it revolves around the Sun. And all the objects on Earth move with it! And don't bother looking, the Sun moves too. All objects in the universe spend their time moving.

A brief silence as they digest the idea.

– Okay? The difference between an object and a place is that an object can be moved or displaced, whereas a place cannot: all you can do with a place is occupy it, vacate it, pass through it... or ignore it, of course!

– Okay, fine... but what does all that have to do with math, apart from the fact that a point is a place?

– It has **everything** to do with math: if all figures are made up of points, that means that all geometry is based on the point... don't you think it's worth thinking seriously about what a point is, then?

– Well, yes, but now we know, don't we?

Ilona's response:

– No, wait! Do you remember what the teacher said earlier? When Clothilde said that a point was a very, very small stain? He said he only agreed "for now"!

It clicks, it clicks, Sébastien takes over:

– Yes. Now we know that a point is a place, but that's not all. What does a very, very small place mean?

– "Very, very small" will never be small enough! Patience, we're getting there. But if you don't mind, let's put places aside for a moment and focus on objects. And your question could become "what does a very, very small **object** mean"?

– An atom?

– It could be, but no, you'll see, it's still much too big. Well, if you look at it with a microscope powerful enough. Okay, listen, we don't have much time left, so would you mind if I take over? With a story?

And I tell them the story of the point object, this object that doesn't really exist, this imaginary object that helps us understand the point so much better... and not just the point, but all of geometry! But since I wrote "donc, d'après" and I'm very lazy, I'm just going to rely on the passage in the book that talks about the point and make it episode /1: the real beginning of "math as I like it."

Episode /1

[Geometry: the starting POINT!](#)

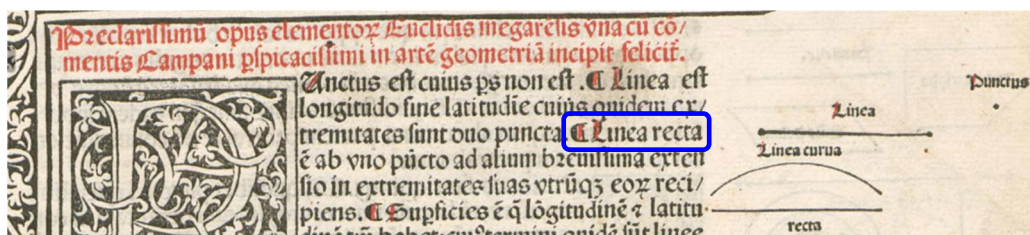
Click here? 😊

(\*) – And what is a straight line? – A line that goes straight! 😐😐😐

The translation of “une droite est une ligne qui va tout droit” cannot be “a line that goes straight”!

Why?

Originally, the French spoke of a “ligne droite” and the English of a “straight line,” in accordance with Euclid's first book of elements, whether in the first known version (that of Erhard Ratdolt, in 1482)...



Erhard Ratdolt – 1482

Source : [https://www.loc.gov/resource/gdcwdl.wdl\\_18198/?q=euclid&sp=7&st=image](https://www.loc.gov/resource/gdcwdl.wdl_18198/?q=euclid&sp=7&st=image)

A point is that which has no parts

A line is a length without width, whose ends are points

**A straight line** is that which stretches evenly between its extremities

or in subsequent versions:

Didier Henrion – 1632

Source : BNFGallica <https://gallica.bnf.fr/ark:/12148/bpt6k1510937s/f9.item> and next page

A point is that which has no parts      A line is a length without width      The ends of a line are points

**A straight line** is one that is equally contained and extended between its points

François Peyrard – 1805

Source digitized by Marc Szwajcer : <https://remacle.org/bloodwolf/erudits/euclide/geometrie1.htm>

A point is that which has no parts      A line is a length without width      The ends of a line are points

**A straight line** is one that lies evenly between its points

Oliver Byrne – 1847

Source : <https://publicdomainreview.org/collection/the-first-six-books-of-the-elements-of-euclid-1847/> (page 20)

A point is that which has no parts      A line is length without breadth      The extremities of a line are points

**A straight or right line** is that which lies evenly between its extremities

And then things got complicated: in “ligne droite,” the French kept only ‘droite’ – which became a noun... and in “straight line,” the English kept only “line” – which was already a noun but in common parlance now refers only to straight lines!

The result:      in French, “ligne” remains a generic word that continues to refer to all lines, straight or otherwise.

In English, it is now the word “curve” that plays this role...

therefore the correct translation of Lounès’ words is:      (a straight line is) **a curve that goes straight!**

As not to upset anyone, the French use either “courbe” or “ligne” interchangeably. Yet, out of loyalty to “donc, d'après,” I will keep using “ligne” in the French version of the episodes.