Philippe Colliard
Who I am

Pour l'épisode en français, cliquez ici ⇨ ***Les maths comme je les aime ... et comme je les raconte !*** 🙂

All episodes published : *https://www.mathasilikeit.com*

Math as I like it /1

The starting POINT!

*Perhaps you haven't read episode **/0: How it all began**? If so, please do! Not just because it's a true story, not just because it still moves me 10 years later: no, simply because this episode begins where the other one ended and complements it. So much so that I'm going to start with the last lines of episode /0:*

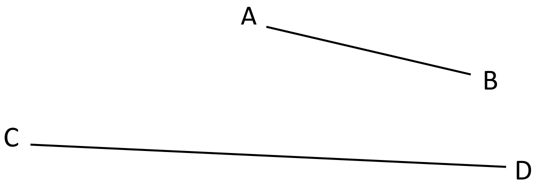
And I tell them the story of the punctual object, this object that doesn't really exist, this imaginary object that helps to understand the point so much better... and not just the point, but all of geometry! ... [a story that will be] the real beginning of "math as I like it."

*– But why is it so important to "better understand" the point? Do you **really** think it's necessary?*

Well, it's obviously debatable! For me it is, for others it isn't. Would you mind if, for a few lines, we pretended that you and I already agree on what a "point," a "curve", a "(straight) line," a "segment," and what "as many" means? Yes? So...

– Hey, you're not waiting for our answer again... but okay, fine, we'll go along with it!

Oops, you're right, sorry! Okay , then:
Look at segments [AB] and [CD].
Which one has more points?



– Hmm, we don't really like when you start like that. Well... [CD]?

You're starting to know me too well😊 ! Actually, they both have exactly the same number of points!

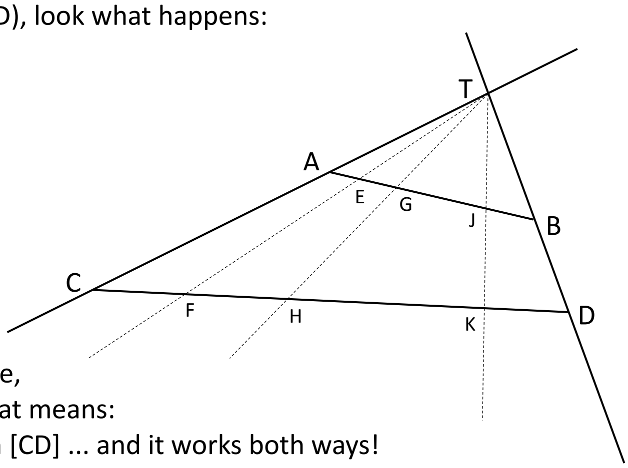
– Yes, of course! Because they have an infinite number of points!

They have an infinite number, that's true, but that's not a good enough reason: there are lots of different infinities! But if I complete the drawing with line (AC) and line (BD), look what happens:

I call T the point common to both lines.

If a ray with vertex T intersects [AB], say at E, it will also intersect [CD] (at F) ...

and if a ray with vertex T intersects [CD] at H, it will also intersect [AB] (at G)!



Okay, just a quick reminder, I'*m talking* about math here, this isn't a lesson! But you can obviously guess what that means: to each point on [AB] corresponds exactly one point on [CD] ... and it works both ways! And that's more or less the definition of "as many"!

Of course, this kind of reasoning only *really* makes sense if the word "point" means roughly the same thing to you as it does to me😊 .

A "something" that is at the heart of the following pages! Shall we go? No, that's not a real question😊 !

In the beginning, there is the "point object"...

I say "at the beginning" but that's just because I chose that order; *I could have* started with "there is the point":
You have to start geometry somewhere, and the one I'm talking about can start with either one (once you have one, the other will be almost obvious). I decided to *invent* the point object because it seems easier to me to imagine the reduction of an object than that of a place, but you have the right to disagree!

You remember the difference between "object" and "place," right?

Yes, of course, we did as you asked and reread episode zero: an object is anything that can be moved – a "real" object or a living being. And a place is... nothing, well, almost nothing. It doesn't move, you can't grab it, it just waits for us to occupy it or pass through it! Except that it doesn't wait for anything at all, it's just there!

Well done, that's a good summary! So, as its name suggests, a **point object** *is* an object. But it's an object unlike any other. In fact, it doesn't even exist, it's an imaginary object!

Excuse me...
Did you say "imaginary"?
And how can that help us???

Of course it can help you!
"Doing geometry" means diving into the imaginary. Juggling with infinitely small, infinitely thin, or thicknessless places... all drawings, even if they seem very precise, are only an extremely rough, extremely imperfect representation of points, curves... they are only there to help us imagine them better.

Shall I continue?

Its defining characteristic: it is "*smaller than small*." But what does that mean?

Choose an object, any object. For example, a remote-controlled model Airbus.
Imagine😊 that you have the power to shrink it 10 times, 100 times, ... a million times...

With a sufficiently powerful microscope, you would still be able to see its shape, its engines, its wings. It is *not* a point object.

Imagine that you stubbornly continue to shrink it, again and again. Until, despite your efforts, it can no longer shrink any further!

With a really powerful microscope, you will be able, one last time, to see its shape, its wings... it is still *not* a point object...

but you insist, you persist in shrinking it once more, *once too often*, and the Airbus implodes: it collapses into itself. And then it loses its shape! No microscope, even a super-powerful one, will ever allow you to make it grow again, to see that it was an Airbus... it has become an object "smaller than small," an object that has exceeded the reduction possibilities of our real universe.

Now ***you have your point object***! And all you can see is a ray of light because its lights were on: but before it imploded, it could just as easily have been a coastal lighthouse or a flashlight (Physicists refer to this as "*point mass*": nothing prevents you from imagining that the Airbus retained the same mass as it shrank, that it still weighs the same).

– So it's a bit like a star in a distant galaxy? All we see of it is a ray of light, even with giant telescopes. It didn't really implode, it didn't become "smaller than small," but it amounts to the same thing: it became "farther than far"! Is that right? To really see it, we would have to get very close to it.

Yes, that's exactly right. You're on form today 😊 ! Except that, of course, even if we can *imagine* that one day we'll be able to get close enough to a star that's millions of light-years away to see it grow larger... we'll *never* be able to get "close enough" to a point object.

... But what place does a point object occupy?

I suppose you've guessed by now? A place "smaller than small." A place that only a point object could occupy without overflowing...

a point!

Don't imagine that all the points in our universe are occupied by point objects:
firstly because point objects don't exist... and secondly because very few points in our universe are occupied, and when they are, it is by very real objects – and each of these objects (even the tiniest of them) occupies an infinity of points all by itself!

On the other hand, it would be reasonable to imagine that a point object *always* occupies a point.
Reasonable, but nothing more: after all, a point object is imaginary, so why not imagine that it could be located "elsewhere" than in a point...

"Elsewhere" **where**?

And that's where it quickly becomes too complicated! Hence the introduction of M_{phy}-0, the first of the physical metaxioms that I introduced in "donc, d'après" which will allow us to breathe:

Mphy-0 A moving point object constantly occupies a point.

This may not seem like much, but all geometric reasoning is based on this property of point objects and points.

See you soon?

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For this episode, I drew on the first pages (in French) of "donc, d'après..." ("so, according to..."): if you wish, you can read them (in French) by clicking on the book cover (just below) and then on

Édition 2019 : extraits

Avant-propos Introduction Partie 1 : la base de la base (80 pages)

Partie 2 : 1er coffret 2e coffret Partie 3 : évolutions dans un plan

Table des matières Remerciements

You can also read (episodes 1a and 1b) the two stories I wrote about the point...

NEVER tell Ioran he's a point! and **No, the Atlanteans haven't (quite) disappeared!**

... But these are not – not at all – math stories. 😊 😊



First and foremost, I want to share: by clicking on the covers, you can access (*among other things*) numerous excerpts from my books!

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