



In the laboratory of Mathematics

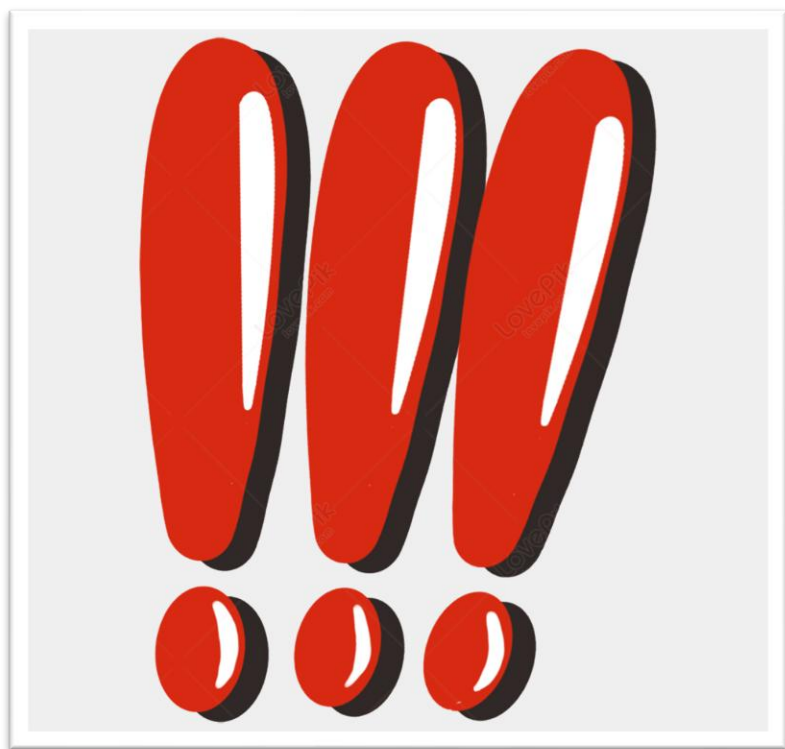
Towards the integral



Riccardo Minisola – riccardo.minisola@unito.it

Riccardo Minisola

Some “products” from this field



For the pupils:

- Laboratory of Mathematics

For the teachers:

- Scuole Secondarie Potenziate in Matematica
- Lesson Study



Scuole Secondarie Potenziate in Matematica

Secondary Schools with Enhanced Mathematics
Programmes



National and local project



Image source: SuperMap.World



Image source: Wikimedia

The national



Image source: SuperMap.World

- 27 universities
- Italian Mathematics Union
- Network of schools
- >150 high schools
- National congress every year
- Multiple events for schools and pupils at the national level

The local

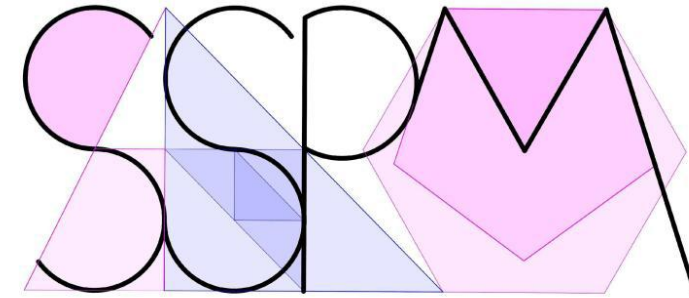


Image source: Wikimedia

- >2000 pupils
- >100 teachers
- >50 schools (primary, middle and high schools)
- For the students: 33 additional hours of laboratory of mathematics
- For the teachers: 20 hours of professional development +
- Database with >100 activities +
- Introduction to current research topics in Mathematics Education +
- Career growth as teacher-researchers

The local group



DIPARTIMENTO
DI MATEMATICA
GIUSEPPE PEANO
UNIVERSITÀ DI TORINO

**IL TEAM del
Polo di Torino**

DF

UNIVERSITAS STUDII TAURINENSIS
1404

UNIVERSITÀ
DI TORINO



<https://www.liceomatematico.it/torino/>

Towards the integral

Improving students learning

- We guide them from intuition to conceptualisation
- We use technology to mediate the content
- We guide the discussion

One fundamental (hard?) truth

- The area under a graph is a *cognitively* meaningful concept for the students

Perceptual

Explorable

Consistent

- The connection between integrals and derivatives *is not* (despite the mathematical importance)

Task	Type of task	Materials and tools
1. <i>Area of an outline</i>	<u>Group work + collective discussion</u> Determine the area of a given outline.	paper and pencil (ruler)
2. <i>Area with grid lines</i>	<u>Group work + collective discussion</u> Use graph paper to determine the area of the shape.	paper and pencil (ruler, sheets with different grid patterns)
3. <i>Area under the curve</i>	<u>Group work + collective discussion</u> How can we determine the area under the given curve?	Paper and pencil + GeoGebra
4. <i>Example from physics</i>	<u>Group work + collective discussion</u> Isothermal transformation.	Paper and pencil + GeoGebra

Your task

- Work with your neighbour to solve as many tasks as possible, and share your observations about:
 - The applications of this task in the classroom: when to do it, why, how it connects to the curriculum, what students need to know to approach the tasks...
- 20 minutes sharing with the whole group

What is the point? Teachers' edition

Developing teaching skills:
new methodologies
new approaches
new teaching ideas

Developing meta-teaching skills: developing the
ability to analyse tasks with a critical standpoint

References

Website of Liceo Matematico - <https://www.liceomatematico.it/>

Website of Scuole Secondarie Potenziate in Matematica - <https://difima.i-learn.unito.it/course/view.php?id=159>

Thank you very much!

Grazie mille!

Dziękuję bardzo!

ありがとうございました

