

Senegalese Students Build a Harmonograph

Can art and mechanics come together to teach mathematics? A group of Senegalese high school students think so thanks to a hands-on harmonograph project.

Last year, the Museum of Black Civilisations in Dakar hosted a science exhibition (see expo-scientifique.github.io/2025). The event was initiated by TerangaMath, a Senegalese non-profit led by members of the diaspora, dedicated to promoting maths among young people through outreach, experimentation and inclusion.

Bringing together more than 2500 students and visitors, the event featured 25 interactive stands highlighting mathematics through games, hands-on experiments, historical narratives and digital tools. Among them, one project stood out: a fully functional harmonograph (see photo) built by students.



Image Credit: TerangaMath

A student-built harmonograph

The harmonograph was developed by eight students on the science and engineering track (15–16 year olds) at Seydina Limamoulaye High School in Guédiawaye, a suburb of Dakar. In my role as an actuary and mentor from TerangaMath, I guided the students as they balanced academic responsibilities with practical sessions held during school breaks.

The process was not without its challenges. Early versions of the harmonograph faced problems with balance and movement. Supported by a school carpenter and guided virtually by harmonograph expert Dr Sam Kamperis FIMA, they explored how pendulum motion and geometric patterns can be translated into a physical drawing device. This support proved vital to the project's success, empowering the students to move from theory to functional design. Through trial, teamwork and redesign, the students produced a working model that created precise, elegant curves.

A tangible way to learn mathematics

The students described how the experience changed their view of mathematics: no longer abstract or intimidating, but creative, collaborative and physical. Building the harmonograph helped them connect mathematical principles with real-world mechanics and artistic expression.

Enabling support from the IMA

The students and the TerangaMath team thank the IMA for a £150 grant that funded essential materials – wood, weights, string, screws and drawing supplies – and for facilitating the virtual workshop with Sam.

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