NOTES de la SMC

Notes pédagogiques

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# An Invitation to Eventmath

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*Education Notes bring mathematical and educational ideas forth to the CMS readership in a manner that promotes discussion of relevant topics including research, activities, issues, and noteworthy news items. Comments, suggestions, and submissions are welcome.*

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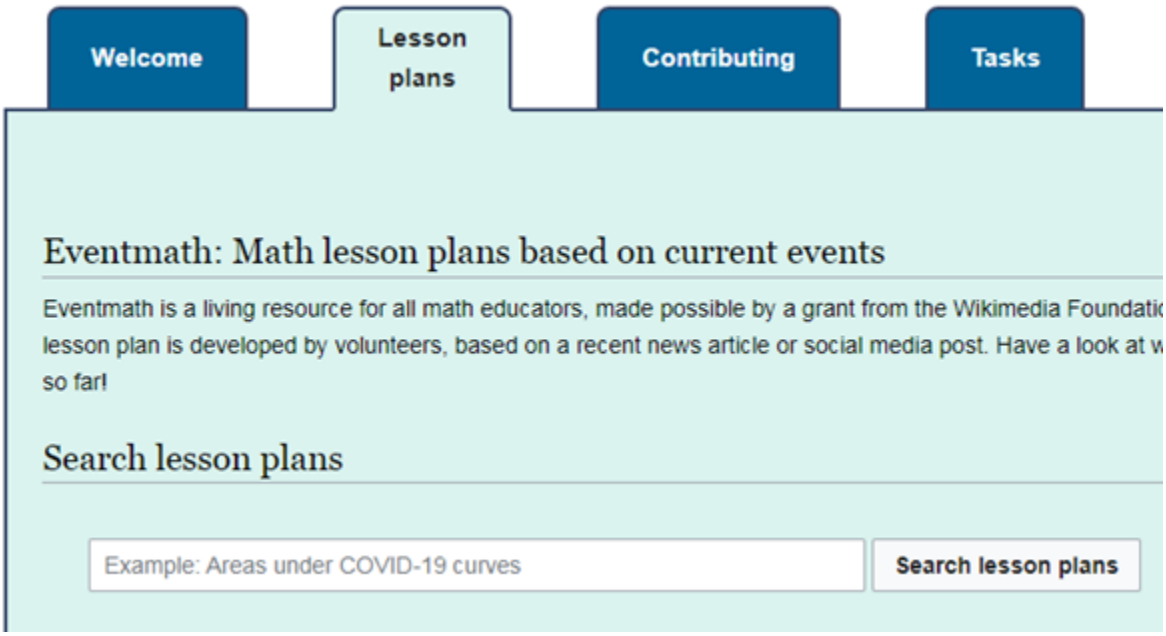
> *"Mathematical literacy is an individual's capacity to reason mathematically and to formulate, employ, and interpret mathematics to solve problems in a variety of real-world contexts" (Programme for International Student Assessment, 2022).*
>
> *"Mathematical literacy involves more than executing procedures. It implies a knowledge base and the competence and confidence to apply this knowledge in the practical world" (Ontario Ministry of Education, 2020).*

## 1. What is Eventmath?

Eventmath is a new open-access wiki for math lesson plans based on current events. Each lesson plan is inspired by a news article, social media post, or video.

Eventmath is also a small but growing international community. Our aim is to help students wield math as a tool for understanding their world. We're building something big, and we want you to be a part of it!




## 2. Why is Eventmath necessary?

The need for Eventmath is based on three observations.

First, misinformation and disinformation are global threats. Canada is no exception: According to a research report from Evidence for Democracy, a non-partisan not-for-profit organization funded by the Government of Canada, "Misinformation and disinformation are ongoing threats to the health and safety of the Canadian public, as well as the basis of democracy" (Heer et al., 2021).

In early 2021, Evidence for Democracy surveyed 180 academics at Canadian institutions. The survey sample was drawn primarily from within their network, which is focused on evidence-based policy. They found wide consensus among respondents that the magnitude of misinformation would only increase in the future, and that addressing misinformation was part of their role as

academics.

Second, mathematical literacy is crucial to countering misinformation and disinformation. In 2020, a study out of Cambridge was published in *Royal Society Open Science*, based on data collected from at least 700 participants in each of five countries (Roozenbeek et al., 2020). The analysis showed that out of fourteen predictors–including variables such as age, education, and political ideology–the most consistent predictor of decreased susceptibility to misinformation about COVID-19 was performance on numeracy tasks. When asked about the finding for a story in *The Guardian*, coauthor Dr. Sander van der Linden replied that "it gives me hope that there's a solution out there" (Grover, 2020).

If Eventmath is to be a solution, we must start by recognizing that mathematics and mathematical literacy are distinct. As explained in the Cambridge study, "the construct of numeracy does not merely measure mathematical ability but captures the ability of individuals to understand and use quantitative information more broadly." Accordingly, the researchers assessed numeracy with questions placed in a real-world context. Here is a typical question, which was borrowed from an earlier study (Schwartz, MD, MS et al., 1997):

"In the BIG BUCKS LOTTERY, the chance of winning a $10 prize is 1%. What is your best guess about how many people would win a $10 prize if 1,000 people each buy a single ticket to BIG BUCKS? ____ person(s) out of 1,000."

Although the Cambridge researchers assessed only basic numeracy skills, they also demonstrated the value of advanced quantitative skills in combating misinformation. After all, they had a large data set with many variables; without higher-level concepts such as multiple linear regression, they would not have discovered the special role played by numeracy. So, for the purposes of Eventmath, it's convenient to include both basic skills and advanced skills under the umbrella of mathematical literacy.

But can Eventmath help us teach advanced skills? It can. That's because scientific research is often covered in the media, whether it's in a *tweetorial* on Twitter (Gero et al., 2021) or in the science section of a news publication. For example, the Cambridge study cited above was covered by a story in *The Guardian*. Using that story as a jumping-off point, an Eventmath lesson plan could ask students to locate the original research. Since the data were all made publicly available, students could even be asked to reproduce the results on their own!

Third, media sources provide special opportunities for building mathematical literacy. To be clear, mathematical literacy demands that students not only solve problems within an authentic context, but also that they identify problems worth solving, and that they make a habit of doing so. Let's consider how teaching from media sources addresses each of these requirements. A media source encountered in everyday life is, ipso facto, authentic. And as Watson (2004) noted, "rarely does an article actually state a 'problem' in the form students would expect from their experience with text books [*sic*]. There is hence the opportunity for problem posing as well as problem solving." Lastly, media sources "provide a venue for continued practice" (Madison, 2014). Practice is key to habit formation.

To build the necessary habits, the general theory of habit formation suggests that students must repeatedly engage in mathematical thinking "in the presence of a cue or set of cues (i.e., context) so that cue-behavior associations may develop" (Gardner & Rebar, 2019). The media sources are the cues that students will continually encounter outside of the classroom. We need more longitudinal studies to evaluate this line of reasoning, but the limited evidence available so far is encouraging (Madison, 2014).

The difficulty, as Ceesay (2011) puts it, is that "assembling a cornucopia of interesting articles can be a daunting task." Current attempts at addressing this difficulty are based around textbooks and static websites. Unfortunately, textbooks are expensive, they quickly become outdated, and they're limited in scope and depth. Existing web resources are scarce and they lack robust feedback mechanisms.

The imperative is clear: we must develop accessible teaching materials based on authentic media sources. Math educators are already present in nearly every school, at every level; they are well positioned to teach mathematical literacy at scale. With the right resources, they can help students combat misinformation in their own lives.

### 3. Who makes Eventmath?




Nonprofit organization

Wiki for education

Wikiversity project

Let's start with Wikipedia. The online encyclopedia is one of the five or ten most trafficked websites in the world (Semrush, 2022; SimilarWeb, 2022). It's volunteer driven, free of charge, free of ads, and a tremendous source of information when used wisely. In fact, media literacy experts say it's often fact checkers' first stop (McGrew et al., 2017).

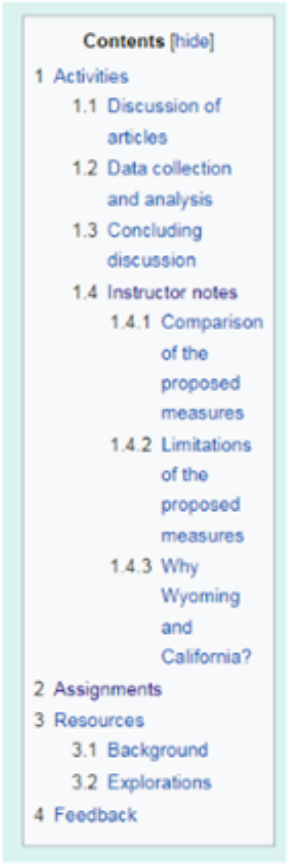
This is all possible because of the Wikimedia Foundation, which is the nonprofit charitable organization that hosts Wikipedia, as well as other projects such as Wikiversity. Wikiversity runs on the same software as Wikipedia, but instead of encyclopedia articles, it hosts learning and teaching resources. Actually, if you already have a Wikipedia account, then that account is good on Wikiversity too.

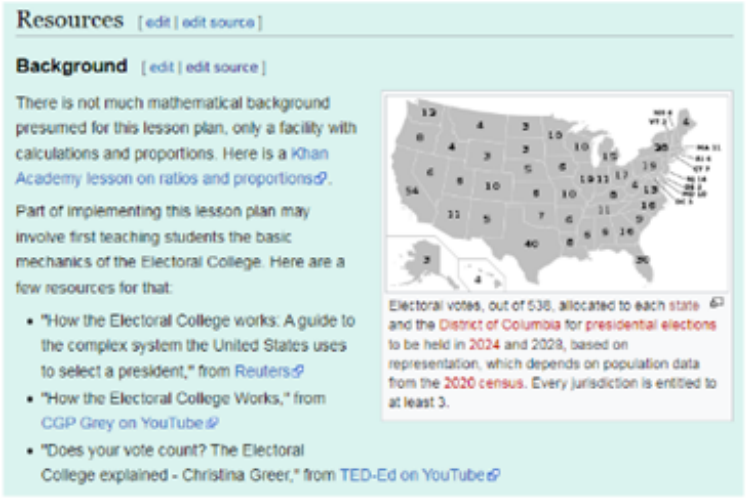
Eventmath is situated within Wikiversity, thanks to a grant from the Wikimedia Foundation. So, Eventmath is built on solid ground, and it's ready to scale. That scaling will happen because of a community of mission-oriented educators and researchers. In short, *you* make Eventmath.

## 4. What's in an Eventmath lesson plan?

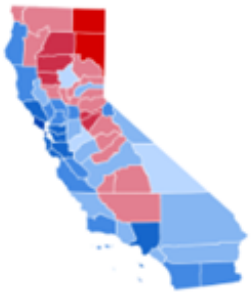
Lesson plans range from bite-sized warm-up quizzes to detailed notes for full class periods.

To facilitate browsing, each lesson plan features an overview box at the top, listing vital information such as assumed knowledge, estimated class time, and a link to the media source. If the source contains misinformation, the lesson plan will include a mathematical refutation, but plenty of reliable sources also make for good lesson plans. Below the overview box, there are suggested sections for activities, assignments, and resources.



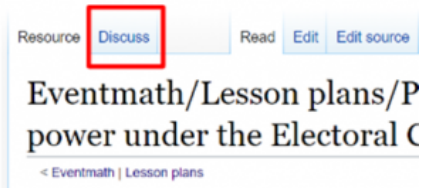




| Decimal notation | Scientific notation |
|---|---|
| 2 | $2 \times 10^{0}$ |
| 300 | $3 \times 10^{2}$ |
| 4321.768 | $4.321768 \times 10^{3}$ |
| −53000 | $-5.3 \times 10^{4}$ |
| 6720000000 | $6.72 \times 10^{9}$ |
| 0.2 | $2 \times 10^{-1}$ |
| 987 | $9.87 \times 10^{2}$ |
| 0.00000000751 | $7.51 \times 10^{-9}$ |



Last, but certainly not least, is a feature that's only possible on an interactive website: an endorsement button. This provides a quality signal for those wishing to choose a lesson plan, since it allows educators to leave comments based on classroom experience.


But, this isn't Amazon. Not only are the products free, but also users can make them better! Every lesson plan comes with an attached discussion page. So, instead of leaving a negative review, educators are encouraged to leave constructive feedback, or to be bold and improve the lesson plan themselves.




## 5. What topics does Eventmath cover?

- **Math types:** Arithmetic, Algebra, Geometry, Calculus, Probability, Statistics…
- **Event types:** Business, Culture, Economics, Education, Government, Health, Science…

The categories may be construed broadly. For example, applications of differential equations may be placed in the calculus category. Other categories can easily be added, however advanced they may be.

To illustrate the power of the platform, links to ten lesson plans from the community are provided below. You, dear reader, can make one of them better right now!

- Dimensional analysis, shipping, and an impossible weight limit
- Comparing streaming service pay rates to artists
- Proportions and voting power under the Electoral College
- White House chart exaggerates economic growth
- Simpson's Paradox in COVID vaccine efficacy data
- California and New York cannot actually decide the popular vote
- Estimating the cost of preventing climate breakdown
- Medium versus large pizzas

- Using inclusion-exclusion to understand COVID reinfection
- Second derivatives and economic inflation

"Dimensional analysis, shipping, and an impossible weight limit" is almost sure to blow your mind! It was developed by a participant at an Eventmath workshop.

"Comparing streaming service pay rates to artists" is also worth pointing out, and not just because students love it. This lesson plan is based on a tweet from an artist with nearly a million followers on Twitter, and she retweeted the lesson plan when it was shared on Twitter. The moral? Misinformation can spread, but so can quantitative literacy.

## 6. What are the use cases for Eventmath?

There are more possibilities than limitations. You may find some inspiration below.

- **Projects:** Anyone can select a single lesson plan for a student project, without having to purchase a whole book.
- **Supplements:** We can create pages with curated lists of daily warm-ups, to supplement courses on traditional math subjects at any level.
- **Full Curricula**
  - **Quantitative literacy:** We can create pages with curated lists of links to lesson plans that comprise curricula for semester-long courses on quantitative literacy.
  - **Journalism:** We can build a course on quantitative methods for journalists, such as COMM-260 at American University. For example, lesson plans can ask students to find errors in published stories, in line with the model statistics course proposed by Martin (2017). Does your institution have such a course? If not, why? It's critical that we don't forget about the supply side of the information market (Ranney et al., 2008; Harrison, 2020).
  - **Education:** Pre-service teachers can publish a lesson plan as part of their coursework, and during practicum, they can implement it!

## 7. How does Eventmath help educators?

How about a holiday metaphor? 'Tis the season, after all. Eventmath is essentially a cookie exchange! If each educator brings just one educational treat to this party, we can all leave with a tin full of goodies.

Whatever the season, Eventmath is designed to make things easy.

**Easy to find:**

The site itself already takes the top spot in a Google search for "math lesson plans based on current events." Within Eventmath, educators can use filters to search for lesson plans at the intersection of multiple categories (e.g. calculus, government, 45-60 minutes). And they can browse a self-updating directory organized by categories relevant to them.

**Easy to use:**

All lesson plans are fully open access.

**Easy to share:**

Like any webpage, the lesson plans are easy to share through social media, email, or a personal website. If you've started a lesson plan yourself, you could share it to find collaborators, or to invite others to use and possibly endorse it. Or, you can download a PDF version for printing. Since it's a wiki, you can link to your history of contributions as well.

**Easy to cite:**

If you've polished a lesson plan to your liking and want to link to that particular version, you can do that easily; you can even generate a citation for it in your preferred format, by clicking "Cite this page."

## 8. How can I contribute to Eventmath?

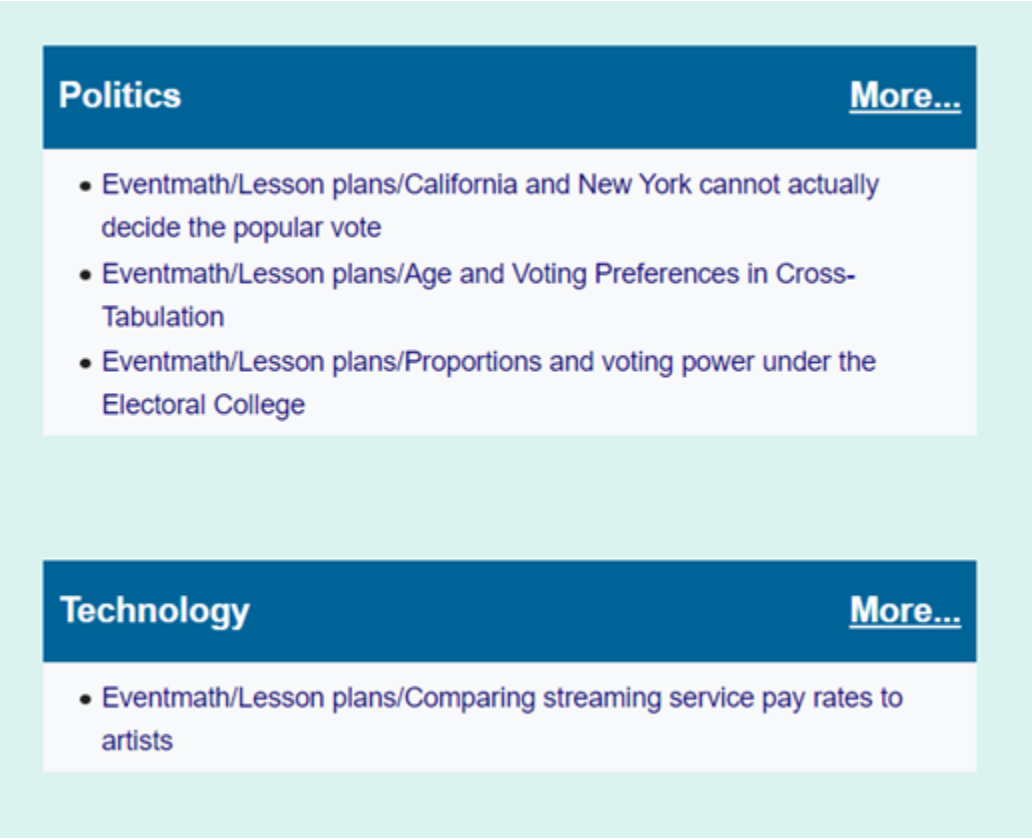
There are a variety of small ways to make a big impact. On the Eventmath site, these are continually organized in a prominent Tasks page.

For example, let's imagine you have a rough idea for a lesson plan, but you're short on time. If you have a possible title and a media source, then that's enough! You can click "Create lesson plan" to publish your idea. When you do, a link to the page you created will automatically appear in a directory of drafts on the Tasks page, under categories you select. Then, other educators will be able to build on your idea.

There are many other valuable ways to participate. Here are a few:

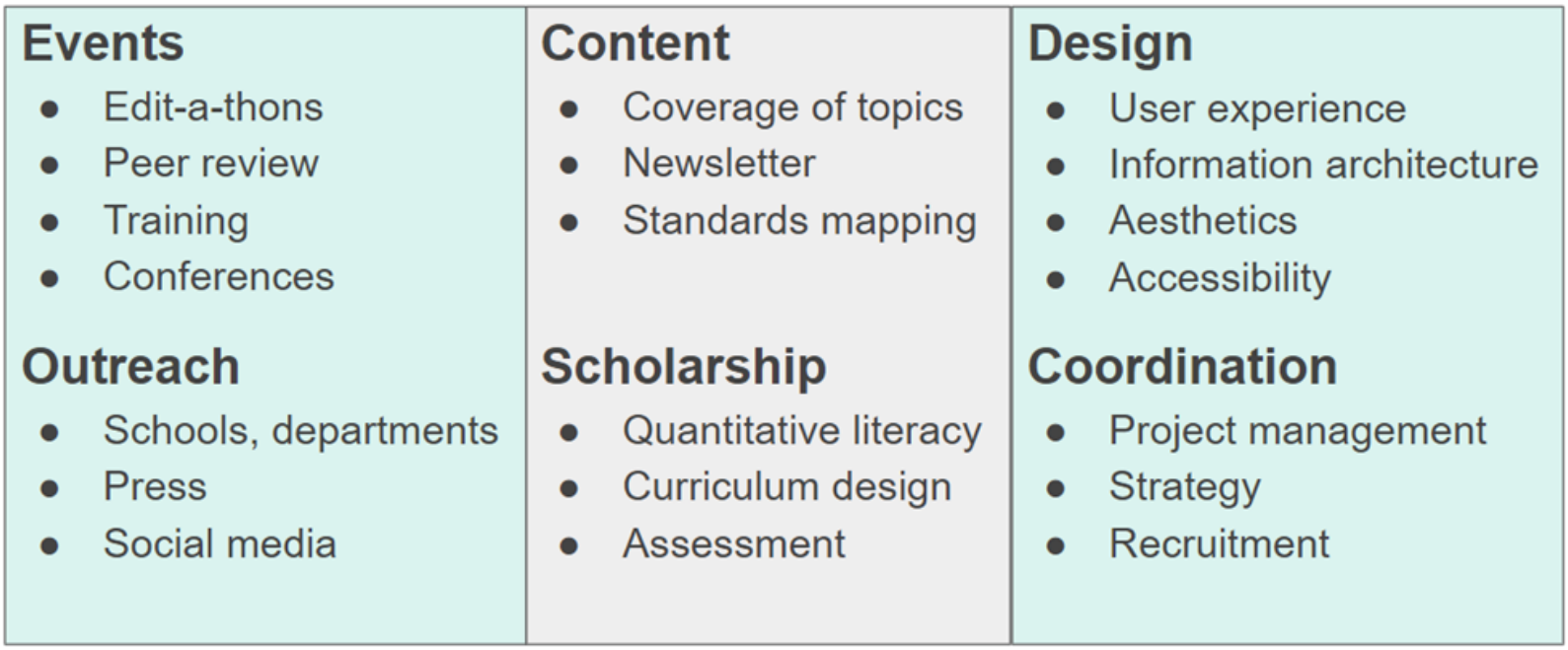
- Use lesson plans in the classroom
- Add feedback or endorse lesson plans based on classroom experience
- Share lesson plans on social media with the hashtag #Eventmath
- Share Eventmath with colleagues
- Link to Eventmath (linking from any site helps with discovery and search)
- Provide peer review of lesson plans

However you participate, you're welcome to create a short profile for yourself or your organization on the Eventmath Participants page. This helps others to see a role for themselves within the project! Speaking of roles…




### 9. What opportunities does Eventmath offer?

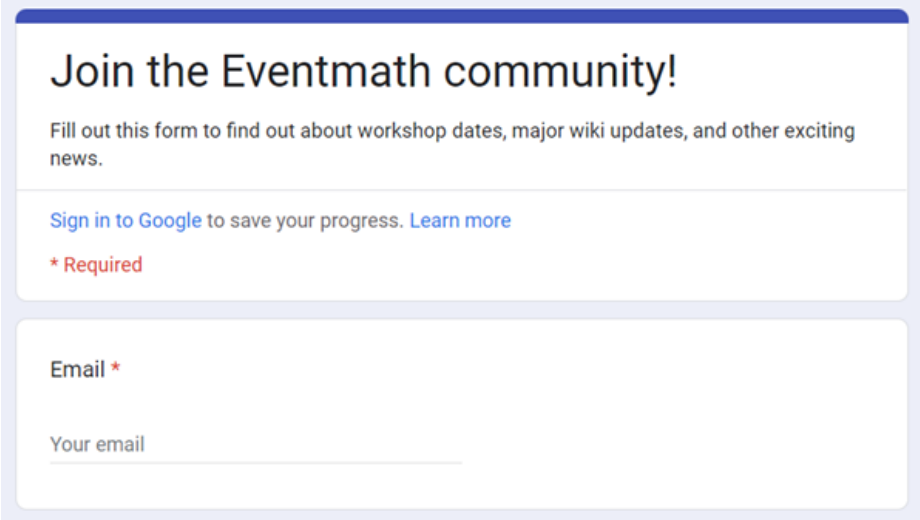
According to Wikimedia's Leadership Development Working Group, "Leaders are considered a key success factor for any project" ("Leadership," 2022). If you'd like to help pioneer Eventmath, there are opportunities for leadership in a range of areas.




The current focus is developing a community and a critical mass of content, as defined in our original grant proposal. Going forward, we expect to shape leadership roles as a community. If you're interested, please reach out!

### 10. How can I stay updated about Eventmath?

To find out about workshop dates, major updates, and other exciting news, you can fill out our community form!

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