55 Exchange Place, Suite 603, New York, NY 10005
(888) 264-2793
info@beammath.org
www.beammath.org

RFP: Online Math Provider for BEAM National Programs

Summary

Bridge to Enter Advanced Mathematics (BEAM) works to create pathways for students from low-income and historically marginalized communities to become scientists, mathematicians, engineers, and programmers. Through our work, underserved students with talent in math gain access to resources and programs for advanced study and the mentorship to help them take advantage of these resources.

While BEAM currently operates in New York City and Los Angeles, it is our goal to reach students nationwide. The subject of this RFP is an initiative to provide access to advanced study for students across the United States. Low-income students in elementary and middle school would receive free access to high-quality online learning; those who do well and are accepted to continue would attend a national, residential summer program in the summer after seventh grade, and would have continuing support and mentoring thereafter. We believe this will transform the lives of high-potential students across the country who currently do not have access to challenging mathematics.

We are looking to collaborate with an established organization for the online learning component of the project. Once the collaboration is in place, BEAM would seek philanthropic funding to support the work.

About BEAM

Bridge to Enter Advanced Mathematics (BEAM) is a project of the Art of Problem Solving Initiative, Inc., a 501(c)(3) organization. We work to create realistic pathways for students from low-income and historically marginalized communities to become scientists, mathematicians, engineers, and programmers. We believe that math is beautiful, and all students should have access to deep and interesting math; that STEM provides a critical gateway to fulfilling, well-paid careers; and that more and more power and influence in society is centered around science and technology, so broader access is even more important. However, an honest appraisal shows that the doors to mathematics and science are often closed because underserved students do not have the same opportunities for advanced study as their more privileged peers.

Many of us involved in running BEAM have been the beneficiaries of programs that provided access to more advanced work that changed our perspective on both mathematics and the community of people who do mathematics. However, we also see that these programs are rarely able to reach out to underserved populations. Our program is unique because instead of focusing on minimum competency or gaining basic exposure to STEM work, we help participants access the same advanced math that already serves as a pathway for students to STEM fields. BEAM students learn to solve challenging problems, develop reasoning skills, and ultimately do real mathematical proof. Moreover, we believe in a deep and continuing investment in our students, supporting those who pursue STEM from middle school all the way

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to college graduation. We believe that advanced work and a deep, long-term personal investment can open the doors to STEM careers.

BEAM's existing programs begin in middle school with intensive summer programs (after 6th and 7th grade). Following those programs, we provide Saturday classes and individual advising through high school. Students interested in declaring STEM majors continue to receive personal advising through to and during college.

Our focus is on giving students access to the same programs and resources as their more connected peers: specialized programs for advanced study; top high schools; great colleges. Our successes include students being admitted to high schools such as Stuyvesant, Bronx Science, and Bard High School Early College (with over 50% of all BEAM New York students admitted each year to what we identify as "Tier 1" high schools), as well as 90%+ college enrollment with many at top colleges ranging from Princeton to Barnard to USC. BEAM students have also gone on to highly selective summer programs for continued enrichment. BEAM students become part of a family; many stay in touch and give back, working for us as counselors at our summer programs.

BEAM's work has been featured in the *New York Times* and the *Atlantic*. The *Times* article, in particular, is a good description of the early experience for students. You may also find it helpful to view our annual report.

About the Project

We envision that our national programs will provide a realistic pathway for students from anywhere in the country to succeed in math and math-related fields. BEAM is seeking a high-quality online math education provider to facilitate the online learning components of the program, and to be an integral part of bringing access to high-level mathematical resources to underserved students nationwide.

The overall program is designed to be a comprehensive program providing longitudinal support. Students would begin the program as early as 3rd grade and receive scholarships to online learning through 7th grade. In addition, partner districts may also offer a (locally funded) program modeled after our 6th grade program, BEAM Discovery, to build mathematical community and enable students to learn a broad variety of deep enrichment mathematics. Students who are especially successful online (and have thus demonstrated both interest and capacity for more advanced work) may apply during 7th grade to join the BEAM Pathway Program, which will begin with a residential summer program run directly by BEAM for students from around the country to learn deep, advanced, proof-based mathematics. When they return home, students in the Pathway Program will continue in online classes and receive remote online mentoring from BEAM staff and volunteers to assist them in accessing future opportunities for advanced study, including other summer programs and colleges. They will also return for a conference during one weekend each year to present their progress and continue to learn math together.

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Students can become a part of the program through two mechanisms. First of all, we will partner with local school districts and community organizations to identify promising students. Students will also be able to apply individually, giving underserved students from any part of the United States the opportunity to participate in the program.

Partnership with BEAM

It is our goal to find an online provider who already has an appropriate set of online (and possibly offline) materials that can be used by students in the program. We envision a division of responsibilities roughly as follows. For early grades, we recognize that not all providers will have materials appropriate for those grades and so offering that content is not required.

	Online Provider	BEAM
Grades 3–5 (if content available)	• Provide high-quality online math content to 2000+ students. • Provide data/progress reports on student work to BEAM and school districts. • Create a fun, compelling, motivating experience for students. • Provide technical support for students and families.	• Source students through national recruitment channels and school district partnerships. • Verify financial eligibility of students. • Foster a sense of membership in the BEAM community among students.
Grade 6	As above.	As above, plus: • Provide an application, metric, or process for students to continue with the program and select participants for continuing.
Grade 7	• Provide high-quality online math content to 100+ of the most successful/engaged students selected by BEAM to continue work. • Provide data/progress reports on student work to BEAM and school districts. • Create a fun, compelling, motivating experience for students. • Provide technical support for students and families.	• Provide an application for continuing to the BEAM Pathway Program. • Run residential summer program for 40 qualifying students.

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Grades 8–10	• Provide online classes to supplement school classes for 40 students in the Pathway Program.	• Provide personal mentors (online via videochat) for Pathway Program students. • Advise students on applications to further enrichment programs. • Run conference weekend for students to gather.
Grade 11–12	As above. If available, provide online SAT/ACT prep.	As above, including support for college applications.

As a charitable organization, BEAM will seek philanthropic funding to cover the online provider's expenses. However, it is our hope to find a provider who will provide the program at cost in service of our charitable mission. We expect the partner to have non-monetary ancillary benefits such as media attention, a broader user base, and evaluation of program impact on underserved populations, publicity to school districts, and increased visibility.

Program Timeline

- **June 1, 2019:** RFP posted.
- **August 31, 2019:** Preliminary RFP submissions due.
- **September 30, 2019:** Preliminary RFP response from BEAM; additional information may be requested.
- **October 31, 2019:** Additional information due.
- **November 30, 2019:** Final partner commitment.
- **December 2019–June 2020:** BEAM continues internally developing the program, developing school partnerships, and applying for external funding.
- **September 2020:** Program launch date (funding dependent). Students in 6th grade and younger begin applying and taking online courses.
- **September 2021:** Students in 7th grade and younger begin taking courses.
- **January 2022:** Applications open for BEAM Pathway Program.
- **Summer 2022:** First Summer Away program, year-round support begins.

RFP Process

We are looking for a partner as committed to access for underserved students as we are. This project needs to be a true partnership with both organizations working on behalf of the students and supporting our applications for funding.

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Of course, it is also important to us that the product we're offering to students is both high quality and aligned with the mathematical work that we do with our students. We will assess fit using the attached rubric. In particular, our program is called Bridge to Enter *Advanced* Mathematics; we are looking for a platform that can push students to think more deeply about mathematics and go beyond school math. We prefer quality (good problems and instructions) over quantity or acceleration. While we have tried to provide precise measures when possible in the rubric, we recognize that many are subjective; an independent group of BEAM staff members and board members will evaluate the proposals based on the information provided.

Completing an RFP requires a significant time investment, and so we are doing a two-stage process to make it as easy for potential partners as possible. In the first stage, we are asking primarily for easily-accessible information and overall statistics. If we think there may be a strong fit, we will then ask for additional information. We may also ask for access to the system to get a feel for it live.

The initial RFP consists of the questions below. We will filter through the responses and then reply with next steps.

As is probably clear, this project is dependent on securing funding. We think there is likely to be significant interest from potential funders and we have already begun having preliminary conversations. However, because the overall product is so dependent on the online provider, we do not want to approach funders formally until this RFP is concluded.

RFP Questions

Please submit a document with the following.

1. Name of organization and primary contact information
2. Organization type (e.g. for-profit corporation, partnership, nonprofit, etc.)
3. Name of platform
4. What grade levels is the platform intended for?
5. Content:
    a. Is the content primarily aligned to school content, primarily enrichment, or a combination?
    b. If the platform is aligned to school content, does it fully cover standards for any grades of school? Specify grades as well as standards alignment (eg if it is aligned to CCSS or state standards).
    c. If the platform has enrichment elements, what enrichment topics are covered?
    d. Does the platform have any outside accreditation, e.g. as a school?
6. Give a brief description of the platform and the overall ways that students interact with it, or point us to a website with a clear description.
7. Give a very brief summary of the teaching philosophy of the platform. (1 paragraph)

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8. When a student uses the platform, what is most important to you when you think about their success?
9. Provide answers to the following questions about the platform if not answered above:
   a. Do students interact with an automated system, a live class, or something else?
   b. Do students communicate with one another at any point?
   c. Are there any offline components or optional supplements?
   d. How do students learn new information? Through text? Audio? Video? Something else?
   e. What is the format of math problems presented to students? Are they primarily multiple choice, numerical answers, or free response? If they are free response, how are they assessed for correctness?
   f. How do students progress through the platform? What determines the subject that they work on? What determines if they continue to another topic? What happens if they're stuck on a question?
   g. Are there any unique elements of your platform that you think are especially important or powerful?
10. Technology:
   a. Describe what technology can be used to access the platform. In particular: does it work on a computer? Tablet? Smartphone? Is access via software or a web browser?
   b. How many students does the platform currently serve each year?
   c. Is all work completed online? Is there any offline component (either optional or required)? How does it work?
11. Audience:
   a. We'd like to get a sense of whom you usually serve. Who is the typical audience for the platform? For example, is it mostly students accessing it via their schools? (If so, what types of schools? Primarily urban, suburban, or rural? Primarily Title I? etc.) Is it primarily homeschoolers? Primarily students seeking enrichment? Another group, or a mix?
   b. If there are other audiences that use your platform but in smaller numbers, tell us about them.
12. Data:
   a. If you collect this data, what is the retention of students on the platform?
   b. What data is tracked for students? In what format would that data be accessible to BEAM for BEAM students? Is this system already in place, or would it have to be built for this collaboration?
   c. How are students assessed on their success, or how do they self-monitor their progress?
   d. Have there been any studies of the platform, or is any other data available on the project's effectiveness? (While BEAM intends to evaluate the mathematical fit of the platform primarily through our review committee, this data may play a role in our assessment and will likely be useful when seeking external funding.)

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13. What do you estimate the cost per student per year would be for this project? (If it varies by grade level, please indicate that.)
14. Please provide two examples of problems that encourage creativity or deeper student learning.
15. If possible, please provide a link to somewhere that we can observe how students learn new content on the platform. (For example, links to videos if they learn via videos.)
16. Is there anything else you'd like us to know?

Again, we recognize the time that it takes to complete a process like this. Thank you for your commitment to this kind of outreach!

Submitting Replies and Questions

Please send any questions as well as the final submissions to Daniel Zaharopol. Submit via email to danz@beammath.org.

Online Provider Selection Rubric

	Category	Unacceptable (not eligible)	Meets qualifications (1)	Good (2)	Strong (3)	Exceptional (4)	Weight
Mathematics	Student ages	Does not offer 5th & 6th grade appropriate content.	Demonstrated success serving 5th & 6th-grade students	Demonstrated success serving at least four consecutive grades from 2nd through 10th grade including 5th and 6th grades.	Demonstrated success serving at least six consecutive grades from 2nd through 10th grade including 5th and 6th grades.	Demonstrated success serving all grades from 2nd through 10th grade including 5th and 6th grades.	3%
Mathematics	Depth of content	Presentation of material is primarily procedural, not conceptual; communicates mathematics as something "handed down from above"; does not get at why things are true.	Instruction consistently demonstrates the importance of mathematical reasoning and shows why things are true.	Instruction demonstrates to students how they could have come up with the same ideas. In addition to results and methods, definitions are also motivated.	Instruction integrates with problems where students are guided to make some important observations themselves.	As before, and the review committee finds the product exceptional on this measure.	10%
Mathematics	Use Cases	Topic or presentation is not grade-appropriate. Problems are provided with no mechanism for students to learn the content.	Provides both instruction and problems on grade-appropriate mathematics but without comprehensive coverage; can be curricular or enrichment.	Provides a broad array of topics, wide enough that no students will run out of material, but not systematically covering all topics at grade level. Content might still be curricular or enrichment.	Covers standard grade-level topics (e.g. Common Core) fully, such that it could function as a replacement for school math classes. Accredited or otherwise has a record of being accepted by schools for credit in the course.	Covers both Common Core topics and enrichment topics to extend student thinking, so that students get deep enrichment in addition to required school mathematics. Carries accreditation or similar as before.	5%
Mathematics	Depth of mathematical assessment	No meaningful way for students to contribute answers. All questions are multiple choice.	Problems are mostly multiple-choice, with a few numerical responses.	Problems are mostly numerical responses, with some multiple choice.	Problems include more free-form responses (such as puzzles, drawings, etc.)	Problems include free-response text responses in addition to other interactive manipulations.	10%
Mathematics	Problem quality	Problems are mostly procedural and routine.	Many problems require creativity and deeper thinking. Problems reinforce important procedures while also having a "twist" that provokes deeper thought. Problems are fun.	As before, but several problems require significant creativity.	Many problems are extremely inventive and build student reasoning and understanding. Problems are beautiful.	Exceptional problem construction; problems consistently draw out higher-level thinking without skipping needed practice on procedures. Problems inspire curiosity.	10%
Mathematics	Adaptability	Linear pathways that do not adapt to student level with no hints. Insufficient challenge for advanced students.	Linear (and sensible) progression, but with a robust hint system to prevent students from getting stuck. Some "challenge problems" or other source of fun, challenging math problems.	Students have choice over what problems they solve such that they can adapt to their own level, or the system robustly adapts to student level based on prior success. Students struggling on a topic get support until they successfully solve it. Challenge problems exist to challenge even the strongest learners.	As before, but students have extensive choices and/or guidance to select problems and topics of the right difficulty, or the system intelligently assesses what students know and skips problems or even entire topic areas that will be too routine.	As before, and the system can narrow down on subtle missing pieces in student background knowledge to review as needed, or provides individual support to cover needed background material.	7%
Loyalty Factors	Fun	Problems and system are not fun or engaging.	Problems are naturally engaging and presentation is pleasant.	System has elements of presentation to help students have fun. For example, some problems have fun themes, there are some motivating questions students want to answer, or there is some kind of points system or gamification.	System seems consistently fun and engaging. For example, a consistent theme or plot running throughout, strong motivating questions, or an immersive gamification. Alternately, student comments/surveys demonstrating significant enjoyment.	System seems extremely fun and engaging; it's the sort of thing kids would want to keep doing.	12%
Loyalty Factors	Retention	n/a	% of students who remain active participants after one year is in the bottom 25% of submissions, or no data available.	% of students who remain active participants after one year is in the 26-50th percentile of submissions.	% of students who remain active participants after one year is in the 51-75th percentile of submissions.	% of students who remain active participants after one year is in the top 75% of submissions.	3%

Online Provider Selection Rubric

	Category	Unacceptable (not eligible)	Meets qualifications (1)	Good (2)	Strong (3)	Exceptional (4)	Weight
	Sense of community and/or identity	n/a	No significant elements of community or identity building.	Basic elements of community or identity building. For example, some indication of other people working on similar problems, or some identification of students as "mathematicians," or some presentation of careers/etc. in math-related fields.	Consistent elements of community or identity building. For example: opportunities for structured interaction with other students, eg seeing moderated comments on math problems, or strong presentation of participants as mathematicians.	Strong sense of community. For example: moderated forums to allow students to interact, or real engagement with career exploration.	5%
Cost, Value, and Usability Factors	Technology	Inaccessible on a computer without special software, or requires constant high bandwidth (eg streaming live video)	Requires bandwidth comparable to streaming video occasionally.	Accessible on a computer with only a web browser, without requiring high bandwidth.	Accessible on a computer as well as some mobile devices, without requiring high bandwidth.	Accessible on computers through web browsers, iOS and Android devices, without requiring high bandwidth.	5%
	Cost	Cost per student that cannot be funded through philanthropy at scale. (For example, $500 per student per year.)	$200 cost per student per year.	$100 cost per student per year.	$20 cost per student per year.	Trivial marginal cost per student per year, e.g. $5 or less.	10%
	Demonstrated scale	Requires one-on-one advising or similar; cannot easily scale to 2000 students per year.	Has capacity to support 2000 students per grade level, but no current track record of doing so.	User base already exceeds 2000 students per grade level.	User base exceeds 10,000 students per grade level (i.e. 2000 students would be a marginal strain).	User base exceeds 50,000 students per grade level (i.e. no new infrastructure required to support new students).	5%
	Offline accessibility	n/a	Students must complete the program online.	Mixed online/offline; students can complete some work offline and then input answers (without needing printer access), or has supplemental books allowing kids to do some work/study offline.	Mixed online/offline but primarily offline; students get questions on paper or through a book, and then upload answers online.	Entirely offline option exists.	5%
Outcome Analysis Factors	Data accessibility	BEAM cannot download student data.	BEAM has access to student progress (see next row) but access is cumbersome.	BEAM has access to all of its student data in a convenient format (eg . csv files, or integration with other platforms such as Salesforce), but data permissions do not allow school districts to access data for just their students and so BEAM must provide this data to them.	Both BEAM and school districts have convenient access to student data.	As before, and data dashboard is intuitive/convenient for accessing bulk statistics and monitoring progress.	3%
	Data collected	Data does not allow for tracking individual student progress	Basic data measures accessible, such as overall progress through the system.	Somewhat more precise data tracking, such as which problems students solved correctly or total amount of time actively working in the system.	Data tracking includes detailed measures of student progress in different content areas, as well as problem-solving skill/success on more difficult problems.	Data provides detailed, highly insightful views into each student's mathematical progress.	4%
	Evidence of impact	n/a	No evidence of impact.	Internal studies have shown some evidence of impact, e.g. school districts using system have seen increases in scores or students show growth on a custom pretest/posttest.	Compelling external evaluation showing evidence of impact.	Randomized control trial or similar showing evidence of impact.	3%
	Totals						100%