

A person is shown from the side, writing on a chalkboard. The chalkboard contains three lines of algebraic work. The first line is a quadratic equation, the second is the discriminant formula, and the third is the quadratic formula. The person's hand is visible at the bottom right, holding a piece of chalk.
$$3x^2 - 14x - 5 = 0$$

$$D = b^2 - 4ac = (-14)^2 - 4$$

$$x_1 = \frac{-b + \sqrt{D}}{2a}$$

Algebra Trends

A White Paper from Tutor.com

tutor.com™

A Service of The Princeton Review

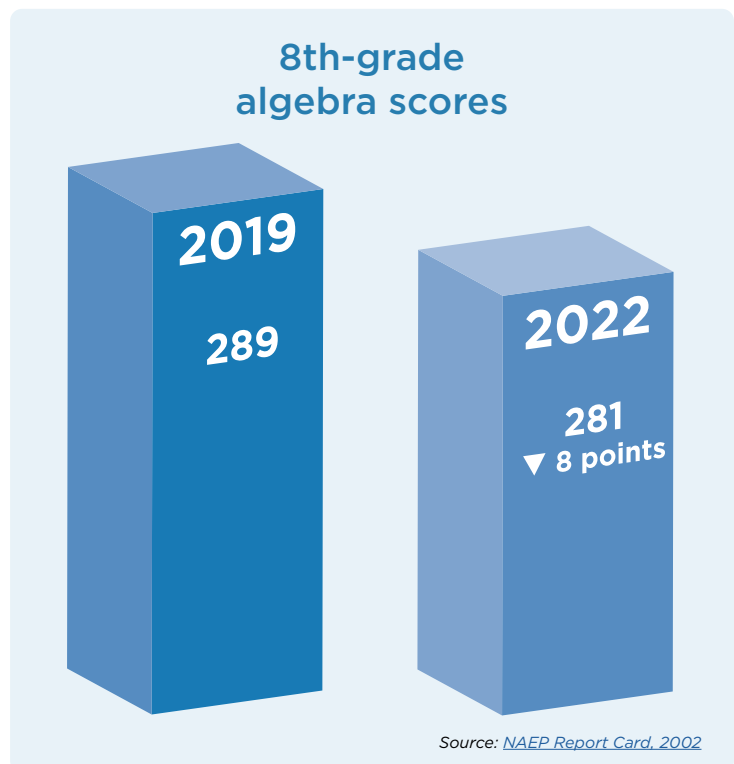


At Tutor.com, we've delivered more than 24 million tutoring sessions. Math has long been the most-requested subject, particularly for K-12 students.

Within math, certain topics present challenges for students year after year. For middle and high schoolers, algebra is one such topic. It is a gateway content area that prepares students to tackle advanced study in calculus, physics, and other subjects. Without a solid understanding of algebra, students find that they get stuck in their math studies.

Since the pandemic, students have struggled markedly in math, including algebra. According to [NAEP Mathematics Assessment](#) data, eighth-graders' algebra scores were eight points lower in 2022 than in 2019. According to the Nation's Report Card, the average eighth-grade mathematics score "was lower than all previous assessment years going back to 2003."

K-12 is the fastest-growing institutional market for algebra tutoring.



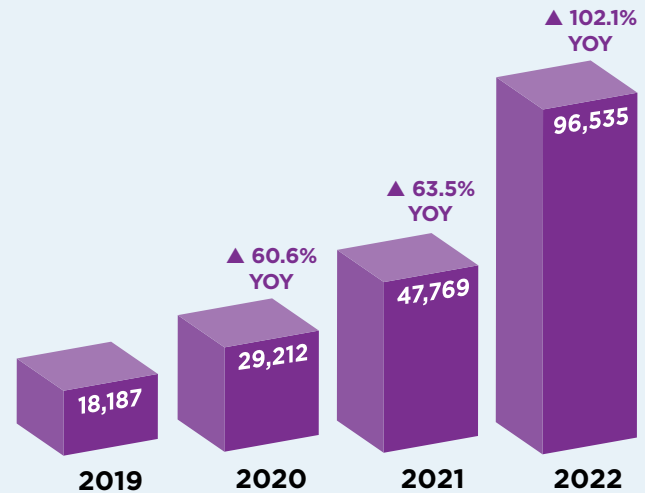
A Struggle—and Pursuit of Support

As students have had difficulty with math, they have also sought help at extraordinary rates.

At Tutor.com, we have seen steady increases in algebra sessions year over year.

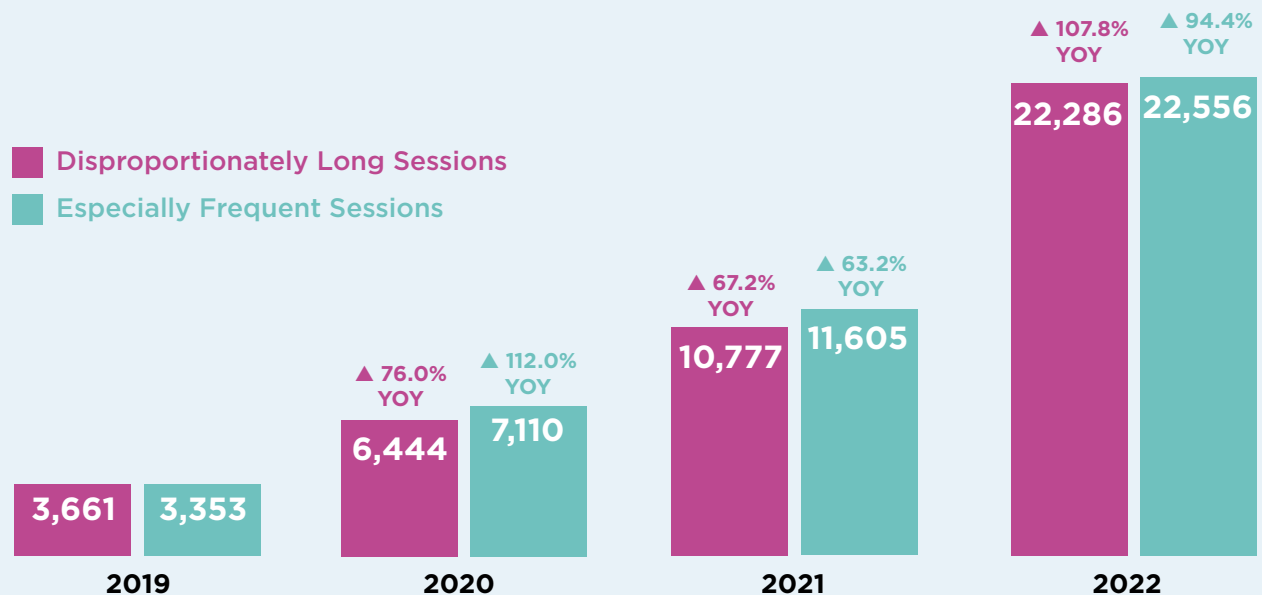
Because Tutor.com supports students at various stages of their education, our tutors see firsthand where and when they struggle. Algebra-related sessions declined year over year for all learner groups (higher education students, library patrons, and others) except K-12 students, for whom algebra has and continues to become an increasingly requested subject.

Increases in K-12 Tutor.com algebra sessions year over year



The data shows, furthermore, that even while K-12 students struggle, they are dedicated to achieving understanding. In fact, the number of algebra sessions that were disproportionately long (75 percent longer than the average algebra session) or especially frequent (7+ sessions in 7 days) increased exponentially over the past several years.

Long and frequent K-12 Tutor.com algebra sessions year over year





Much of the commentary about learning loss leaves students out of the conversation. What tens of thousands of algebra sessions show is that students feel the effects of interrupted learning—and that they are committed to overcoming those challenges.

Madhu Trasi, who has been a Tutor.com algebra tutor for ten years, has noted a shift over the past couple of years—one characterized both by learning loss and by student awareness of learning loss: “Students are very honest about their lack of background knowledge. They tell me outright that they were sick and missed an entire chapter or lesson, and that they need to learn from the ground up. Their frankness has made it much easier for me to instantly know where to begin and which foundational concepts to review before addressing their original question. This saves valuable time in the opening minutes of a session.”

“Students are very honest about their lack of background knowledge. They are genuinely motivated to learn, and this has made for more productive, satisfying sessions.”

—Madhu Trasi, Tutor.com algebra tutor

Students’ openness about their struggles aids in their academic growth, Trasi notes. They’re “comfortable asking intelligent questions or saying they did not understand something, and they are genuinely motivated to learn.”

Trasi recounted a student’s self-representation of gaining understanding: “A student once sketched Atlas struggling to bear the weight of the Earth on his back. It was a beautifully rendered drawing. I realized only much later that it was an alter-ego of sorts, depicting how careworn the student was

feeling. As we worked, the sketch transformed alongside us into Atlas standing up taller and looking more cheery. By the end of the session, Atlas was beaming and holding the Earth aloft like it was a trophy!”

The takeaways: Students seek help when they need it. They stick around until they achieve understanding. And they aren’t afraid to return with additional questions. They invest time and energy in accelerating their own learning.

“Very awesome math tutor. He helped me regain my lost knowledge with algebra.”

—Algebra student

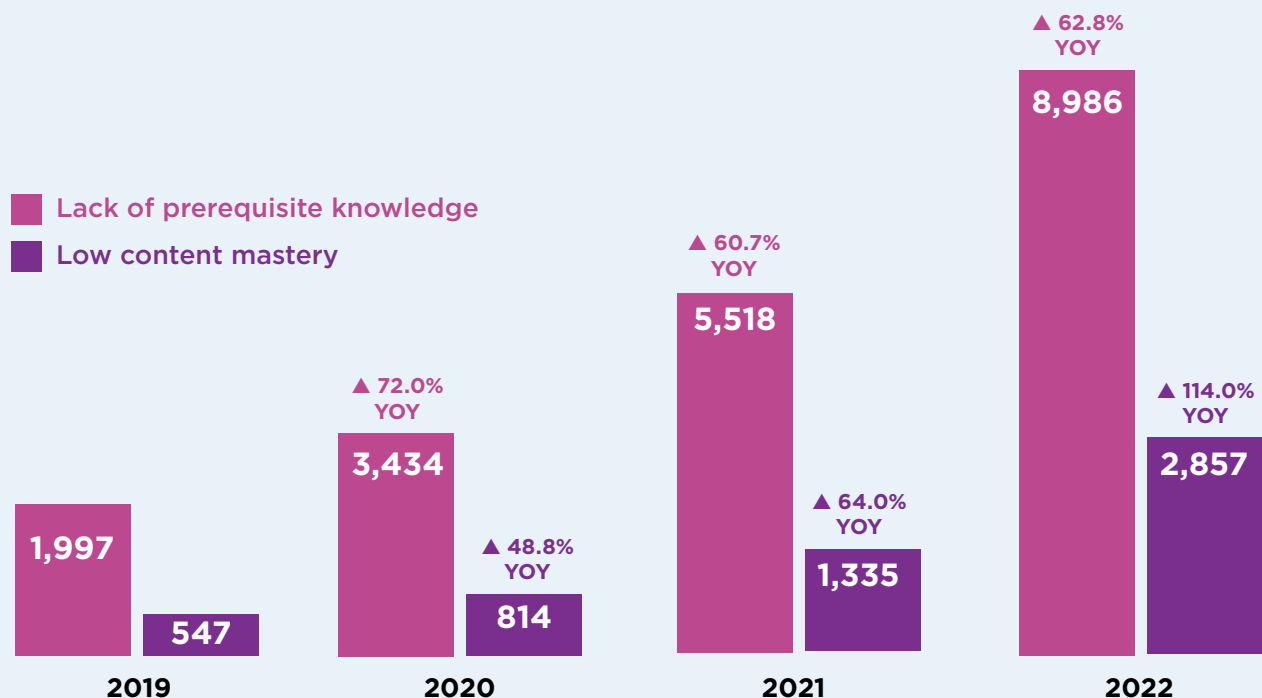
Help for Teachers with Early Intervention Alerts

Early intervention alerts are notifications that tutors issue—and teachers receive—in real time. They help teachers provide just-in-time support when students struggle with content mastery or lack of prerequisite knowledge.

A promising cycle of support has emerged for students studying algebra: They have struggled at the highest rates seen in at least two decades nationwide. They have also sought help at the highest rates seen in more than two decades of Tutor.com tutoring. And when they have sought help, they have been flagged at unprecedented rates for early intervention alerts.

Our expert tutors have seen a rapid increase in the number of students struggling with algebra—one that correlates with the rise in algebra tutoring sessions.

Early intervention alerts for K-12 Tutor.com algebra sessions



The rise in algebra early intervention alerts corresponds to the increase in sessions overall. More students are seeking and receiving help, and more students are also being identified as needing additional support.

Zooming In—Where Students Struggle

Even as algebra itself is a gateway subject, it encompasses a pivotal topic of its own: linear equations. When students seek help in algebra, the place they're most likely to have gotten stuck is on linear equations. That is—and has historically been—the most-requested topic area within this most-requested subject.

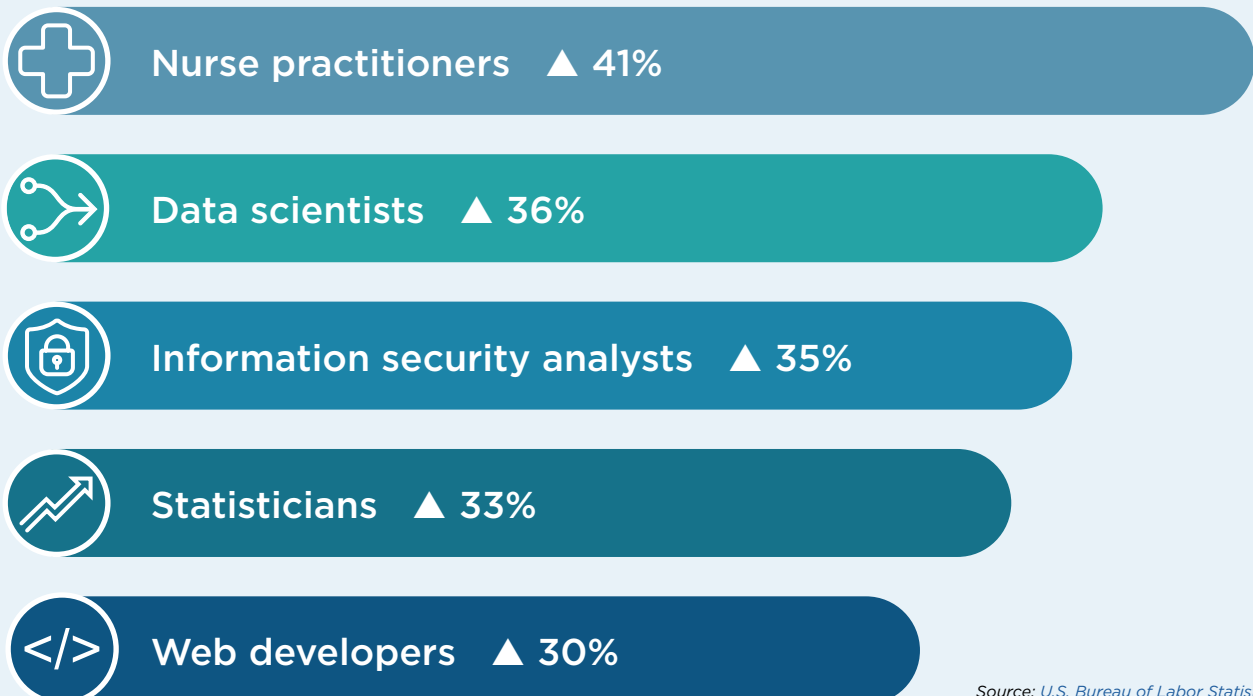
A linear equation takes the form $y = mx + b$ or $ax + by = c$. Linear equations are essential for describing relationships between variables and for predicting trends. Students need to understand linear equations—what they indicate, and how to graph them—in order to do advanced analyses in other mathematical and scientific areas.

After linear equations, the next most-requested topic areas are motion, force, energy (with about half as many sessions as for linear equations) and polynomials (with about 2.5 times fewer sessions than delivered for linear equations).

When a student doesn't grasp linear equations, that student cannot advance in math and related disciplines. With that challenge comes an opportunity, though: Once a student achieves understanding of linear equations, the learner unlocks doors to many other disciplines—particularly in emerging and growing fields.

Top 5 Fastest-Growing Occupations Requiring Algebra

Projected growth from 2021 to 2031



Source: [U.S. Bureau of Labor Statistics](#)

When Students Seek Help

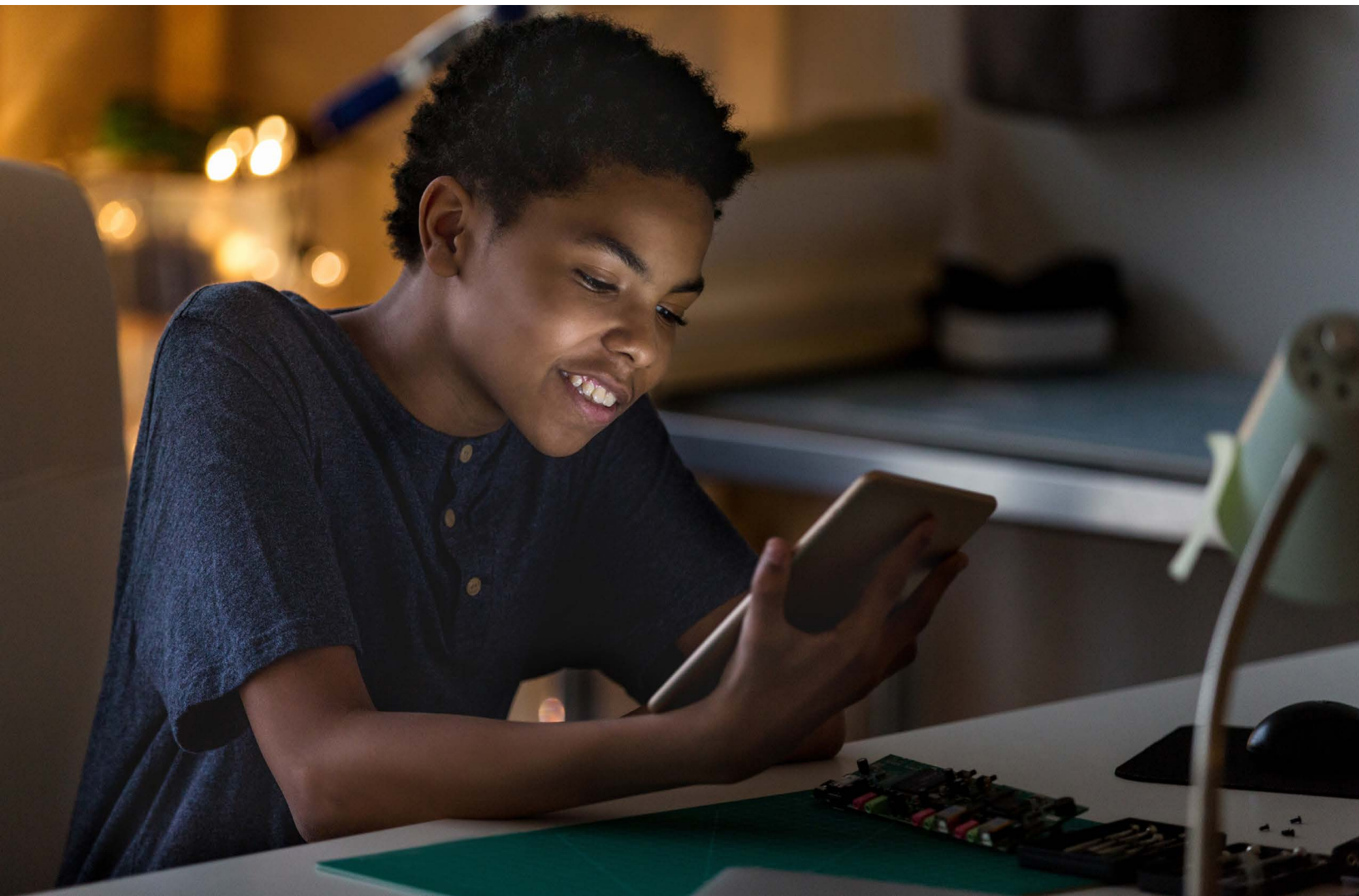
15,355

The number of K-12 algebra tutoring sessions initiated between 11:00 p.m. and 4:00 a.m. in 2022

▶ Many students stay up late or rise early to work on algebra problems.

When algebra tutoring is available 24/7, students do opt to connect day and night. Students are most likely to seek algebra tutoring on weekday evenings. The single most popular time during 2022 was Wednesday night at 9:00 p.m. (in students' local time zones). That was also the most popular algebra tutoring time in 2021. In 2020 and 2019, it was the second most popular time, having been bested by Tuesday night at 8:00 p.m.

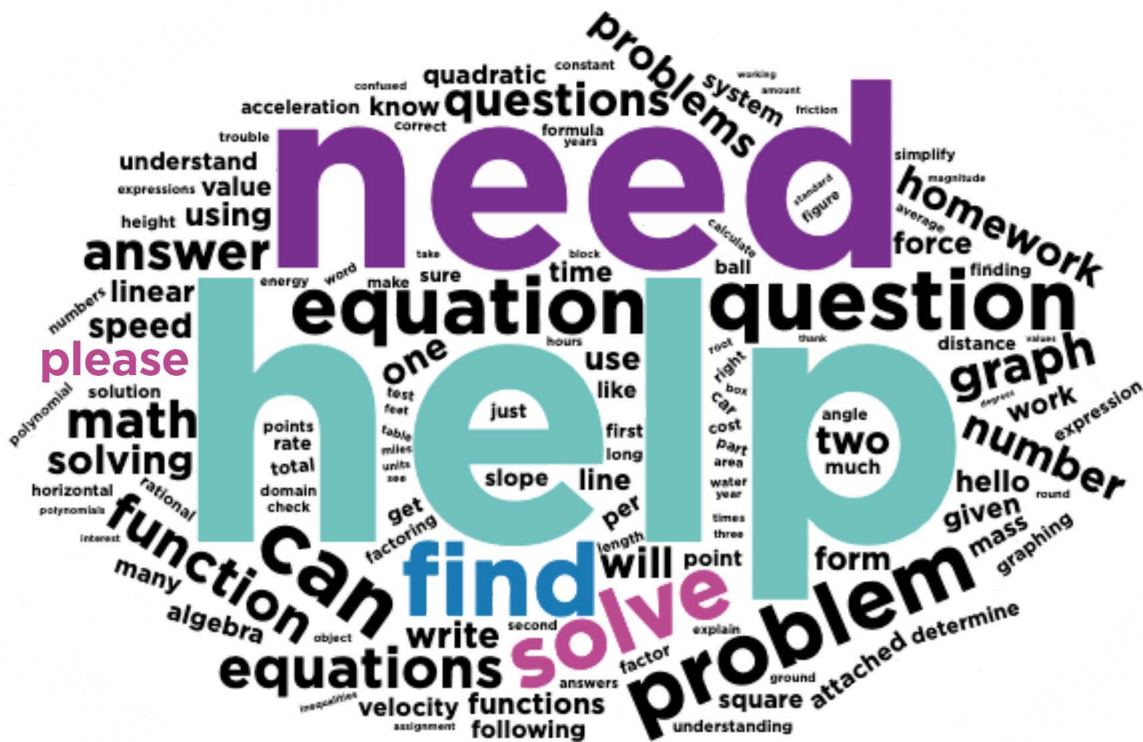
While after-school evening hours are the most-requested times for algebra tutoring, students—and teachers—also utilize the service during the school day. About one-third of K-12 algebra sessions take place during school hours. In-school tutoring provides an important opportunity for teachers to offer individualized, differentiated support to multiple students at once.



Story in Words

When we look at the word cloud from algebra session transcripts, a few common themes emerge. The most-used word among students seeking help was, predictably, “help.” The words “equation” and “equations” featured prominently, too, as did “function” and “graph.” (There were also many instances of “please”; in addition to seeking help when they need it, students are typically polite.)

Tutor.com’s proprietary online classroom features graph paper and a Desmos® graphing calculator, so students can work with tutors in real time to solve linear equations and address other algebra topics.



A Promising Approach for Accelerating Learning: High-Dosage Tutoring

Our [efficacy research](#) has shown that higher education students who have used on-demand algebra tutoring pass and persist in their studies at higher rates than their peers who have not. Among K-12 students, the most frequently used word in post-algebra session comment was “amazing.” (“GOAT”—greatest of all time—made it to the top fifteen.)

In their surveys, 95 percent of students said that their tutor helped them improve their grades, and 96 percent said their tutor helped them feel more confident about their school work.

While the results of on-demand tutoring are promising, a [multi-tiered system of supports](#) that includes high-dosage tutoring offers unprecedented opportunities to help students accelerate their learning.

Developed by education experts and based on the [Brown University Annenberg Institute’s](#) research-driven learning model, [High-Dosage Tutoring from Tutor.com and The Princeton Review](#) offers a proven method for K-12 schools and districts to accelerate students’ algebra learning.

According to key [design principles](#) for this method, hallmarks of high-dosage tutoring include:



3+ times per week frequency



Small-group instruction (2-4 students)



Assessment-based, with regular feedback



Relational interactions with the same tutor and students



Tailored design in alignment with state standards



Curriculum-driven, with high-quality instructional materials

When implemented, the results from such instruction are staggering: According to a recent [meta-analysis](#), high-dosage tutoring “**increased achievement by roughly an additional three to 15 months across grade levels**” (quoted in [EdResearch for Recovery](#)). Moreover, the Institute’s researchers have written that students likeliest to benefit from high-dosage tutoring are those who are least likely to have access to such supports without district or school action.



Delivered online, high-dosage tutoring is cost-effective, scalable, and equitable.

With a 65-year track record of driving student success, The Princeton Review and Tutor.com are uniquely positioned to help K-12 schools and districts accelerate student learning in algebra and other critical subjects.



- ✓ **Leading college-readiness provider**
- ✓ **Comprehensive curricula from The Academy books and courses**
- ✓ **Proven *I Do - We Do - You Do* student engagement approach**



- ✓ **Leading academic tutoring provider, with 24+ million sessions delivered**
- ✓ **Award-winning LEO™ classroom and platform**
- ✓ **Rigorous tutor screening and highly effective instructional methodology**

We have seen the bravery and tenacity of algebra students. Add to that equation a proven methodology delivered by academic experts, and the results are achievement and success.

As we anticipate our 25-millionth tutoring session and the algebra learning in which students will engage, we expect to see well-earned gains and boosted confidence leading into 2024 and beyond.