Eighth-grader Manpreet Kaur works out an algebra homework problem during class at Spring View Middle School in Rocklin. New state laws make algebra a required class for all high school students to graduate, and California's academic standards say algebra should be taught in eighth grade, if possible.

Say you're at a party. There are 25 people there. You bring up a certain subject from school that we'll call "x." There are 12 loud groans, 10 blank stares and three little cries of delight.

What is x?

If you're a product of American schools, chances are good you nailed this one.

Yes, we're talking about algebra, land of misery for many, hallowed ground to a few. And as of this fall, one of the hottest subjects in public schools.

A noble yet nettlesome old subject, algebra has been around longer than there have been schools. But its treasures and tribulations have been largely limited to an exclusive band of students: those at least in ninth grade and on their way to college.

In California, those days are over.

Algebra is being ordered up as a standard course of study for eighth-graders. Its basic themes are being taught to children as young as kindergarten. And starting with this year's freshman class, the subject is being required of every student who intends to graduate from high school.

It is a huge shift for kids and for schools but one that offers lofty rewards. It will open the doors of higher mathematics and college to more students. It will give young people more options in their lives. And beyond all that, the new blanket of
algebra will endow students with something invaluable: the ability to ponder, to solve problems and to sort things out no matter how tough.

Algebra, in simple terms, will teach people how to think.

The California crusade for algebra has been gaining in strength for several years.

In 1997, the state's best minds in math got together and came up with a new collection of mathematics guidelines for schools. Adopted by the California Board of Education, the standards took a strong position on algebra, a system of mathematics that uses letters to represent numbers. The standards called for the subject to be covered in eighth grade, with algebraic themes to be taught all through the grade school years.

Two years later, Gov. Gray Davis fought for and won legislative approval of the state's first high school exit exam. The test, which will include a section on algebra, must be passed to obtain a diploma from a California public school.

And this fall, the governor signed what was known around the Capitol as the "Algebra Bill." The new law, which takes effect now for the graduating class of 2004, makes Algebra 1 a graduation requirement in all public schools.

Some school districts already had such a requirement. But until now, the state only required two years of mathematics to graduate and did not specify the content. As a result, many students left school with classes such as "General Math" or "Basic Math" on their transcripts, never moving beyond a fifth- or sixth-grade math level.

They also tended to leave with something else: the sense that math is boring and of little relevance to their lives.

It is a great loss, said Alec Ostrom, assistant superintendent in the Roseville Joint Union High School District.

"These are kids who have been in what I call the math recycling program," he said. "They study the same low-level stuff year after year. They never get to algebra, which means they miss out on a lot."
"It's not just about math. Algebra teaches you how to think and how to get unstuck. Adult life will bring complex problems, and the people who can't get unstuck get lost."

Ostrom is among many local educators who support the goal of making algebra happen for all students.

But it will not be easy to accomplish.

In the Sacramento region and up and down the state, middle and high school principals are struggling to find enough teachers, books and classrooms to get the job done. Many are privately grumbling, questioning whether it is possible to teach algebra to every student, especially at the eighth-grade level.

Until now, most local districts have been putting only their highest-achieving middle school students through algebra. At the high school level, many freshmen come with math skills too low to handle the rigors of the subject. Statewide estimates indicate that about a third of high school graduates do not complete the course.

In many places, the numbers run higher; in the Sacramento City Unified School District, about half of graduates do not complete Algebra 1.

John Mockler, California's interim secretary for education, has worked in education for years and has seen a lot of changes arrive at schools. This new drive for algebra, he said, will go down as one of the more difficult and far-reaching movements.

"This is big," Mockler said. "And it's going to be hard for everyone, including the kids and their families, especially those without algebra backgrounds or money to spend on tutors."

The algebraic summons in California mirrors a nationwide trend. It was born, in large part, of a basic question about fairness.

Over the years, as people have tried to address the poor achievement of low-income and minority students, they have studied many sides of the problem: Which boys and girls take honors classes? Who goes on to college? Who ends up with the better jobs?
Increasingly, people noticed a link to an unsplashy fundamental of high school. Kids who take algebra wind up going to college at rates exceeding those who don't. And the kids who don't get algebra tend to be disproportionately from poor and minority backgrounds.

"For generations, algebra has been used to eliminate possibilities for people," said Uri Treisman, a math professor at the University of Texas, Austin.

During the late 1980s and 1990s, "algebra for all" grew as a mantra across the nation. Universities, tired of having to teach remedial math to freshmen, joined the call. So did employers, whose need for better-educated workers surged with the rise of high technology.

U.S. Secretary of Education Richard W. Riley was among many prominent leaders urging that all students complete algebra, ideally by the end of eighth grade. In a 1997 policy paper, Riley said national statistics showed that 83 percent of students who took Algebra 1 and Geometry went on to college within two years of graduating from high school, compared with 36 percent of those who did not.

"Algebra is known as the gatekeeper course," said Kati Haycock, director of the Education Trust, a nonprofit organization based in Washington, D.C., dedicated to improving the achievement of minorities and the poor. The Education Trust, like many other groups focused on schools, has been tracking algebra enrollments as a measure of equity.

"It's very clear that algebra holds the keys to the kingdom," she said.

California has been behind other states in getting on the algebra train, Haycock said. In a report last year by the trust called "Ticket to Nowhere," researchers found that 13 states -- including Alabama, Georgia, Kentucky and Texas -- required Algebra 1 or an integrated version of it for high school graduation. California was still in the talking stages.

The nationwide call for more algebra is part of a powerful movement that has states across America insisting on much higher standards for what kids learn in school. In terms of math, there are simultaneous efforts to broaden the teaching of geometry and other higher-level math courses.

In this quest for more rigor in schools, algebra occupies an exalted position. But mention the word in public, and you may get an earful.
"I hate algebra. I took it three times in high school, and I never understood it. I don't know why I should bother. It feels totally pointless to me," said Mary Ann Colby, a student at Sacramento City College.

Colby, 25, is taking beginning algebra this fall at the community college. She spends several hours a day in math labs and with tutors, trying to pass.

Once she does, she must take Algebra 2 to reach her dream of finishing college and becoming a social worker. Then, she plans to ignore algebra for the rest of her life.

Such algebraic angst runs deeply through society. And yet, if you ask many parents whether they want their kids to take algebra, they will respond with a vigorous "Yes!"

"Algebra is a most curious course," said Sue Stickel, an assistant superintendent in the Elk Grove Unified School District. "There is this general phobia about it. Yet parents look at it as an enormous measure of success."

Texas math expert Treisman agreed. "Parents remember it as being really difficult. And it's the point where they are no longer able to help their kids with math homework. Yet for many adults, algebra is a cultural reference point. They see it as an important ritual."

When explaining why all students should study algebra, math types let the metaphors roll. They speak reverently of algebra as the "backbone," the "key," the "foundation" for all of higher mathematics.

"It is the language of mathematics. You can't do anything else without it," said Tami Cooper, an algebra teacher at Laguna Creek High School in the Elk Grove district.

Not only that, algebra is the language of computers and of the sciences. It is used in medicine, business, finance, insurance, marketing and economics.

Trying to impress such real-life links on adolescents can be tough.

"Kids at this age can still be very concrete thinkers," said Ostrom, the assistant superintendent from Roseville. "We're saying, 'OK kids, you've got to factor these polynomials.' And the kids are saying, 'Oh yeah? That's not what's on my mind right now.' "
The practical applications can seem so remote, Cooper said, that some days she leaves them unspoken. "At this age, I just try to emphasize to my students that algebra will open doors for them," she said.

"It's kind of like when your child learns the ABC's. There's not a lot you can do with A or B or C as they stand. But once they learn all the sounds, you know it will open the door to reading."
So here we are, opening this door to all of our children, ushering them down the hallways of x and y. Where will it lead?

Treisman, a lifelong lover of math who not only dreams about algebra but dreams in it, said that as schools embrace algebra and teach it better and as more children are exposed to its concepts when they are young and fearless about math, the moaning and groaning associated with algebra may one day fade away.

Visit a classroom like that of Tami Cooper at Laguna Creek High, and you already can see the turnabout.

Cooper is a warm and entertaining teacher, a favorite among her students. The faces in her morning Algebra 1 class are the faces of California: Asian American, African American, Latino and white, some well-off and some poor.

On a recent morning, there was a girl in the front row wearing lavender Capri pants and a headband to match, sitting straight and still throughout class. Off to one side was a boy barely visible beneath his bulky black coat. In the back was a boy with silver hoop earrings, spiked hair and a full supply of wisecracks.

The students were learning to plot linear equations on a graph. They were taking equations such as "y = 2x - 1" and turning them into something called a "table of values." From there, they sketched these values as points on a graph and checked to see if they made a straight line.

It was a lot to absorb, and Cooper was zipping around the room making sure everyone was on track.

She was pleased by what she found. The girl in lavender was producing meticulous graphs. Figures were appearing from under the black coat. And the boy with the earrings kept up a steady flow of answers alongside his steady stream of chatter.
"Let's run through this one together," Cooper said to the class. "Is it a function?"
Many voices: "Yes."
The teacher: "Why?"
The kids: "There's only one y for each x."
"Is it linear?"
"Yes, it's a straight line."
"And is it proportional?"
A chorus, with confidence: "Yes!"

Together they were getting it. And no one was complaining. They were all too busy making their way through a significant door.