Faces of Algebra 2

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If American children went to school most anywhere else, their algebra experience
would be vastly different.

Here, many students never study it. Among those who do, most wait until their freshman year in high school or later. By then, it is an abrupt shift into the world
of abstraction.

Not so in Germany, Japan, Argentina, Korea, France and other developed countries. In those nations, all students are expected to conquer beginning algebra. They start early -- routinely in the sixth or seventh grade -- and study it
thoroughly until they reach high school.

"In the United States, only about 25 percent of students in the middle grades get
algebra. Everywhere else, basically 100 percent get it at that point," said William
Schmidt, national coordinator of research for the Third International Mathematics
and Science Study. Widely known as TIMSS, the study draws regular headlines
because it usually shows American children behind other children in the world.

That embarrassment has helped prompt a revolution of sorts in math education,
especially when it comes to beginning algebra. Although few U.S. schools are going as far as those in Europe, Japan and other places, the shift has been unmistakable.

In California, the algebra overhaul is hitting two levels -- middle school and high
school. The state's academic standards now say that algebra should be taught
beginning in the eighth grade, a new and somewhat controversial ideal. And state
law now requires that all high school students, starting with this year's freshmen,
master Algebra 1 to graduate.

It is a tall, tall order, and one that is rocking schools throughout Sacramento and
the state.

The eighth-grade algebra goal has left middle schools grappling with how to

teach
a tough subject that historically has not been their province. Responses have run
the gamut. Some schools have cautiously studied the options, while others have
jumped in and placed all students into algebra.
Teachers and principals have expressed private doubts, saying middle school is
too early for many to learn algebra. Even at the high school level, some teachers
believe that not all students can or should be required to complete the subject.
To the naysayers, the algebra allies point across the sea.
"I don't believe it for a second. I see too much evidence in other countries, where
algebra is just the norm for everyone," said Sue Stickel, an assistant superintendent for the Elk Grove Unified School District.
Elk Grove has been on the algebra bandwagon for years. It has required Algebra 1
as a condition of graduation since 1989, and it recently added geometry to its list
of graduation requirements.
When it comes to the eighth-grade front, however, Elk Grove looks like most other
districts -- about a third of its top students complete Algebra 1, while the majority enter high school without it.
Middle school algebra has long been a hot topic for families in the area. Those
eighth-graders who have taken it often had savvy and aggressive parents who
pushed for it.
Take Spring View Middle School in Rocklin. At one time, the campus offered no
algebra. But about five years ago, a small group of parents began insisting on it
for their high-achieving youngsters.
The mothers and fathers wanted their kids to be challenged in math. And they were aware of something else: Those who don't get beginning algebra out of the
way before high school may not get all the way to calculus by the time they are
seniors.
It's a basic math problem: There are four years of high school, but five years of
math courses in a typical precollege lineup -- Algebra 1, Geometry, Algebra 2,

some form of Trigonometry or Math Analysis, and Calculus.
Algebra proved popular at Spring View. By last year, the school was putting about
30 percent of its top students through the course.
But reaching all eighth-graders, as the standards now recommend, will not be easy, even there.
"It's going to be a real stretch," said Spring View Principal Marjorie Crawford. "The
majority of our kids are not ready for Algebra 1 at the eighth grade."
The same is true in districts across the Sacramento region. The San Juan Unified
School District, long considered a premier system for its historically strong test
scores, had 16 percent of its eighth-graders mastering Algebra 1 during the 1998-1999 school year.
It's a common problem in the United States, according to Schmidt, the TIMSS expert.
To understand why it happens, and also why it need not, look at how math is taught elsewhere in the world, he said.
In the United States, students have tended to study basic arithmetic from kindergarten through eighth grade. Seventh and eighth grade are notorious for
being wastelands of arithmetic -- fractions, decimals, multiplication, division -- that students have seen before.
Then boom, in ninth grade, students hit algebra -- a mathematics course that is
tough and abstract. They are expected to learn it in a single year.
By the standards of other nations, Schmidt said, that is cruel and unusual punishment.
Most developed nations teach arithmetic through grade five or six. Then, for the
next two or three years, students study beginning algebra at a pace that is slow
and thorough. Most also learn geometry alongside algebra. By the time they reach
high school, nearly all are ready for higher mathematics. Some may wind up going
down a vocational or technical track rather than college prep, but that sorting process occurs after Algebra 1 and Geometry have been covered.
"In Asia, in Europe, it is so much more sensible and humane. The students have
time to really absorb the material," Schmidt said.
"Here, people are just plopped into algebra, and they end up struggling all year. It
is only the brightest kids in mathematics who are able to make this abrupt