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Math

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Philadelphia girl makes math a game — and excels

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In second grade, Josephine Nguyen discovered she loved a game in school - First in Math. She could play it at home, on a computer.

But her parents, Vietnamese refugees, didn't own one.

So her father, Joseph Nguyen, who works in a nail salon, took her first to the Lawncrest branch of the Free Library.

Computer time is limited. After an hour there, he took his daughter to the Cottman Avenue branch. Then the Castor branch. Every day, they went from library to library.

First in Math, founded by inventor Robert Sun, is now in 5,000 schools across the nation, played by 1.5 million students, and more than 110,000 students in 320 schools in the Philadelphia area.

Each year, the student who solves the most problems, earns the most virtual stickers, is crowned national champion.

In third grade, after her father bought a computer, making life easier on everybody, Josephine finished fourth in the nation.

In fourth grade, she won - the youngest winner ever.

In, fifth, she won again.

And this week, the sixth grader at St. Cecilia in Fox Chase won for the third consecutive year, an unprecedented feat.

"She's even shown me strategies," says Mary Cihak, her honors math teacher. "Sometimes I'll call Josephine up and say, 'How do I complete this one?' . . . She has something almost that I think you can't teach.

She has the focus and the drive to succeed. This is what she's passionate about."

Josephine has other interests. She has read all seven Harry Potter books, and while she admits Hermione is clearly the best in math, her favorite character is Malfoy, or maybe Sirius Black. Asked what house she would be in, she replied Ravenclaw. "I'm smart," she explained.

Josephine won't win next year, she promises.

"I want to give other kids a chance," she said.

Bob Sun, 65, a University of Pennsylvania graduate who lives in Easton, patented the popular 24 cards in 1988 and later organized 24 Challenge competitions.

When the Internet arrived, he created First in Math, a series of games that students play online. There are problems for kindergartners and ones that challenge teachers. He adds games every year.

Sun sees urban youth as America's greatest untapped resource. Developing math skills will give them a path to success, he says.

"Getting a kid to take ownership is essential," Sun said. "It's got to be their thing. They make the decision about where they go, where they spend their time, what they do next. The person who knows best where



PHOTOGRAPH BY: MICHAEL BRYANT / STAFF PHOTOGRAPHER

Sixth grader Josephine Nguyen, with her father, Joseph. After winning the nationwide First in Math competition three years in a row, she says she won't dominate next year: "I want to give other kids a chance."

the gaps are in math is the child himself."

"We have found that the quickest way to engage a child is give them something they can do," he said. "But if it's too easy, they quickly get bored. So as you develop some skills, I quickly take you to the next level of challenges."

Sun has worked in a sportslike, competitive element, so students can see how they are doing relative to their class, school, and country. Solving problems earns them hugely coveted virtual stickers.

Area school officials say that at about \$7 per student per year, First in Math has been a great complement to classroom instruction.

"First in Math is an amazing resource that engages students," said Donna M. Runner, acting deputy for



PHOTOGRAPH BY:
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Josephine Nguyen, sixth grader at St. Cecilia in Fox Chase, with her First in Math national awards for 2011, 2012, and 2013.

curriculum and assessment for Philadelphia schools.

“When the program is implemented with fidelity,” she said, “students show increased achievement in math.”

About 95 schools in the Archdiocese of Philadelphia participate, and 19 are in First in Math’s top 100 nationally, Sister Edward Quinn, head of elementary curriculum, was happy to note. “The format is teaching them something that feels like a game, but it’s not,” she said. “They’re really learning. Teachers can tie in their instruction to First in Math.”

“It challenges them to go beyond what they’re doing every day into something higher.”

At her kitchen table last week, Josephine worked on a bonus game called Into the Vortex. Five numbers

or equations appear on the screen. Three of the five are equal.

Josephine has 30 seconds to click on the three equal values before all five get sucked into a vortex.

This girl is 11.

She looked at these five values on her screen:

- 1) 300.0%
- 2) $(29.4)(1/3)$
- 3) 64.0×10^{-2}
- 4) $4.9/(0.5)$
- 5) 9.8

Very quickly she worked out that it was 2, 4, and 5.

The fifth, 9.8, is self-evident. Then she saw that the fourth is actually doubling 4.9, equalling 9.8.

She needed a third to equal 9.8. She saw one-third of 29.4 had to be less than 10. In fact, 9.8. Done.

A new problem came on the screen:

- 1) $100(0.012)$
- 2) 10.0×10^{-1}
- 3) 12.0×10^{-1}
- 4) $1/(10^2)$
- 5) $1.25 - 0.05$

Without solving, she concluded, correctly, the three right answers were 1, 3, and 5. Her reasoning was fast, simple: Each of those three had a 12 in it, though the decimals were in different places. The two others had no 12.

Answers 1, 3, and 5, indeed, all work out to 1.2.

A third series of five appeared on the screen.

- 1) $(0.1)(0.01)$
- 2) $0.2 \times (0.1)^2$
- 3) $8(0.08)$
- 4) $(0.01)/10$
- 5) $3/(300 \times 10)$

This she couldn’t solve in time, though a journalist was on her shoulder, and it vanished into the vortex. The answer is .001 - 1, 4, and 5.

Josephine is not beyond asking her teacher or her father for help, especially back when she was in third and fourth grades, when radicals and exponents were new. But once explained, she took to it.

To win the national championship, she competes against students in grades 3 through 8. In theory, seventh and eighth graders, who have learned higher math skills in school, have an advantage.

“The teachers enjoy watching her,” Cihak said. “Is she really doing this?’ They’ll stand behind her.”

Josephine plays a game called Area & Perimeter in which she is given the area and perimeter of a square, rectangle, triangle, or other polygon in millimeters and must decide how long each side should be in inches.

So not only must she solve, but also convert. “That one I don’t even play,” her teacher jokes.

“One of the things that makes Josephine remarkable is that she has done essentially every module on the site to perfection and has managed to milk the maximum number of stickers from each one,” Sun said.

“In numerous modules, I have built in problems that require you to think outside of the box to earn the maximum stickers. The 60,821 stickers she has earned in this season is a record that no other player has been able to achieve over the past 10 years. That includes about 80,000 adults who are competing this season as teachers or parents.

“For me,” he added, “the most remarkable trait she has developed is her dogged persistence. To win this title three years in a row takes a tremendous amount of work – I estimate 1,000 hours per year.”

That would average almost 30 hours a week over 35 weeks from Labor Day to the end of April. “Josephine has a burning desire to prove herself,” Sun said, “and she found a vehicle in First in Math to do just that.”

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