

## Math kids go to track to figure equations

Written by Elizabeth Barrett  
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Teacher tries to make math fun, meaningful.

Gothenburg High School advanced math students recently took advantage of mild weather to gather data at the track.

Under the direction of math teacher Sharise Scherer, the calculus class—including students Kaylee Beyea, Cody Cooper, Morgan Kowalewski, Amanda Larson, Kyle Maline and Jonathan Rehmert—and the math analysis class analyzed the data of runner Jake Scherer (Sharise's son) who raced 200-meters during Dudley Elementary's annual track meet.

However with six students, Scherer said the distance of 200 meters wasn't evenly divisible in equal increments for the calculus students to stand and get Jake's times.

As a result, students measured off the distance at random increments to clock Jake's times.

Scherer said Jake's time was 5.82 seconds 30 meters into the race.

Other measurements included 12.35 seconds at 60 meters, 18.37 seconds at 100 meters, 21.02 seconds at 130 meters, 28.66 seconds at 160 meters and 37.39 seconds at the finish (200 meters).

With this data in hand, Scherer said math students returned to the classroom and entered it into graphics calculators.

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Students also put time in the “x” variable and distance in the “y” variable to generate an equation to model the information they would get with distance as a function of time relationship.

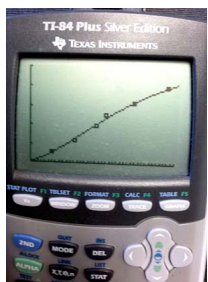
Scherer described the equation as messy to model the four subtle changes in direction that the points took.

When graphed, the equation matched up closely to the actual data points, she said.

What evolved from the data, Scherer said, is Jake running 200 meters pretty steady with a little burst of energy, peaking and slowing a little at the end of the race.

Using the equation, the class used calculus to study the times recorded to discover what Jake’s velocity was at the different distances.

The data was put into their calculators and graphed by time, distance and instantaneous velocity, she said.



They then studied time on the “x” axis and velocity on the “y” axis.

Scherer said this graph looked like an arc and was modeled by a cubic equation with one subtle change and two big changes.

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What this told the calculus class, she said, is that Jake's velocity increased during the first part of the run and decreased during the last part of the race.

The class then figured calculus on instantaneous velocity (called the derivative of velocity) to give the class the rate of change.

"This rate of change of velocity is known as acceleration," Scherer explained. "Jake's acceleration was positive but decreasing in value which showed he was speeding up but at a slower rate."

She said it also showed negative acceleration values which meant he didn't speed up anymore at the end and that his velocity slowed.

Scherer said she likes to make math fun and meaningful in the classroom by using experiences such as this to teach complicated concepts like calculus.